

ROTTLER

SAD SERIES SURFACING MACHINES

OPERATION AND MAINTENANCE MANUAL



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ORDERING PROCEDURE

Contact your regional Rottler sales rep for assistance in ordering optional equipment, replacement parts, or tooling.

If you are unable to contact your regional Rottler sales rep, call the factory at 253-872-7050 and ask to speak to the parts sales specialist.

Have the following information handy to expedite the ordering process:

1. Your name, business name, and contact number
2. Customer number
3. If you don't have a customer number, your billing address
4. Shipping address if different from billing address
5. Machine model and serial number
6. Part number and description of what you want to order
7. Preferred method of shipment
8. You may also contact us via e-mail with the above information. Send e-mail requests to:
parts@rottlermfg.com

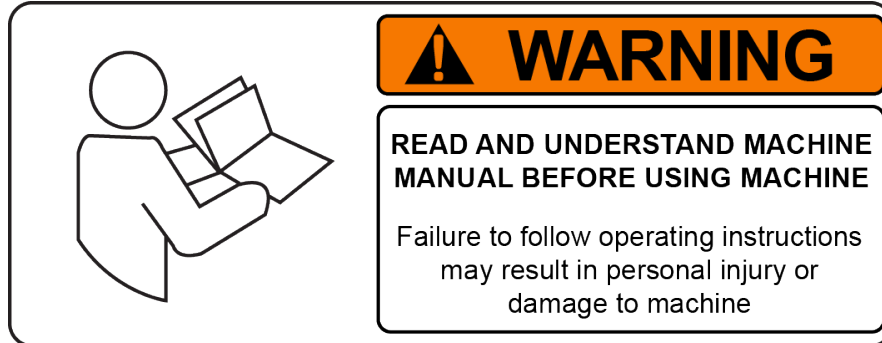
In some cases you may be requested to send a photo of the part you are ordering if it is a replacement part, or doesn't appear in the database.

If you are unsure which part you need to order, contact our service department and ask to speak to one of our service consultants. They will assist you in determining which part you require.

THERE IS A MINIMUM ORDER OF \$25.00

INTRODUCTION

READ THE SAFETY CHAPTER BEFORE INSTALLING MACHINE. THOROUGHLY UNDERSTAND ALL SAFETY ISSUES BEFORE OPERATING MACHINE.



ATTENTION OWNER/BUSINESS MANAGER

To validate the warranty on your new Rottler machine, please be sure to sign and complete the “Installation Report” located in the Installation Chapter of this manual.

We suggest that the new user of the S7AD & S8AD read the CONTROL DEFINITIONS to get an idea how the machine operates.

The Operating Instructions chapter should be read in order to familiarize the user with the actual button pushing sequences required to carry out a job. These chapters in the manual should be considered an introduction. As the operators of the S7AD & S8AD series machines gain experience with using the different functions of the machine, complicated setups and programs will make more sense.

The rest of the manual contains information and part number reference on fixtures, cutting tools, and machine maintenance. The operator should read and become familiar with these areas as well.

Description

The model S7AD & S8AD surfacing machine is a precision, high speed surfacing unit.

The model S7AD & S8AD 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.

S7AD & S8AD machines may be readily tooled to resurface a wide variety of engines, including European and Asian models, 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, and convenient controls.

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 control panel. Power required is 230 volt, single phase. This provides power to the variable speed AC motor controller, the horizontal S.C.R. drive, and various relays and solenoid valves that actuate mechanical controls on the machine to engage feeds and travels.

Disclaimer

The S7AD & S8AD Manual (henceforth to be referred to as the "Manual") is proprietary to Rottler Manufacturing LLC. ("Rottler Manufacturing") and no ownership rights are hereby transferred. No part of the Manual shall be used, reproduced, translated, converted, adapted, stored in a retrieval system, communicated or transmitted by any means, for any commercial purpose, including without limitation, sale, resale, license, rental or lease, without the prior express written consent of Rottler Manufacturing.

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Rottler Manufacturing and its employees or representatives are not responsible for any information regarding final specifications of any workpiece that is created as a final product when using Rottler equipment. It is the responsibility of the end user of Rottler equipment to determine the final dimensions and finishes of the workpiece that they are working on. Any information regarding final dimensions and finishes that appears in any Rottler literature or that is expressed by anyone representing Rottler is to be regarded as general information to help with the demonstration of or for operator training of Rottler equipment.

Limited Warranty

Rottler Manufacturing Company Model S7AD & S8AD parts and equipment is 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 the instructions in the manual.

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

The products are warranted upon delivery to conform to their published specifications and to be free from

defects in material and workmanship under normal use for a period of one year from shipment. Should a product not be as warranted, Rottler sole obligation shall be, at its option, to repair, correct or replace the product or to refund the amounts paid for the Product upon its return to a location designated by Rottler. No warranty shall extend to rapid wear Products (including tooling) or to Products which have been subject to misuse (including any use contrary to Rottler instructions), neglect, accident (including during shipment), improper handling or installation, or subject to any modification, repair or service not certified by Rottler. Rottler shall not be liable for any consequential, direct or indirect damages or for any other injury or loss. Buyer waives any right, beyond the foregoing warranty, to make a claim against Rottler. No warranty is provided for any Products not paid in full.

Merchandise cannot be returned to Rottler without prior approval. Customer must contact the Order Department or representative to get approval and to be issued a Return Goods Authorization number (RGR#). Merchandise authorized for return must be returned prepaid. If merchandise is returned with shipping charges collect, the actual amount of these charges may be deducted from any credit which may be due the customer. The RGR # assigned by the Order Department should be written on the shipping label and must appear on a copy of the invoice(s) covering the original shipment. This invoice copy must be included in the box with the parts. Shipment must contain ONLY those items on the RGR as approved for return. Merchandise must be received within 10 days of the date of RGR or the RGR will be canceled. All returned merchandise may be subject to a 20% restocking fee on under \$1,000.00 amount or 10% on any items over \$1,000.00. Parts or tooling over 30 days old are considered as customer property and can only be returned with prior written approval from Rottler Corporation Management and/ or Shipping Department.

The issuance of a RGR DOES NOT guarantee credit - it is only authorization for the return of the goods. Credit for return merchandise is at the sole discretion of Rottler. Credit will be issued only after inspection of returned goods.

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

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INSTALLATION

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ATTENTION OWNER/BUSINESS MANAGER

To validate the warranty on your new Rottler machine, please be sure to sign the installation report after the installation technician has installed the machine and verified the machine is operating correctly and given the operators operation and maintenance training.

Thank you for your cooperation and the opportunity to be of service to you.

ROTTLER MANUFACTURING



OFFICE USE ONLY
Route to: Servicer Mgr → Accounting → Andy → Accounting **Warranty Exp Date**

ROTTLER MANUFACTURING MUST HAVE THIS REPORT RETURNED TO PROPERLY QUALIFY WARRANTY ON EQUIPMENT

Customer: _____ Address: _____
City: _____ State: _____ Zip: _____ Phone: _____
Country: _____
Machine Model: _____ Serial Number: _____ Representative: _____

MACHINE INSTALLATION: Electrical information MUST be complete to validate this report.



VERY IMPORTANT: Modern design machines contain electronic low voltage circuitry that provides great advantages and a better machine life. **BUT**, you must have an excellent, stable, isolated power supply along with an isolated ground. If not, electrical noise problems are likely to interfere with machine operation unexpectedly.

Customer is responsible for providing electricity to machine in a manner that meets the local electrical code requirements.

- _____ Check machine with precision level and for equal support on feet, then carefully adjust supports to precisely secure the best average flatness of the top table.
- _____ This machine requires 208 to 240V AC 1-phase, 50/60HZ, isolated power supply (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 100-120V AC. Measure the voltages of the power supply twice during installation (1) _____ VAC (2) _____ VAC



IF VOLTAGE IS OUTSIDE THE CORRECT RANGE AT ANY TIME THE MACHINE WILL NOT OPERATE PROPERLY AND MAY BE DAMAGED.

- _____ **BEFORE** turning power on to the machine. Check all wires for security by using the correct screw driver and turning CW until movement stops. Stranded wire can “spread” slightly from vibration during transport.
- _____ Install electrical component covers inside the electrical enclosure with fasteners provided.
- _____ Briefly describe the isolated ground connection you have made: (Instructions to make a correct ground are included with the manual.

- _____ Have Internet connection available for the machine. Either via Ethernet cable or Wireless (Wi-Fi). The machine comes equipped with a wireless USB adapter.
- _____ Install and test the Internet connection to the machine. DO NOT download any updates unless instructed to do so by Rottler.

INSTRUCTING THE OPERATOR

WARNING

- _____ Explain to the customer and operator that at NO time is there to be any software or hardware other than Windows Auto Update and Rottler installed on this machine. This includes screen savers, anti-virus software, and any hardware device that installs software on the machine. Installation of screen savers and anti-virus software can cause dangerous control problems. Any installation of software or hardware will void the warranty on the machine.
- _____ Explain to the customer and operator that the machine should be hooked up to the Internet anytime it is on. The software on the machine will automatically connect to our server to send back useful information on machine status.
- _____ Explain to the customer and the operator how the to log onto Skype and communicate with Rottler when needed.

WARNING

- _____ Computer Viruses will cause the machine control system to become unstable. This may cause the machine to make uncontrolled moves which could create a dangerous environment for the machine operator.

IMPORTANT

- _____ Refer to Chapter 4, Control Definitions of the Machine Manual, Section: Computer and Controller System Safety. Explain and discuss this section carefully with Owner/Manager/Operator and have them sign off. Failure to do so will result in the machine warranty being Null and Void.

Signature / Title

- _____ Explain to the customer the importance of backing up the block profiles to a separate device. Any computer failure or possible operator input error can result in the loss of all block profiles that were created for the machine. Refer to Chapter 5 of the machine manual for detailed instructions on backing up and restoring block profiles.
- _____ Connect customer supplied Internet to the machine. Verify that the Internet is accessible from the machine.
- _____ A dry air supply of at least 80 PSI will use 1 cu. ft./min., maximum. An industrial vacuum system with a flexible 1-1/2" hose should be used on the S7/8--explain the electrical control options for the vacuum.

OPERATOR TRAINING

Note: Rottler employees and representatives per company policy are not permitted to provide end user of Rottler equipment with any OEM specifications for the workpiece that is created by end user using Rottler equipment.

- _____ Explain controls per "Control" section in manual.
- _____ Verify all machine movements are working correctly using the hand wheel.
- _____ Verify all machine movements are working correctly using the jog buttons.
- _____ Demonstrate and explain hand feed system (see manual).
- _____ Exercise spindle rotation, speed controls, fast travel, feeds, and stop adjustments.
- _____ Have operator perform machine functions (and automatic cycles on applicable machines).
- _____ Remove back of cutter head guard and have operator unclamp, rotate, and clamp cutter inserts.
- _____ Point out the changing and adjustment of insert tool holders per manual.

- _____ Explain optional cutting inserts that are available and their correct application to the type of material being cut. Explain the use of one versus two inserts.
- _____ Explain availability of optional tooling.



STRESS CAUTION AND PERSONAL SAFETY

- _____ Explain speeds required for carbide, coated carbides, CBN, etc., on specific work piece materials.
- _____ Cutter head change and clearance of guard from cutter level.
- _____ Review operator manual and emphasize safe, methodical operation.
- _____ Parts ordering-show how to refer to manual for part numbers.

MACHINE MAINTENANCE

- _____ Inner spindle adjustments (see manual).
- _____ Lubrication (see manual).

CYLINDER HEAD RESURFACING

- _____ Assemble cylinder head fixturing in accordance with the manual diagram.
- _____ Have operator clamp head properly, place and adjust jacks and level the work piece with level.
- _____ Point out value of a double axis level.
- _____ Use the first work piece to check dial indicator is set at zero, when cutters touch the surface of the work piece.
- _____ Explain feed speed combinations for finish on cast iron and aluminum.

V6/8 BLOCK RESURFACING

- _____ Assemble V-block tooling in accordance with the manual diagram.
- _____ Demonstrate the convenience, strengths and weakness of block hold down and leveling capability where block surfaces require the adjustment.
- _____ Explain adjustments for block angles and rearrangement for large V-blocks, such as 3208 Cats and adaptations to odd angles such as the Ford super duty truck block.
- _____ Explain procedures to surface protruding cylinder sleeves flush with the block surface.

IN-LINE BLOCK RESURFACING

- _____ Assemble in-line tooling, demonstrating support levels to accommodate a great variety of blocks.
- _____ In addition to adequate hold down force, explain the use of chocking or providing stops that prevent the block sliding.
- _____ Thoroughly review speeds, feeds, cutter types including shell mills, and general productivity that the machine is capable of. Make sure operator demonstrates complete understanding.
- _____ Explain cleaning work piece if required and absolute prevention of direct air blast.
- _____ Similarly review all safety precautions and use of emergency stop.
- _____ Explain procedures to surface protruding cylinder sleeves flush with the block surface.

General remarks on machine performance, adjustments as received and any further organization or parts required to complete the installation.

Instructions given to: _____

Sales/Service Engineer: _____ Date _____

Shop Foreman/Superintendent or Owner: _____ Date _____

Once completed send this form to:
Rottler Manufacturing
attn: Service Manager
8029 S 200 St
Kent, WA 98032 USA

Alternately you may send this form via fax or e-mail:
fax: [+1] 253-395-0230
e-mail: service@rottlermfg.com

Installation Procedure

Location

The productivity of this machine will depend a great deal on its 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 S7AD & S8AD machine is extremely important.

A slow travel (6 to 10 feet / 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 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 recommend that the open faces be placed at right angles to each other, with the machines about three feet apart.

Unpacking

Use care in removing the crate from the S7AD & S8AD machine, do not 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 and 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, any of this inhibitor left on the machine will result in considerable collecting of cast iron dirt.

Shipping Hold Down Bolt

Remove cover (#7036E) from the rear of the spindle base by removing its four mounting screws. Remove the bolt located in the front 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 chamfered washer (502-1-12), 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 washer.

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 S7-8AD 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 PSI air source to the appropriate intake at the air filter on the side of the rear control enclosure.

Power Supply

This machine has the following power requirements:

- 208 to 240 VAC
- Single Phase
- 50 or 60 Hertz
- 30 amps

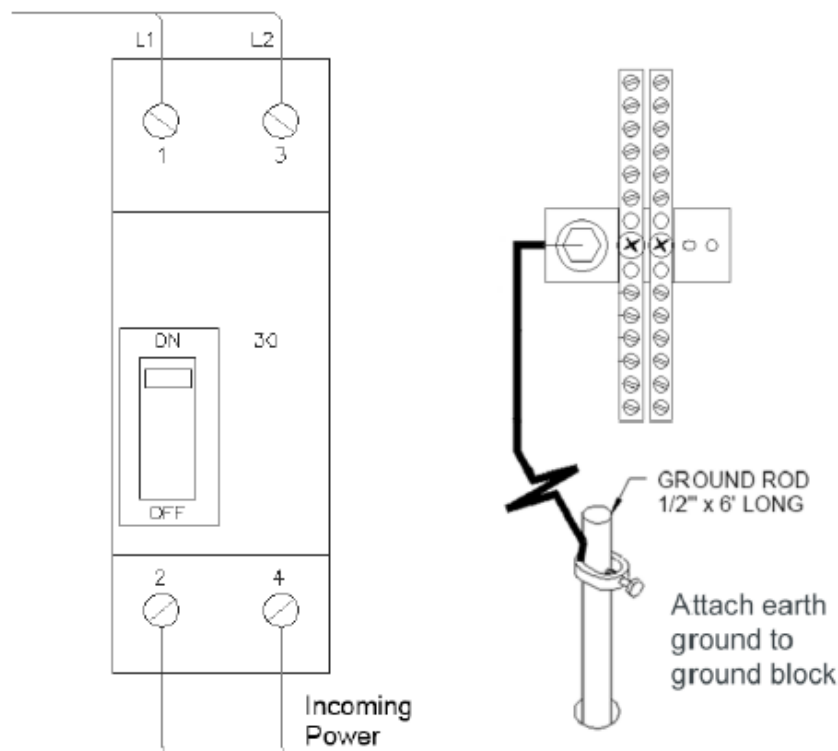
See illustration below for correct connection of “measured” incoming power. Connect single phase wiring to the main rear enclosure, located on the right rear of machine base. The connection point for power is located inside the enclosure. The connection termination point is the breaker / power switch..Attach wire from the grounding rod to the ground block.

IMPORTANT *Electrically connect in accordance with national and local electrical codes.*

Note: For voltages over 240 VAC (380 – 440 VAC) a transformer needs to be installed with the machine.

Grounding

CAUTION This machine must be connected to a good earth ground. Connect the earth ground wire to the ground bar inside the electrical enclosure.



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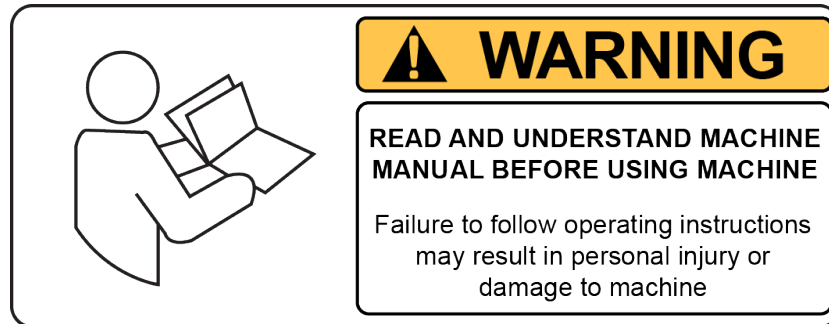
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Safety Information

For Your Own Safety Read This Instruction Manual Before Operating This Machine.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Safety Instructions for Machine Use



This machine is capable of causing severe bodily injury

ONLY A QUALIFIED, EXPERIENCED OPERATOR SHOULD OPERATE THIS MACHINE. NEVER ALLOW UNSUPERVISED OR UNTRAINED PERSONNEL TO OPERATE THE MACHINE. Make sure any instructions you give in regards to machine operation are approved, correct, safe, and clearly understood. Untrained personal present a hazard to themselves and the machine. Improper operation will void the warranty.

KEEP GUARDS IN PLACE and in proper working order. If equipped with doors, they must be in the closed position when the machine is in operation.



KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.

KEEP CHILDREN AND VISITORS AWAY. All children and visitors should be kept a safe distance from work area.

WEAR THE PROPER APPAREL. **DO NOT** wear loose clothing, gloves, rings, bracelets, or other jewelry which may get caught in moving parts. Non-Slip foot wear is recommended. Wear protective hair covering to contain long hair.

ALWAYS USE SAFETY GLASSES. Also use face or dust mask if cutting operation is dusty. Everyday eye glasses only have impact resistant lenses, they are **NOT** safety glasses.



DO NOT OVER-REACH. Keep proper footing and balance at all times.

USE THE RECOMMENDED ACCESSORIES. Consult the manual for recommended accessories. The use of improper accessories may cause risk of injury.

CHECK DAMAGED PARTS. Before further use of the machine, a guard or other part that is damaged should be checked to determine that it will operate properly and perform its intended function. Check for alignment of moving parts, breakage of parts, mounting, and other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.

NEVER OPERATE A MACHINE WHEN TIRED, OR UNDER THE INFLUENCE OF DRUGS OR ALCOHOL. Full mental alertness is required at all times when running a machine.

IF AT ANY TIME YOU ARE EXPERIENCING DIFFICULTIES performing the intended operation, stop using the machine! Then contact our service department or ask a qualified expert how the operation should be performed.

DO NOT MODIFY OR ALTER THIS EQUIPMENT in any way. If modifications are deemed necessary, all such requests must be approved and/or handled by Rottler Manufacturing. Unauthorized modifications could cause injury and/or damage to machine and will void the warranty.

SAFETY DECALS SHOULD NEVER BE REMOVED. They are there to convey important safety information and warn of potential hazards.

ALL LOCAL SAFETY CODES AND REGULATIONS should be followed when installing this machine.

ONLY QUALIFIED PERSONAL should perform service on the electrical and control systems. When boring the machine is capable of throwing metal chips over 10- feet from the cutting area. Always use the guards. Eye protection must be worn at all times by the operator and all other personnel in the area of the machine.

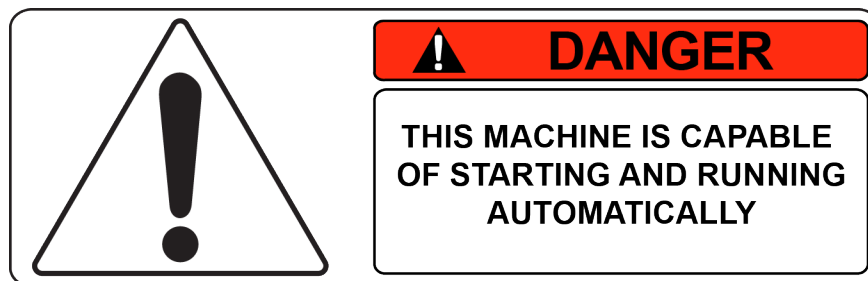
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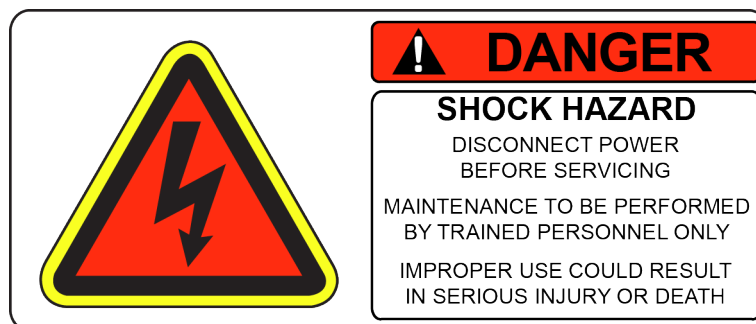
CAUTION No list of safety guidelines can be complete. Every piece of shop environment is different. Always consider safety first, as it applies to your individual working conditions. Use this and other machinery with caution and respect. Failure to follow guidelines could result in serious personal injury, damage to equipment or poor work results.

Electrical Power

THIS MACHINE IS AUTOMATICALLY CONTROLLED AND MAY START AT ANYTIME

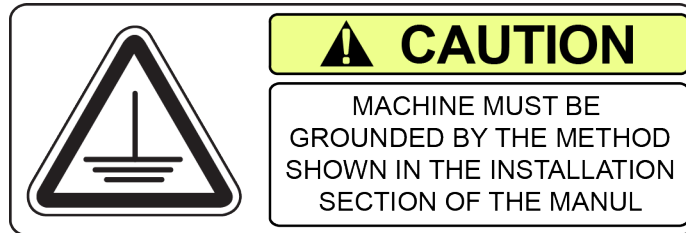


All electrical power should be removed from the machine before opening the rear electrical enclosure.



In the event of an electrical short, grounding reduces the risk of electric shock by providing a path of least resistance to disperse electric current.

Electrocution or a fire can result if the machine is not grounded correctly. Make sure the ground is connected in accordance with this manual. DO NOT operate the machine if it is not grounded.



CAUTION No single list of electrical guidelines can be comprehensive for all shop environments. Operating this machinery may require additional electrical upgrades specific to your shop environment. It is your responsibility to make sure your electrical system comply with all local codes and ordinances.

WARNING This machine operates under computerized control and, as is all computerized equipment, and is susceptible to extraneous electrical impulses internally for externally produced. The machine may make moves out of the operator control at any time. The operator should work in and around the machine with caution at all times.

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

Make sure all electrical equipment has the proper overload protection. This machine should have a fully isolated power supply to prevent damage and uncontrolled movement of the machine. If this machine is on the same power lines that are running to other electrical equipment (grinders, welders, and other AC motors) electrical noise can be induced into this machines electrical system. Electrical noise can cause the controller to see false signals to move. Not supplying a fully isolated supply to the machine may void factory warranty. Refer to the Power supply section located in the Installation section for voltage and amperage requirements of this machine.

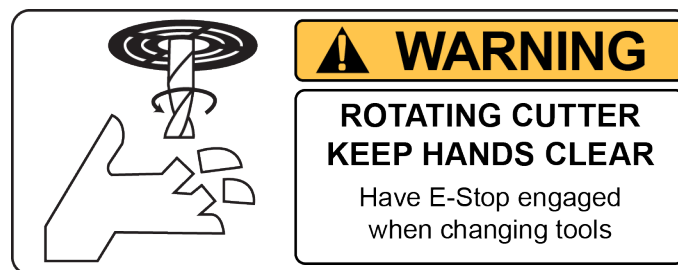
Machine Operator

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

If the operator is not a skilled machinist he/she must pay strict attention to the Operating Instructions outlined in this manual, and get instruction from a qualified machinist in both production and operation of this machine.

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

Cutting Tool Area – Any operation involving hands in the cutter head area, such as inspection or alignment of the cutter head or tools, changing Centering Fingers, tool insertion, and removal, cutter head changes, and size checking etc. requires the machine to be in Neutral.



Machining – Eye protection must be worn during all operations of the machine. Hands must be kept completely away from the cutter head. All chip guards must be in position during machine operations.



CAUTION **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.

CAUTION **Machine Maintenance** – Any machine adjustment, maintenance or parts replacement absolutely requires a complete power disconnection from the machine.

Emergency Procedure

Assuming one of the following has occurred: tool bit set completely off size, work piece or spindle base not clamped, spindle is not properly centered, and these mistakes will become obvious the minute the cut starts

PRESS THE EMERGENCY STOP BUTTON (on the front control panel) **IMMEDIATELY!**

Find out what the problem is; return the spindle to its up position without causing more damage. To restart the machine, turn the Emergency Stop Button CW until the button pops out

Be alert to quickly stop the machine in the event of a serious disruption of the boring process either at the top or bottom of the bores.

“REMEMBER” metal cutting tools have the speed and torque to severely injure any part of the human body exposed to them.

Computer and Controller System Safety

The computer and controller are located in the main rear electrical enclosure. This unit is a full computer, running Windows 7 64 Bit operating system. Contact the factory if more information on the computer system is required.

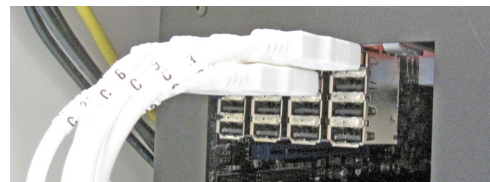
IMPORTANT The computer in this machine has the ability to connect to the World Wide Web via Ethernet or Wireless using a USB wireless (Wi-Fi) adapter. Updating the Rottler software should **ONLY** be done when directed to do so by a Rottler service technician. Updating Rottler Software when not directed by Rottler personnel will result in a non-operational machine.

The machine should be hooked up to the Internet anytime it is on. The software on the machine will automatically connect to our server to send back useful information on machine status.

Any “IT” personnel should **ALWAYS** get approval from Rottler before doing **ANYTHING** on the computer.

! DANGER This machine is capable of causing severe injury or death. Doing any of the following without Rottler’s direct consent may cause severe injury or death.

! WARNING Do not attempt to install USB devices in the PCI ports. These ports have high voltage and any attempt to connect a USB device in these ports will result in destruction of that device. There is also the possibility of damage to the computer system of the machine.



IMPORTANT Downloading any program or changing any Rottler or Computer settings may cause the machine and/or software to become unstable. **DO NOT** install ANY screen saver, Anti-Virus, Spyware or any type of Security software on the computer. This could create a hazardous environment for the operator and personnel around the machine. Performing any of the above will also result in the machine warranty being NULL and VOID.

IMPORTANT **DO NOT** connect any type of external hardware to the computer via USB or any other means. Do not install any type of Device Driver. This could create a hazardous environment for the operator and personnel around the machine. Performing any of the above will also result in the machine warranty being NULL and VOID.

Electrical Safety Features Of Rottler DM Controlled Machines

All Rottler machines that use the DM operational control system are designed to comply with all applicable safety standards. This includes but is not limited to the following systems:

- Thermal sensors in all motors and motor controls.
- Current sensors in all motor control panels.
- Electrical breakers to prevent voltage surges and spikes from reaching electrical system.
- Electrical lockout on main electrical enclosure.
- E-Stop that shuts down all operational systems in an event of an emergency.

All thermal and current limits for motors and motor controls are preset at the factory. In the event that any of those parameters are exceeded during operation of the machine, the machine control system will shut down the machine and a warning of the specific fault will appear on the control screen.

CONTROL DEFINITIONS

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Control Definitions

The purpose of this chapter is to define the function of the buttons throughout the various screens. Certain button functions may not make sense right away in this chapter. As the operator reads through the Operating Instructions chapter of this manual, the function of these buttons will become clear.

NOTE: Not all modes of operation will be discussed in this Chapter. The function of several buttons and actions are the same in many modes. The description of a function or button operation will not be repeated if it exists in another mode. All modes of operation will be discussed in the Operations Section of this manual (Section 5).

Computer and Controller System Safety for DM Controlled Machines:


The computer and controller are located in the main rear electrical enclosure. This unit is a full computer, running Windows 7 64 Bit operating system. Contact the factory if more information on the computer system is required.


IMPORTANT: The computer in this machine has the ability to connect to the World Wide Web via Ethernet or Wireless using a USB wireless (Wi-Fi) adapter. Updating the Rottler software should ONLY be done when directed to do so by a Rottler service technician. Updating Rottler Software when not directed by Rottler personnel could result in a non-operational machine.

It is recommended that the machine be hooked up to the Internet anytime it is on. The software on the machine will automatically connect to our server to send back useful information on machine status. It will also record performance parameters that will be used to evaluate any occurrence of a malfunction.

The Auto Update for the Windows Firewall (Security) and Windows Defender (Anti-Virus) is turned on. The computer will automatically download the updates and then install them when the computer is shut down every Friday night.

Any "IT" personnel should ALWAYS get approval from Rottler before doing ANYTHING on the computer.

 **WARNING** Downloading ANY program from the Internet or by other means when not directed by Rottler is prohibited and will result in the machine warranty being NULL and VOID.

 **WARNING** Downloading any program or changing any Rottler or Computer settings may cause the machine and/or software to become unstable. DO NOT install ANY screen saver, Anti-Virus, Spyware or any type of Security software on the computer. This could create a hazardous environment for the operator and personnel around the machine. Performing any of the above will also result in the machine warranty being NULL and VOID.

COMMON INTERFACE NOTICE

All Rottler machines using Direct Motion technology share a common control interface. This allows for a better environment for programming machine functions across a wide range of different machines. This also allows for easier deployment in shops already using Rottler Direct Motion machines.

Because of the common interface some machines may have buttons and menu tabs that may not be applicable to the machine that is being used. If the buttons or menu tabs are not mentioned in the control definitions section of the manual, they will not be used in machine operation.

Master Power On/Off Switch

This switch is located on the main electrical control enclosure on back of the machine. The switch must be in the off position before opening the rear enclosure door.

When first applying power to the machine the computer will need to boot up. Be patient, it will take several minutes to complete booting. The Rottler program will not automatically start. Double tap the Rottler_WPF icon on the screen to start Rottler.

