Installation, Setup and Operation

INSTRUCTIONS

for

SUNNEN® KROSSGRINDING SYSTEMS

Model: KGM®-5000NT & KGM®-1000NT

READ THE FOLLOWING INSTRUCTIONS THOROUGHLY AND CAREFULLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THE SUNNEN® KGM®-NT KROSSGRINDING MACHINE.

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SUNNEN® PRODUCTS COMPANY • 7910 MANCHESTER ROAD • ST. LOUIS, MO 63143, U.S.A. • PHONE: 314-781-2100

GENERAL INFORMATION

The Sunnen® equipment has been designed and engineered for a wide variety of parts within the capacity and limitation of the equipment. With proper care and maintenance this equipment will give years of service.

READ THE FOLLOWING INSTRUCTIONS CAREFULLY AND THOROUGHLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THIS EQUIPMENT.

IMPORTANT: Read any supplemental instructions BEFORE installing this equipment. These supplemental instructions give you important information to assist you with the planning and installation of your Sunnen equipment.

Sunnen Technical Service Department is available to provide telephone assistance for installation, programming, & troubleshooting of your Sunnen equipment. All support is available during normal business hours, 8:00 AM to 4:30 PM Central Time.

Review all literature provided with your Sunnen equipment. This literature provides valuable information for proper installation, operation, and maintenance of your equipment. Troubleshooting information can also be found within the Instructions. If you cannot find what you need, call for technical support.

Where applicable, programming information for your Sunnen equipment is also included. Most answers can be found in the literature packaged with your equipment.

Help us help you. When ordering parts, requesting information, or technical assistance about your equipment, please have the following information available:

- Have ALL MANUALS on hand. The Customer Services Representative or Technician will refer to it.
- Have Model Number and Serial Number printed on your equipment Specification Nameplate.
- Where Applicable: Have Drive model and all nameplate data. Motor type, brand, and all nameplate data.

For Troubleshooting, additional information may be required:

- Power distribution information (type - delta, wye, power factor correction; other major switching devices used, voltage fluctuations)
- Installation Wiring (separation of power & control wire; wire type/class used, distance between drive and motor, grounding).
- Use of any optional devices/equipment between the Drive & motor (output chokes, etc.).

For fast service on your orders call:

Sunnen Automotive Customer Service toll free at: 1-800-772-2878

Sunnen Industrial Customer Service toll free at: 1-800-325-3670

Customers outside the USA, contact your local authorized Sunnen Distributor.

Additional information available at: http://www.sunnen.com or e-mail: sunnen@sunnen.com

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ESD PREVENTION REVIEW

Let's review the basics of a sound static control system and its effective implementation. First, in the three step plan:

1. Always ground yourself when handling sensitive components or assemblies.
2. Always use a conductive or shielded container during storage or transportation. These materials create a Faraday cage which will isolate the contents from static charges.
3. Open ESD safe containers only at a static safe work station.

At the static safe work station, follow these procedures before beginning any work:

A. Put on your wrist strap or foot grounding devices.

B. Check all grounding cords to make sure they are properly connected to ground, ensuring the effective dissipation of static charges.

C. Make sure that your work surface is clean and clear of unnecessary materials, particularly common plastics.

D. Anti-static bubble wrap has been included for use at the machine when an ESD safe workstation is not available.

You are now properly grounded and ready to begin work. Following these few simple rules and using a little common sense will go a long way toward helping you and your company in the battle against the hazards of static electricity. When you are working with ESD sensitive devices, make sure you:

GROUND

ISOLATE

NEUTRALIZE

SUNNEN® LIMITED PRODUCT WARRANTY

Sunnen® Products Company and its subsidiaries (SPC) warrant that all new SPC honing machines, gaging equipment, tooling, and related equipment will be free of defects in material and/or workmanship for a period of one year from the date of original shipment from SPC.

Upon prompt notification of a defect during the one-year period, SPC will repair, replace, or refund the purchase price, with respect to parts that prove to be defective (as defined above). Any equipment or tooling which is found to be defective from improper use will be returned at the customer's cost or repaired (if possible) at customer's request. Customer shall be charged current rates for all such repair.

Prior to returning any SPC product, an authorization (RMA#) and shipping instructions must be obtained from the Customer Service Department or items sent to SPC will be returned to the customer.

Warranty Limitations and Exclusions This Warranty does not apply to the following:

- Normal maintenance items subject to wear and tear: (belts, fuses, filters, etc).
- Damages resulting from but not limited to:
  - › Shipment to the customer (for items delivered to customer or customer's agent F.O.B., Shipping Point)
  - › Incorrect installation including improper lifting, dropping and/or placement
  - › Incorrect electric power (beyond +/- 10% of rated voltage) including intermittent or random voltage spikes or drops
  - › Incorrect air supply volume and/or pressure and/or contaminated air supply
  - › Electromagnetic or radio frequency interference from surrounding equipment (EMI, RFI)
  - › Storm, lightning, flood or fire damage
  - › Failure to perform regular maintenance as outlined in SPC manuals
  - › Improper machine setup or operation causing a crash to occur
  - › Misapplication of the equipment
  - › Use of non-SPC machines, tooling, abrasive, fixturing, coolant, repair parts, or filtration
  - › Incorrect software installation and/or misuse
  - › Non-authorized customer installed electronics and/or software
  - › Customer modifications to SPC software

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Shipping Damages

Except in the case of F.O.B., Buyer's destination shipments, SPC will not be liable for any settlement claims for obvious and/or concealed shipping damages. The customer bears the responsibility to unpack all shipments immediately and inspect for damage. When obvious and/or concealed damage is found, the customer must immediately notify the carrier's agent to make an inspection and file a claim. The customer should retain the shipping container and packing material.

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Any alteration or reverse engineering of the software is expressly forbidden and is in violation of this agreement.

SPC reserves the right to update the software covered by this agreement at any time without prior notice and any such updates are covered by this agreement.

SAFETY INSTRUCTIONS

READ FIRST

This machine, like any equipment, may be dangerous if used improperly. Please read all warnings and instructions before attempting to use this machine.

Always disconnect power at main enclosure before servicing machine.[1]

Always wear eye protection when operating this machine.

WARNING: Do not wear cotton or heavy gloves while operating this equipment! If gloves must be worn, wear only the tear-away type.

NEVER open or remove any machine cover or protective guard with power "ON." Always disconnect power at main enclosure before servicing this equipment.[1]

DO NOT attempt any repair or maintenance procedure beyond those described in this book. Contact your Sunnen® Field Service Engineer or Technical Services Representative for repairs not covered in these instructions.

Due to the wide variety of machine configurations, all possibilities cannot be described in these instructions. Instructions for safe use and maintenance of optional equipment ordered through Sunnen, will be provided through separate documentation and/or training provided by your Sunnen Field Service Engineer or Technical Services Representative.

DO NOT attempt to defeat any safety device on this machine or on any of the optional equipment.

If specially built automation components are added to this system, be sure that safety is not compromised. If necessary, obtain special enlarged work area safety system from Sunnen Products Co.

CE Indicates CE version ONLY.

[1] DO NOT touch electrical components until main input power has been turned off and *CHARGE* lamps are extinguished. WARNING: The capacitors are still charged and can be quite dangerous.

IMPORTANT NOTE

The temperature requirements of the Sunnen® KGM®-1000 Rod Reconditioning Machine have been established as 35 degrees C (95 degrees F). Above this temperature, an optional cooler will be available to handle temperatures from 35º to 46º C (95º to 115º F). IT IS NOT recommended that the Rod Reconditioning Machine be operated at temperatures above 46º C (115º F).

Sunnen® Products Company warrants the KGM®-1000 Rod Reconditioning Machine for operating environments up to 35º C (95º F). For operating environments of 35º to 46º C (95º to 115º F) the warranty only applies if the optional cooler is installed on the Machine. No warranty coverage is offered for operating environments above 46º C (115º F).

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LIST OF APPENDIXES

INTRODUCTION

This Instruction Manual provide information required to install, operate, and maintain Sunnen® KGM®-NT Krossgrinding System.

When ordering parts for, or requesting information about your Machine, include the model and serial numbers of your System.

READ THE FOLLOWING INSTRUCTIONS THOROUGHLY AND CAREFULLY BEFORE UNPACKING, INSPECTING, OR INSTALLING SUNNEN® KGM®-NT KROSSGRINDING SYSTEM.

In this book the (CE) symbol indicates steps or information that is only for CE version of this Machine. The CE version is constructed to meet highest level of safety standards as required by the European Machinery Directive. Required for European market, this CE version is available for any customer. The regular version of this Machine is quite safe for any operator exercising a normal degree of caution associated with machine tool use. The CE version provides an extra level of protection by minimizing risks of operator carelessness.