When turning off the main power to the machine there is a specific procedure to follow so as not to damage the computer. The computer must shut down its internal systems before main power is removed from it.

Press the "Start" button in the left-hand side of the Start Bar. This will bring up the "Start Menu". Press the "Shutdown" line at the bottom of the Start Menu. This will bring up a Pop Up menu, make sure that "shut down computer" is selected and press "OK".

This will shut down the computer. It is now OK to turn Main Power off to the machine.

Initialization Screen

When the S7-8AD is powered up the Rottler program will not automatically start. It may take several minutes for the computer to power. Start the Rottler program by double tapping the Rottler_WPF icon on the desktop. Once the program is started, the Rottler Program Select will appear.

NOTE: Do not push any buttons or icons on the screen before the Rottler program starts or an error may be caused on the computer.



General Information

The Rottler software operates on a Block Model format. You select or create the block you are working with. Then select or create an operation to be performed on that block. The following are descriptions of the functions of the different buttons that appear on the display screen after the system has loaded.

Home

The machine **MUST** be homed after it is turned on. This is how the machine gets its reference points to operate.

Fixture Select and Table of Tools buttons are not used on this machine. Operating software is shared among many of Rottler's machines and not all features are used on all machines.

Rapid Travel Buttons

Rapid Up will cause the spindle to move up quickly at a fixed rate of speed. The button is a momentary

button and contact must be maintained or the travel will stop.

Rapid Down will cause the spindle to move down quickly at a fixed rate of speed. The button is a momentary button and contact must be maintained or the travel will stop.

Feed Buttons

Feed Up button moves the spindle up at a fixed feed rate. If the spindle is rotating, the spindle will move up using the feed rate value set by the operator. This button is a latching button and will remain activated until the end of travel is reached or the operator touches the button a second time.

Feed Down button moves the spindle down at a fixed feed rate. If the spindle is rotating, the spindle will move down using the feed rate value set by the operator. This button is a latching button and will remain activated until the end of travel is reached or the operator touches the button a second time.

CW and CCW Buttons

CW rotates the spindle in the Clockwise direction until released.

CCW rotates the spindle in the Counter-clockwise direction until released



Definitions of Control Buttons

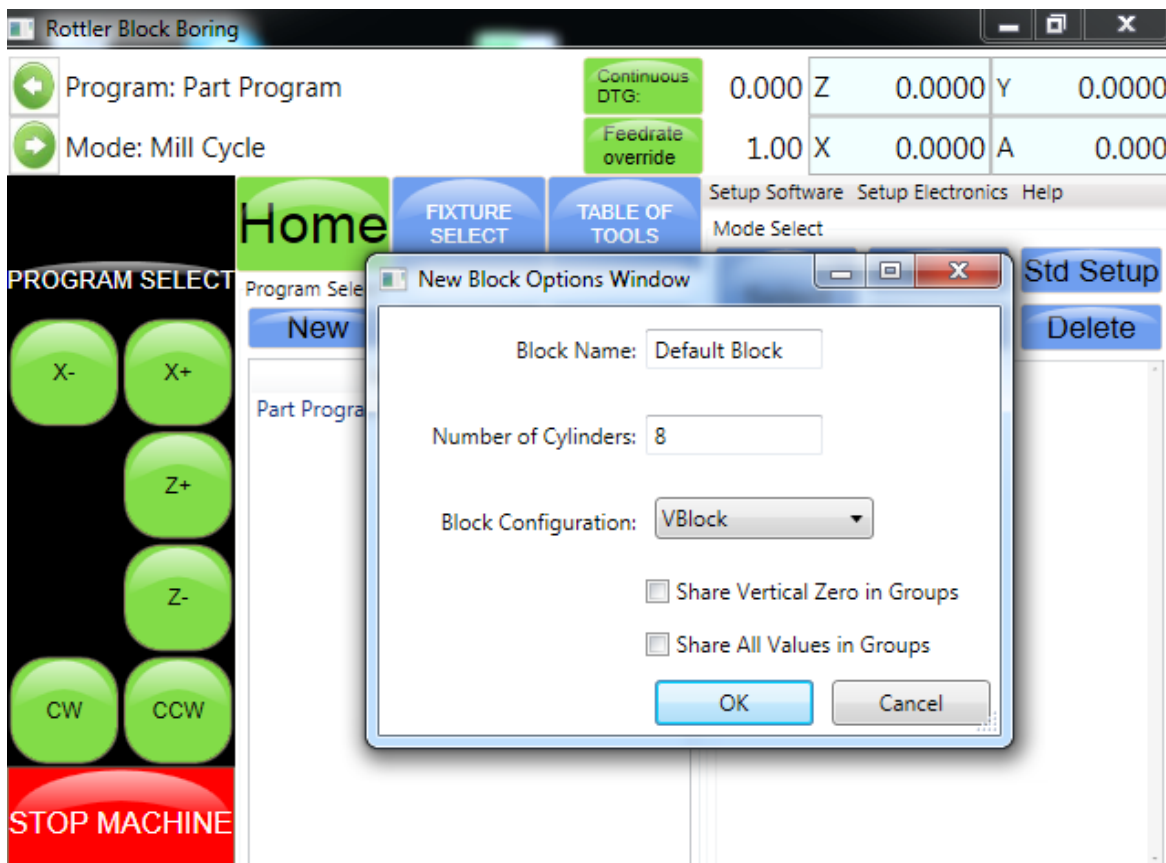
Program Select

This button will bring you back to the home screen.

The Program Select section of the home screen is located above the spindle control buttons. This is where you create programs for different type of blocks.

New

Pressing this button will cause a dialog box to appear. Here is where you name and configure the block i.e. number of cylinders and Inline or V Block.



Pressing OK will result in the Block Model being inserted into the left hand side of the screen.



Options

This will bring up the same dialog box as described above if any of the information needs to be changed.

Delete

This will delete whatever block program is selected. A dialog box will appear to ask you if you want that program deleted.

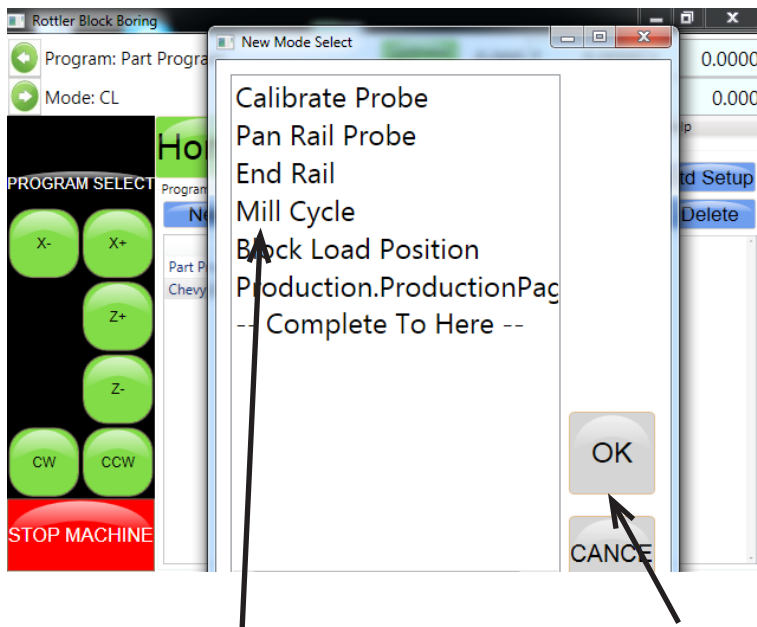
Mode Select

This is the right section of the screen. This is where you create or select operations to be performed on the selected Block. This area will be blank when you first create a block.

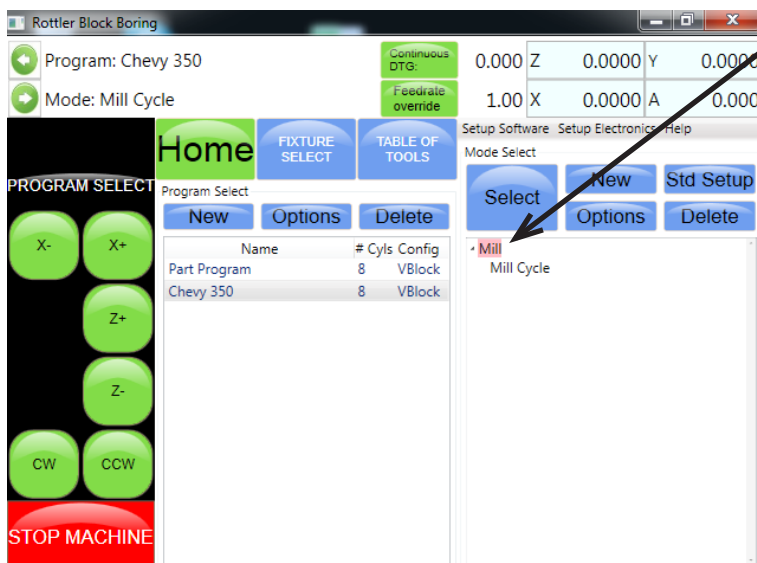
You can create only certain modes you will use on a block or use a standard set up that inserts all modes available. You can also create a new mode and rename it for a specific use.

New

Pressing this button will bring up a dialog box with Rottler standard operations.



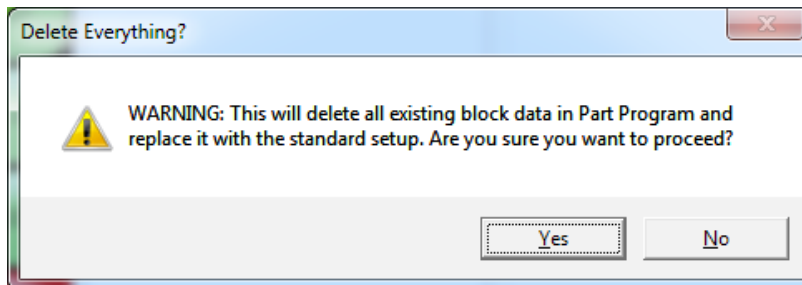
Select the operation you want to create and then press OK. This will place a Mill operation under the Cylinder bore mode in the right hand section.



To enter Mill mode highlight it and then press Select. This will take you to the operation screens that will be described later.

Std (Standard) Setup

Pressing this button will insert all the Rottler operations into the right hand section automatically.



Delete Warning box will appear asking if you wish to delete all existing block data.

Options

This button is not used on this machine.

Delete

This will delete the selected Mode. It will ask you if you want this mode deleted before deleting it.

NOTE: Once the control definition for a particular button has been discussed it will not be repeated in the different modes of operation. Only new buttons or buttons with a different function will be discussed in different modes.

Select

Highlight the Mill Cycle function and then touch the Select button.



This will bring up the Set Zero screen.



Handwheel Buttons

.010 button allows the operator to use the hand wheel to move the spindle left or right at .010" per click in either direction.

.001 button allows the operator to use the hand wheel to move the spindle left or right at .001" per click in either direction.

Pressing any of the spindle control buttons will disengage the handwheel.

Zero Buttons

Spindle Zero button is used to set the tool index position. The operator rotates the tool to the desired index position, always 6 o'clock for normal operation, and press the button to set that position as the tool index point.

Vertical Zero button is used to set the vertical zero position which is used as reference for the vertical stop points in the program.

Horizontal Zero button is used to set the horizontal zero position which is used as reference for the horizontal stop points in the program.

Spindle Load

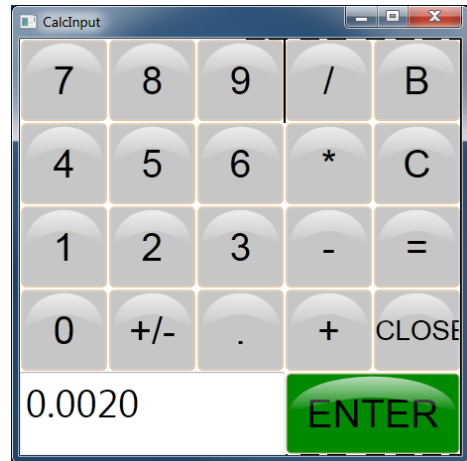
Spindle Load indicates percent of motor load during operation.

Feed Rate

Operator clicks the box to the right to enter desired feed rate. Wherever there is number box where a value can be entered, pressing value box will activate a pop up number pad to input values.

Move Buttons

When pressed a pop up number pad will appear. By selecting function, a distance can be entered. Press Enter to make spindle move the selected distance.

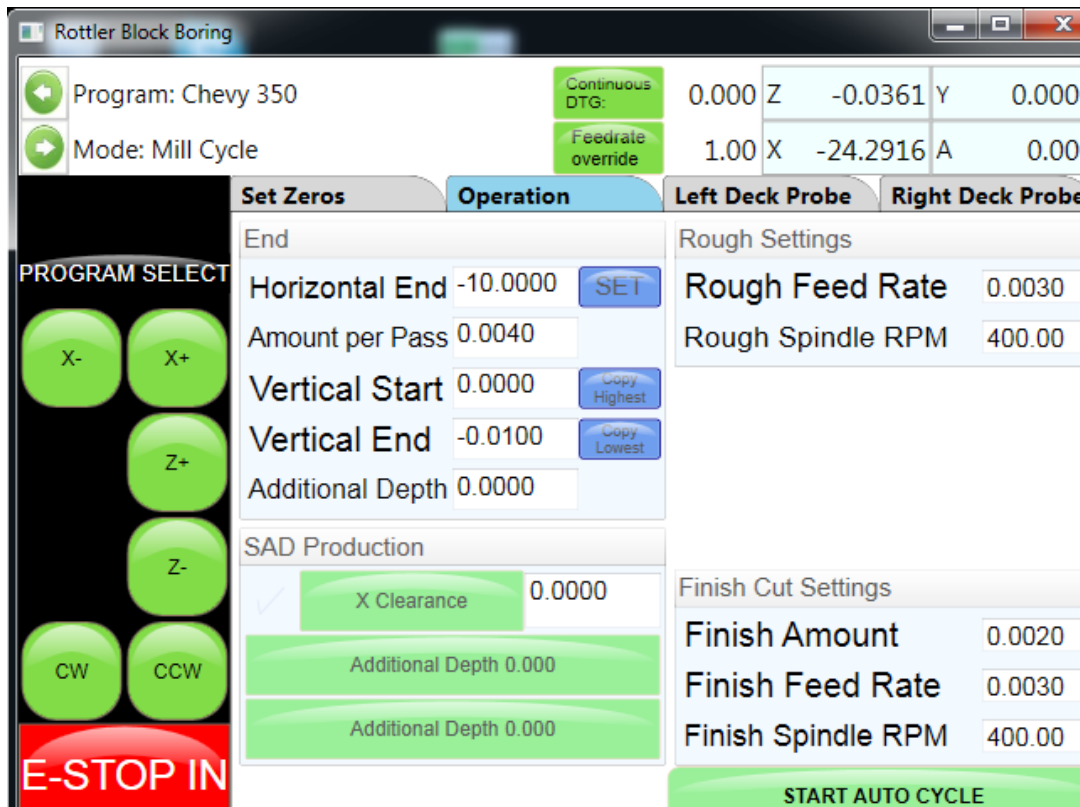


Spindle RPM

Operator clicks the box to the right to enter desired spindle RPM.

Operation Setup

Press the Operation tab. This will bring up the Operation page. This is where all the start and finish stops are set.



START SPINDLE

This button causes the spindle to start rotating at the designated RPM. Pushing the button again will stop the spindle rotation.

START AUTOCYCLE

This button causes the spindle to move vertically to the Start Height position. Start Cutting Height, start spindle rotation, feed down to the Finish Cutting Depth, index the tool, and move the spindle vertically up to the selected SET position.

The operator can press the START SPINDLE button and then press the Feed Left or Feed Right button. The spindle will rotate and feed continuously in the desired direction until either:

- The operator presses the STOP MACHINE button to stop all motion.
- The machine reaches the end of horizontal travel in either direction.

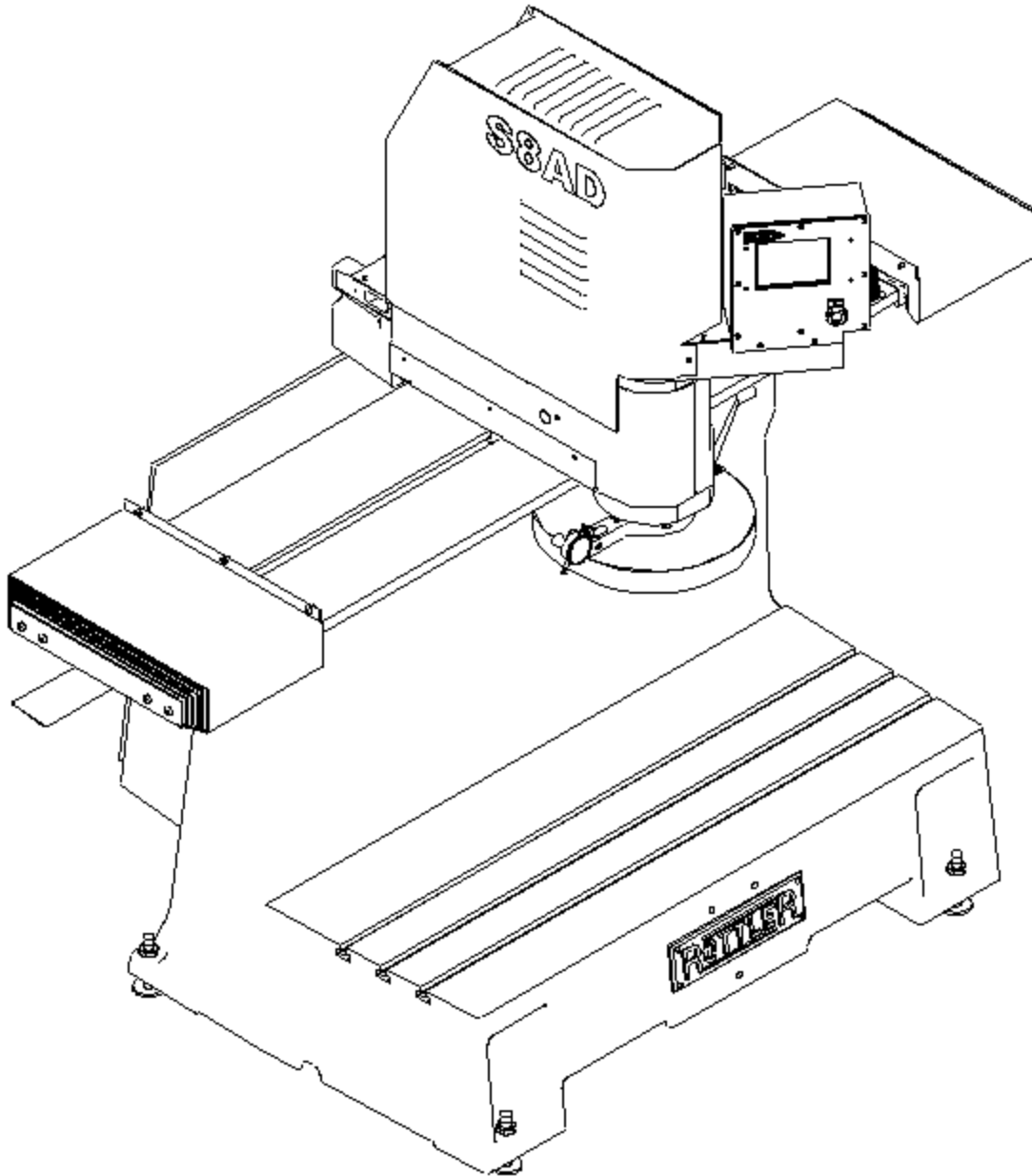
OPERATING INSTRUCTIONS

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Operating Instructions

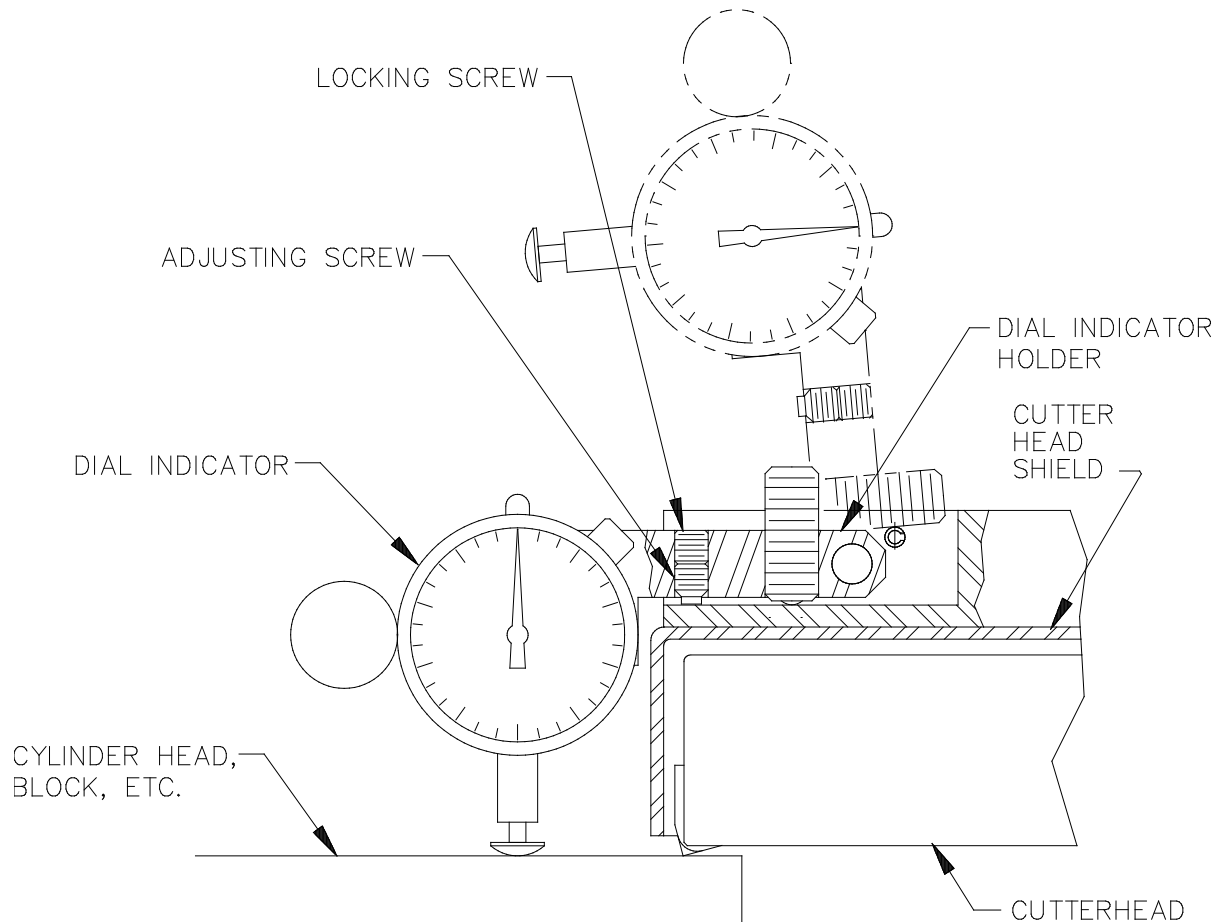
Included in this chapter is a general description of how to use this machine for surfacing, whether it cylinder head, block or other type of job. For details of operating specific fixtures available on this machine refer to the Optional Surfacing Fixtures and Tooling section of this manual.



There are several ways to use the S Series machine cutting system depending on the type of work you do and your personal preferences. Following are some details and descriptions that will help you decide which method is best suited to your application.

Manual Operation

Press the Left rapid travel button and move the spindle over to the starting position. The starting position is just before the cutterhead guard passes over the work piece. Push the dial depth indicator, on the guard, down onto the top of the work piece. Assuming the dial indicator has been properly adjusted (see the Maintenance chapter of this manual for adjustment instructions) it will indicate the depth of the cut at your current height setting.



Zero Vertical and Horizontal Position

When the machine has finished cutting, press the Left travel button to stop the feed, then the Spindle Start button to stop the spindle. You must manually lift the cutterhead then press and hold the right travel button back to the home position.

Automatic Operation

Press the Left rapid travel button and move the spindle over to the starting position. The starting position is just before the cutterhead guard passes over the work piece.

Push the dial depth indicator, on the guard, down onto the top of the work piece. Assuming the dial indicator has been properly adjusted (see the Maintenance chapter of this manual for adjustment instructions) it will indicate the depth of the cut at your current height setting.

Zero Vertical and Horizontal Position

Set the required length of cut. Adjust the depth of the cut using the manual handwheel. Adjust the Feed Rate and Spindle RPM for the desired finish. Press the Cycle Start button, the spindle will come up to speed then the left feed will start. When the cutterhead clears the work piece the spindle will lift and the machine will return to Starting Point.

If a cycle is started with an end of cut position already set, the machine will stop the spindle and left feed at this position, the spindle will lift and return to the Starting Point.

You can manually move the machine to the end of the work piece and record the length of cut.



Be careful when starting a cycle. The machine will cut to the last End of Cut set position. If no End of Cut position has been set the automatic cycle will not start. An End of Cut position must be set after every power up. When the power is turned off to the machine, the end of cut is reset to zero.

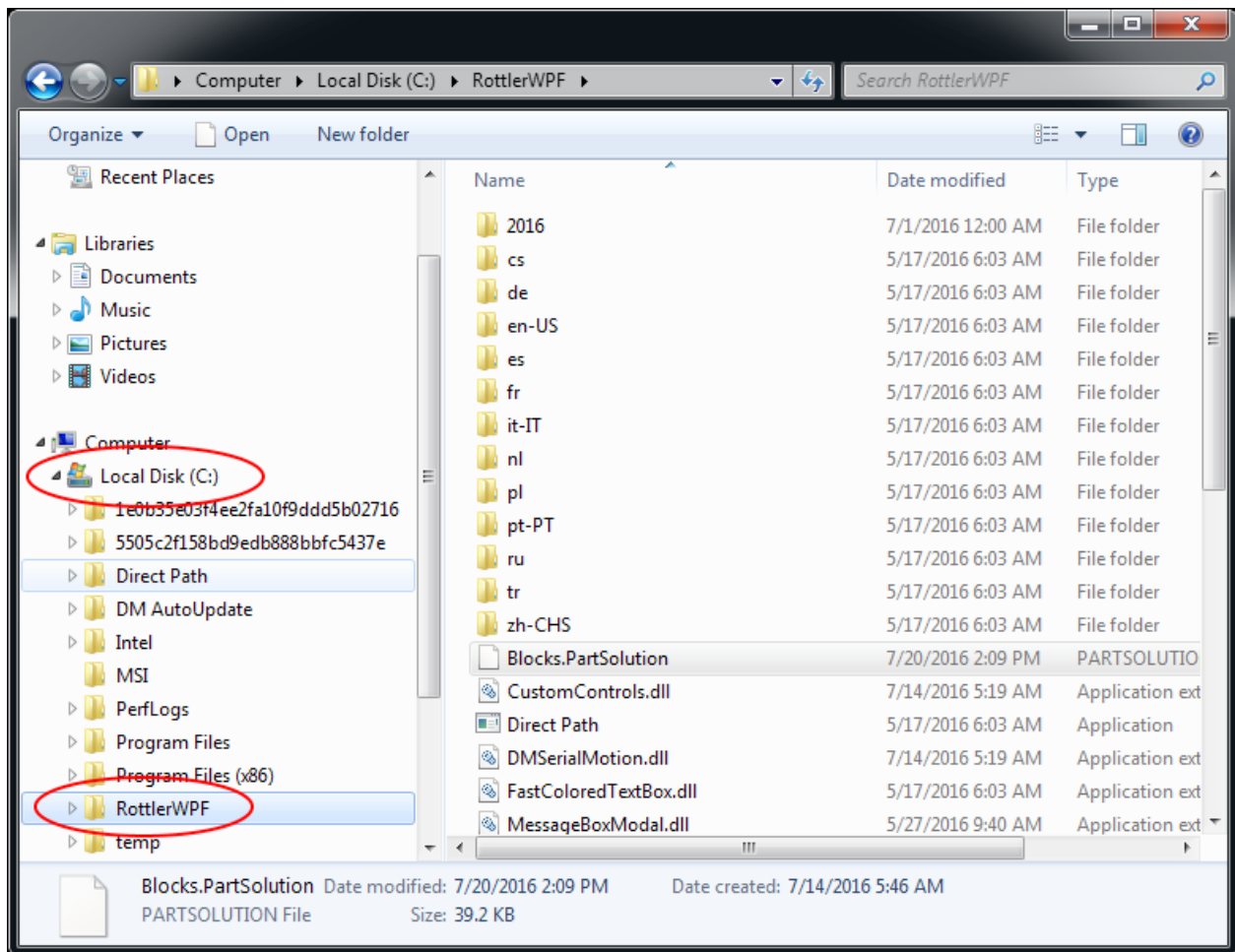
Following is a description of the cutting inserts available from Rottler. The inserts have gone through extensive performance testing. To take full advantage of the capabilities of your Rottler machine, we highly recommend Rottler cutting tools be used. Rottler machine performance can be significantly reduced if qualified tooling is not used. Using an incorrect insert can result in bore geometry inconsistency, short tool life, and poor surface finish.

Following are general guidelines. When using these inserts it is best to refer to the operator manual of the particular machine you are using. Rottler Manufacturing's latest operator manuals have more detailed information on feeds and speeds for the particular machine and cutterhead that you are using.

Backing Up and Restoring Block Profiles

This section will explain how to back up and restore the operator created block profiles for DM controlled machines for archival purposes or to transfer to a different machine.

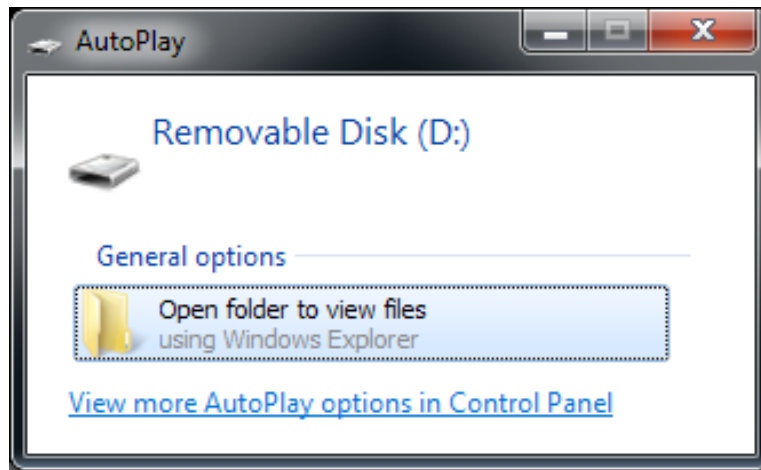
First step is to open your file browser locate the RottlerWPF file on the C disk drive.