This Machine is to be used for bore finishing. In finishing bores, this Machine can achieve any or all of following results: fast stock removal, consistent final size, a high degree of cylindrically, fine surface finish. To achieve best results and ensure safe operation, ONLY Sunnen Tools and Abrasives are to be used in this Machine.

GENERAL INFORMATION & SPECIFICATIONS

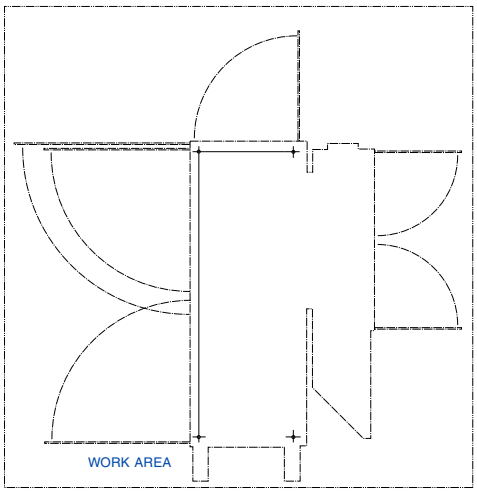
Sunnen® Krossgrinding® Systems - Models KGM®-1000NT & KGM®-5000NT

Diameter Range (ID)[1] -	
Krossgrinding®Tooling:	5,46 to 32 mm (.215 to 1.260 in.) CGT Tools
TurboHone® Tooling:	3,81 to 32 mm (.150 to 1.260 in.) MMT Tools
Connecting Rod Tooling:	53,8 to 63,8 mm (2.120 to 2.510 in.) CRT Tools
Larger Tooling:	25,4 to 101,6 mm (1.000 to 4.000 in.) (Contact Sunnen Products Company for other applications.)
Workpiece:[2]	8 to 150 millimeters (.31 to 6.00 inches)
Maximum Workpiece Weight:[2]	2,0 kg (4.5 lbs)
Spindle Speed -	
Standard Speed:	250 to 3700 rpm variable
High-Torque Low Speed:	20 to 1000 rpm variable
Stroke Rate:	33 to 500 spm variable
Coolant System -	
Pump Motor:	0,18 kW (1/4 Hp)
Coolant Pump:	5,6 LPM (1.5 GPM)
Coolant Capacity:	132 liters @ 11,2 LPM (35 gallons @ 3 GPM)
Coolant Requirements:	Sunnen Water-Based Coolant or Sunnen Industrial Honing Oil
Pneumatic Requirements:	566 L/min @ 4,48 Bars(20 CFM @ 65 psi) 5,52 Bars (80 psi) Recommended
Electrical -	
Electrical Requirements:	400/460 V, 3 Ph, 50/60 Hz, 29.7 A
Spindle Motor:	400/460 V, 11/10 Amp, 5,6 kW (7.5 Hp)
Stroker Motor:	400/460 V, 5.3/4.4 Amp, 2,2 kW (2.9 Hp)
Feed Motor:	400/460 V, 1.7 Amp, 0,5 kW (.67 Hp)
Stroke Length Motor:	400/460 V, 1.5 Amp, 0,5 kW (.67 Hp)
Stroke Position Motor:	400/460 V, 1.5 Amp, 0,5 kW (.67 Hp)
Coolant Motor:	400/460 V, 1/.9 Amp, 373 W
Separator Motor:	400/460 V, .71/.70 Amp, 210 W
Temperature Range:	0° to 35° C (32° - 95° F)
Floor Requirement (Concrete):	150 mm (6 in.) minimum thickness
Machine Dimensions:	2946 L x 3023 W x 1829 H mm (116 x 119 x 72 in.)
Color:	Pearl Grey with Pewter Gray & Black Trim
Floor Weight:	1579 kg (3480 lbs)
Noise Emission:	Less than 71 dB (A) continuous; Less than 75 dB (A) peak

Special Features

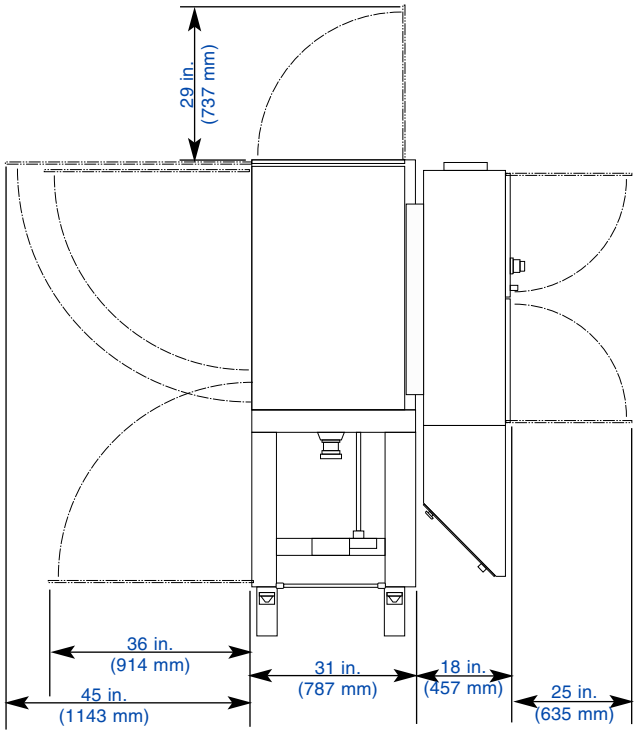
Automatic Setup:	Spindle Speed, Stroke Speed, Stroke Length, Feed Rate, and Sparkout
Automatic Sizing:	Standard
Machine Operating Modes -	
Auto:	Continuous
Manual:	Single
Fixturing:	Optional

[1] Diameter range, length range, and workpiece weight are contingent on workpiece and application.
[2] Stroke length & workpiece weight is contingent on machine configuration and application.

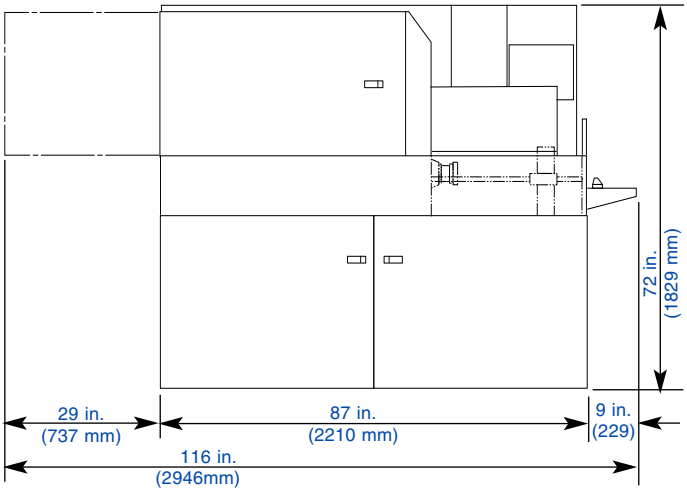


Weight Installed:
Approximately 1579 kg. (3480 lbs.) including coolant.

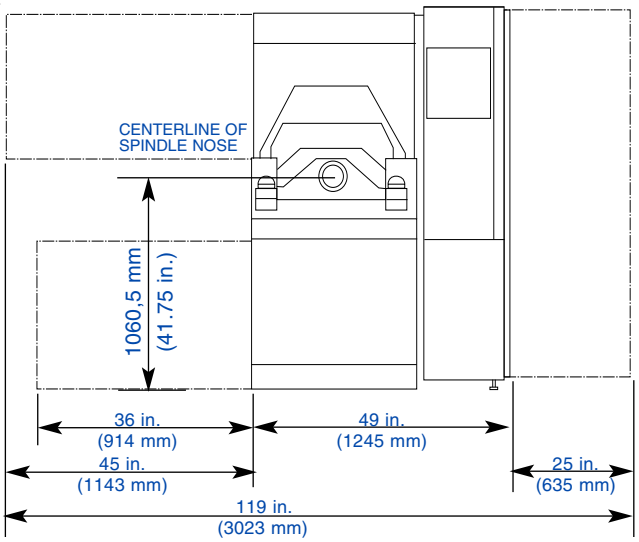
Floor Loading:
Less than 702 kg/sm (154 lbs/sf).



TOP VIEW



SIDE VIEW



FRONT VIEW

FIGURE1-A, Floor Layout (Configuration)

SECTION 1
INSTALLATION

GENERAL

Consult this section when unpacking, inspecting, and installing Sunnen® KGM®-1000NT/-5000NT Krossgrinding System. Hereafter, referred to as the System.

TOOLS & MATERIALS

The following tools and materials are required for unpacking and installation of your Machine:

Knife	Hex Wrenches
Hammer	Open End Wrenches
Crow Bar	Cleaning Solvent
Tin Snips	Slip Joint Pliers
Forklift	Screwdriver (Std)

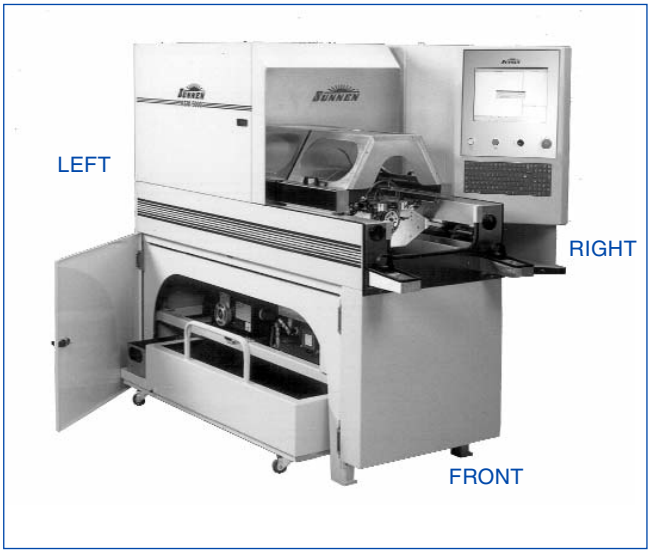


FIGURE 1-1, Rod Reconditioning Machine

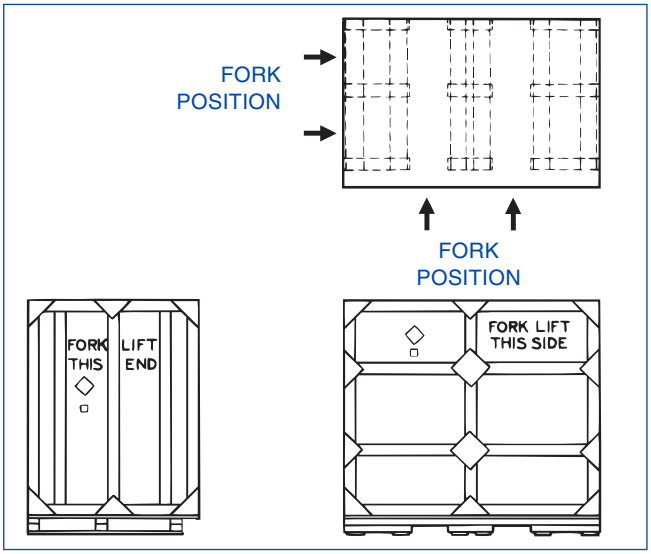


FIGURE 1-2, Shipping Crate

INSTALLATION

Read the following instructions carefully and thoroughly before unpacking, inspecting and installing your Machine. All references to right and left in these instructions are, unless otherwise noted, as seen by operator as one looks at Machine or assembly being described (see Figure 1-1).

NOTE: When ordering parts for, or requesting information about your Machine, include Model and Serial Numbers printed on Nameplate.

WARNING

Read handling instructions printed on sides of shipping crate before moving *(see Figure 1-2)*.

1. Move crate to staging/unpacking area.
2. Remove top and sides from shipping crate.
3. Remove all loose components from crate.
4. Check all components against packing list.
5. Inspect Machine and components for dents, scratches, or damage resulting from improper handling, by carrier. If damage is evident, immediately file a claim with carrier.

CAUTION

When moving machine, use Installation Brackets which are supplied with the machine. Positioned forks under enclosed end of machine as illustrated.

6. Position Installation Brackets on forks as shown *(see Figure 1-3)*.

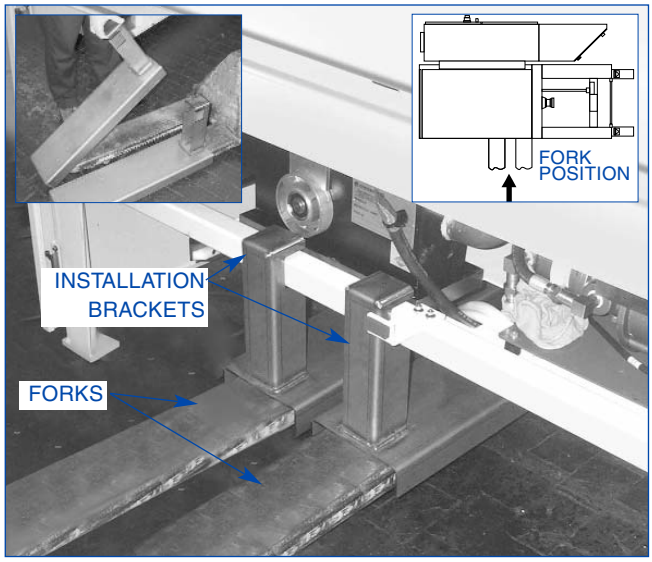


FIGURE 1-3, Position Forks

7. Move Machine to desired location.

8. Stabilize Machine by adjusting Stabilizing Screw in Machine Base *(see Figure 1-4)*. Screw out two (2) Foot Assemblies on Electrical Control Enclosure Support Legs until they contact floor; then turn each Foot 1/4 turn further. Tighten Jam Nuts on Foot Assemblies and Stabilizing Screw.

9. Wipe all protective shipping oil and grease from Machine.

10. CONNECT factory air supply line to 1/8 BSPT threaded fitting on airline Filter Regulator *(see Figure 1-5)*.

NOTE: The Factory Air Supply Line is not supplied. A minimum of 5,52 Bar (80 psi) clean, dry compressed air is recommended for proper operation.

11. Slide Coolant Reservoir into position under left side of machine *(see Figure 1-6)*.

12. Position Dump Pail on platform, under Magnetic Separator.

13. Attach coolant Doors to machine. Doors are equipped with spring latches.

14. Close access Cover.

ELECTRICAL

All wiring is to be performed by licensed electrician in accordance with all local, state, and federal codes and regulations. Along with the information provided on the machine nameplate.

WARNING

Residual Voltage exists for 2-3 minutes after Master ON/OFF Switch is turned OFF.

NOTE: An Entrance Hole has been provided, in the Enclosure, for the Electrical Supply Cord. **Drilling holes in the Enclosure is not recommended and voids Warranty.**

1. Turn Master ON/OFF Switch to OFF position and open Doors. (Doors WILL NOT open unless Master ON/OFF Switch is in OFF position.)

CAUTION

DO NOT install or run cord on left side of enclosure - Electrical Components may be damaged.

2. Insert Electrical Supply Cord through Entrance Hole, and route to Electrical Disconnect Block *(see Figure 1-7)*.

3. Strip 254 mm (10 in) off cable's outer jacket.

4. Strip 6 mm (1/4 in) of insulation off each wire.

5. Connect Green Wire (GRN) to Terminal PE (or E) as noted on Electrical Disconnect Block (Earth Ground). Refer to Illustration.