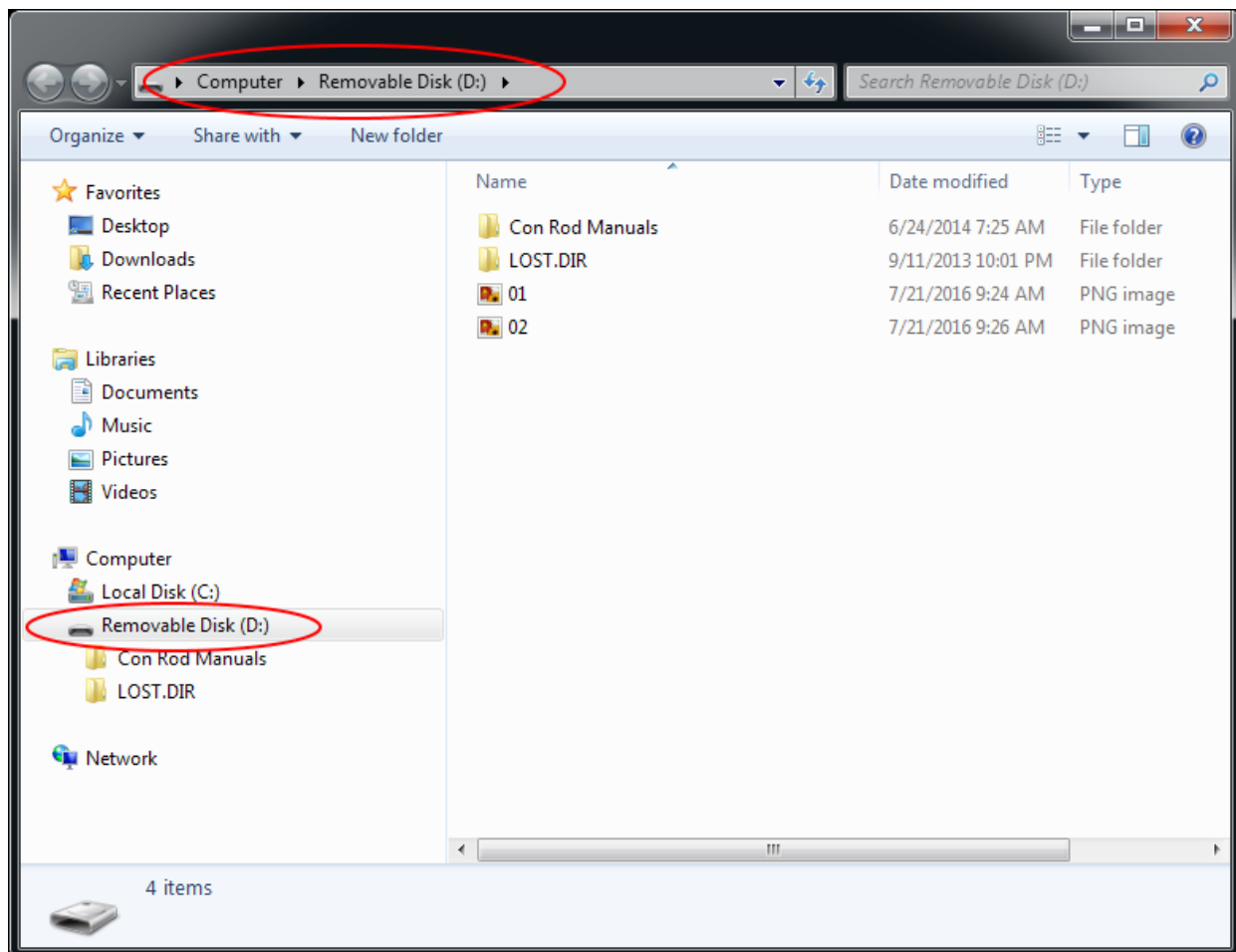
The next step is to plug in a flash drive to an open USB port



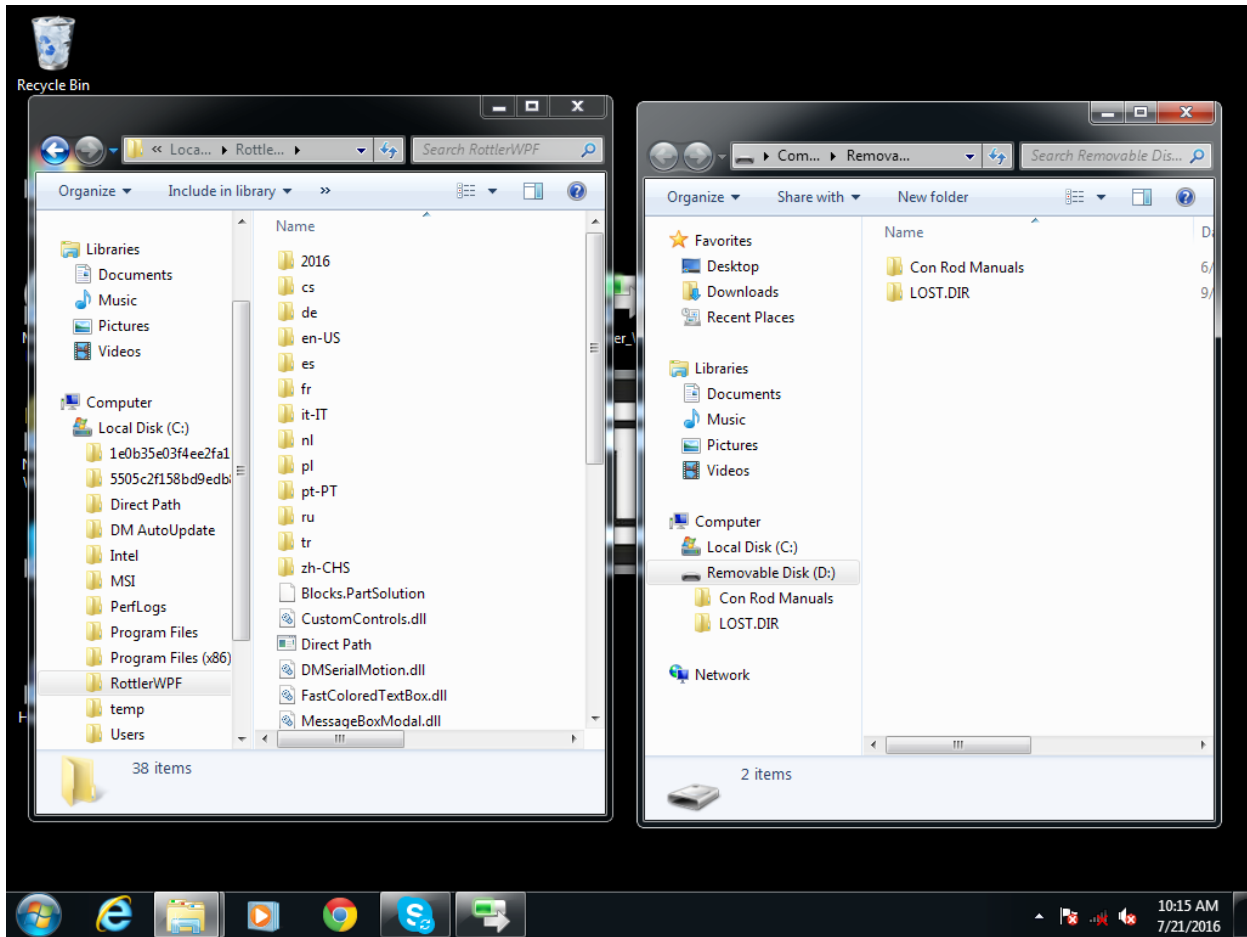
The following pop up box will appear on your screen.



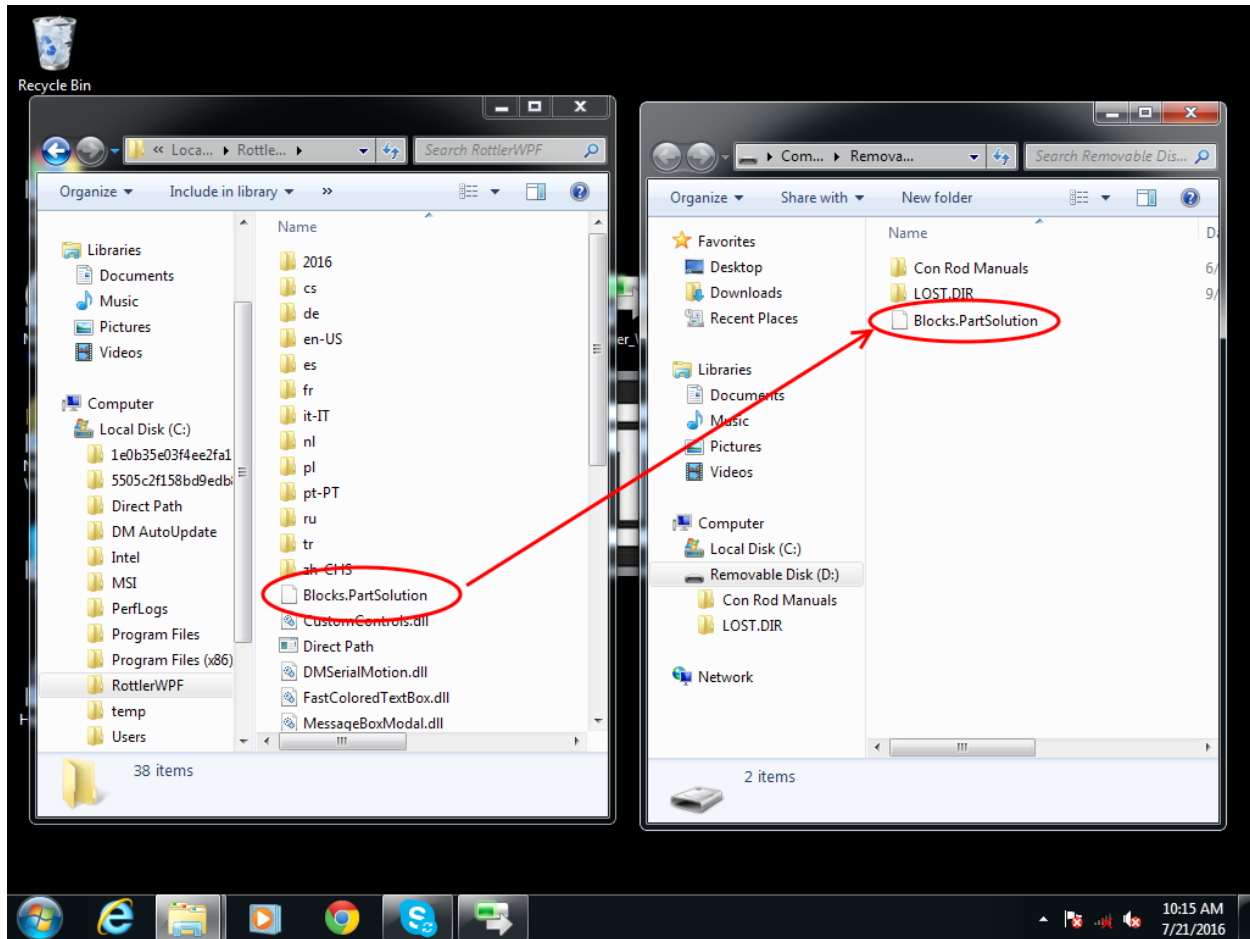
Click on the Open folder to view files option and the following screen will appear. This is the contents of the flash drive you just plugged in.



Next resize and arrange both file browsers so that they are side by side.



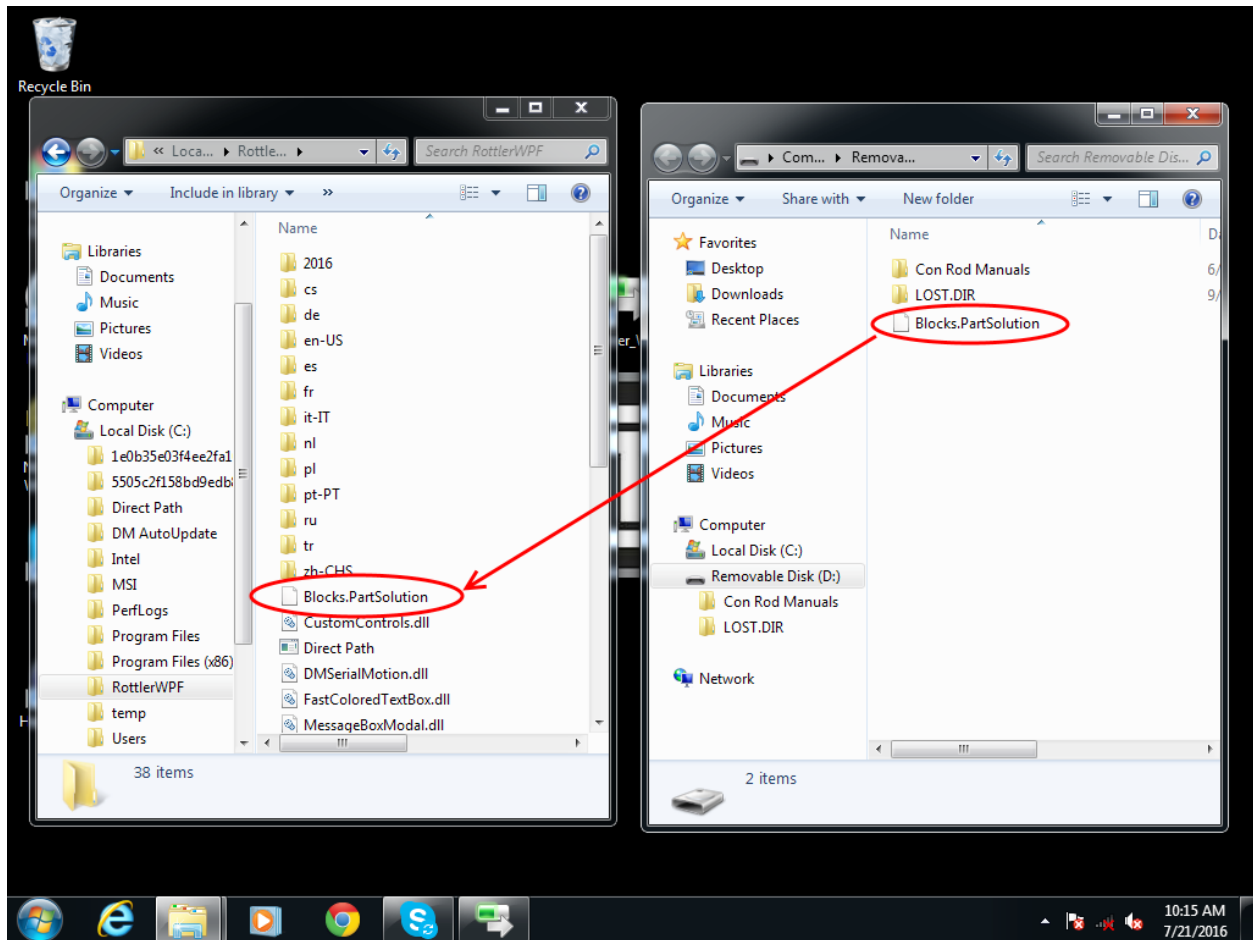
Block profiles are backed up each time the machine is run with the current profiles being shown in the RottlerWPF folder. All that needs to be done to back up the current profile is to simply drag it from the RottlerWPF folder to the flash drive folder. A copy of the file will be placed on the flash drive.



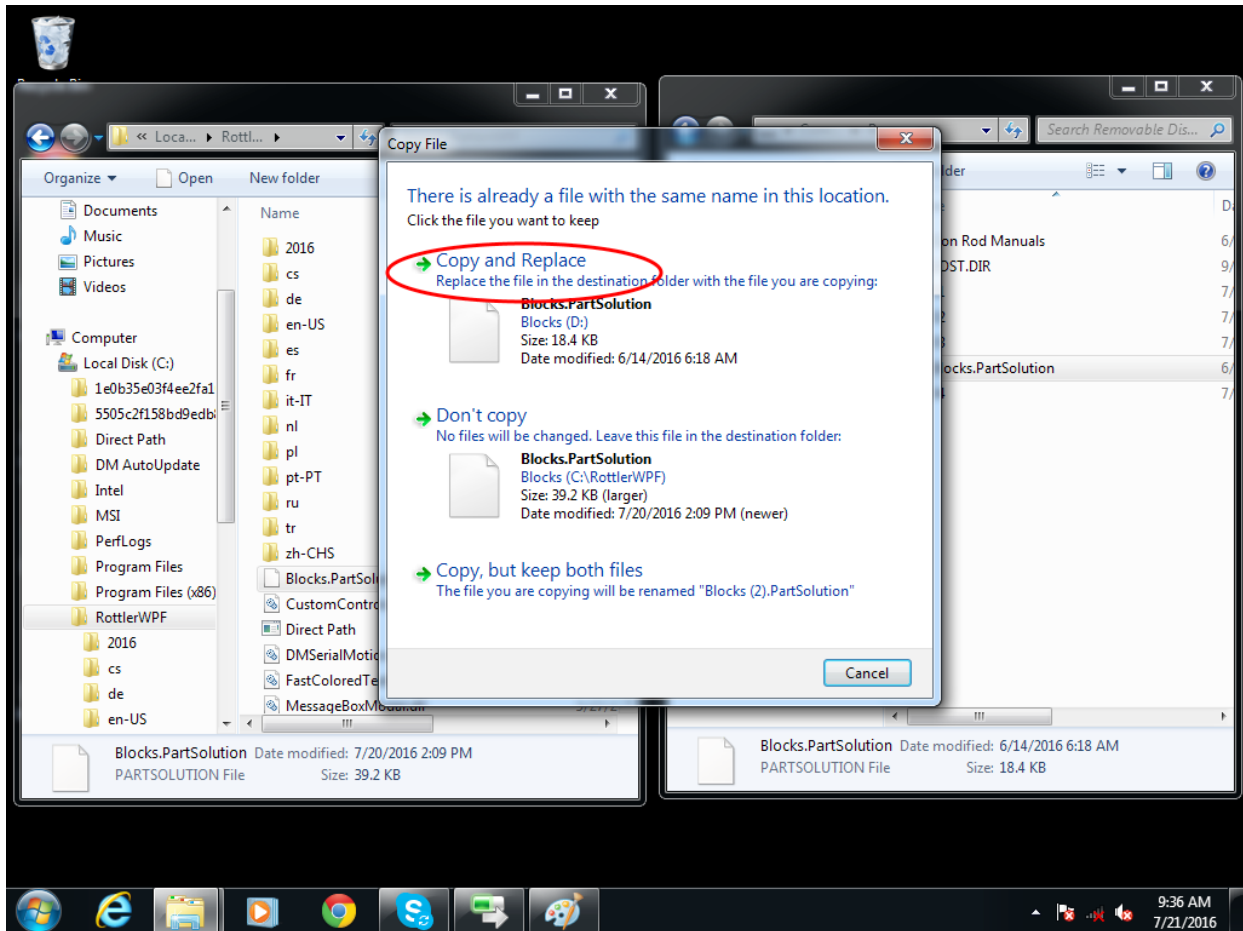
Backup is now complete. Close both file browser windows and remove the flash drive.

To restore or add block profiles go through the first 5 steps explained previously.

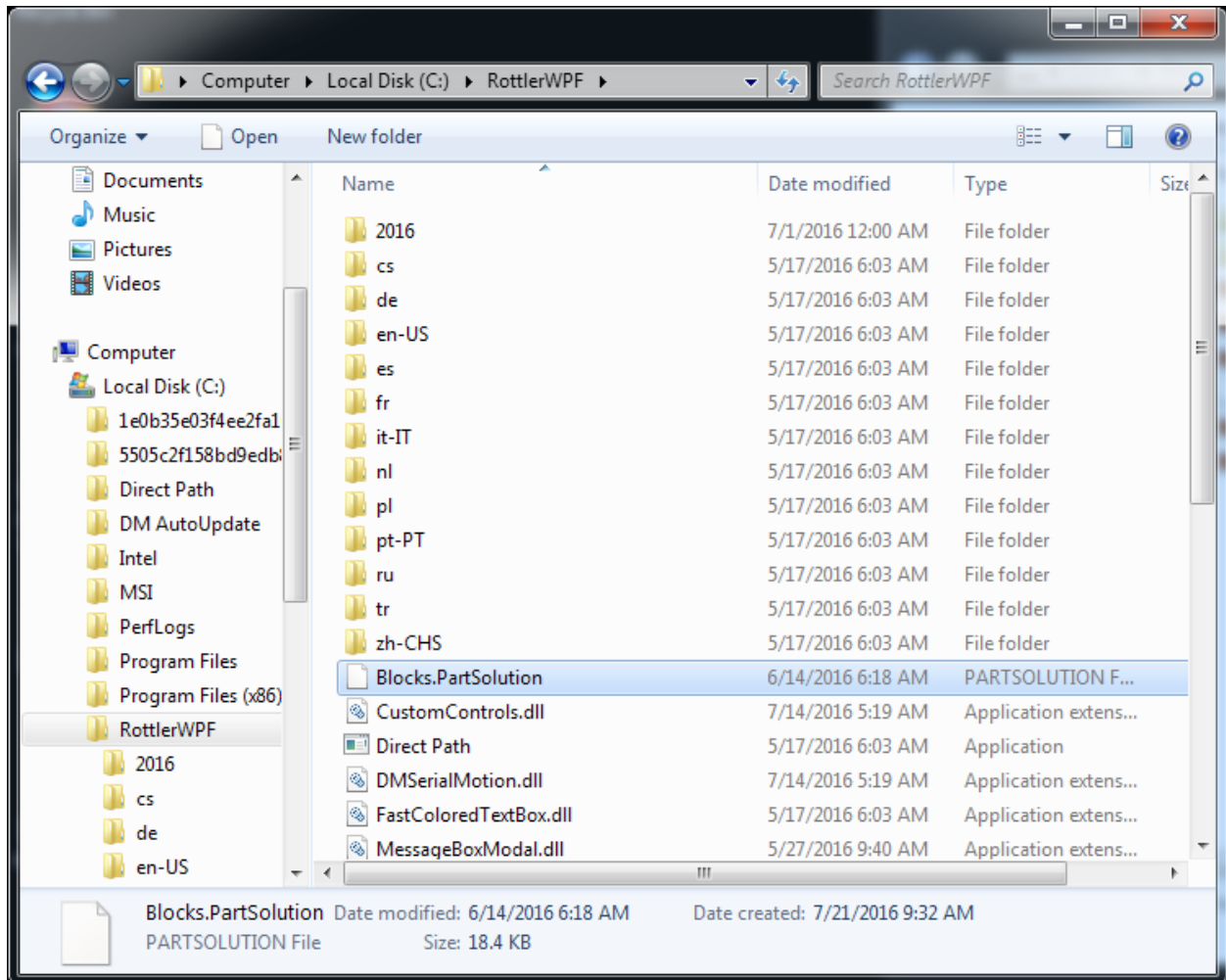
Highlight the block profiles file in the flash drive and drag it into the RottlerWPF folder on the local hard drive.



You will get a pop up window about there being a file of the same name in the destination folder. Click on the Copy and Replace option.



The archived block profiles will now be installed.



Close both browser windows and remove the flash drive. The restore process is now complete.

General Insert Information

Rottler CBN and PCD Inserts are laser marked with our part number on one side. On single sided inserts, the part number is on the back side of the insert.

Rottler surfacing insert toolholders are designed so they can hold square and round inserts that are of the same basic size. For example, a 3/8" IC round and 3/8" IC square insert will fit into the standard 3/8" IC Rottler toolholders. IC stands for inscribed circle.

Rottler S, F60, F70 and F100 Series surfacing cutterheads are supplied standard with Rottler 3/8" IC toolholders fitted to our surfacing heads. Optional 1/2" toolholders are interchangeable with 3/8" toolholders.

Insert breaking or chipping can be caused by several things. It can be caused by not operating the insert at the correct RPM. It is very typical for an insert to break or chip when cutting too slow. Interrupted cuts can cause an insert to break as well. When making a heavy sleeve cut in a cylinder that has been cracked it is often required to slow the RPM down to 1/2 the normal operating speed to prevent chipping of the insert.

Cutting Speed Calculation

Inserts are designed to cut within a speed range (SFPM). In order to convert from cutting speed to RPM, use the following formula:

$$\text{RPM} = \frac{\text{SFPM} \times 3.82}{\text{DIAMETER}}$$

SFPM = Surface Feet per Minute

RPM = Revolutions per Minute

DIAMETER in Inches

The feed rate on most Rottler machines is designated in inches (mm) / revolution. The S Series have feed rates designated in inches (mm) / minute. It is important to adjust the inches (mm) / minute rate to obtain the correct load (inches / revolution). Following are the formulas to use. You do not have to perform this calculation with an "A" model machine

If you know the RPM and the Feed Rate per Revolution you want, use the following formula to obtain the correct Feed Rate per minute.

$$\text{FRM} = \text{RPM} \times \text{FRR}$$

FRM = Feed Rate Inches per Minute

FRR = Feed Rate Inches per Revolution

RPM = Spindle Revolutions per Minute

Surfacing Inserts

Following are the inserts commonly used on Rottler machines in surfacing/milling applications. Please read carefully.

6303B

A round 3/8" IC, double sided, CBN Insert. An excellent, long life insert for surfacing cast iron heads and blocks -round shape gives many cutting edges on each side of insert. When using a 14" cutterhead (SF, F65, F80) speeds range from 900-1200 RPM. When using an 18" cutterhead speeds range from 600-800 RPM.

6303M

A round 3/8" IC, single sided, PCD Insert. For use on aluminum only - heads and blocks without liners. This insert has a thin layer of PCD applied to a carbide disk. The diamond appears to be a shiny black wafer. The hardness of the diamond resists the abrasive nature of the silica in aluminum heads and blocks. RPM speeds with a 14" cutter range from 900-2000 RPM.

6303U

A round 3/8" IC, single sided, CBN Insert. This insert does an excellent job when cutting hard cast iron blocks and heads of a single material or bi-metal. This insert is the best to use when machining compacted graphite cast iron heads and blocks often found in the performance industry. RPM speeds with a 14" cutter range from 650-750 RPM.

6303K

A round, 3/8" IC, single sided, coated carbide insert. This is a very economical, general purpose insert for surfacing aluminum. It is advisable to use this insert for rough cutting to remove welding or contaminants before. A PCD insert should be used for the final cut to give the super fine finish required for MLS (multi layer steel) head gaskets. RPM speeds with a 14" cutterhead range from 600-1000 RPM.

RS322

A square 3/8" IC carbide insert with a purple ceramic coating. This carbide insert is normally used for high speed boring. It works well as an economical insert for rough surfacing or heavy stock removal of cast iron. A CBN insert should be used for the final finish cut.

6301J

A square 3/8" IC, 1/16" Radius, double sided, CBN Insert. The 1/16" radius of this insert will produce a more accurate (flatter) finish than a round insert typically used for surfacing on F80/F90 Series machines when surfacing large diesel blocks and heads which are high in nickel. The square surfacing insert is intended for F80/F90 applications where it may encounter heavier cuts and greater interrupted cuts. When using an 18" cutter speeds range from 600-800 RPM, and with a 14" cutter speeds range from 900-1200 RPM.

1/2" (12.70mm) Surfacing Inserts

6303P

A round 1/2" IC, single sided, PCD Insert. For use on aluminum only - heads and blocks without liners. This insert has a thin layer of PCD applied to the top of a carbide disk. The diamond appears to be a shiny black wafer. The hardness of the diamond resists the abrasive nature of the silica in aluminum heads and blocks. RPM speeds with a 14" cutter range from 1000-2000 RPM. Requires the purchase of 1/2" negative rake tool holders. The standard Rottler 3/8" IC tool holders will not hold this insert.

6303Q

A round 1/2" IC double sided, CBN Insert. An excellent insert for machining cast iron heads and blocks. Round shape gives many cutting edges on each side of insert. Requires the purchase of 1/2" negative rake tool holders. The standard Rottler 3/8" IC tool holders will not hold this insert.

Bi-metal Surfacing

Cylinder Heads with Pre-combustion Chambers and Aluminum Blocks with Hard Sleeves

Cylinder heads with pre-combustion chambers or aluminum engine blocks with cast iron or steel cylinder sleeves are a challenge to cut and most often require a special cutting insert and special cutting technique. There are many different material combinations so there is not one insert that works the best on all applications. Below is information to use as a guide to the best insert to use and some of the required cutting parameters.

Generally the tool life when using any of these inserts in the cutting of bi-metal surfaces will be short when compared to cutting a single material. The cost of the insert per surfacing job will be higher compared with cutting single materials. The customer must incorporate the higher insert cost into the price charged for the surfacing job.

Another excellent alternative to cutting cylinder heads with pre-combustion chambers is to remove the combustion chamber from the head, surface the cylinder head, then use the Rottler Pre-combustion Chamber Re-seating Tool to machine the combustion chamber counterbore back to OEM specification depth. It is fast and economical to use.

Cylinder Heads with Protruding Valve Seats

Some cylinder heads have valve seats that protrude into the head gasket surface. Valve seats are made out of a wide variety of material. Some are very hard or difficult to cut when compared with the aluminum or cast iron head surface. In many cases it is best to cut the valve seat down below the head surface in a seat and guide machine. This takes a few more minutes when cutting the valve seats but it can save a lot of time and minimize tooling cost when surfacing the head.

The following inserts use Rottler 3/8" (9.52mm) Toolholders supplied with Rottler Surfacing Cutterheads:

6303S

A round 3/8" IC, single sided, CBN Insert. For use on aluminum blocks with iron liners and aluminum heads with steel pre-combustion chambers. When cutting aluminum heads with pre-combustion chambers it is best to use Rottler's spray mist coolant system or Goodson's HPS-10 High Performance Resurfacing Spray. RPM speeds with a 14" cutter range from 650-750 RPM.

6303U

A round 3/8" IC, single sided, CBN Insert. This insert does an excellent job when cutting hard cast iron blocks and heads of a single material or bi-metal. This insert is the best to use when machining compacted graphite cast iron heads and blocks often found in the performance industry. RPM speeds with a 14" cutter range from 650-750 RPM.

6303R

A round 3/8" IC, single sided, CBN Insert. For use on cast iron heads with steel pre-combustion chambers. RPM speed with a 14" cutter range from 600-700 RPM and with an 18" cutter range from 500-600 RPM.

6301I

A square 3/8" IC, double sided, ceramic insert. For use on cast iron heads with pre-combustion chambers. You can make one finish cut and two rough cuts with each new cutting edge. Always use a new edge when making a finish cut. Use 350-500 RPM on a 14" diameter cutterhead.

6301V

A round 3/8" IC, double sided, ceramic insert. For use on cast iron heads with pre-combustion chambers. You can make one finish cut and two rough cuts with each new cutting edge. Always use a new edge when making a finish cut. Use 350-500 RPM on a 14" diameter cutterhead.

Special Toolholder and Insert

7202X

Holder Assembly, Fly Cutter Tool 3/8" (9.525mm) IC (for use with special insert for aluminum cylinder heads with pre-combustion chamber and cast iron heads with soft precups like Land Rover) for use with 7202Z insert only

7202Z

Round Insert, 3/8" gold coated for aluminum cylinder heads with pre-combustion chamber and cast iron heads with soft pre-combustion chambers like Land Rover). Use in 7202X tool holder only. RPM speeds with 14" cutter range from 450-550 RPM and with a 16" cutter, 400-500 RPM.

	One Insert	Two Inserts Set within .0015" - .0003	Two Inserts Set within .0001"
RPM 1000 Feed Rate .002" Per Rev	12 rms	12 rms	10 rms
RPM 1000 Feed Rate .005" Per Rev	20 rms	20 rms	15 rms
RPM 1000 Feed Rate .010" Per Rev	30 rms	30 rms	25 rms
RPM 1000 Feed Rate .020" Per Rev	60 rms	60 rms	40 rms
RPM 1000 Feed Rate .030" Per Rev	90 rms	90 rms	60 rms

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Maintenance

Lubrication

Refer to the illustrations on the following pages.

Horizontal Ballscrew Nut

The horizontal ballscrew nut is located under the Spindle base inside the Main Base.

Every 175 hours, Grease the ball screw nut using **NLGI #2 White Lithium Grease**. Wipe a small amount of grease on the screw just ahead of the nut.

Vertical Ballscrew Nut

The Vertical ballscrew nut is located in the Spindle base inside the cover.

Every 175 hours, Grease the ball screw nut using NLGI #2 White Lithium Grease. Wipe a small amount of grease on the screw 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 **WD-40**. And occasionally **ISO VG 32 Hydraulic 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 **ISO VG 32 Hydraulic Oil**.

Every 175 hours: Add one shot of **NLGI #2 White Lithium Grease**.

Run the spindle down near the lower limit and you will see a flush type grease fitting in the keyway. Add lubrication here. If the inner spindle is removed clean the lower bearing and repack it with grease.

Cleaning The Way Surface

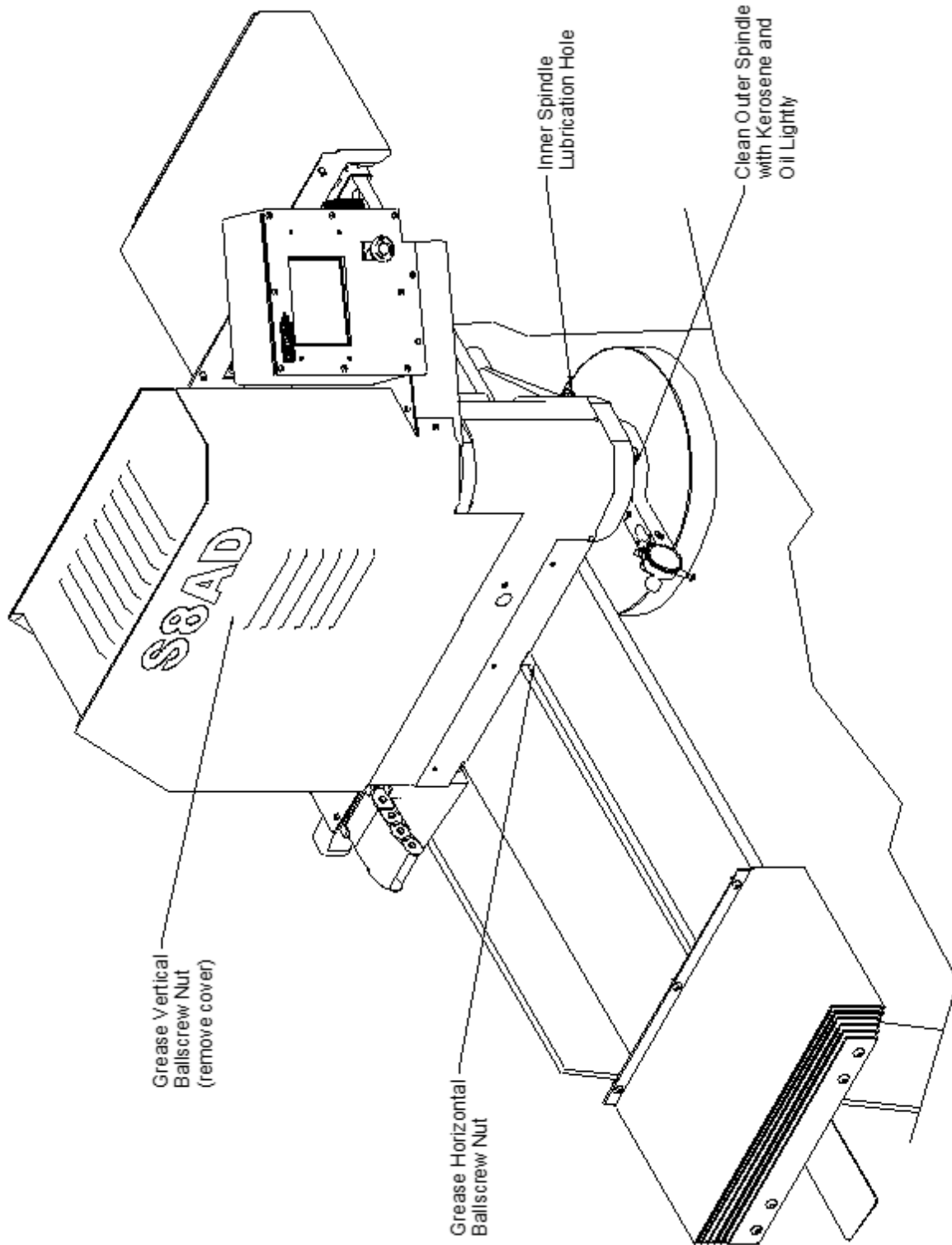
Do not clean way surfaces with abrasive or harsh cleaners, The sliding way material used under the spindle base, must “break in” which will deposit a small amount of the material into the top of the main base. Discoloration will occur in slides. If the way surface is cleaned of these deposits, the “break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

Lubrication – Quick Reference Chart:

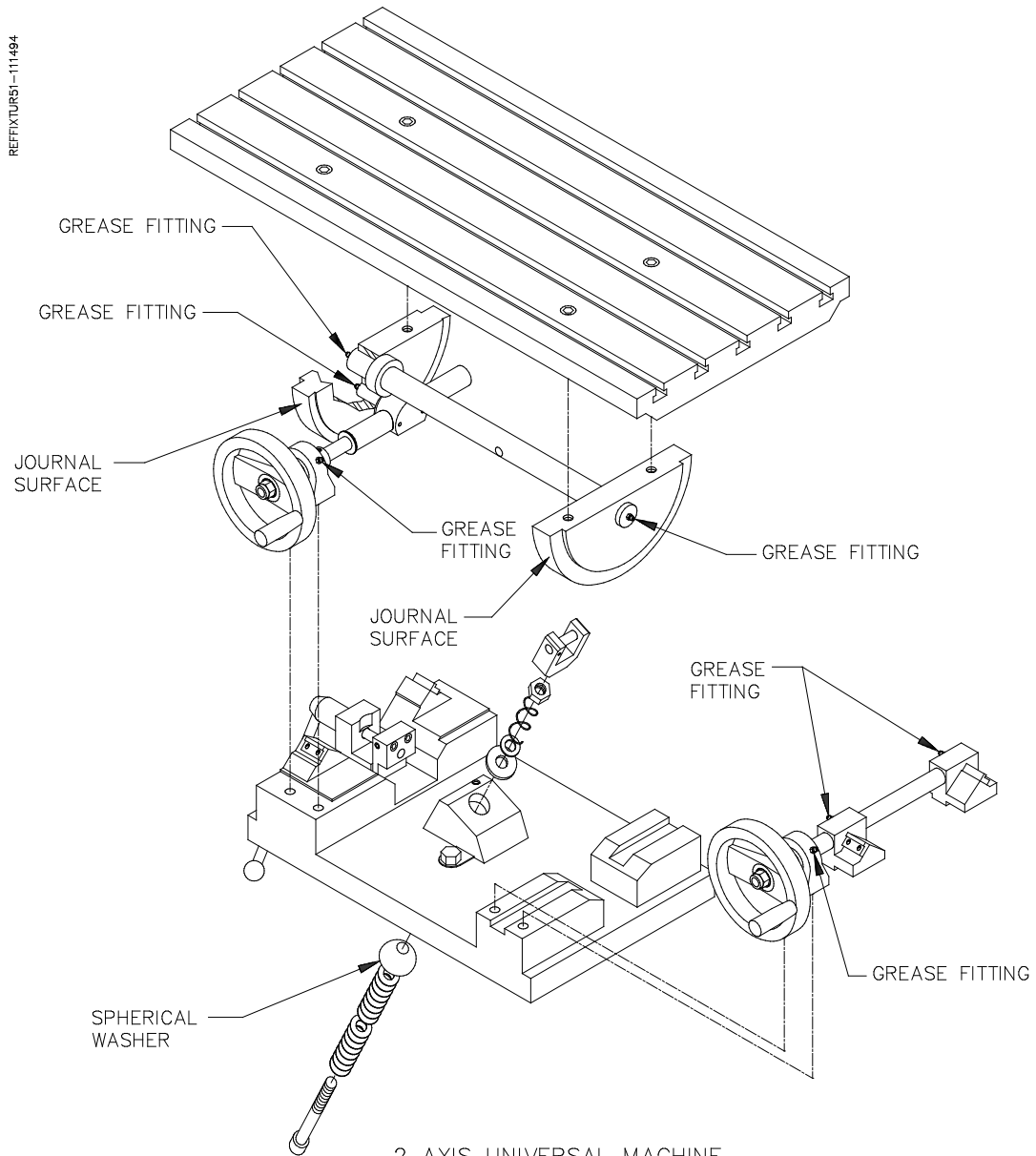
Refer to the previous page for types of lubrication to be used.

Assembly	Frequency	Lube Operation
Horizontal Ballscrew Nut	Every 175 hours	Grease ballscrew nut
Vertical Ballscrew Nut	Every 175 hours	Grease ballscrew nut
Outer Spindle	Every 40 hours	Clean and wipe with oil
Inner Spindle	Every 40 hours	Add 2 to 3 drops of oil
Inner Spindle	Every 175 hours	Add Oil
Way Surface	Every 175 hours	Wipe and oil way surface

S7AD -S8AD Machine Lubrication Illustration



2 Axis Universal Machine Table 7119Q – Lubrication Illustration



2 AXIS UNIVERSAL MACHINE
TABLE 7119Q LUBRICATION

Setting Cutting Tool Inserts

Press the Mill button. Travel the spindle base approximately 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.

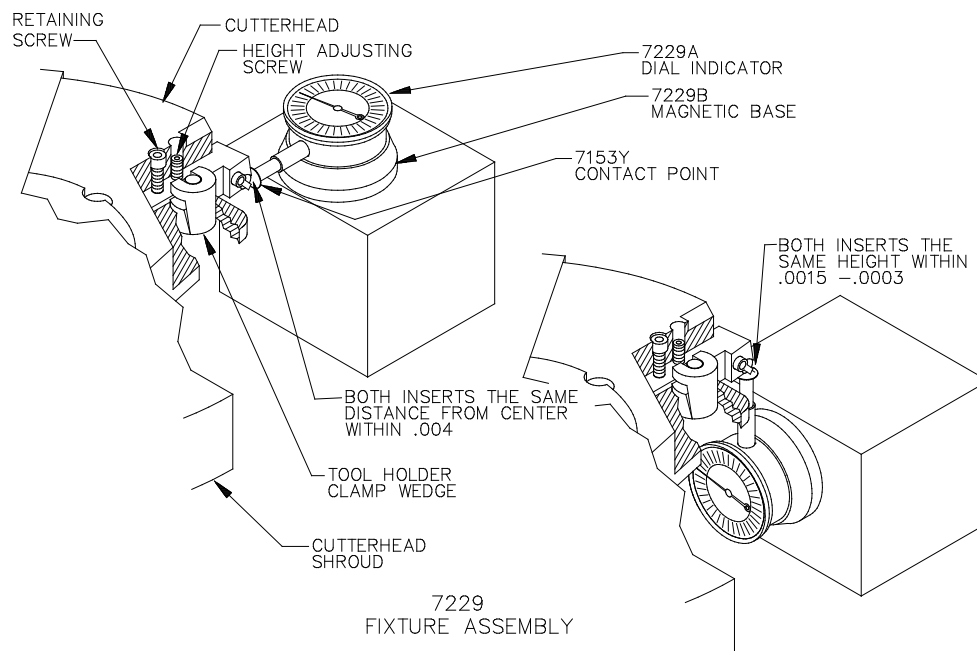
Rotate cutter head and check to see that both inserts are the same distance from the center of the spindle, within .004. If adjustment is necessary loosen the tool holder clamp wedge, and the height adjustment screw. Move tool in or out the required distance. Tighten the clamp wedge. Snug up the height adjustment screw. There is a set screw located at the bottom of the toolholder, it locks a dowel pin in place. When the in-out adjustment is set, loosen the set screw, the pin will pop out and hit the back of the slot. Tighten the set screw. This way, when a tool holder is removed and then replaced, it will be located very nearly where it was. Insert height will still need to be adjusted.

Rotate cutter head and check to see that both inserts are the same height within .0015-.0003. If adjustment is necessary loosen the tool holder clamp wedge, then alternately loosen and tighten the height adjusting screw and the retaining screw, until both inserts are set as desired. Retighten the tool holder clamp wedge, and recheck both inserts.

Production Cutting

Aluminum & Cast Iron

For fast tooling set-up, this machine can be set-up with one cast iron cutting insert and one aluminum cutting insert. Set the cast iron insert with no down or out adjustment. Set the aluminum style insert .02 further out and .005 lower than the first insert. With the cutter head set up this way, aluminum work can be easily cut. To cut cast iron simply remove the aluminum cutting insert from its holder.



Dial Indicator Setting

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

To reset press the up/down adjust button. With the surfacing cutter in the fore and aft position, press the left travel button until the cutterhead overlaps a test piece by about 1/2" when rotated.

CAUTION Turn off all power to the machine whenever handling the cutter head.

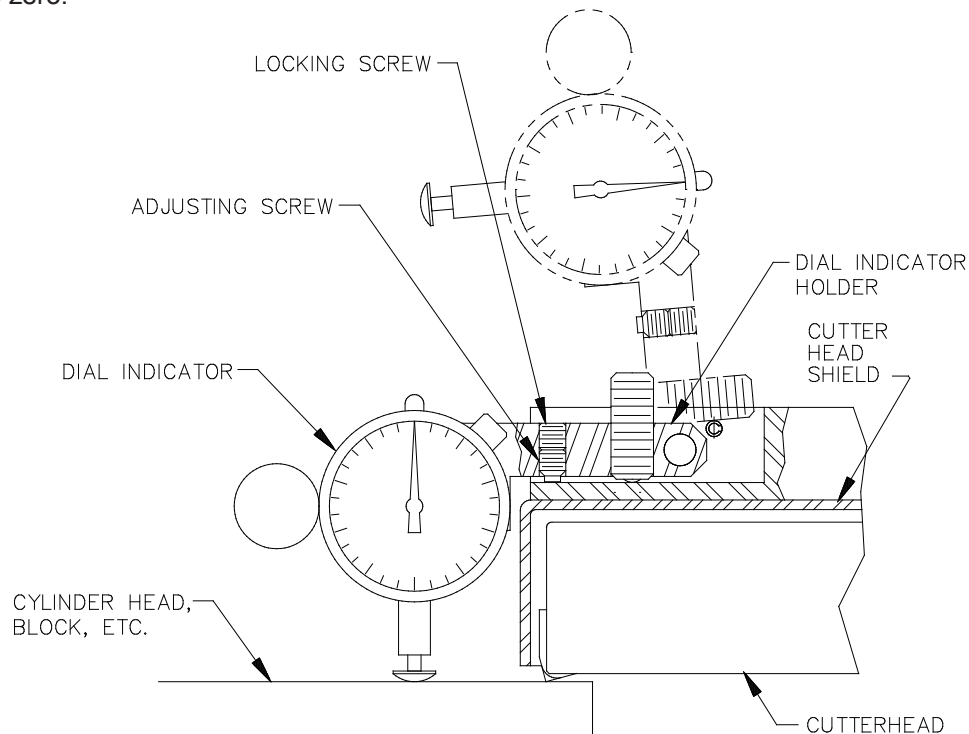
Touch off surface, by turning hand wheel clockwise until cutter insert just touches test piece surface when rotated back and forth.

Note: Do not lower the cutter head directly onto surface, it may chip the cutting tool insert.

Make a very light cut on your test piece about one inch in. Back out and without adjusting the height press the dial indicator down on this surface. Adjust it by: Removing the lock screw. Then turn adjusting screw up or down until the dial indicator is half way between its minimum and maximum range.

Replace the lock screw and tighten firmly.

Set dial to zero.

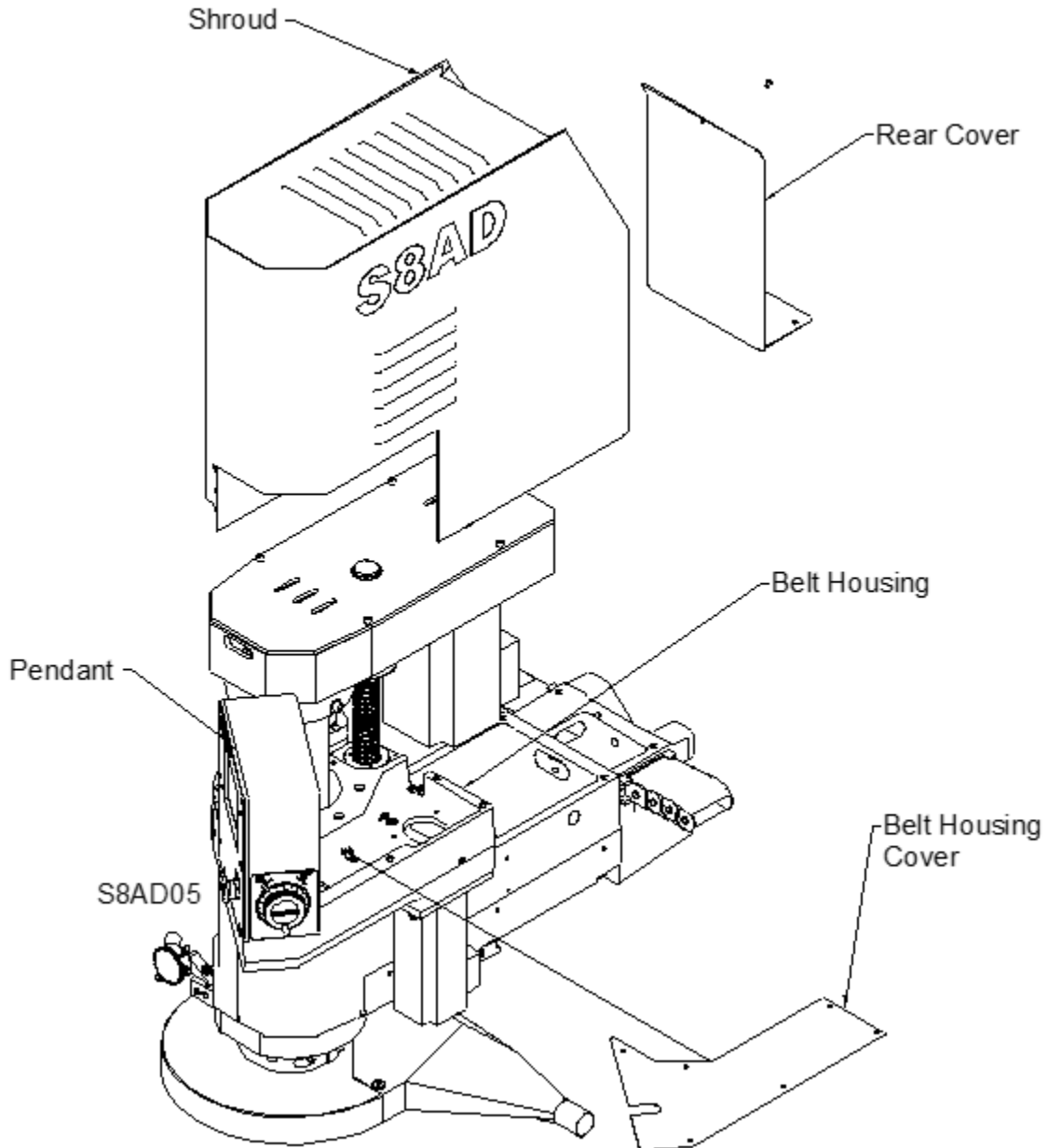


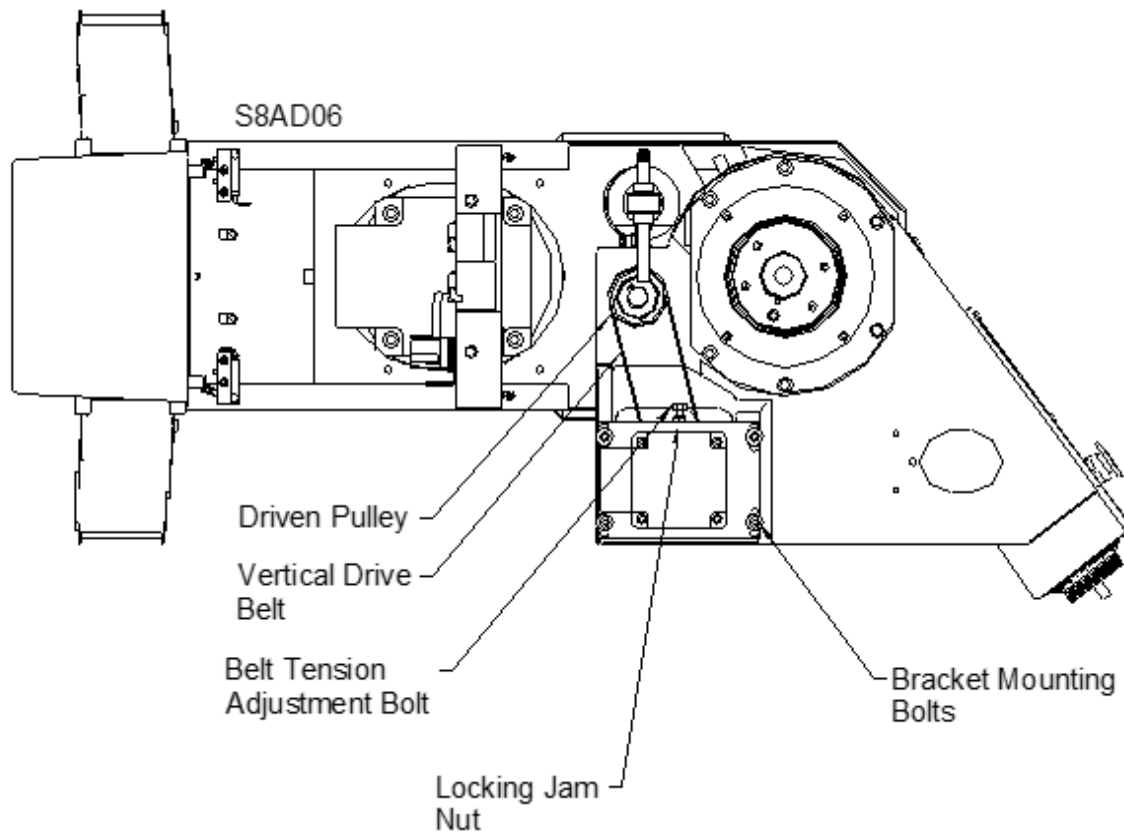
Vertical Travel Belt Removal, Replacement and Adjustment

CAUTION Turn off all power to the machine before continuing.

Remove six screws from the belt housing cover, and lift it off.

Remove the access panel at the rear of the machine shroud. Remove the six screws mounting the shroud to the machine. Four screws are located inside the enclosure and are accessed through the rear opening. The other two screws are in the front and the front right side, from the outside. Lift cover off the machine carefully. (As cover is lifted slide forward and up to clear motor and belt case.)



Vertical Travel Belt

Loosen the four bracket mounting bolts.

Loosen the locking Jam nut.

Turn the Belt Tension adjustment bolt CW until you can slide the mounting bracket all the way forward.

Remove belt.

Follow this procedure in reverse order to install the belt.

Adjust belt for .12" (3.17 mm) deflections when 3 to 4 lbs. (6.61 to 8.82 kg) pressure is applied.

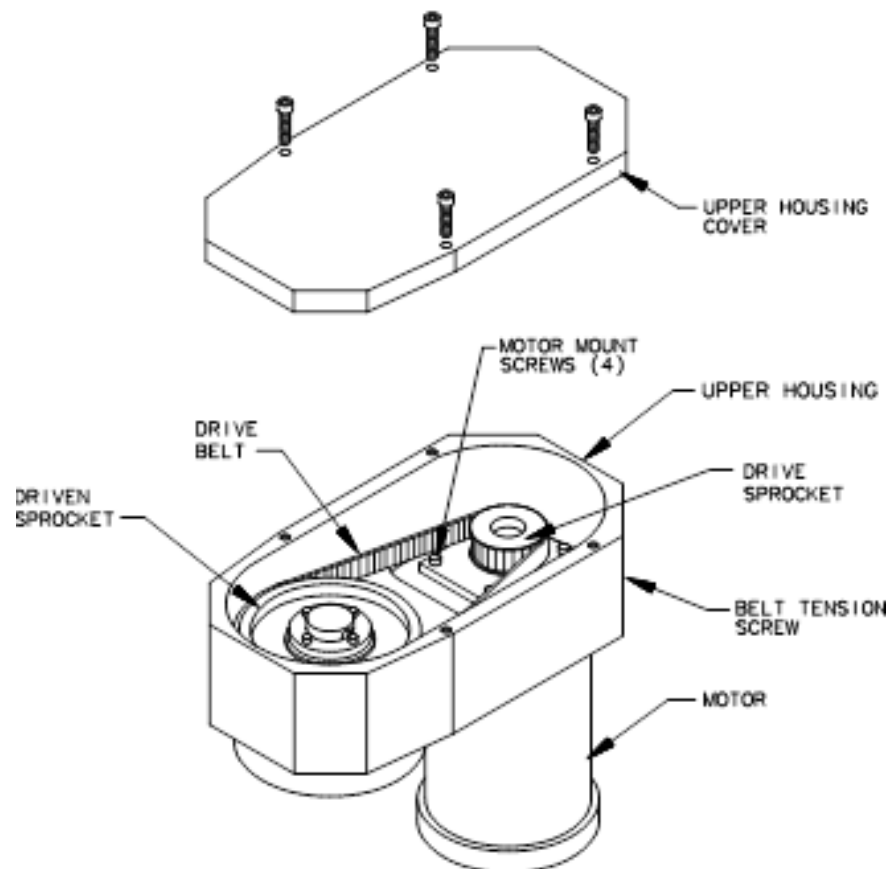
Drive Belt Replacement



Turn off all power to the machine before continuing.

Remove the access panel at the rear of the machine enclosure. Remove the six screws mounting the enclosure to the machine. Four screws are located inside the enclosure and are accessed through the rear opening. The other two screws are in the front and the front right side, from the outside. Lift cover off the machine carefully. (As cover is lifted slide forward and up to clear motor and belt case.)

- 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.
- Replace the machine enclosure and tighten the mounting screws.



Drive Sprocket / Motor Removal and Replacement



Turn off all power to the machine before continuing.

Removal of Drive Sprocket

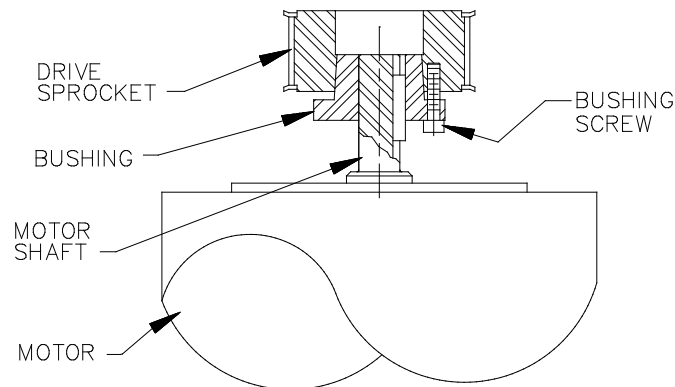
(Small sprocket)

- Remove the upper housing cover, and drive belt.
- 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 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 Removal and Replacement



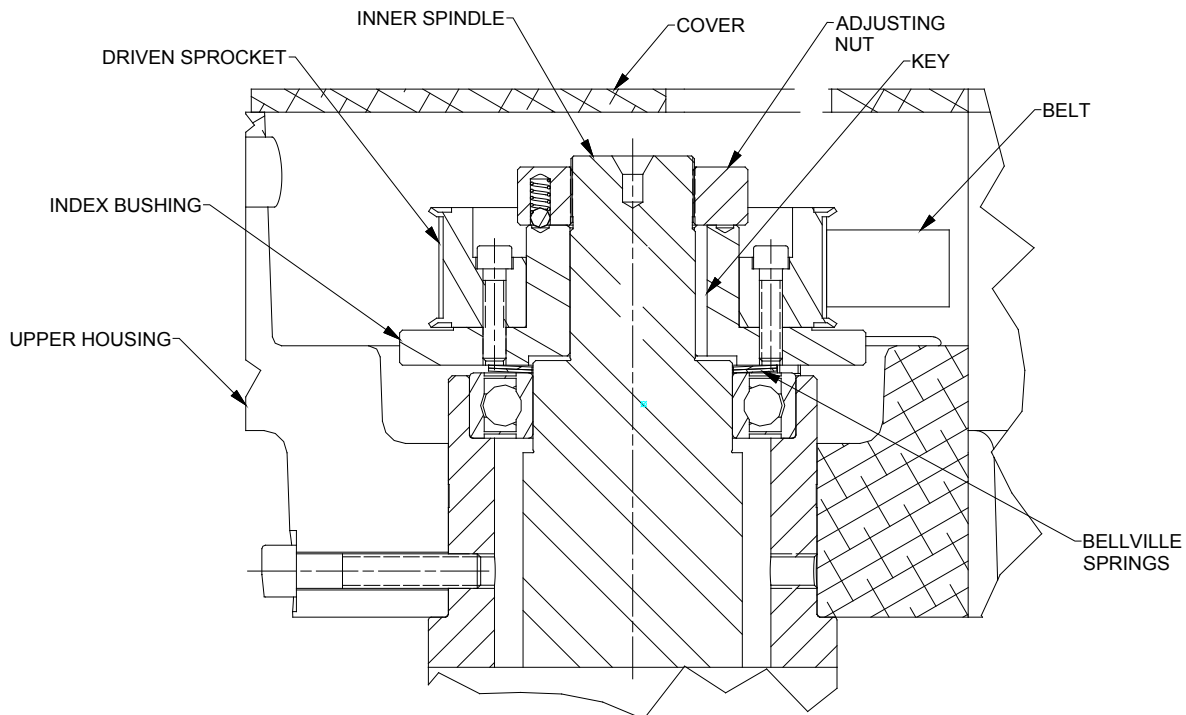
Turn off all power to the machine before continuing.