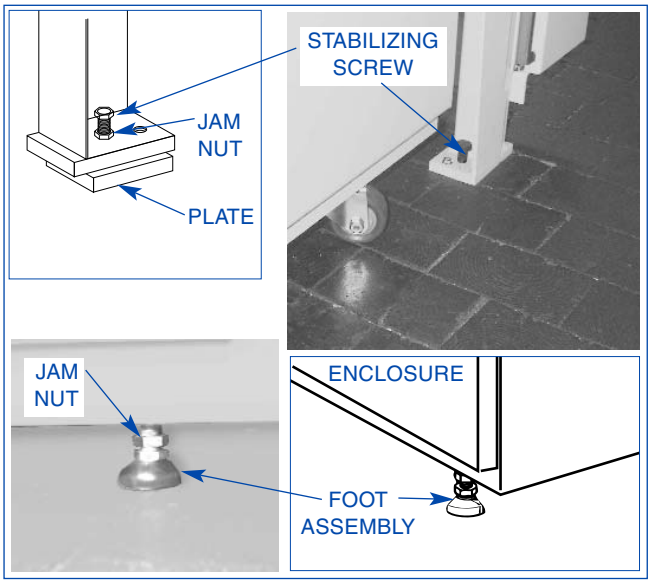


FIGURE 1-4, Stabilize Machine

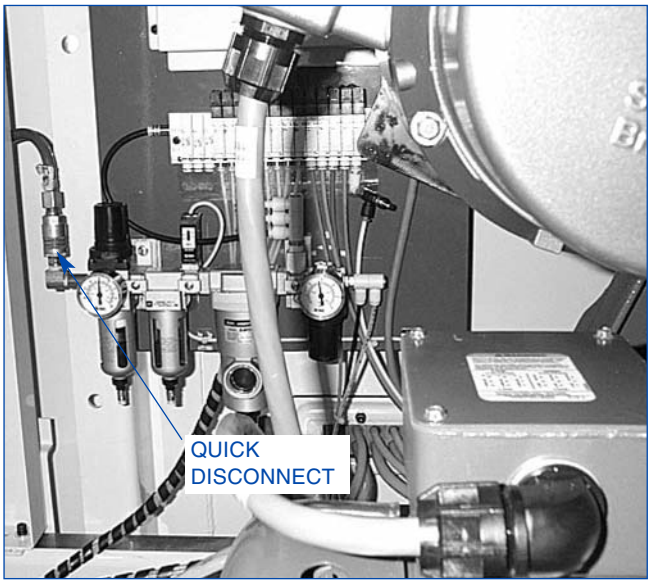


FIGURE 1-5, Filter Regulator

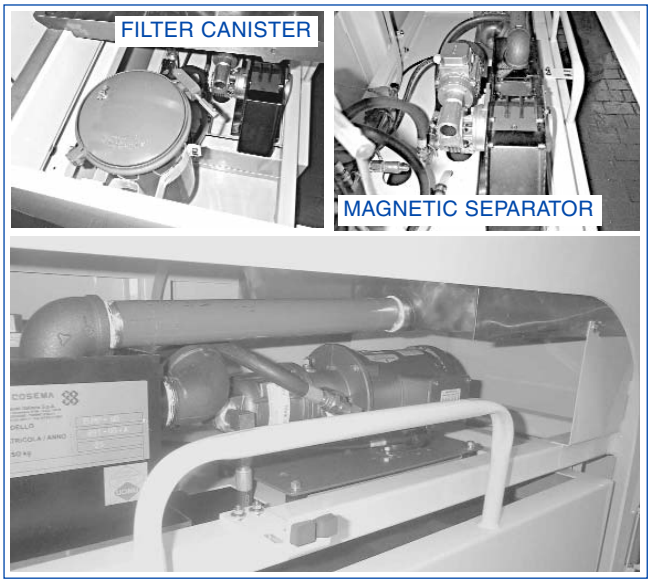


FIGURE 1-6, Coolant Reservoir

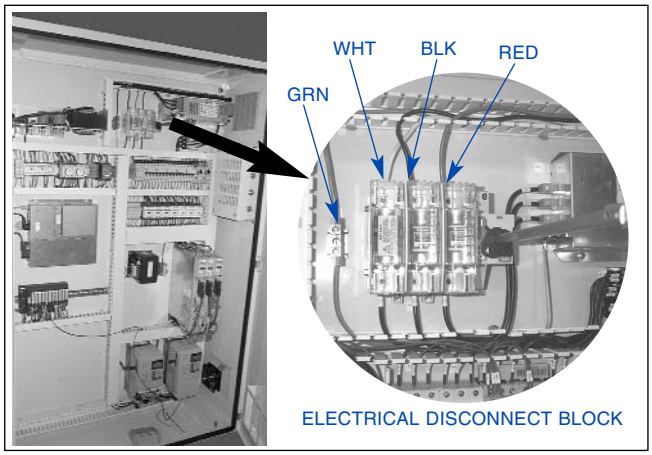


FIGURE 1-7, Electrical Enclosure

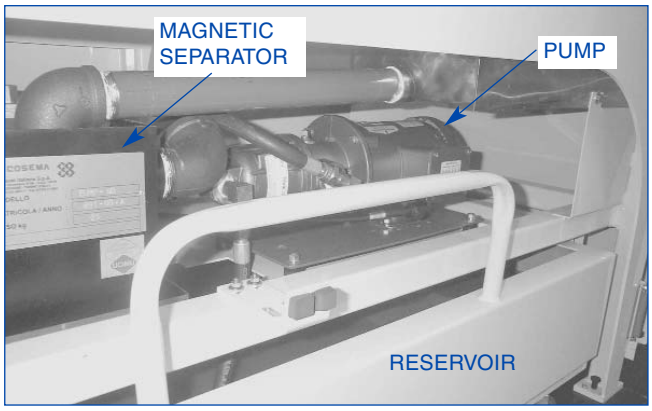


FIGURE 1-8, Coolant Reservoir

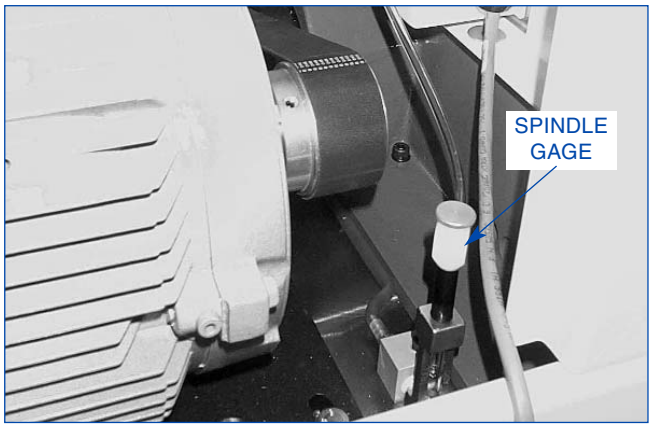


FIGURE 1-9, Spindle Gage

6. Connect other three wires to Block as noted on Block. Refer to Illustration.

7. Route and secure Cord inside of Enclosure.

8. Tighten Oil Tight Fitting.

9. Close and lock Door to Electrical Control Enclosure.

10. Route and connect Electrical Supply Cord to factory main power source.

FLUIDS

Fill Coolant Reservoir with approximately 114 liters (30 gallons) of either Sunnen Industrial Honing Oil or Sunnen Water-Based Coolant *(see Figure 1-8)*. Refer to Section 4.

Check level of oil in Spindle Gage and add oil as required. Fill with Mobil SCS 626 or its equivalent *(see Figure 1-9)*. (Use syringe supplied in accessory kit to add oil to spindle. Remove tube from gage and add oil to top of spindle until gage reads full.) Refer to Section 4.

OPTIONAL LIGHT CURTAIN

(CE Machines Only) CE machines come with optional Light Curtain and guarding installed. Light Curtain alignment must be tested for proper function after machine installation. To check, proceed as follows *(see Figure 1-10)*:

1. Check for signs of external damage to the light curtain transmitter, receiver, or cables and wiring.

2. Inspect electrical connections between guarded machine's control system and light curtain. Verify they are properly connected.

3. Turn on power to machine.

4. Verify that curtain is in alignment. The individual beam indicators located on the receiver will illuminate when alignment of a beam is not met *(refer to Figure 1-10)*.

SENDER UNIT LIGHTS		
	Floating Blanking (Receiver)	Light indicates that one or more of the beams has been deactivated. This light should not be illuminated. If it is, contact a Sunnen representative for repair.
	Machine Run (Receiver)	Light indicates the protected machine is allowed to operate
	Machine Stop (Receiver)	Light indicates the protected machine is not allowed to operate
	Interlock (Receiver)	Light indicates the protected machine is not allowed to operate until the protected zone is cleared and the start button is pressed and released
	Status Indicator (Transmitter)	Indicates the light curtain is functional

FIGURE 1-10, Light Curtain

LIGHT CURTAIN FUNCTION TEST

(CE Machines Only) Check Light Curtain operation as follows*(see Figure 1-11)*:

WARNING

The test outlined below must be performed at installation, according to employer's regular inspection program and after any maintenance, tooling change, setup, adjustment, or modification to Light Curtain System or the guarded machine. Where a guarded machine is used by multiple operators or shifts, it is suggested that the test be performed at each shift or operation change. Testing ensures that Light Curtain and machine control system work properly to stop the machine. Failure to test properly could result in injury to personnel.

1. Interrupt light curtain system with proper size test object (Test object size: 30 mm diameter). When using the test object, guide it through the detection zone as shown below. At least one individual beam indicator must be lit while test object is anywhere in detection zone.

2. Start machine. While machine is in motion, interrupt detection zone with test object. Machine should stop immediately. Never insert test object into dangerous parts of machine.

3. With machine at rest, interrupt detection zone with test object. Verify that machine will not start with test object in detection zone.

4. Verify that braking system is working properly. Machine must come to a quick controlled stop when light curtain is interrupted. Drive faults, spindle coasting and stroker coasting are unacceptable.

OPERATIONAL CHECK

Read Sections 2 and 3 thoroughly and carefully before performing the Operational Check.

1. Power up Machine and check that motors are operating properly:

• Turn OFF Coolant at Total Volume Control Valve on Flow Control Manifold.

• Open Coolant Access Doors.

NOTE: Ensure Air Vent on Filter Canister is closed and that Relief Hoses are in Coolant Reservoir..

• Turn ON Magnetic Separator Disconnect, located inside Electrical Enclosure *(see Figure 1-12)*.

• Release E-STOP by turning button counterclockwise. Then depress POWER ON Button.

• Check rotation of Magnetic Separator for proper rotation *(see Figure 1-13)*. Rotation should be counterclockwise, as viewed from side of Machine.