Removal of Driven Sprocket

- Remove the upper housing cover, and drive belt.
- Remove the adjusting nut using a 5/32 (4mm) diameter Rod through the slot in the upper housing. Once the nut is removed the index bushing and the sprocket can be lifted off. Note the position and arrangement of the two Belleville springs below the index bushing.

Replacement of Driven Sprocket

- Clean bushing, and sprocket. Do not use any lubrication on bushing, sprocket, or screws.
- Assemble the sprocket back onto the index bushing. Slide the index bushing and key back onto the inner spindle, making sure the Belleville springs are in place. Install the adjusting nut back on the inner spindle and adjust per inner spindle adjustment procedure.
- Replace drive belt, and adjust, as indicated in drive belt replacement.
- Replace upper housing cover and tighten the four screws.

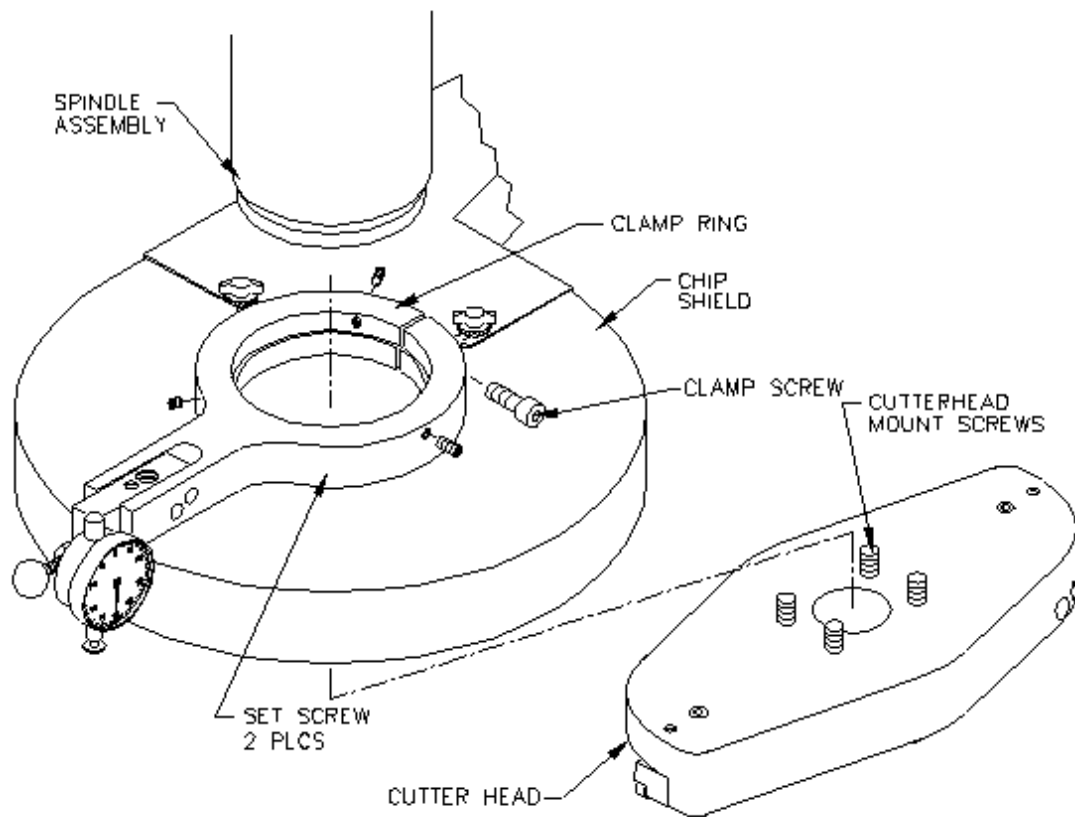


refdriven sprocket assembly-6/21/2008

Cutterhead and Chip Guard Removal

CAUTION Turn off all power to the machine before continuing.

- Mark cutterhead and spindle so they can be reassembled in the same position.
- Remove cutterhead by removing its four 3/8-16 screws. Remove chip guard by removing its two 1/4-20 set screws that go into the clamp ring at an angle, and loosen the 3/8-16 cap screw in the split line of clamp ring.
- Remove cover.

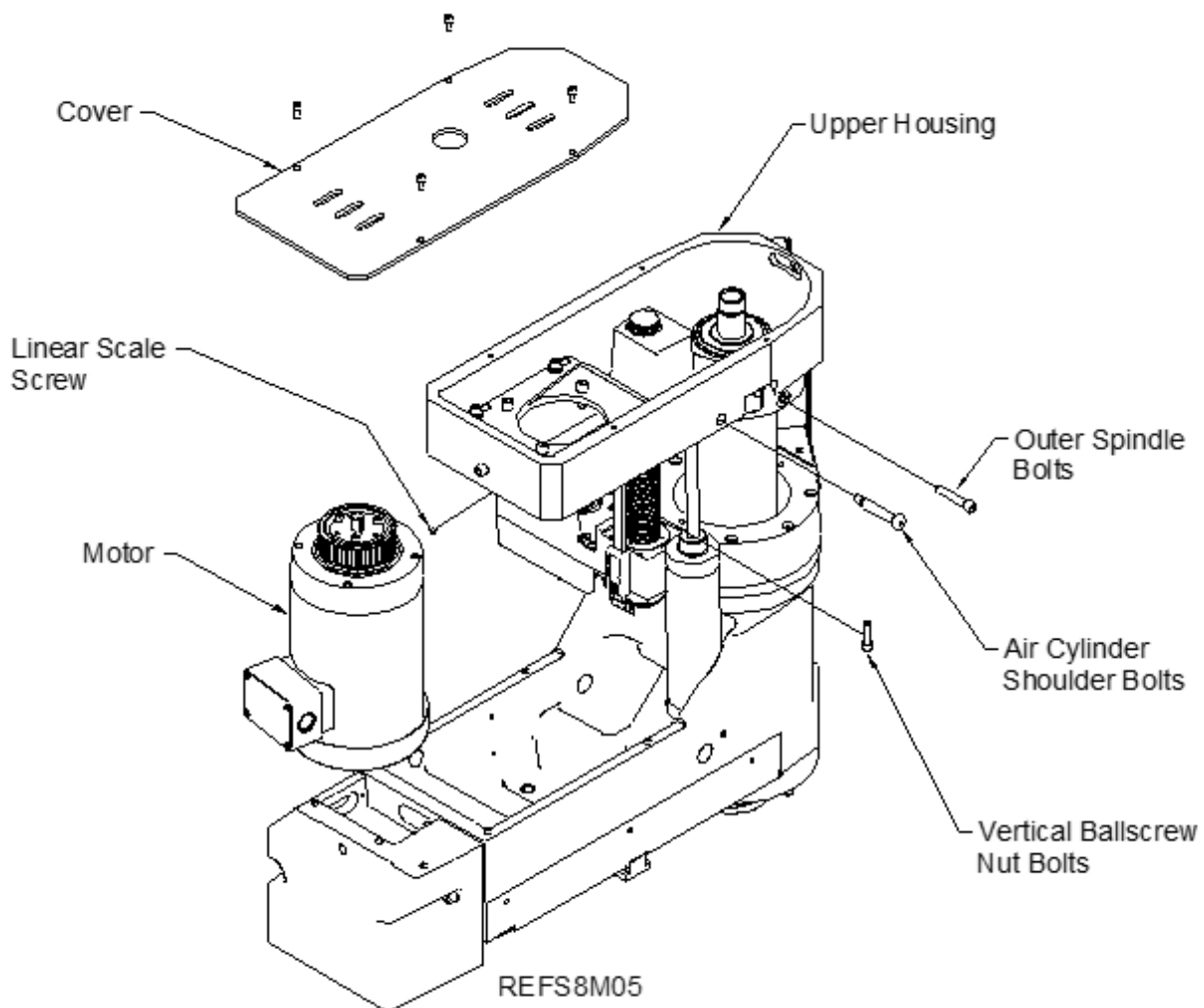


Upper Housing Removal



Turn off all power to the machine before continuing.

- Remove the Drive Belt, Motor and Driven Sprocket and described earlier in this chapter.
- Remove the shoulder bolts holding the top of the air cylinder to the upper housing. Compress the air cylinder and lay it out of the way.
- Remove the screw holding the top of the Linear Scale on to the Upper Housing.
- Remove the four (4) bolts holding the vertical ballscrew nut to the Upper Housing.
- Remove the three bolts, located at the top of the Outer Spindle. The Upper Housing will lift off. It may require some heat as you lift to get it off.
- Reassembly is the opposite of disassembly. Be sure the Outer Spindle and Upper Housing mating surfaces are clean and free from burrs.

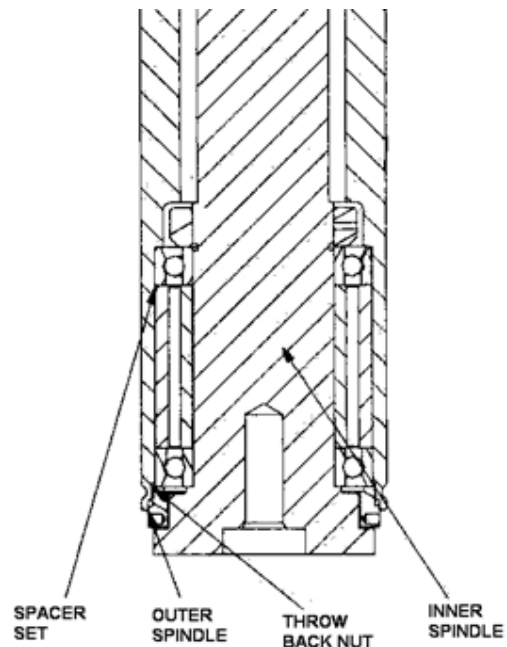
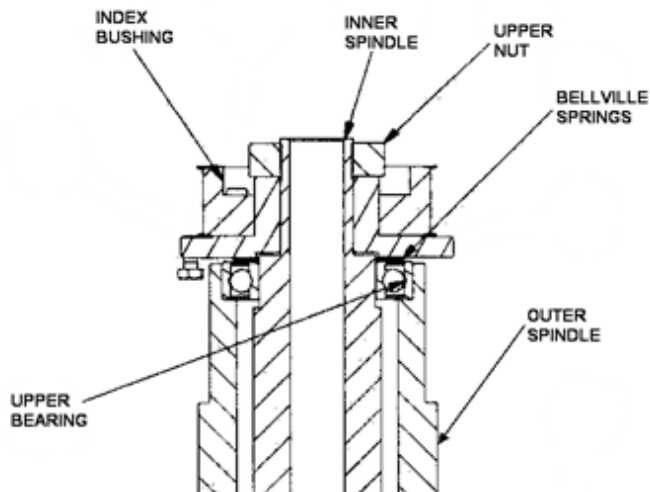


Inner Spindle Removal



Turn off all power to the machine before continuing.

- Remove the upper housing cover, and drive belt.
- Remove the driven sprocket.
- Remove the cutterhead and chip guard.
- Crank spindle up to its full up position.
- Insert a rod or punch through this opening and into the upper adjusting nut. Holding the cutterhead, loosen this nut by turning it counter-clockwise. Remove nut, index bushing (7246C), key (6062), and two Belleville spring washers (7052).
- Thread upper adjusting nut 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 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.

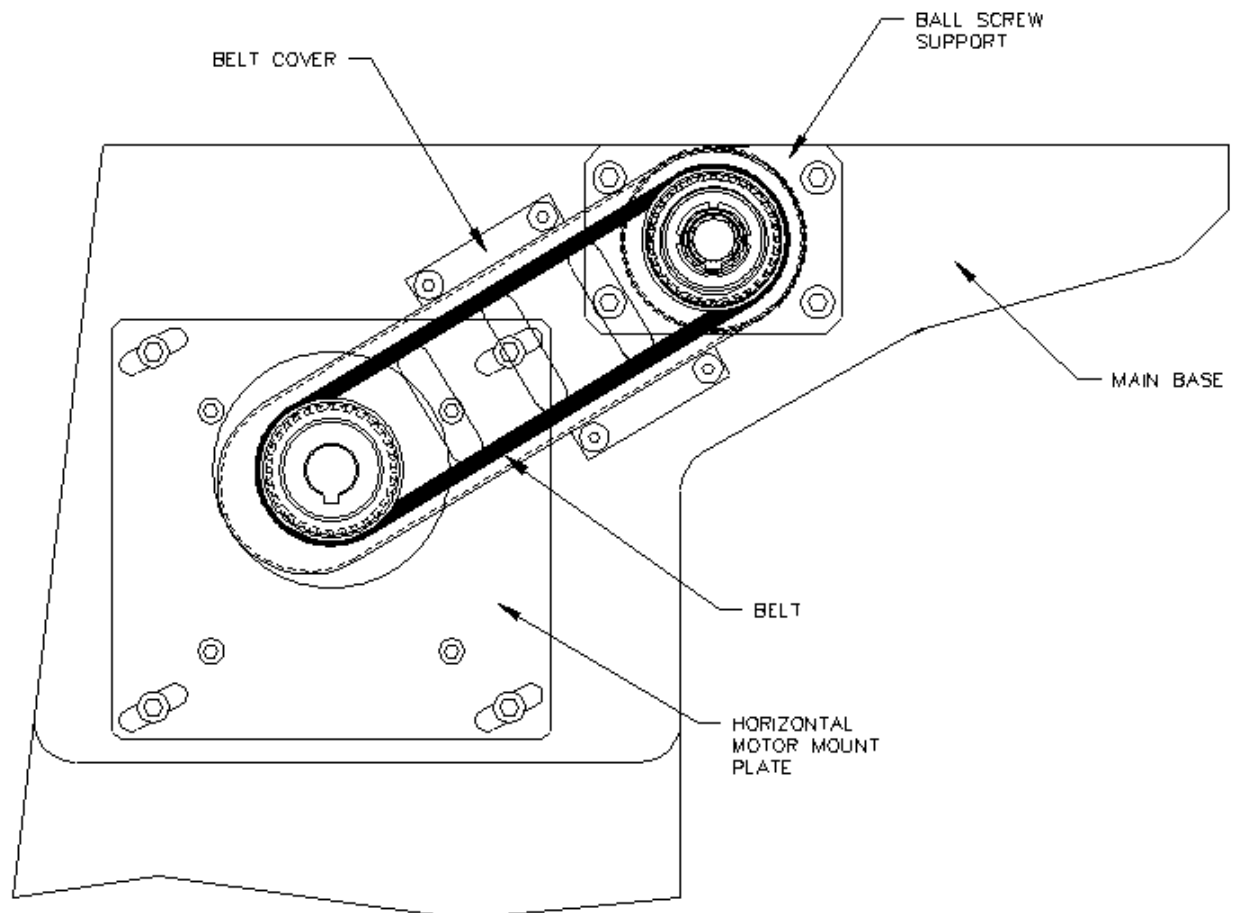


Horizontal Ball Screw and Belt Alignment and Adjustment



Turn off all power to the machine before continuing.

- The Way Covers do not need to be removed to align the ballscrew or adjust the belt tension. They can be accessed underneath the way covers at each end.
- Move the spindle unit to the middle of it's travel.
- Loosen the four mounting bolts on the Horizontal Motor Mount Plate.
- Remove the belt.
- Loosen the four mounting bolts on both of the ballscrew supports (one at each end).
- Move the machine to the home position (all the way right). Tighten the four mounting bolts on the right hand ballscrew support.
- Move the machine to it's full left hand travel. Tighten the four mounting bolts on the left hand ballscrew support.
- Install the belt onto the ballscrew and motor pulleys. The motor mount bolts should still be loose at this point.
- Let the weight of the motor tighten the belt. This is sufficient tension on the belt. Tighten the four motor mount bolts.

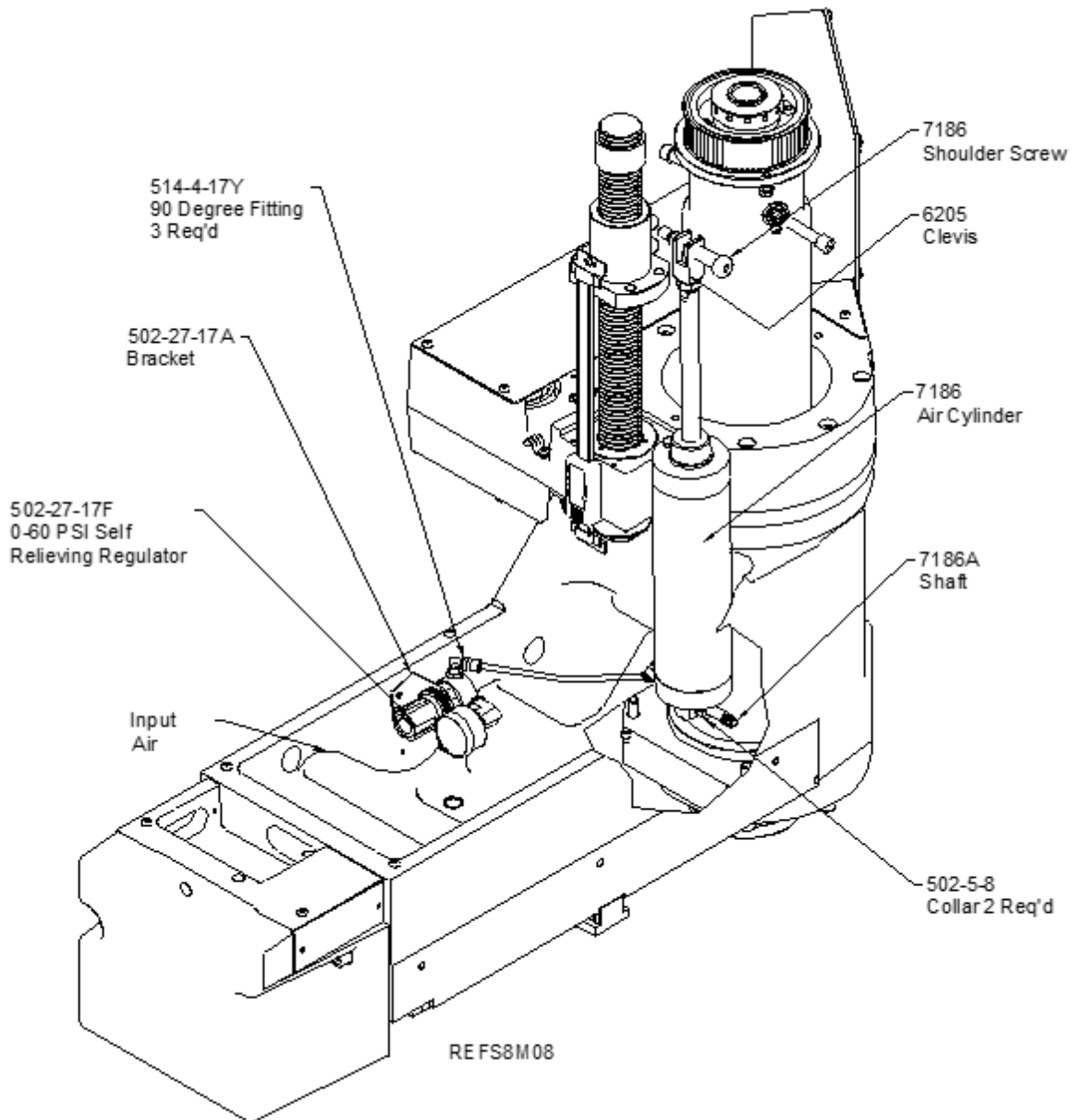


Air Adjustment of the S7AD–S8AD Machine

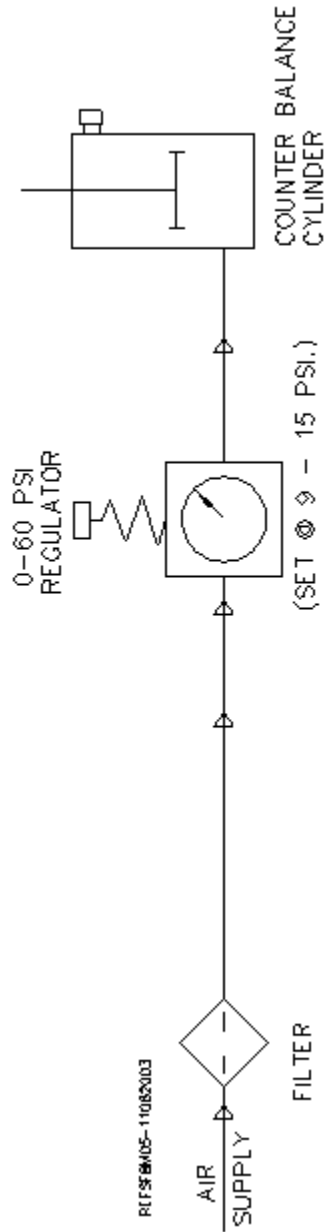
The Regulator for the counter balance air cylinder is located in the Spindle Base. Remove the rear cover to access the regulator. This pressure should be approximately 9 to 15 PSI.

Note: Maximum 20 PSI

Air Adjustments Illustration



Pneumatic Control Diagram



Cutterhead Tilt Adjustment

Remove all work pieces, fixturing and parallels, from the lower surface of the main base. Travel the spindle unit over to the center of the main base.

CAUTION Turn off all power to the machine before continuing.

Remove one tool holder from the cutterhead. Insert 7202J holder, fitted with a dial indicator, in the open tool holder slot. Using the handwheel, adjust the cutterhead down until you are in the middle of the dial indicator's range. The dial indicator will be indicating from the lower deck surface. Zero the dial indicator. Manually rotate the cutterhead clockwise. The left, leading edge, of the cutterhead should be .0025 to .004 inch lower than the right, trailing edge, of the cutterhead.

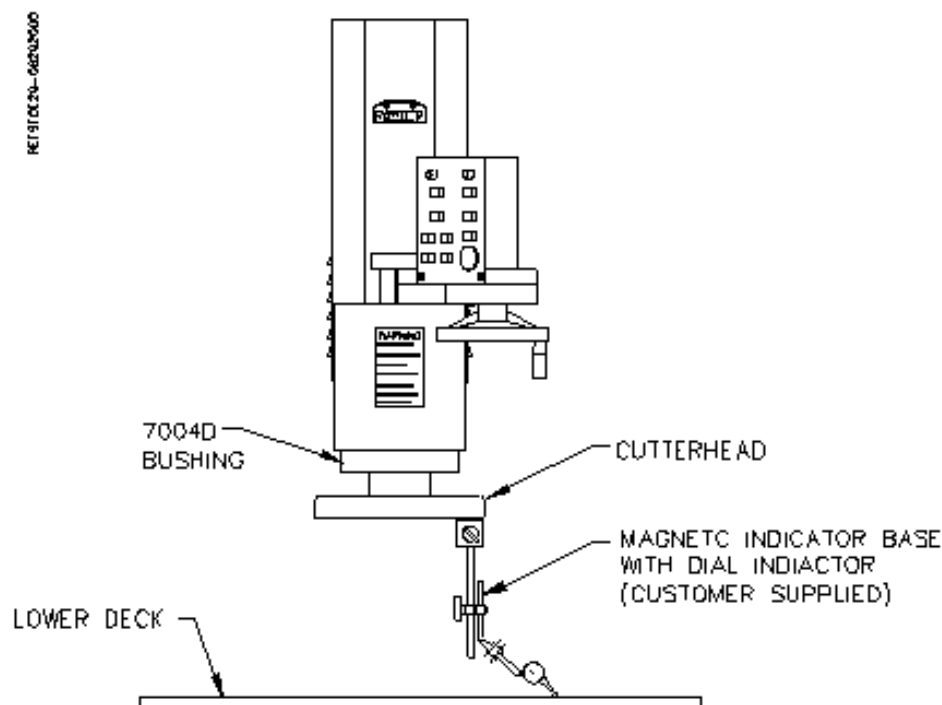
If the tilt is not within this tolerance, it will need to be adjusted. Loosen the six allen head bolts holding the 7004D bushing to the bottom of the spindle base. Snug the bolts up very lightly.

Use the three set screws, located just above the lower bushing, near the lower edge of the spindle base, to move the bushing for the proper tilt. If the spindle needs to tilt to the left, loosen the left set screw and tighten the right, the opposite is true if the tilt needs to be to the right.

Tighten the six allen head bolts firmly, Snug all set screws to prevent them from backing out.

Recheck tilt with dial indicator to be sure it is correct.

Remove the indicator holder from the cutterhead. Replace tool holder. Turn the power back on and operate normally.



Outer Spindle Adjustment

The main spindle bearings are tapered split cast iron rings, held in a seat by an adjustment nut. These bearings normally require no adjustment for many surfacing cycles.

CAUTION: Be careful not to over tighten these bearings. An over tight condition only serves to wear out the machine and make control operation difficult.

If it is necessary to adjust, see the following instructions:

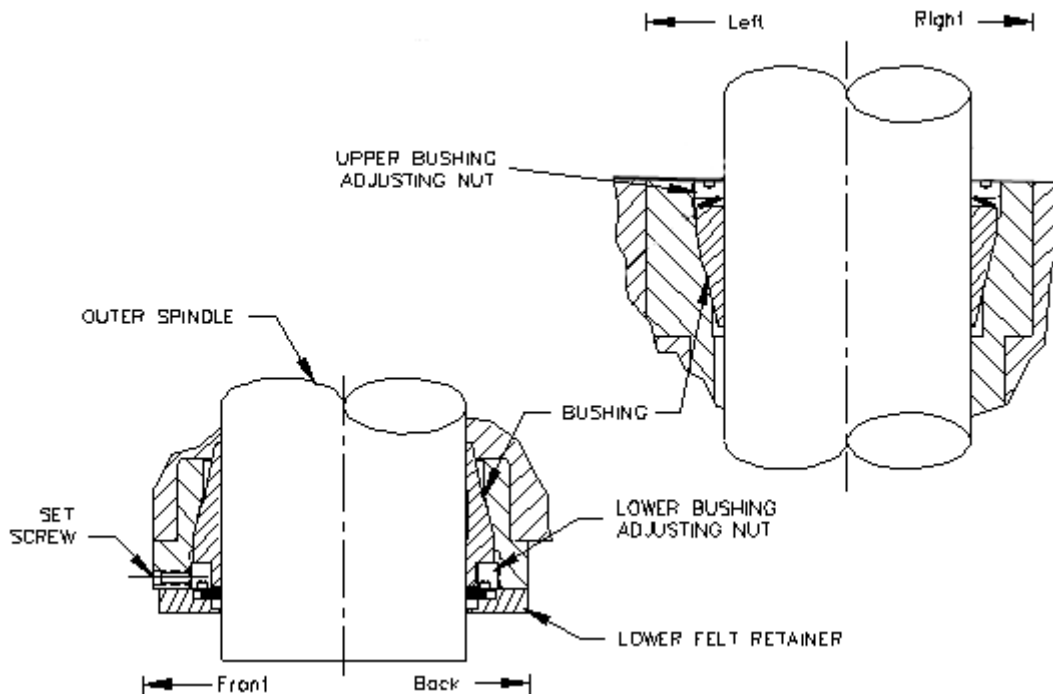
Move the spindle base to a clear position making sure the spindle can travel its full vertical length. Thoroughly clean and lightly oil the Outer Spindle before adjustment.

Remove the lower wiper retainer ring along with the wipers and felts to expose the lower spindle bushing adjustment nut.

Loosen the set screws located on the front of the upper and lower portion of the Spindle Base. Loosen the upper and lower bushing adjustment nuts to remove any pressure on the bushings. Tighten the upper and lower adjustment nuts evenly until they are lightly touching, but have no load on them.

Move the spindle down 3-4". Tighten the upper bushing. Tighten only by hand.

Move the spindle up. Tighten the lower bushing. Tighten only by hand.



Inner Spindle Adjustment



CAUTION

Turn off all power to the 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 its 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 to 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.



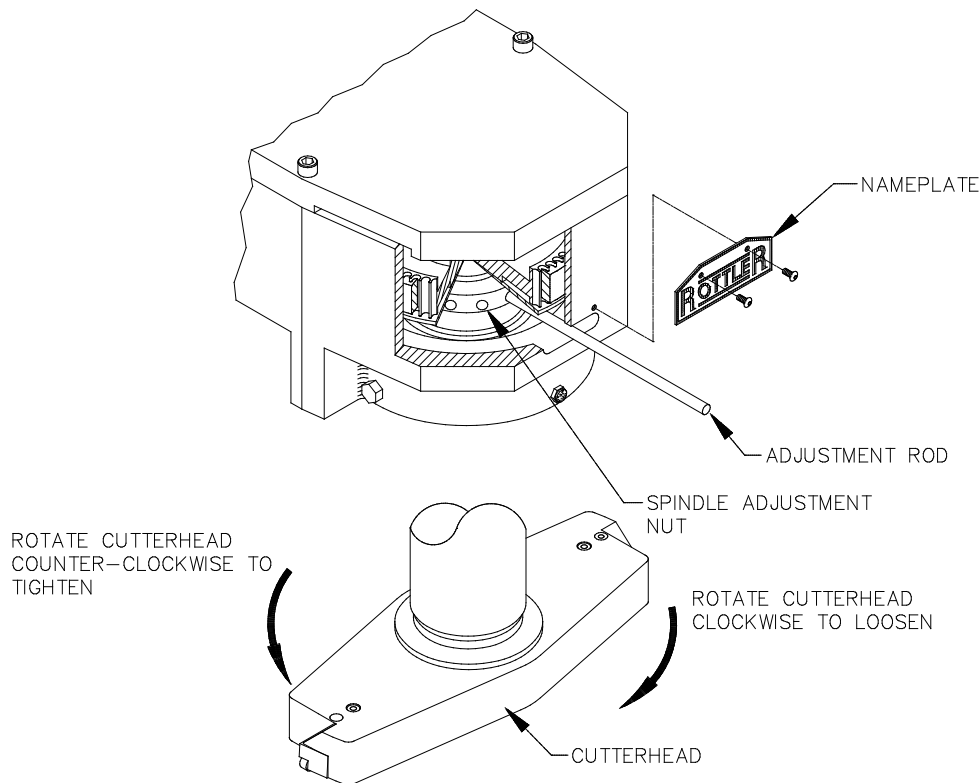
CAUTION

Do not over tighten or severe bearing damage will occur.

Turn the cutterhead clockwise one or two detents.

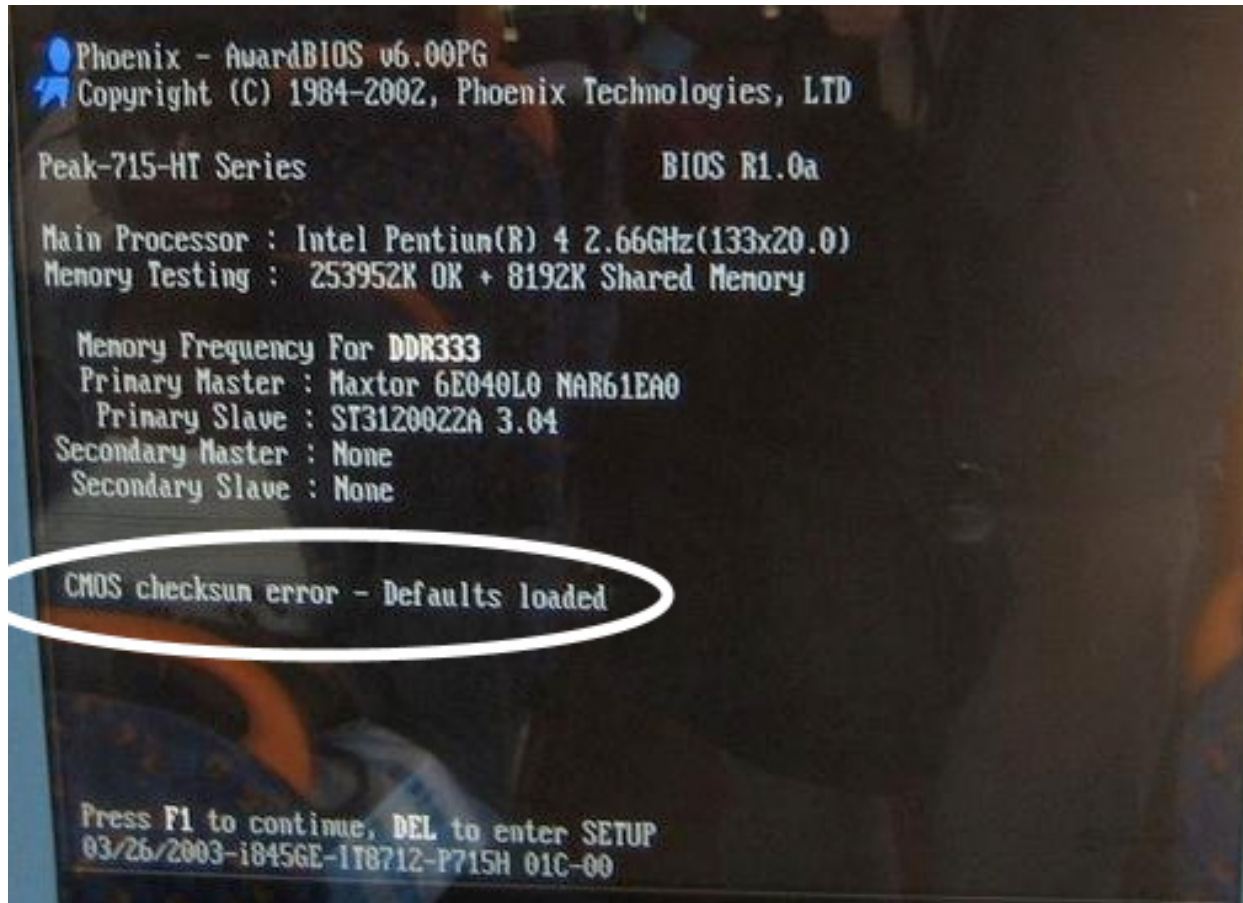
Remove the adjustment rod and replace the nameplate

REFSFOE22-111694



Replacing the Motherboard Battery

If computer fails to boot up and you get a CMOS error message on the screen, then the battery on the computer motherboard has failed and needs to be replaced.



The following is the procedure for replacing the motherboard battery.

Turn off the power on the electrical enclosure and remove the enclosure cover.



Locate the computer and check to see that the power light is not on. If it is on turn off the power switch.
Note: On some machines it may be necessary to unbolt the computer from the enclosure in order to gain access to the cover screws.

Remove the 6 screws indicated by the arrows from the cover.

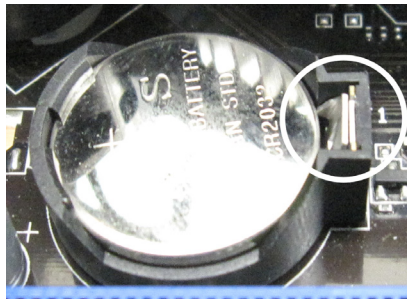
Remove the cover.



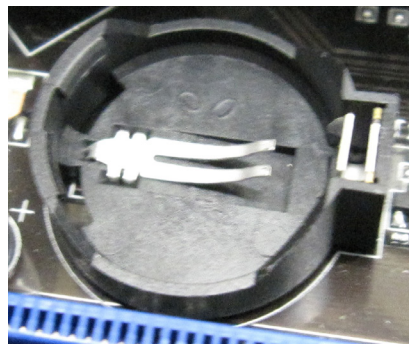
Locate the battery on the motherboard.



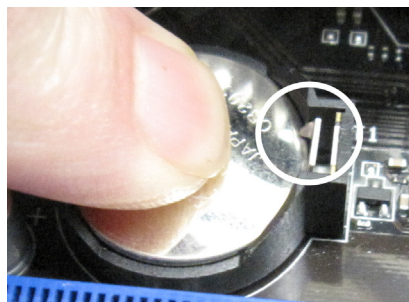
Push the battery retention clip away from the battery. When the clip is released the battery will pop up.



Remove the battery and place new battery in the battery holder.



Using your finger tip push down on the battery until the retention clip is in its lock position.



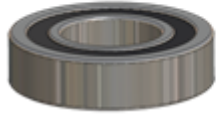
Replace computer cover and make sure that power switch on the computer is on.
Replace the enclosure cover and switch power back on.

Alignment Definitions for Angular Bearings and Belleville Washers

Bearing Alignment

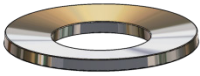


VIEW OPEN END UP



VIEW CLOSED END UP

Belleville Washer Alignment



VIEW CUP UP



VIEW CUP DOWN

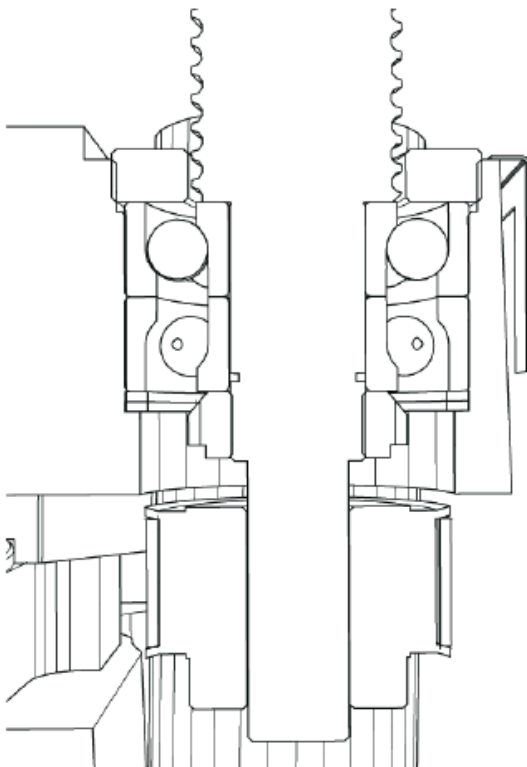
Z-Axis Vertical Ballscrew Lower Bearing Stacking Order



Install 1st bearing with open end up.

Install 2nd bearing with closed end up.

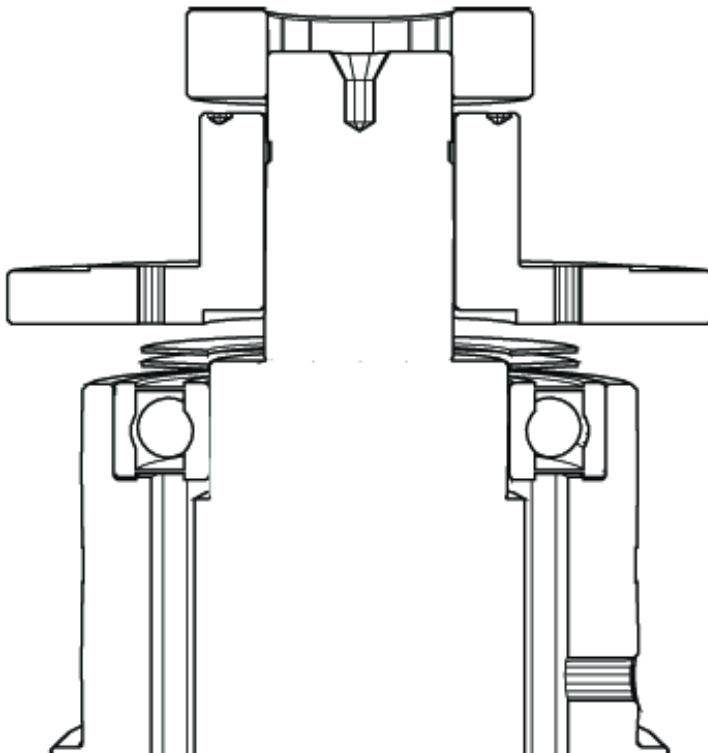
Z-Axis Vertical Ballscrew Lower Bearing Section View



Inner Spindle Upper Section Belleville Washer Stacking Order



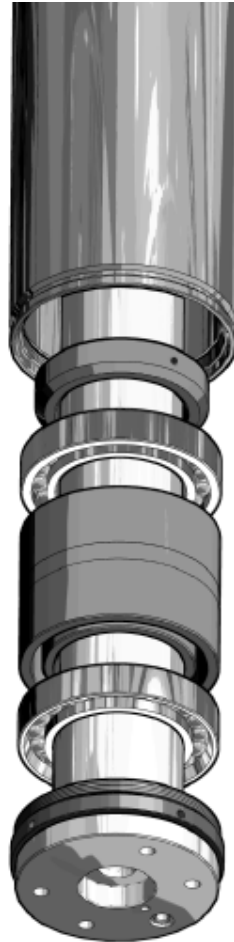
Inner Spindle Upper Section Belleville Washer Section View



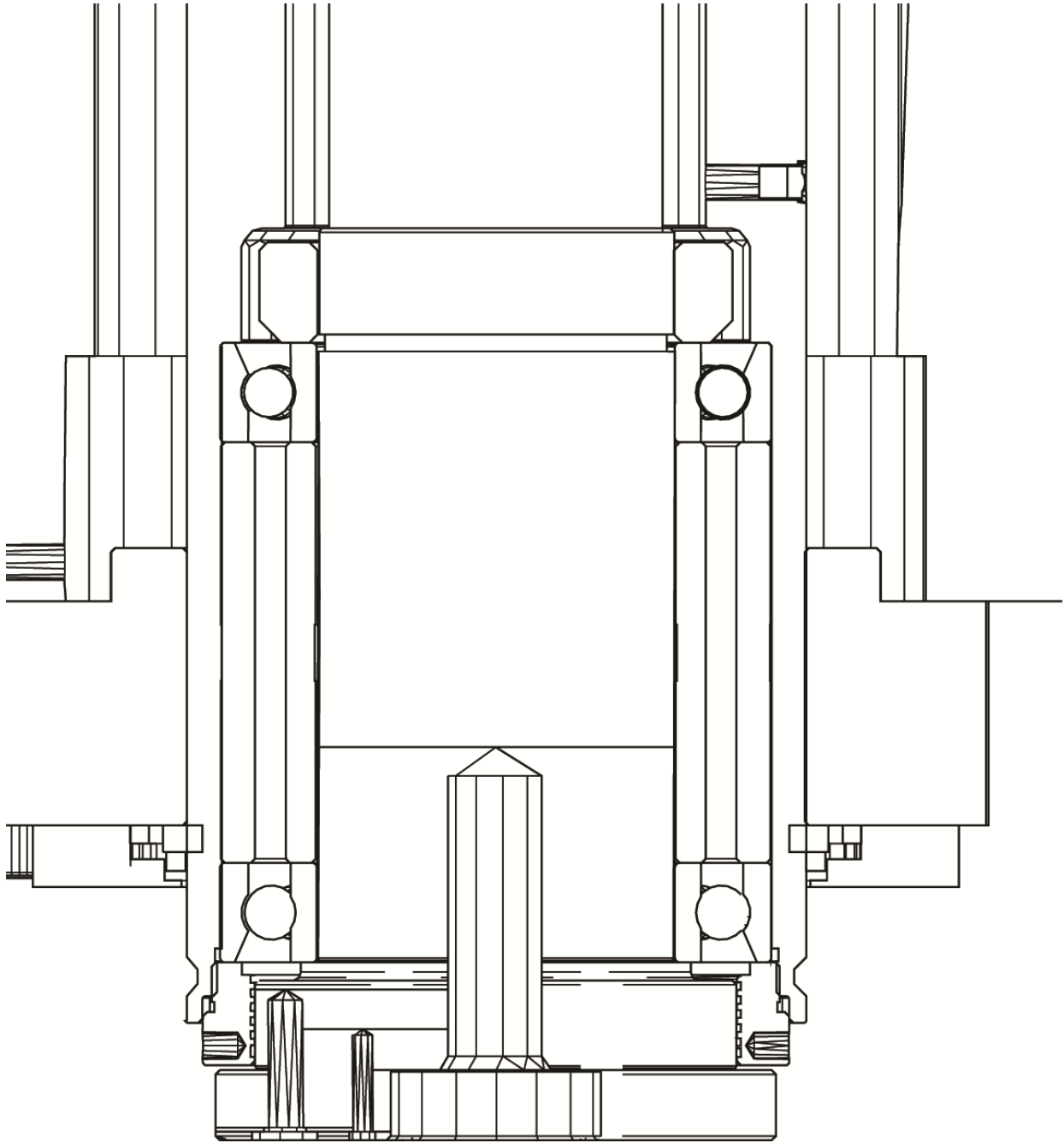
Inner Spindle Lower Section Bearing Stacking Order

Install 2nd bearing with closed end down.

Install 1st bearing with open end down.



Inner Spindle Lower Section Bearing Section View



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TROUBLESHOOTING

Problem:

Icon on screen does not move to area touched.

Solution:

Follow the procedure below to recalibrate the touchscreen.

1. Get to the Alignment screen.
 1. If an Elo icon is available in the tool tray at the lower right side of the desktop, click it, then click Align.
 2. Otherwise, go to the Windows Control Panel, double-click Elo Touchscreen and click the Align button on the General tab.
 1. If Windows XP and no Elo icon, click the "Switch to Classic View" button on the left
 2. If Windows 7 and no Elo icon, look for "View by: Category" text toward the upper right; click it and select "Small icons"
2. Touch and release the upper left target; the target should jump to the lower right.
3. Touch and release the lower right target; the target should jump to the upper right.
4. Touch and release the upper right target; a check screen should appear.
5. Touch and release the green check mark; the check screen should disappear.
6. The cursor should now jump to the point of touch.
7. If the Elo Control Panel is open, close it and the Windows Control Panel.

For further assistance in troubleshooting:

Please visit the service tab of our web page at Send a Service Request www.rottlermfg.com or contact the Rottler Factory Service at service@rottlermfg.com for assistance and your service request.

You may also call Rottler at 1-800-452-0534 or 1-253-872-7050

Please ensure you have the Machine Model and Serial Number available when contacting Rottler for Service

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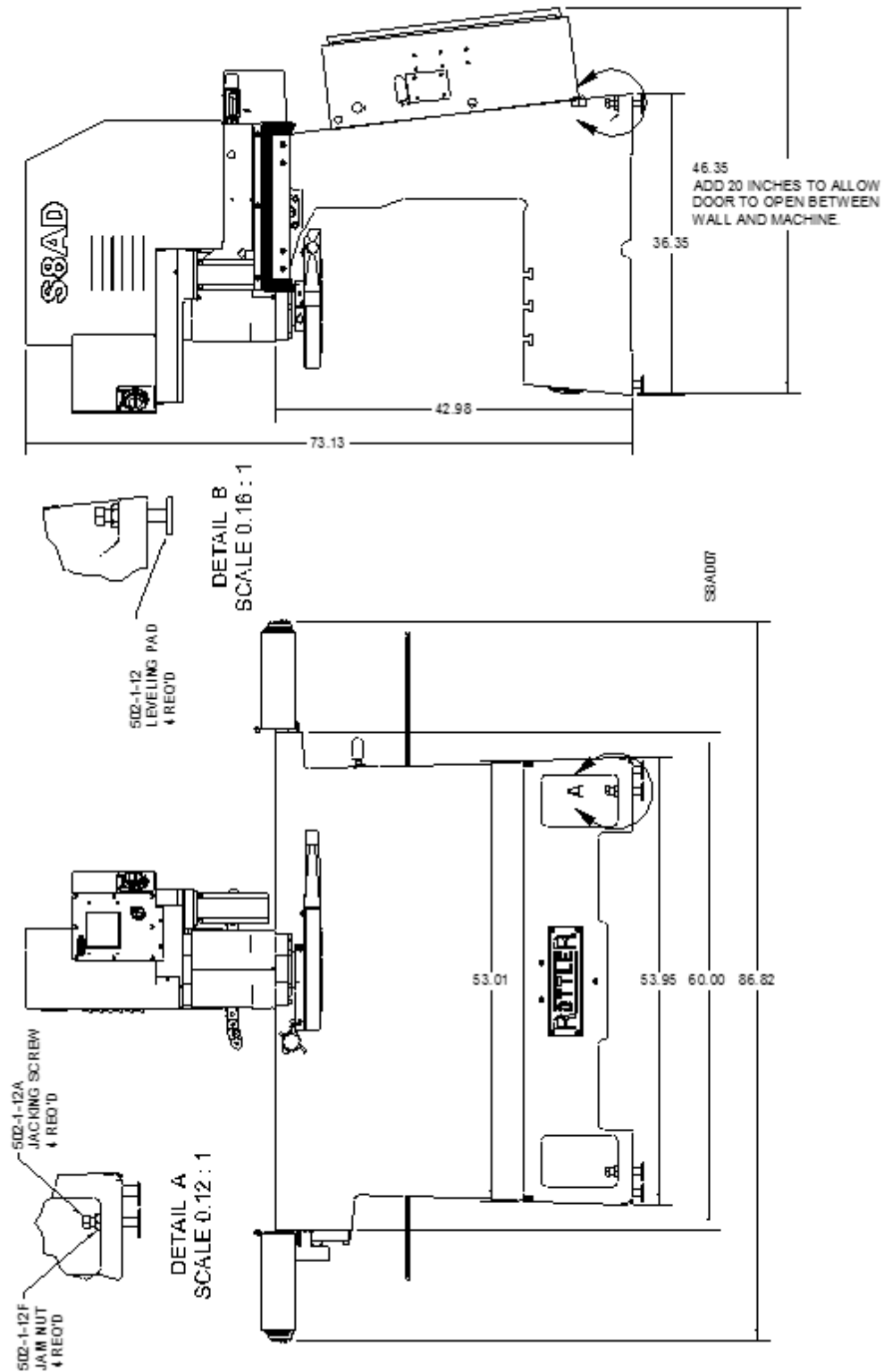
MACHINE PARTS

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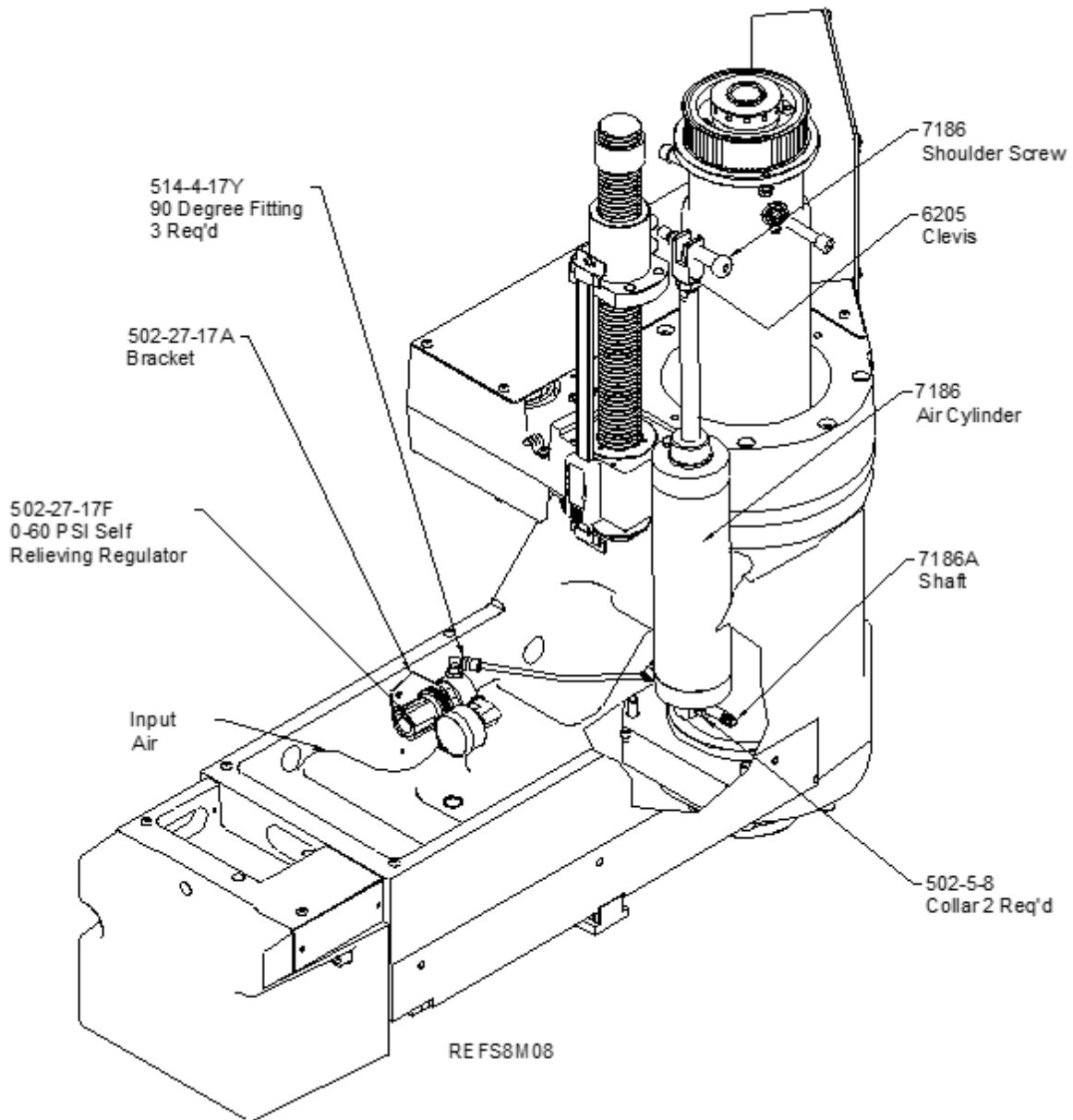
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Machine Parts

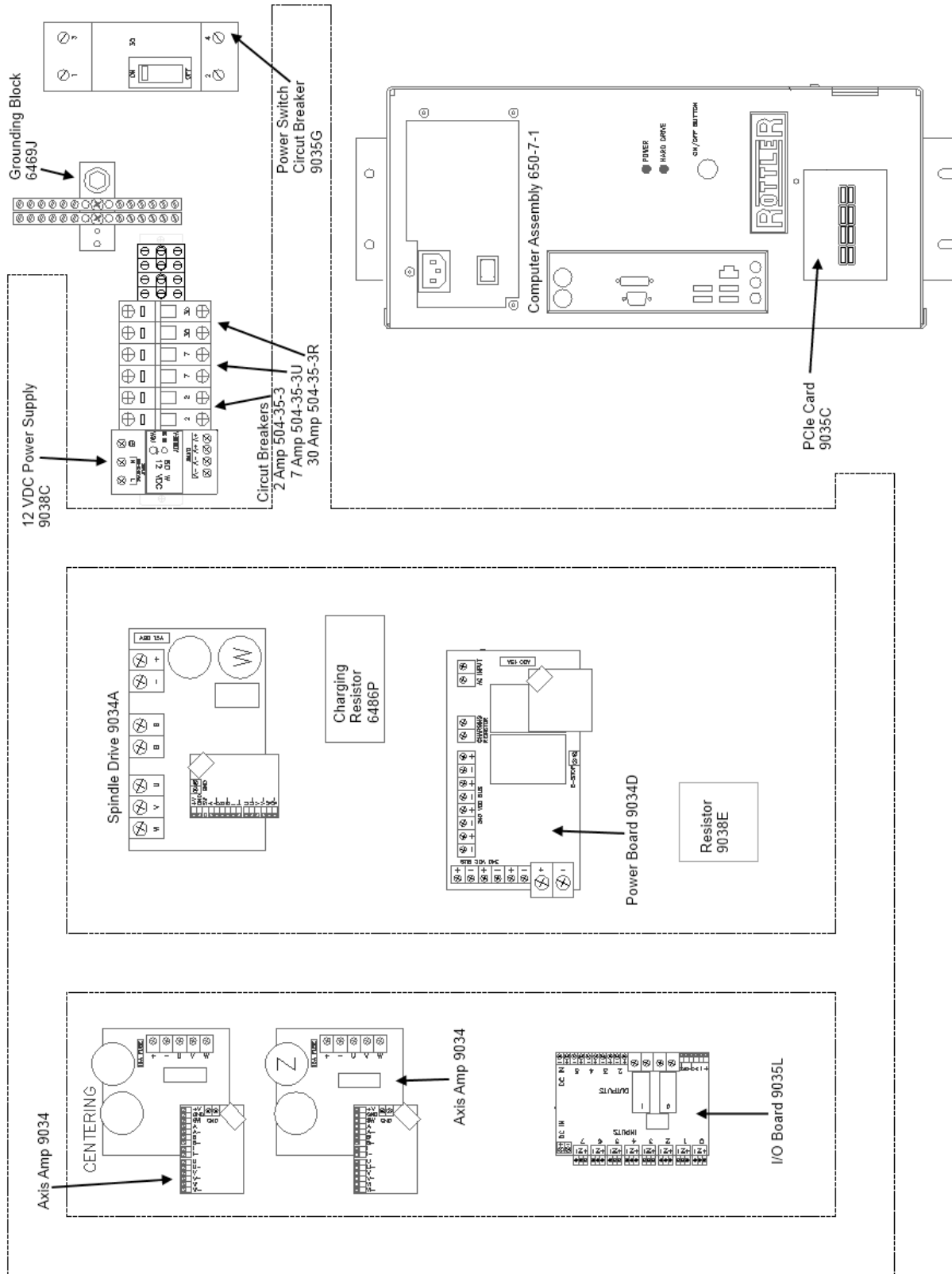
Front / Right Side View S7AD-S8AD



Pneumatic Assembly

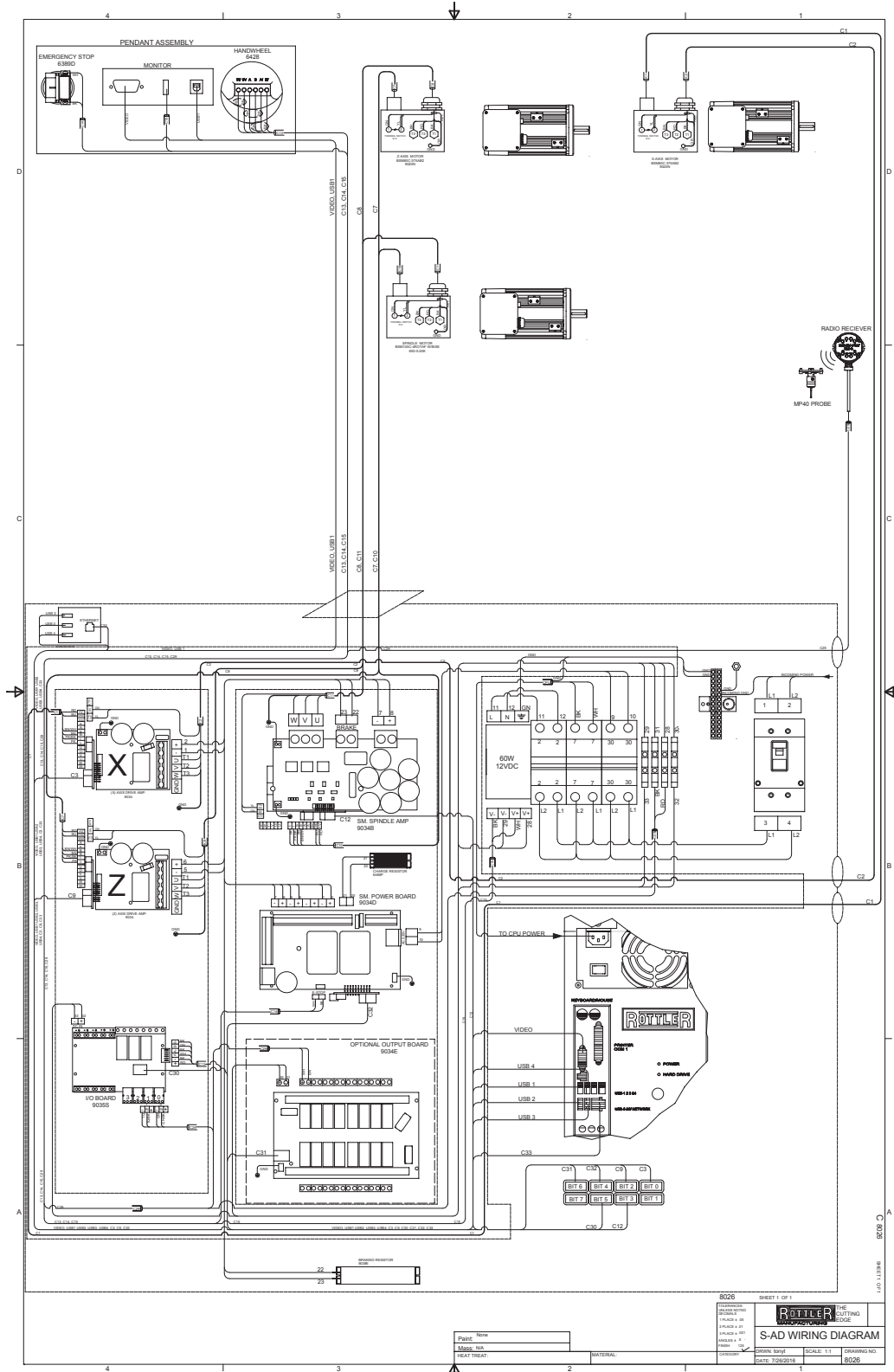


Electrical Enclosure

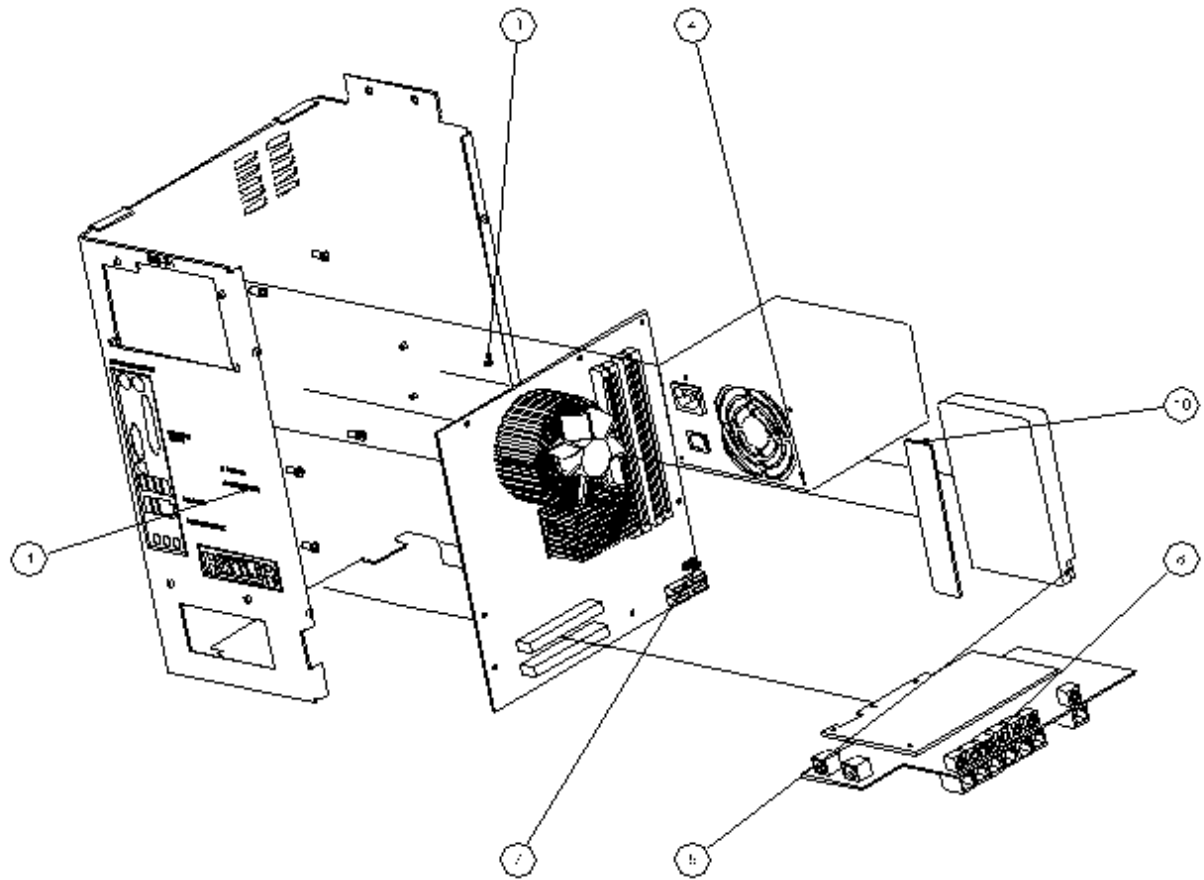


Electrical Wiring Diagram

A scalable version of this wiring diagram is located on the manual CD.