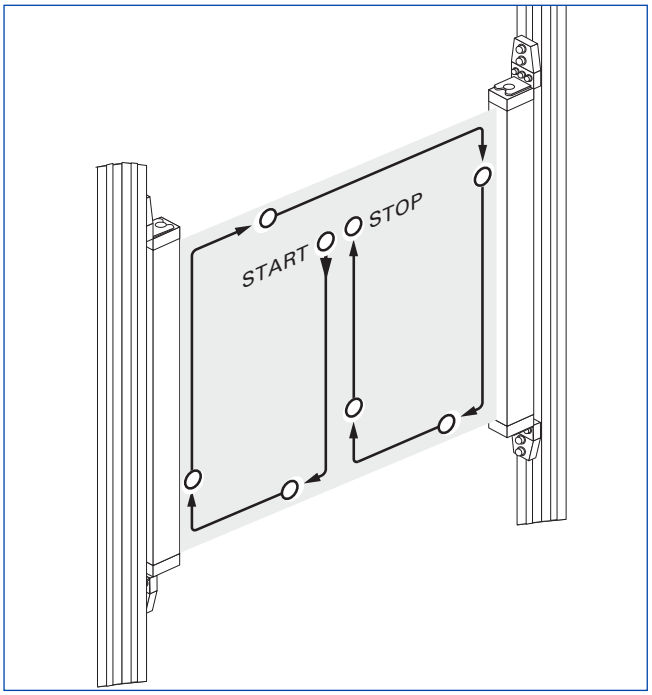


FIGURE 1-11, Light Curtain

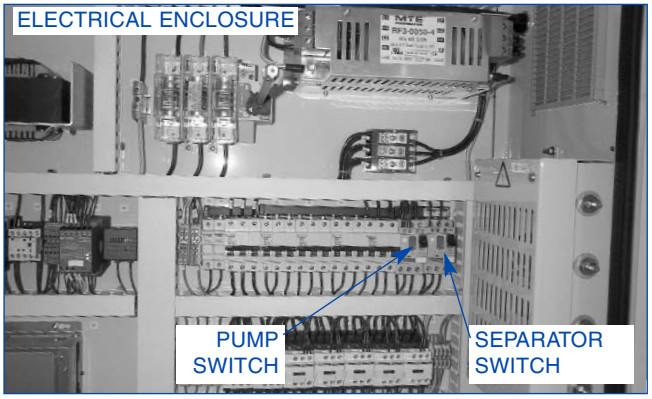


FIGURE1-12, Coolant Disconnect

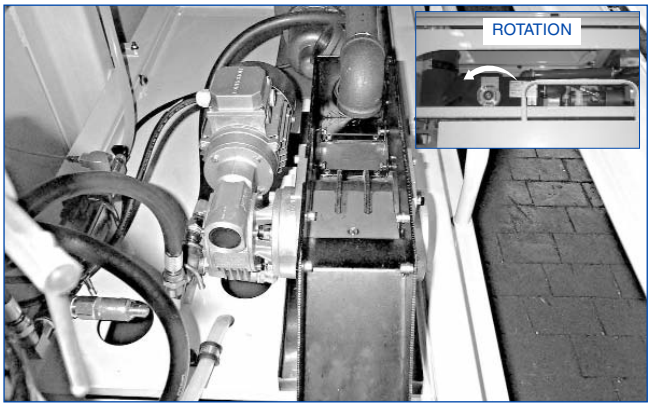


FIGURE1-13, Magnetic Separator

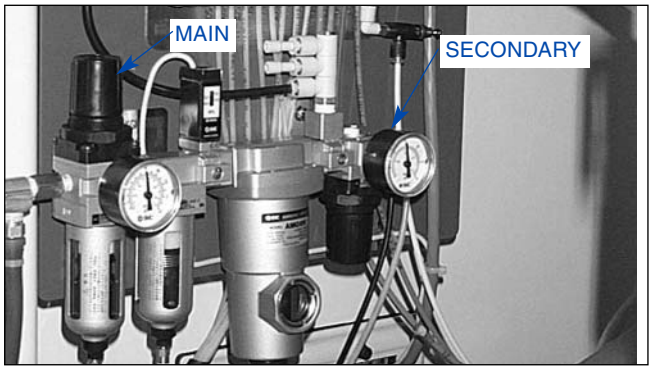


FIGURE 1-14, Airline Regulators

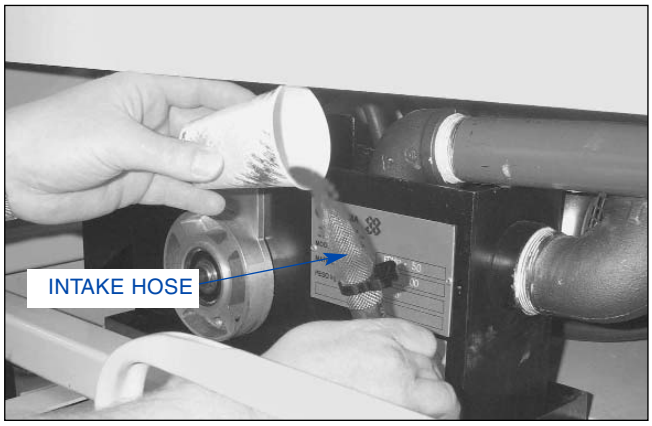


FIGURE 1-15 Coolant System

• If rotation is incorrect, shut OFF power to Machine and reverse any two wires (RED, WHT, or BLK) of Electrical Supply Cord where they are connected to Electrical Disconnect Block in Electrical Control Enclosure. *(Refer "Electrical" and to Figure 1-7.)*

• Turn ON Air Supply *(see Figure 1-14)*, set Main Regulator to 5,52 Bar (80 psi), and set Secondary Regulator to 1 Bar (14.5 psi).

• Turn OFF power to Machine.

2. Bleed Coolant System *(see Figure 1-15)*:

• Open Air Vent in Filter Canister Cover.

CAUTION

DONOT run pump without priming.

• Turn ON Coolant Pump Disconnect, located inside Electrical Enclosure *(refer to Figure 1-13)*.

• Turn ON power to Machine.

• Press POWER ON Button.

• With coolant Intake Hose held above pump fitting, prime pump by filling hose with coolant.

• Return Intake Hose to coolant cart when pump begins moving coolant.

• Ensure all three hoses are in reservoir.

• As coolant fills Filter Canister, air will escape through Air Vent. When coolant appears in partially opened Vent, close Vent.

• Open Total Volume and Nozzle Control Valves.

• Slowly pour an additional 19 liters (5 gallons) of approved Coolant into Work Tray, to top off System. System holds a total of 133 liters (35 gal.) of Coolant.

• Close Coolant Access Doors and turn OFF power to Machine.

3. After unpacking and installing Machine, clean and lubricate *(refer to Section 4)*.

NOTES

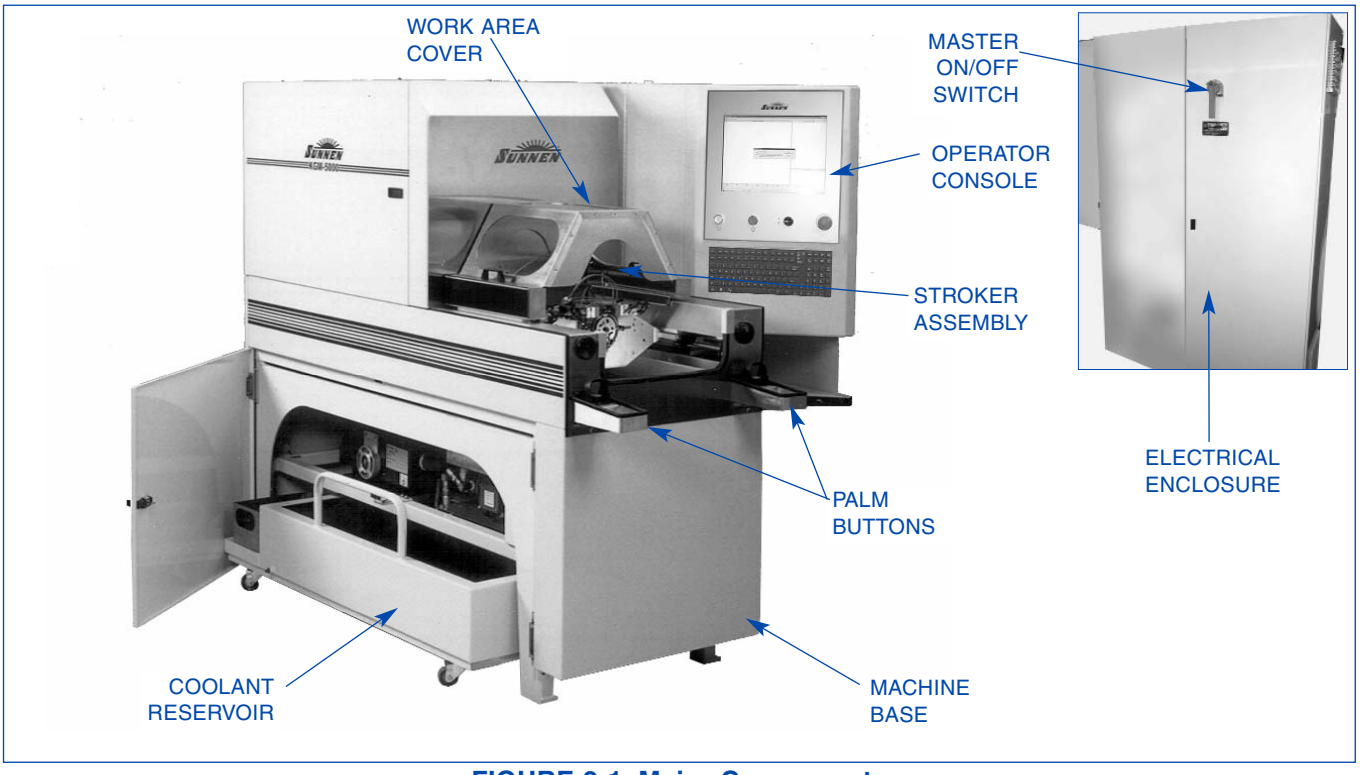


FIGURE 2-1, Major Components

SECTION 2
PREPARINGFOROPERATION

GENERAL

Consult this section when preparing the Machine for operation.