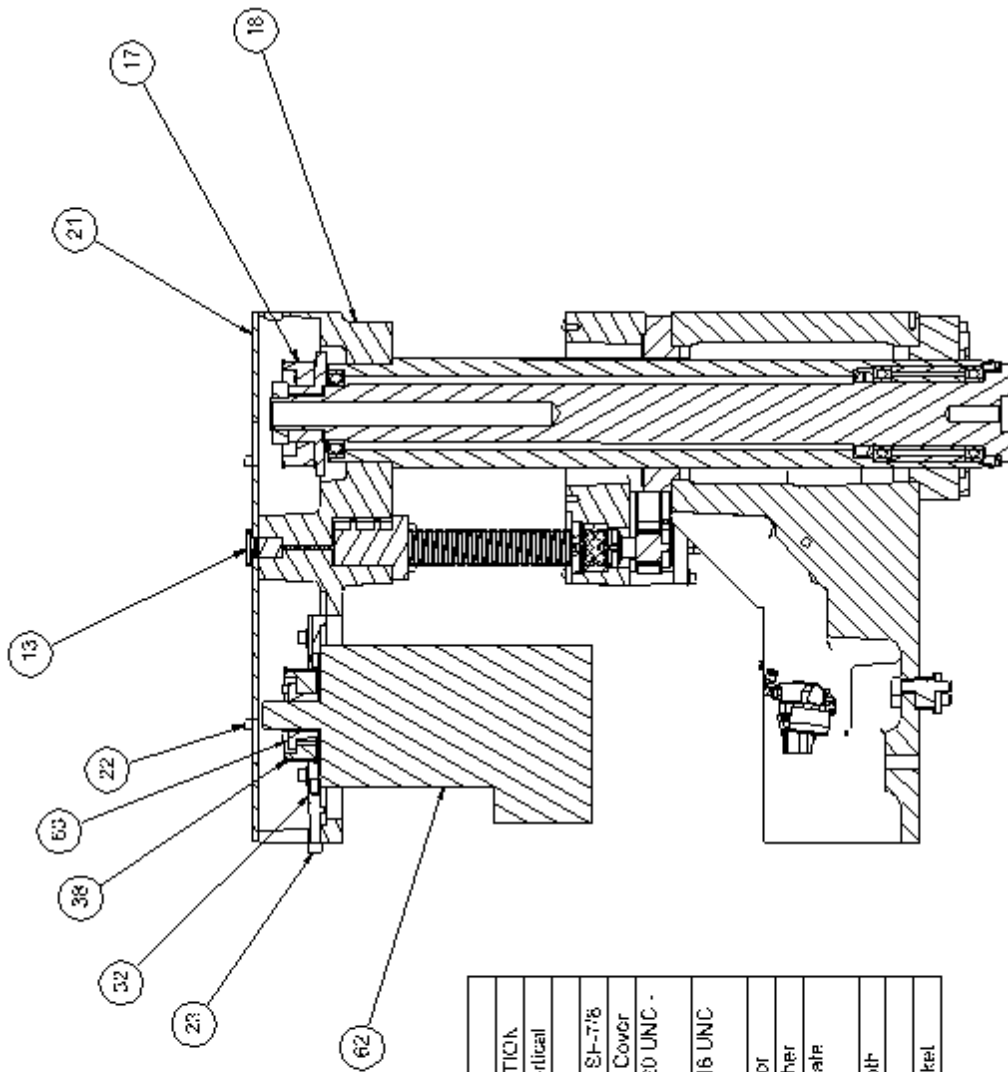


650-7-1 Computer Assembly



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	-	ESD-1-27Y	Computer Case, Front
2	-	ESD-1-27Z	Case Computer, Side
3	-	ESD-7-1C	Power Suppl.
4	-	ESD-7-1F	Hard Drive
5	-	ESD-6-1A	Mother Board
6	-	ESD-1-27O	PCI Card
7	2	ESD-1-29F	Bracket, PCI Card
8	-	ESD-7-1B	512 Mb DD-32 RAM

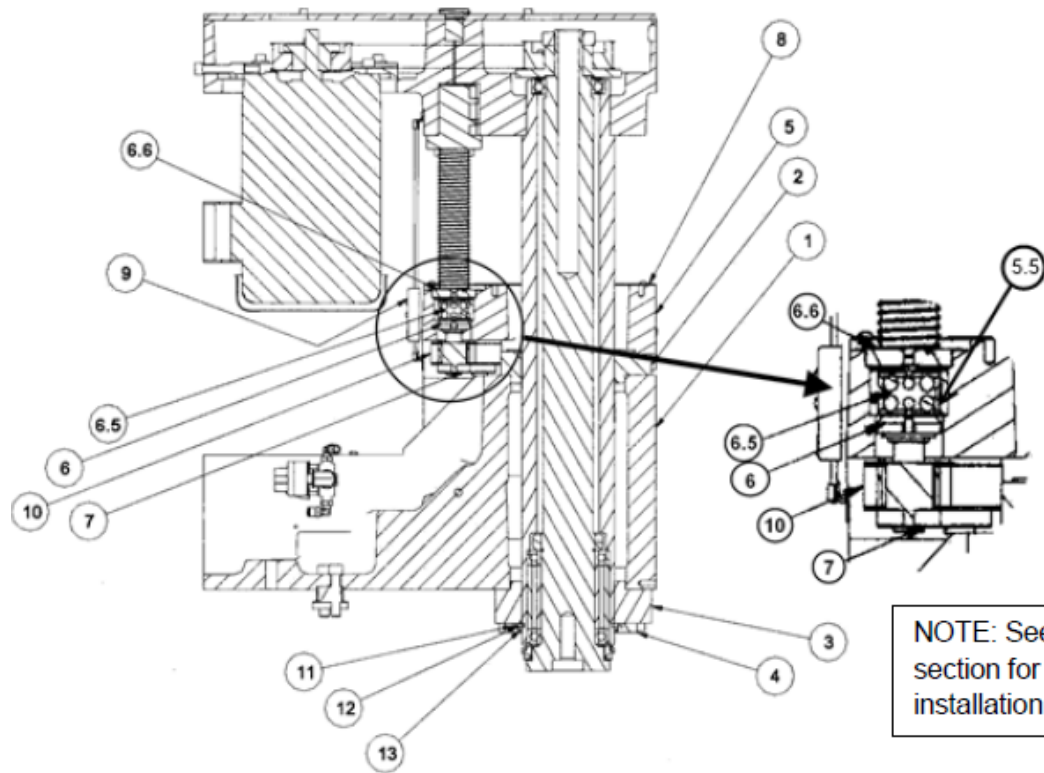
Upper Housing



Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
13	1	7244L	Ball Screw - Vertical
17	1	SF Spindle Assembly	
18	1	7247A	Upper Housing SF-778
21	1	7247D	Upper Housing Cover
22	4	MF-12	S.H.C.S. 1/4 - 20 UNC - 1/2
23	3	MF-34	S.H.C.S. 3/8 - 16 UNC - 2
24	1	502-37-81	Proximity Sensor
25	1	100-19	Hardened Washer
26	1	7247	Motor Mount Plate SF-778
28	1	70-1R	Sprocket 68 tooth
32	1	501-31-87	
36	1	70-1V	Bushing, Sprocket
62			
63			

Spindle Base Front Section

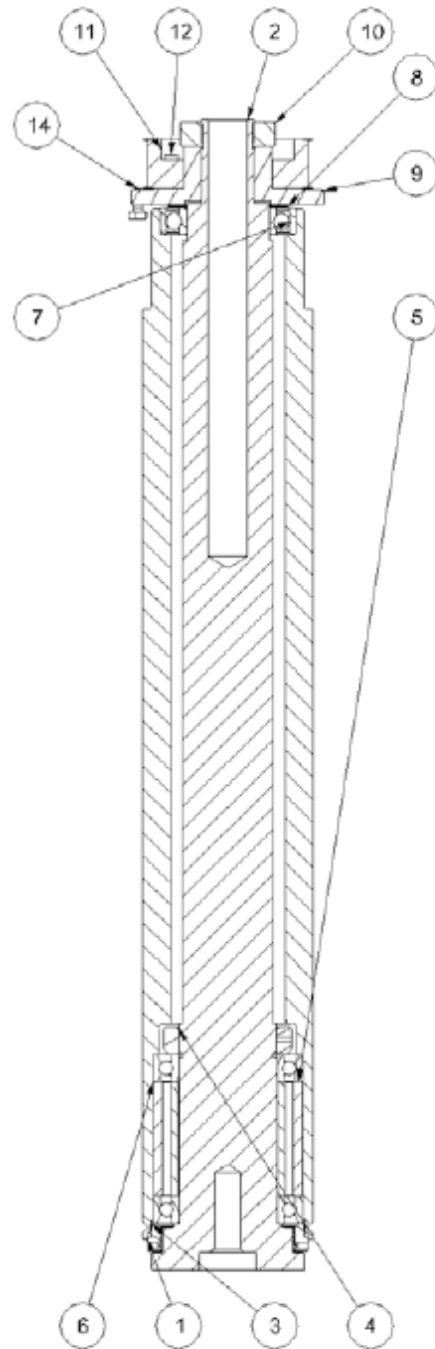


Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	7002Z	Spindle Base SF/7&8
2	1	7246K	Bushing, Upper SF, outer spindle
3	1	7246J	Lower Bushing SF
4	1	7035	Felt Retainer
5	1	7244A	Vertical Adjustment Housing (Machining)
5.5	2	504-34-73	Steel Spacer
6	1	504-34-54	Bearing Nut
6.5	1	7245K	Bearing
6.6	1	7244K	Bearing Retainer Nut
7	4	504-34-56	Sprocket
8	1	7244J	Cover, Vertical Adjust Housing SF
9	1	Linear scale head	
10	1	504-34-59	Belt, Vertical
11	1	6251	Square Ring
12	1	6249	Felt Oiler
13	1	6248	Square Ring

Inner / Outer Spindle Assembly

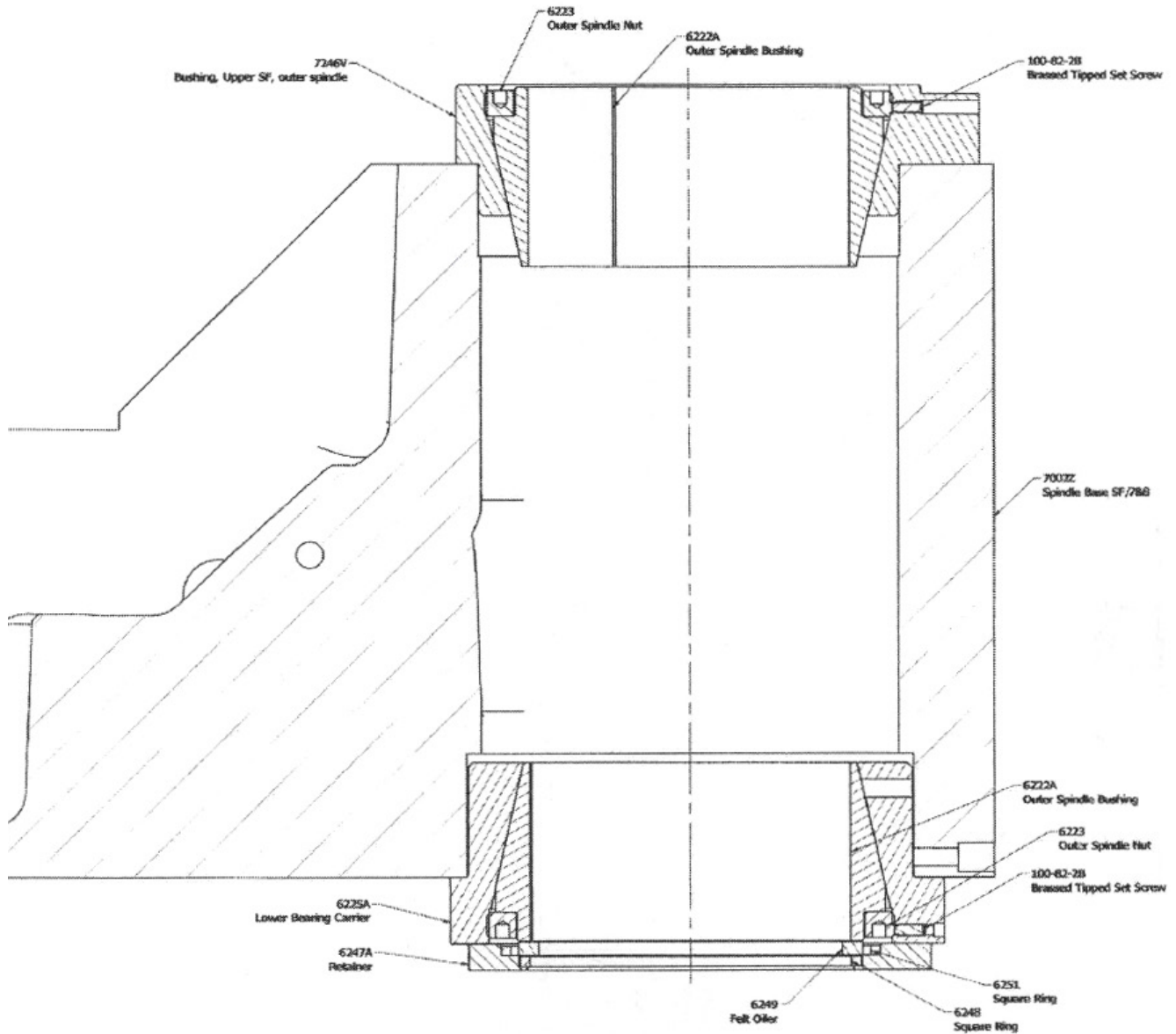
NOTE: See maintenance section for correct bearing and Belleville washer installation procedure.

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	7246D	Outer Spindle
2	1	7246E	Inner Spindle
3	1	7022	Throw Back Nut - Inner Spindle
4	1	7021A	Bearing Lock Nut
5	2	7049A	Spindle Bearing
6	1	7246H	Spacer Set (Precision) SF Spindle
7	1	7017	Bearing
8	2	7052	Bellville Spring
9	1	7246C	Index Bushing
10	1	504-34-25	Nut, Spindle Adjustment, Upper Housing
11	1	7246B	Driven Sprocket 68 Tooth
12	4	MF-15	S.H.C.S. 1/4 - 20 UNC - 1
13	1	502-9-68B	Flush Grease Fitting
14	1	ANSI/ASME B18.2.1 - 1/4-20 UNC - 0.625	HHMS

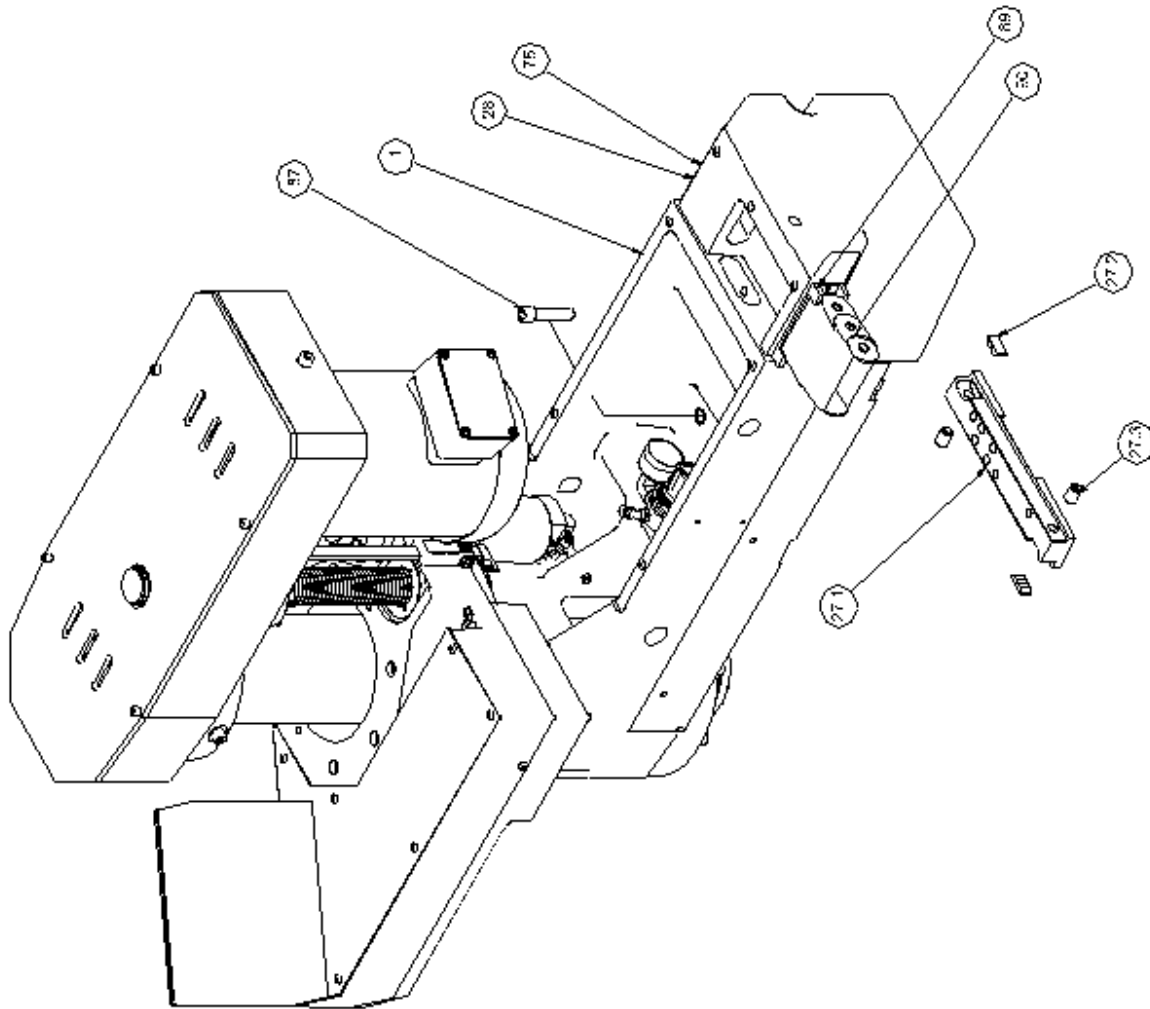


Spindle Base Bushings

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	7002Z	Spindle Base SF/7&8
2	1	6247A	Retainer
3	1	6225A	Lower Bearing Carrier
4	1	7246V	Bushing, Upper SF, outer spindle
5	2	6222A	Outer Spindle Bushing
6	2	6223	Outer Spindle Nut
7	2	100-82-2B	Brassed Tipped Set Screw



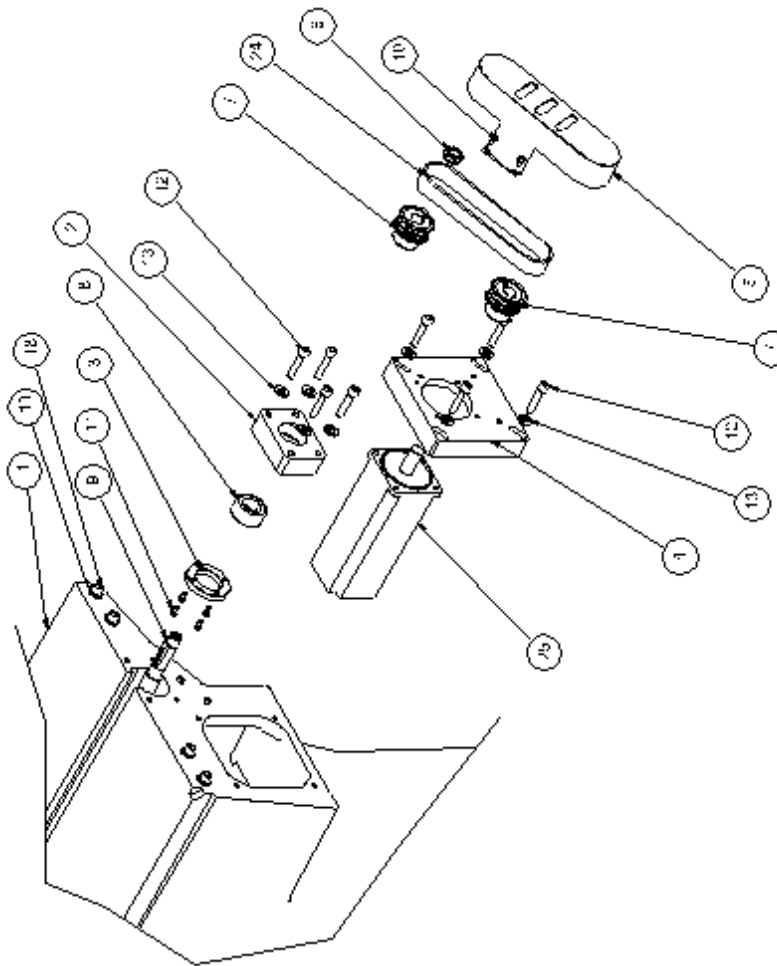
Spindle Base Assembly



ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	70027	USUCK F.I.I.C.N.
27	1	7032D	Spindle Base SF78N
27.1	1	7038C	Spindle Key Assembly
27.2	2	7032F	Spindle Key
27.3	2	502-9-82C	Spindle Key
28	1	7002W	String Springs
75	1	6507-1P	Con. Verweijl. Spindle Base (Cast Iron SF)
76	3	1N81318.3 - 716 - 14	Cover Plate
77	1	UMC - 2	Hexagon Sec. Head Cap Screw
78	1	50434-69C	SPS Wire Trac.
79	2	50434-69C	SPS Wire Trac.

REVISION 13

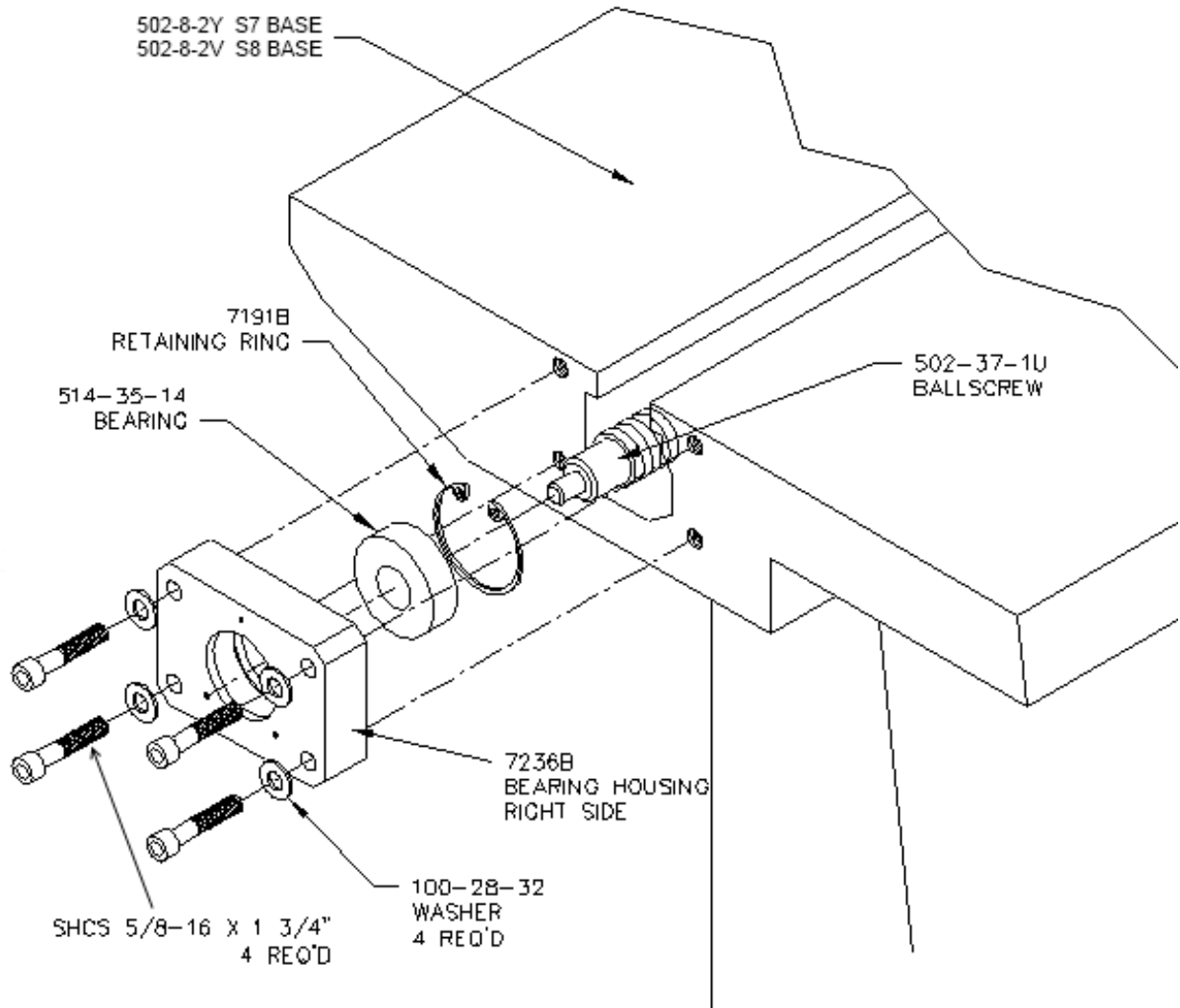
Left Ballscrew Support



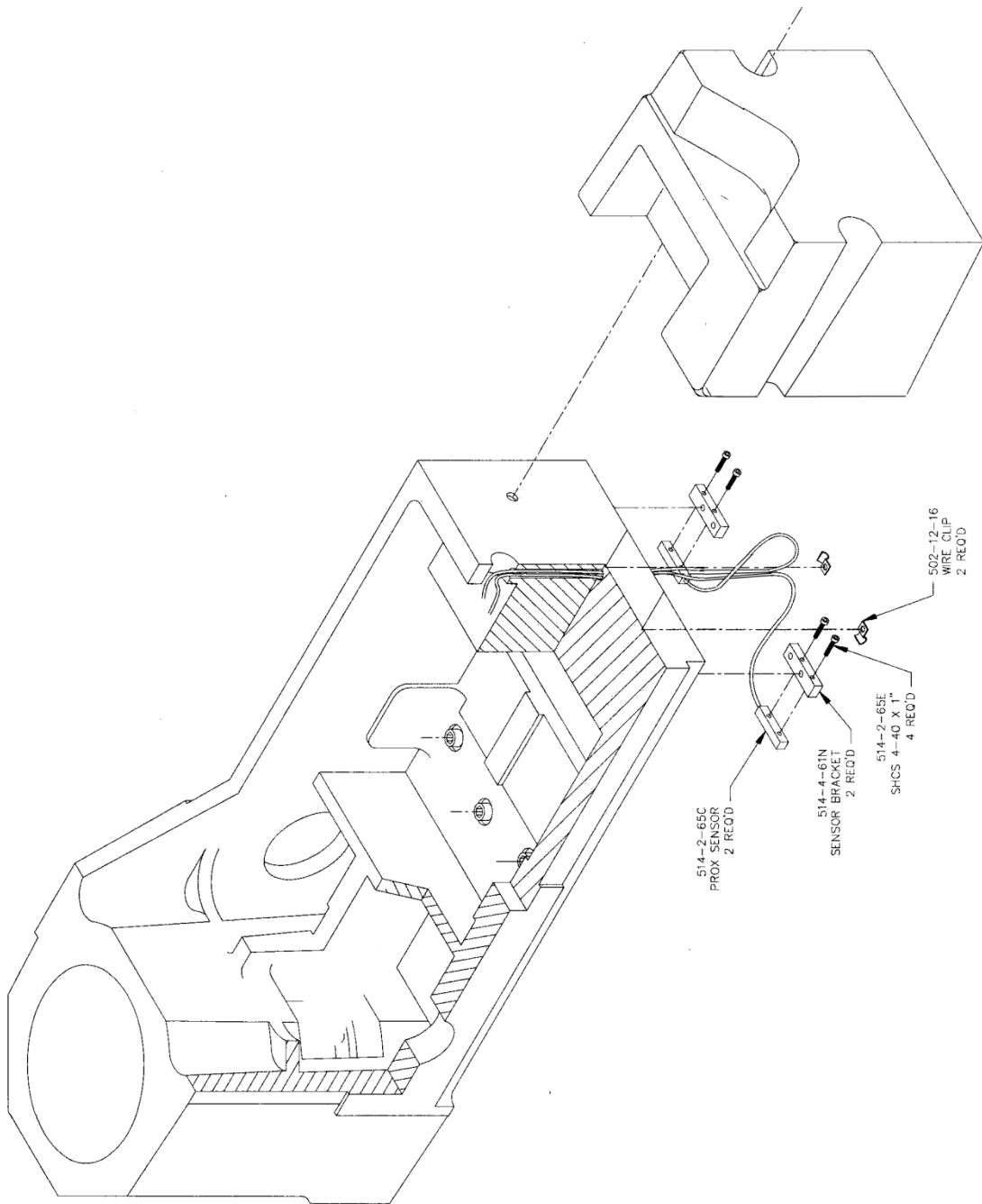
ITEM	QTY	PART NUMBER	Part Description	DESCRIPTION
1	1	502 R21	Main Shaft Flange	Main Shaft Flange
2	1	7237H	Bearing Housing Left	Bearing Housing Left
3	1	7237	Bearing Housing Right	Bearing Housing Right
4	1	7237K	Motor Mount Plate	Motor Mount Plate
5	1	7237C	Cover, Terminal Ball	Cover, Terminal Ball
6	1	6177C	Lock Nut, BH235	Lock Nut, BH235
7	2	J04-34-026	Sprocket	Sprocket
8	1	502-71	Ball Screw, 5"	Ball Screw, 5"
9	1	502-57-11U	Ball screw	Ball screw
10	4	5-KSI R16.5 - 4 - 20 x	Smoked Rubber Linn: Cap	Smoked Rubber Linn: Cap
11	4	3/4	Screw, #4 - 20 x 3/4	Screw, #4 - 20 x 3/4
12	12	MF-35A	S F.C.S. 10 - 27 JMC - 3.5	S F.C.S. 10 - 27 JMC - 3.5
13	20	5-STAL 243.3 3.0	S F.C.S. 3/8 - 12 UNC - 1.34	S F.C.S. 3/8 - 12 UNC - 1.34
14	6	5-KSI R16.5 - 4 - 20 x	Washer F	Washer F
15	6	5-KSI R16.5 - 4 - 20 x	Socket Head Cap screw	Socket Head Cap screw
21	1	7237F	3.5 - 16 UNC - U3	3.5 - 16 UNC - U3
25	1	6191M	Ball Housing	Ball Housing
			Motor Housing	Motor Housing

REFS8AD11

Right Ballscrew Support

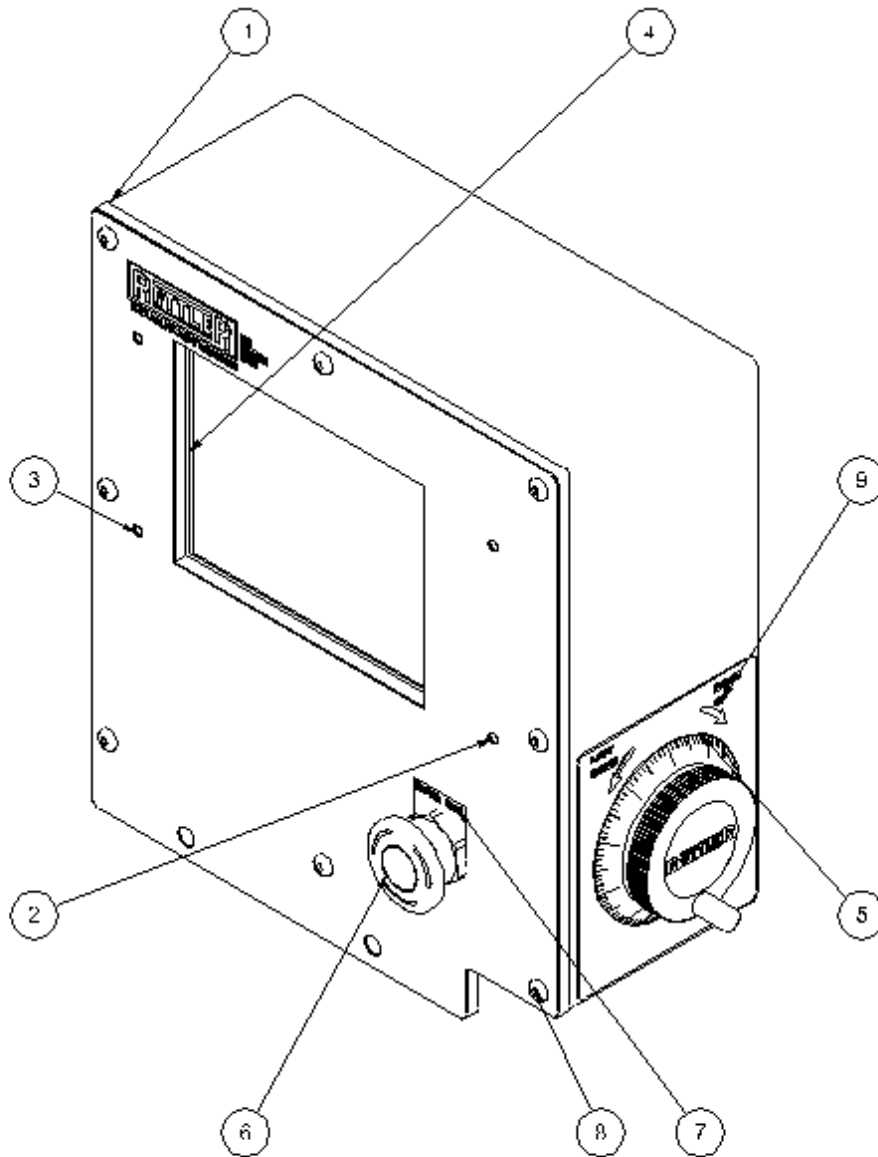


Home and Limit Switches



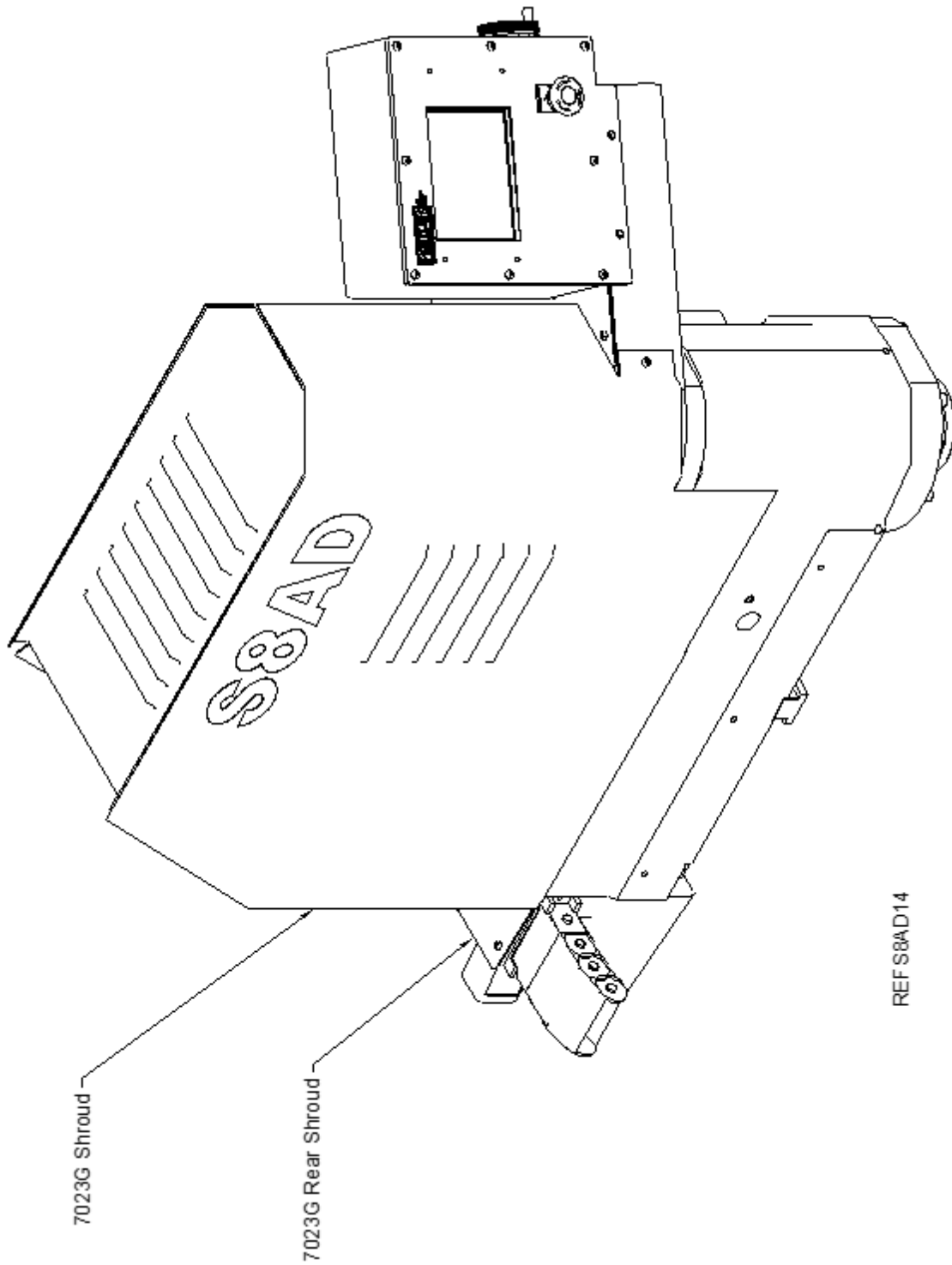
REFSR15-10172003

Pendant Assembly

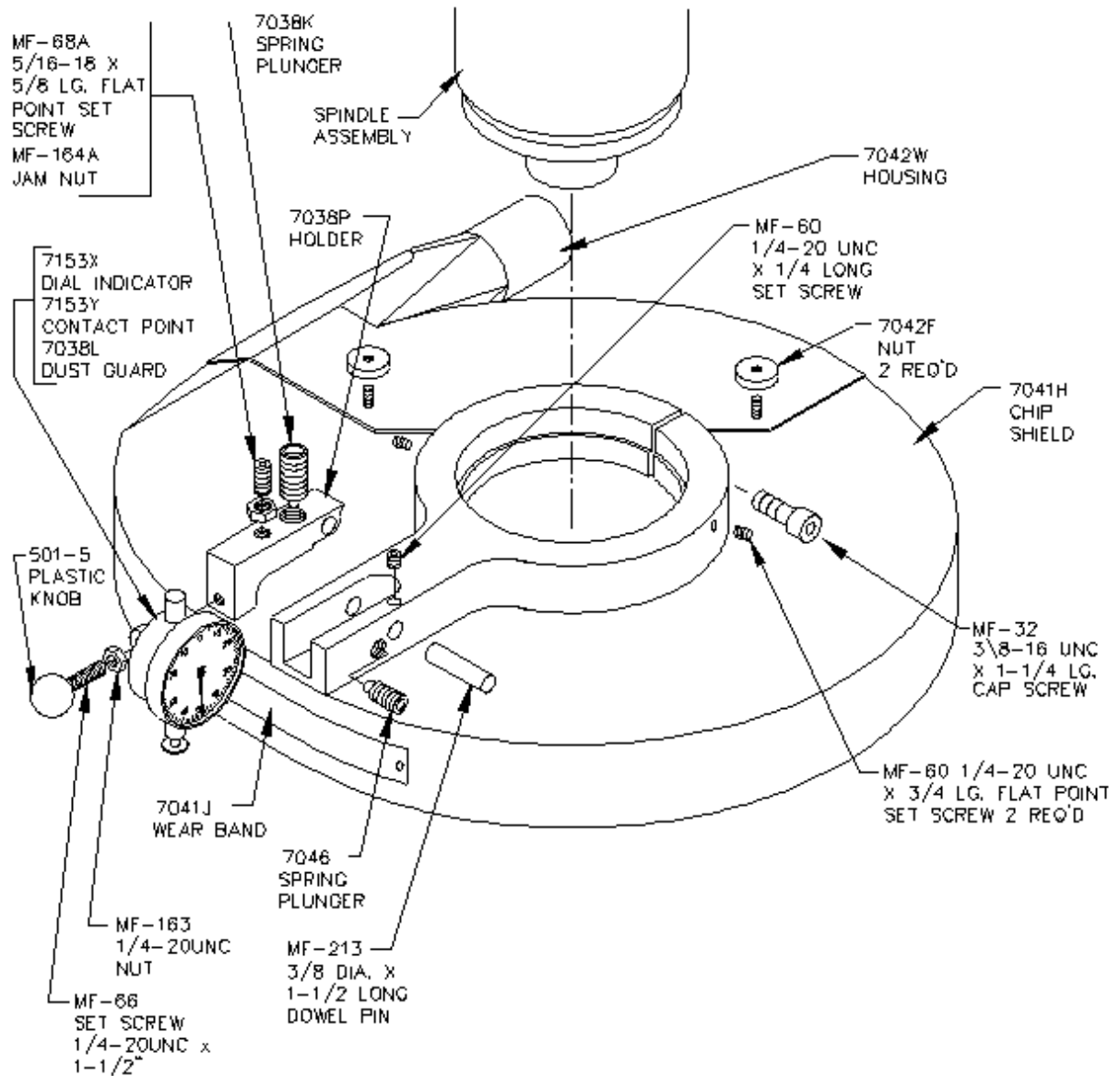


Parts List:			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	650-7-1J	Enclosure, Pendant
2	1	650-7-1K	Faceplate, Pendant
3	1	650-7-1L	Layover, Pendant Faceplate
4	1	650-7-1G	Touchscreen
5	1	642B	Electronic Handwheel
6	1	6389D	E-Stop Button
7	1	6389B	E-Stop Nameplate
8	8	MF-68A	Socket Button Head Cap Screw 10 - 24 x 1.2
9	1	650-7-1M	Layover, Handwheel

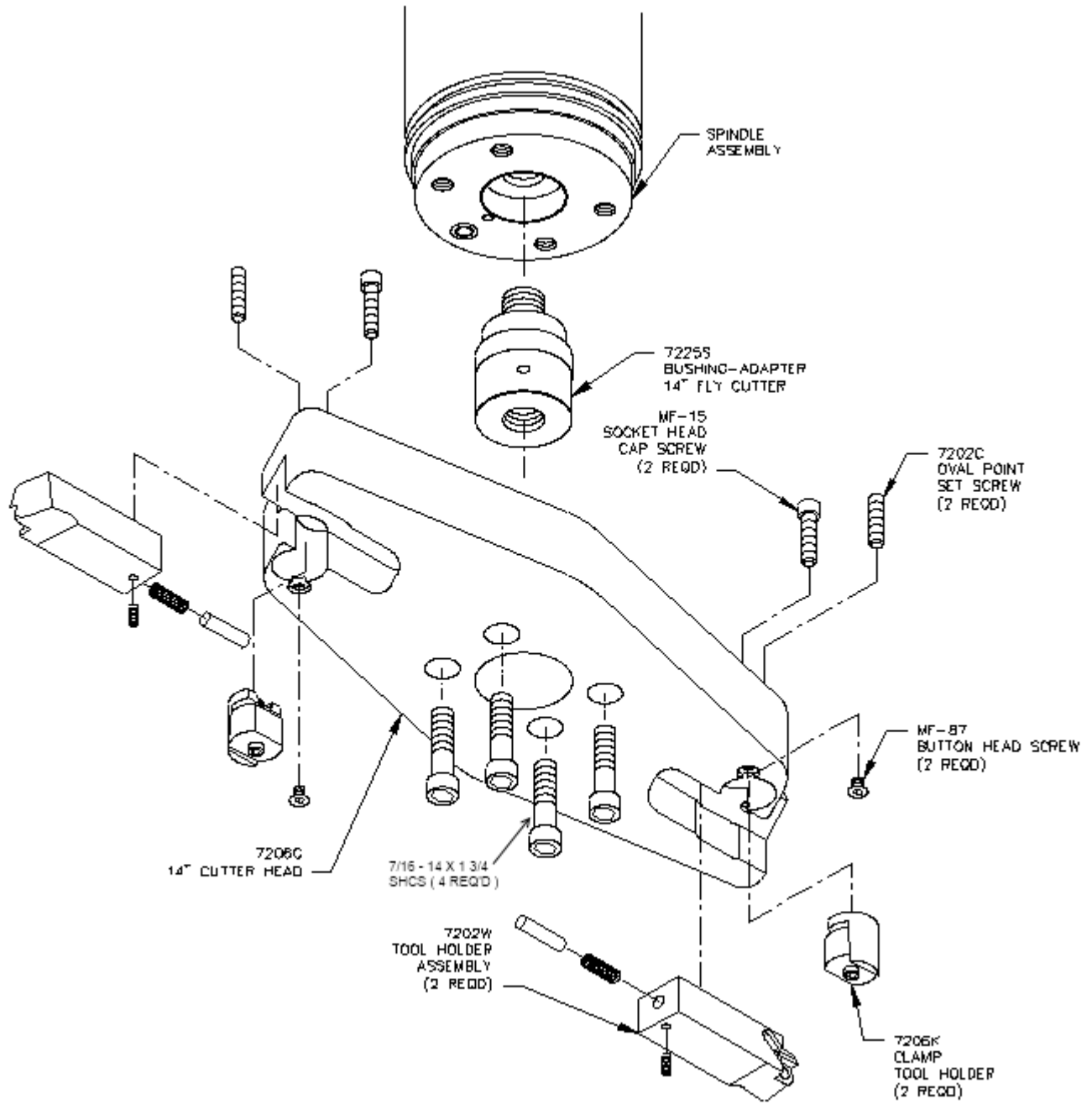
Spindle Base



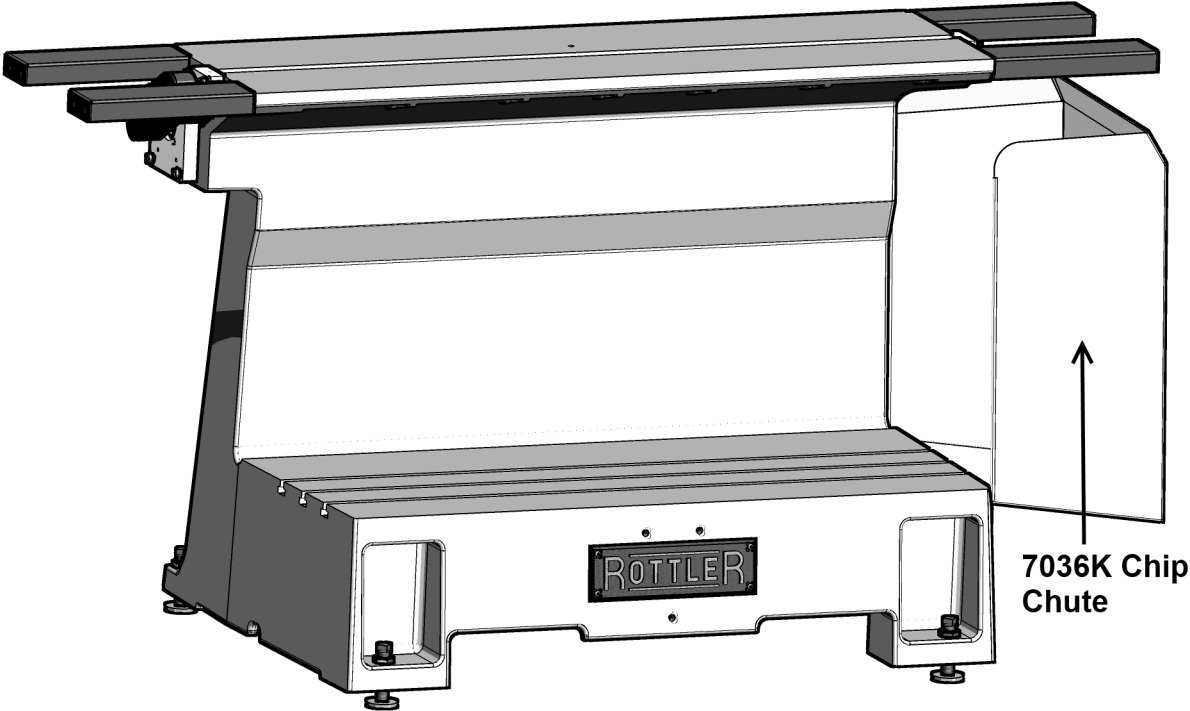
Chip Shield



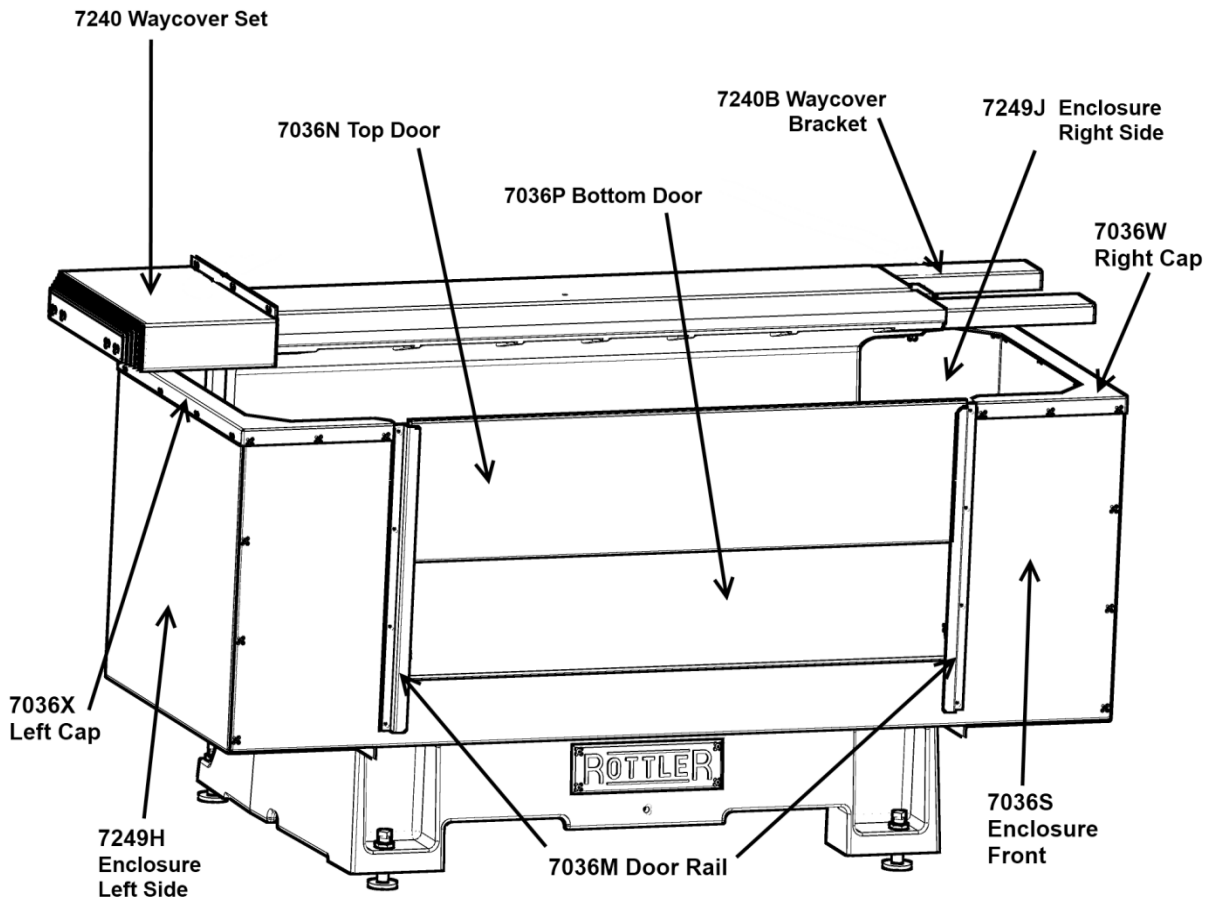
14" Fly Cutter



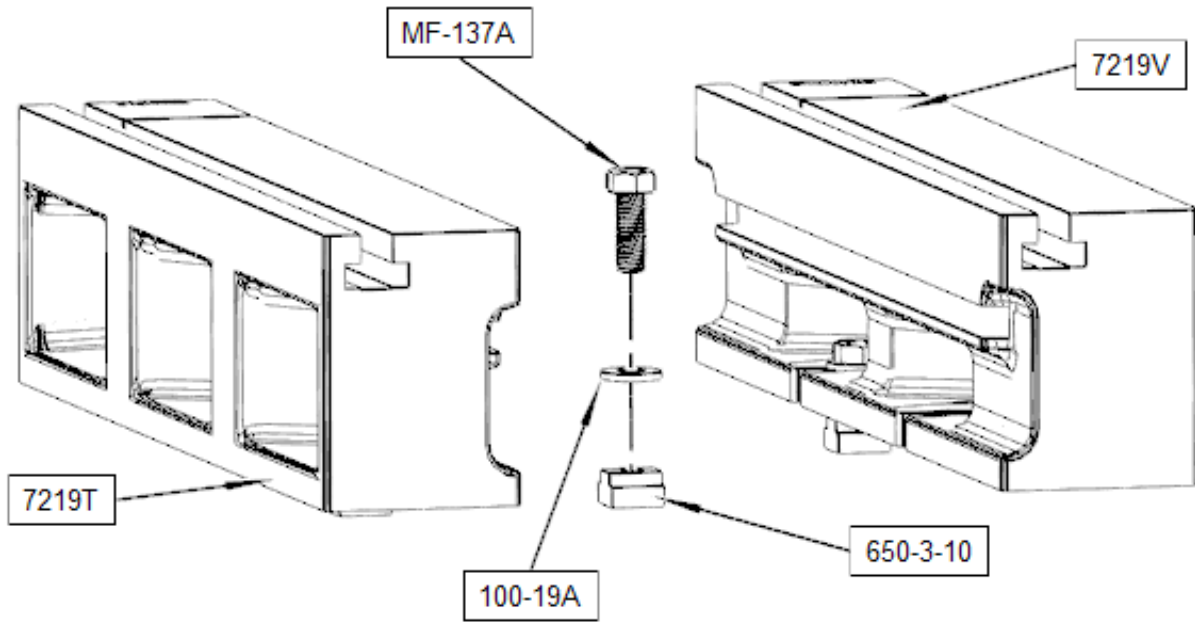
Chip Chute



Waycovers and Optional Chip Catcher Assembly



Riser Set



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OPTIONS

Optional Equipment

Optional Equipment Catalog and Parts Manual are located on the Manual CD shipped with machine.

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MSDS

The Material Data Safety Sheets list shown in this section are the substances and materials that an operator is most likely to come in contact with while using this machine.

Other substances and materials are used in the manufacture, testing, and shipping of this machine. A complete list of the Material Data Safety Sheets of substances and materials used by Rottler Manufacturing during manufacturing, testing, and shipping is located on the Manual CD shipped with the machine. Material Data Safety Sheets are also located on the company web site: <http://www.rottlermfg.com/documentation.php>

1) NAPA Lithe-Ease Grease

MATERIAL SAFETY DATA SHEET			
Product:	765-1393	<i>Note: The information herein is given in good faith. No warranty, expressed or implied, is made.</i>	
Printed:			
Printed For:			
Original Issue Date:	11/12/85	Approved By:	Chuck Hiddema
Revision No. 3 Date:	07/25/01		V.P. Technical Operations
Section I - Identification			
Manufacturer:	AGS Company		
Street Address:	2651 Hoyt St		
City/State/Zip	Muskegon Hts., MI 49444		
Phone:	800-253-0403		
Phone:	231-733-2101		
FAX:	231-733-1784		
Transportation Emergency:	CHEM-TEL		
Phone:	800-255-3924		
Trade Name:	NAPA Lith-Ease Grease		
Catalog No.:	765-1393		
Common Name:	Lith-Ease		
Container/Size:	1 pound plastic tub		
NFPA - Health:	0		
Flammability:	1		
Reactivity:	0		
Specific Hazard:			
HMIS - Health:	0		
Flammability:	1		
Reactivity:	0		
Protective Equipment:	A		
Section II - Hazardous Ingredients			
Hazardous Ingredient	CAS No.	Wgt. %	TLV
1 White Lithium Grease	Not Assigned	100%	5 cu. m.
2			
3			
4			
5			
6			
7			
8			
9			
10			
NOTES:			

Section III Physical Data		Catalog No. 765-1393
pH - Supplied:	Not Applicable	
pH - Diluted:	Not Applicable	
Water Solubility:	Nil	
Specific Gravity:	(Water=1) 0.90	
Melting Point:	360°F (min.)	
Boiling Point:	Not Determined	
% Volatiles:	Not Applicable	
Vapor Pressure:	Not Applicable	
Vapor Density:	Not Applicable	
Evaporation Rate:	Not Applicable	
Appearance:	Pale yellow semi-solid with mineral oil odor.	
Section IV Fire & Explosion Data		
Flash Point:	> 400°F.	
Method:	C.O.C.	
Auto Ignition Temperature:	Not Determined	
Flammable Limits In Air	LEL: Not Determined	
	UEL: Not Determined	
Extinguishing Media:	Dry chemical, carbon dioxide, foam, water fog, sand or earth.	
Special Procedures:	Wear self-contained breathing apparatus.	
Unusual Hazards:	Dense smoke.	
Section V - Reactivity Data		
Unstable and/or Auto Reactive:	Stable	
Incompatible Materials:	Strong oxidizing agents.	
Hazardous Decomposition Products:	CO and carbon dioxide.	
Section VI - Emergency First Aid		
Eyes:	Flush with water for at least 15 minutes. Call physician immediately.	
Skin:	Wash thoroughly with soap & water.	
Ingestion:	Do not induce vomiting. Call physician immediately.	
Inhalation:	Of oil mist from grease; remove victim to fresh air. Administer oxygen or artificial respiration as required. Consult physician.	
Section VII - Health Effects		
Eyes:	May cause irritation.	
Skin:	May cause irritation on prolonged or repeated contact.	
Ingestion:	Contains petroleum, may cause diarrhea and nausea.	
Inhalation:	When at elevated temperature or aerosolized, may cause irritation of the respiratory tract.	
Other Effects:	Not known.	

Section VIII - Ventilation and Protective Measures		Catalog No. 765-1393
Ventilation Requirement:	General exhaust acceptable where a TLV of 5 cu. M. as mineral oil will not be exceeded.	
Eyes:	Yes	
Gloves:	Yes	
Clothing:	No	
Respiratory:	No	
Other:	Eye wash in work area.	
Section IX - Storage and Handling Procedures		
Conditions to Avoid:	None listed.	
Section X - Spill Procedures and Waste Disposal		
Spill Procedure:	Transfer bulk material to a container. Remove the residue with an absorbent material.	
Disposal Method:	Removal by an approved, licensed waste hauler.	
EPA Waste I.D. NO.:	Not Reg.	