MAJOR COMPONENTS

For the location of major components on your Machine *(see Figure 2-1)*.

FIGURE 2-2, Machine Base

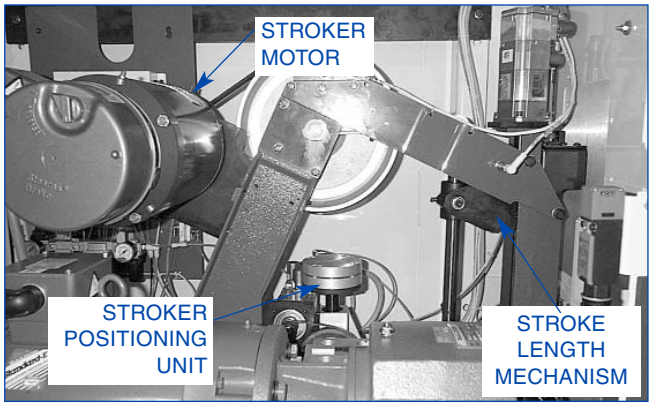


FIGURE 2-3, Stroker Assembly

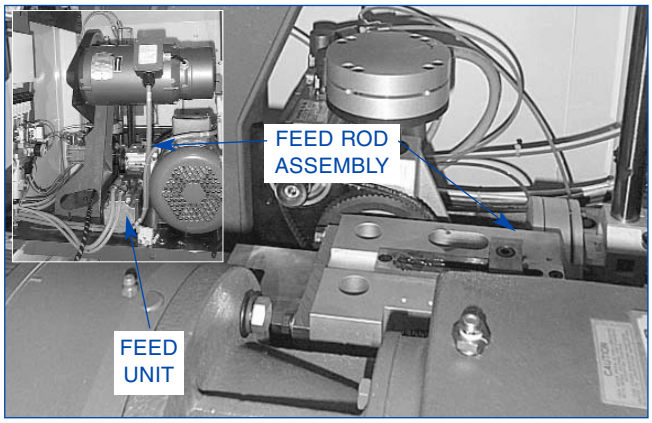


FIGURE 2-4, Spindle & Feed Unit

1. The MACHINE BASE consists of Frame, Base, Machine Cover (Hood), Shelf, Work Tray, and Work Area Cover *(see Figure 2-2)*.

2. The STROKER ASSEMBLY is located at inside rear of Machine. It provides stroking power to Stroker Carriage. It consists of a Stroker Motor Assembly, Stroker Positioning Unit, and Stroke Positioning Mechanism (see Figure 2-3).

• The STROKER CARRIAGE is located in work tray of Machine. It provides the means for mounting optional Workholding Fixture and stroking of Fixture. *(Refer to Appendix C for Carriage Hole Pattern.)*

3. The SPINDLE & FEED UNIT is located inside cabinet in middle of Machine. It consists of Spindle Housing, Spindle Assembly, Feed Rod Assembly, and Feed Unit *(see Figure 2-4)*.

• The SPINDLE ASSEMBLY is located inside work tray of Machine *(see Figure 2-5)*. The tool is mounted in the assembly and adjusted for conical and parallel runout with lettered and numbered Screws in the Spindle Nose.

4. COOLANT SYSTEM is a removable unit which slides into left side of Machine *(see Figure 2-6)*. System consists of the following items:

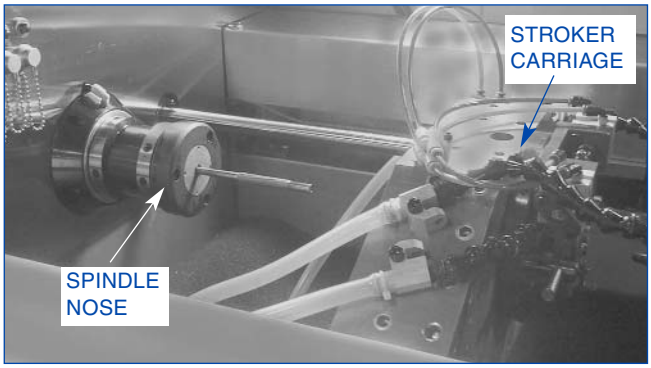


FIGURE 2-5, Spindle Assembly

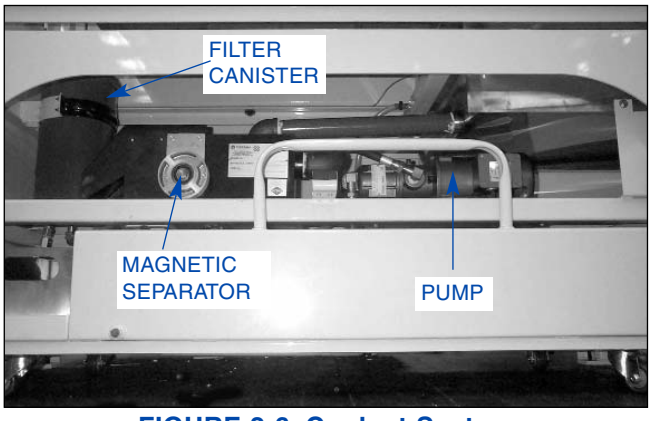


FIGURE 2-6, Coolant System

• Coolant Reservoir is the storage unit for coolant, and is mounted on casters for ease of sliding in and out of Machine.

• Filter Canister is mounted on the rear of the machine for ease of cleaning. It filters coolant before it is delivered to flow control manifold.

• A High Pressure Relief Valve, located in line with filter canister, dumps excess coolant from filter into reservoir as filter begins to clog.

• A Low Pressure Relief Valve, located between filter canister and flow control manifold, routes excess coolant back to the reservoir assembly when flow control manifold valves are closed.

• A Magnetic Separator is incorporated in the System to filter out metal particles from coolant as it is returned to reservoir. A Pail is also provided to catch metal waste from separator.

• Motor & Pump Assembly circulates coolant through the System and delivers it to flow control manifold.

• System is wired into Operator Control Panel and flashes a message on screen, to inform operator when there is no coolant flow.

• FLOW CONTROL MANIFOLD is located inside work tray of Machine (see Figure 2-7). It provides independent regulation of Coolant flow to each Nozzle through Total Volume Control Valve and individual Nozzle Control Valves. The total volume control valve is used to turn coolant supply on and off, eliminating readjustment of individual nozzle control valve settings.

• NOZZLES are located inside work tray. A Thumb-screw on each of nozzles allows nozzles to be removed from their base and to be moved directly to Stroker Carriage frame or Workholding Fixture.

• Nozzles provide coolant to workpiece and mandrel. Four (4) independently controlled Coolant Nozzles are easily positioned to assure an even flow of coolant through workpiece during honing operation. Coolant flow to each of independent nozzles is adjustable by individual Nozzle Control Valves.

5. PNEUMATIC (AIR) SYSTEM is used in setup and operation of basic machine functions, as well as, providing air pressure for operation of optional Workholding Fixtures *(see Figure 2-8)*.

• FILTER REGULATOR is located inside top access Cover, at left end of Machine. It is used to regulate incoming pressure to Machine *(see Figure 2-9)*. Gauge is preset at Factory to 5,52 Bar (80 psi).

6. DRIVE MOTOR(S): There are five (5) Motors used in the Machine *(see Figure 2-10)*:

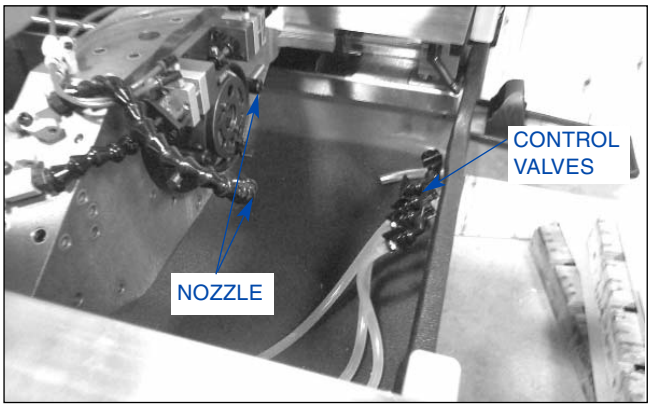


FIGURE 2-7, Flow Control Manifold

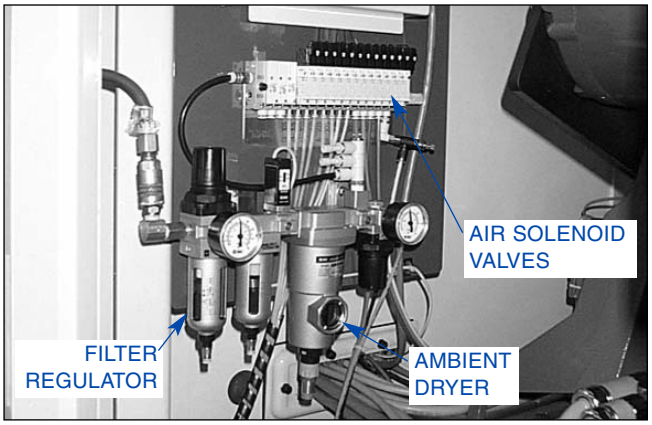


FIGURE 2-8, Pneumatic System

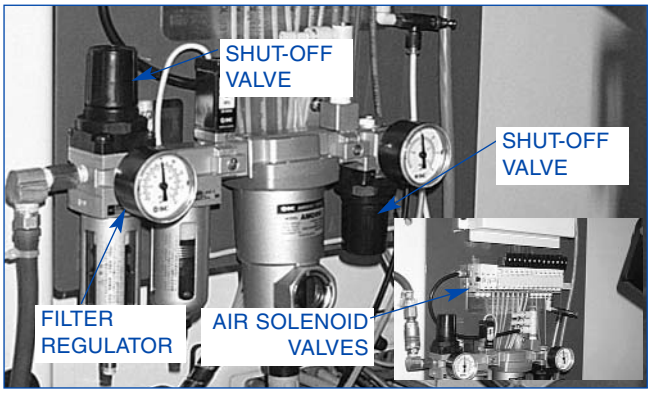


FIGURE 2-9, Filter Regulator

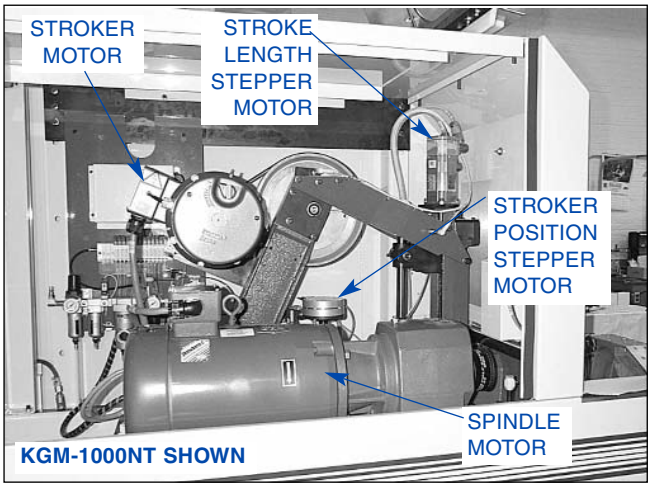


FIGURE 2-10, Drive Motors

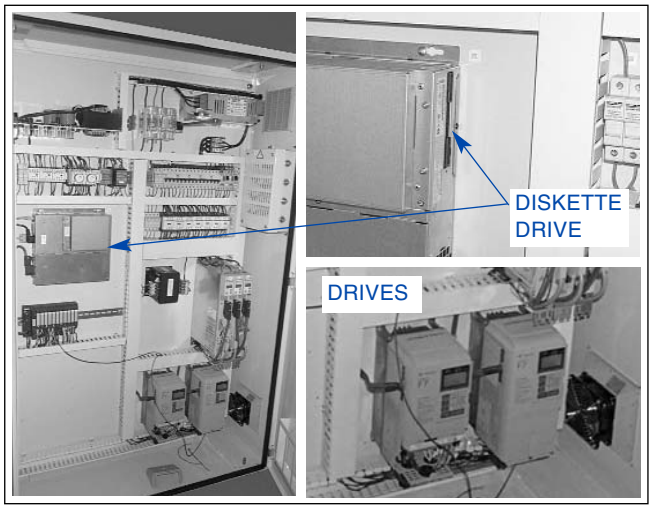


FIGURE 2-11, Electrical Enclosure

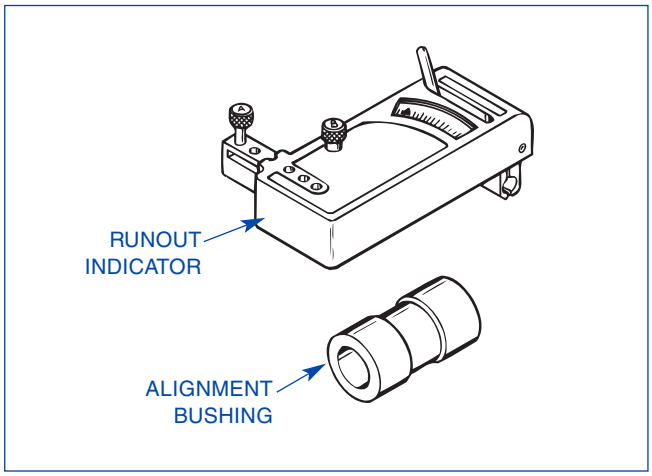


FIGURE 2-12, Runout Indicator

• Spindle Motor, which provides power to rotate Spindle. Feed (Gear) Motor, which provides power to feed and retract Tool Wedge. Stroker Motor, which provides power to move Stroker Carriage over Tool. Stroke Position Motor, which provides power to move Stroker Carriage to its pick-up or load position. Stroke Length Motor, which provides power to set stroke length.

• There are two (2) Motors used in Machine's Filtration System *(refer to Figure 2-6)*: Pump Motor, which provides power to the Systems Coolant Pump. Magnetic Separator Motor, which provides power to drive Magnetic Separator.

7. OPERATOR CONTROL PANEL is mounted on front of enclosure *(refer to Figure 2-13)*. The Operator can control all Machine functions from Controls mounted on Display Terminal.

8. ELECTRICAL CONTROL ENCLOSURE: Master ON/OFF Switch is located on doors to Electrical Control Enclosure at rear of Machine *(see Figure 2-11)*. It Controls all electrical power to the Machine.

9. TOOLING: Contact Sunnen Products for a complete list of tooling options.

10. RUNOUT INDICATOR *(see Figure 2-12)* attaches to Stroker Drive Shaft and is used in conjunction with an Alignment Bushing to indicate conical or parallel runout in a Tool.

OPERATOR CONTROLS

For the location and function of the operator controls refer to *Figure 2-13 and Table 2-1*.

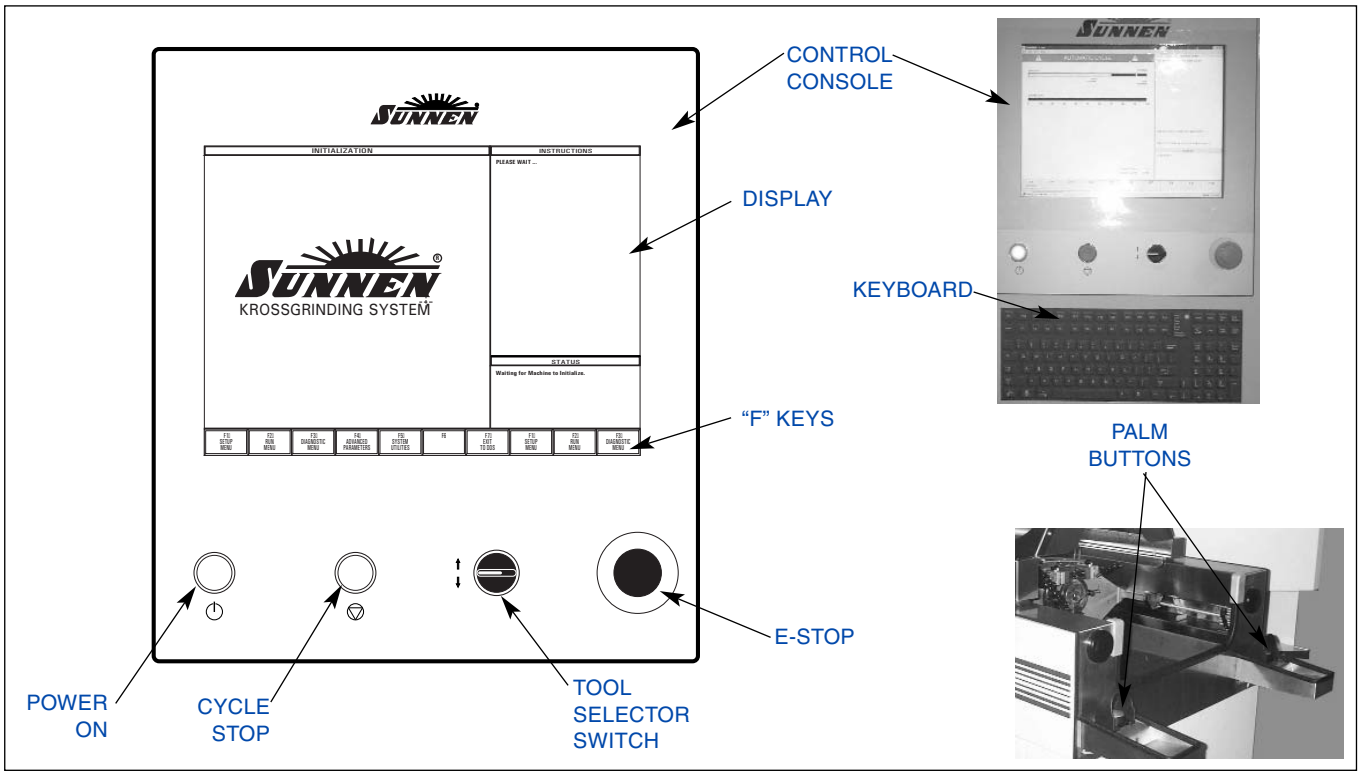


FIGURE 2-13, Operator Control Console

TABLE 2-1, Operator Controls

SYMBOL	DESCRIPTION	FUNCTION
	E-STOP (Pushbutton, Red)	Stops all Machine movements.
	POWER ON LIGHT (Pushbutton, White)	Turns ON all electrical power to the Machine.
	CYCLE STOP (Pushbutton, Red)	Turns OFF power to machine spindle, stroker, and feed motors where applicable.
	TOOL - EXPAND ( ) RETRACT(↓) (Selector Switch)	Expands tool when the button is turned and held in up position. Retracts tool when the button is turned and held in down position.
	DISPLAY	Colored display screen, used to prompt operator for information, during the setup and operation of the machine. Used in conjunction with “F” keys and alpha-numeric keypad.
	“F” KEYS	These keys are used for a variety of functions, as indicated across the bottom of the display screen.
	KEYBOARD	Alpha-Numeric keyboard is used to enter information into the display screen. (CPU and software are NT based.)
	(Palm Buttons)	Located on the front of the Machine. They are also use for various functions during the setup and operation of the machine. Buttons MUST be activated together, with both hands, to ensure operator hands are clear of any moving parts.

TABLE 2-2, Safety Symbols

SYMBOL	DESCRIPTION	FUNCTION
	Warning Label	Warns that an electrical hazard exists.
	Warning Label	Warns that power must be off with guards open to prevent injury, and that hand and finger hazard exist.
	Warning Label	Warns that safety glasses should be worn at all times when operating this machine.
	Warning Strip	Warns that a *physical hazard exists*, and that proper precautions should be taken.
	Warning Label	Warns that no drilling is allowed. Drilling any new holes may void warranty.
	Warning Label	Warns not to hold workpiece in hand without a torque resisting fixture.
	Warning Label	Warns not to touch - Hot Surface.
	Label	Designates this machine is *“CE” compliance*.

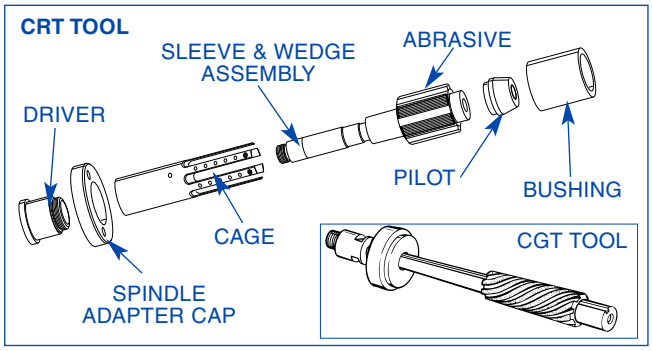


FIGURE-14, CRT Tool

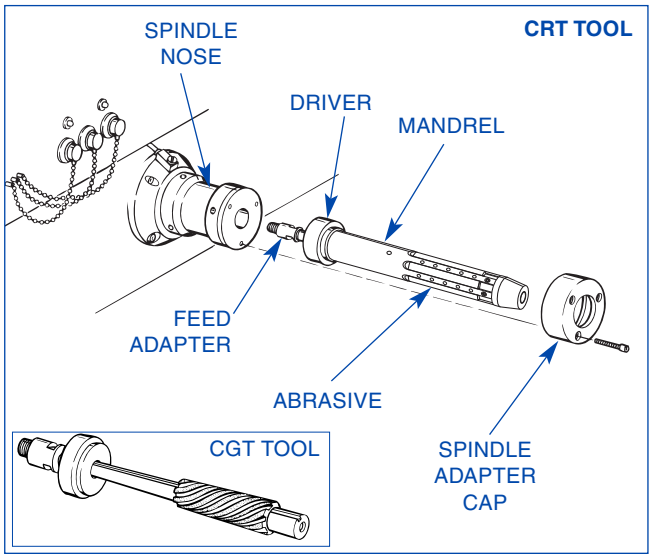


FIGURE-15, Install Tool

SAFETY SYMBOLS

For a description of safety symbols used on this machine, *refer to Table 2-2*.

WORKHOLDING FIXTURE

Install and align Workholding Fixtures according to instructions packaged with fixtures supplied for your particular application. *(Refer to Appendix C for Carriage Hole Pattern.)*

CAUTION

When install Sunnen Universal Fixture or a custom fixture on machine carriage; ensure carriage mounting bolts are torqued to a maximum of 130 in-lb (14.7 N-m). Over tightening may damage carriage inserts.

NOTE: Fixtures used on these machines are custom made for each job. Follow installation and alignment procedures packaged with your fixture.

CGT & CRT TOOL

Sunnen CGT Krossgrinding Tool and Sunnen CRT Production Rod Reconditioning Tool, are expandable, superabrasive-plated tool *(see Figure 2-14)*. It comes in a variety of sizes and grits to accommodate a wide range of bore diameters and finishes.

INSTALL "CGT/CRT" TOOL

To set up your machine for operation select "SETUP" from main menu. The machine's control software will walk you through the setup procedure step by step on the display screen. Follow all instructions carefully. If additional information is needed at any time during set up, refer to the related setup overview, which follows:

NOTE: The following is provided for general reference. Specific steps on your machine may be different.

To install a Tool, proceed as follows:

1. Key in Part Specifications *(refer to Section 3)*.
2. Select Tool referenced by your Machine.
3. Key in Tooling Information.
4. Key in Honing Parameters.
5. Key in Feed Parameters.
6. Use F4 and F5 along with Palm Buttons, to position Carriage at a comfortable position.
7. Remove Guard.
8. Press F2, Install New Tool:
   F2, Install New Tool.
   F3, Use Existing Tool.
9. Remove Spindle Adapter Cap from Spindle, by removing three (3) Socket Head Capscrews.
10. Press ↵ (ENTER) when complete. Tool moves out of spindle. (That is, machine will expand tool until feed adapter is fully exposed.)
11. Remove existing tool *(see Figure 2-15)*:

• While holding Spindle Nose with Spanner Wrench (supplied), loosen Tool by turning Feed Adapter using preset Torque Wrench and Torque Wrench Head (supplied).

• Grasp Tool by abrasive section and unscrew Tool from Spindle.

CAUTION

DO NOT grasp Tool at Hub while rotating Tool. This may damage Tool.

12. Install new Tool:

• Wipe Face of Spindle Adapter and Hub to ensure faces are clean.

CAUTION

DO NOT grasp Tool at Hub while rotating Tool. This may damage Tool.

• Grasp Tool by abrasive section and screw Tool into Spindle. Hand tighten.
• While holding Spindle Nose with Spanner Wrench (supplied), tighten Tool by turning Feed Adapter using preset Torque Wrench and Torque Wrench Head (supplied). The Sunnen Torque Wrench is pre-set at factory to 61 N/m (45 ft/lbs).

• Hold Tool Selector Switch in UP position (expand), until Tool Hub is in contact, flush against face of Spindle Adapter.

• Slide Spindle Adapter Cap over Tool until it is up against face of Spindle Adapter. Install and securely tighten three (3) Socket Head Capscrews.

13. Press F7, NEXT STEP.

14. Set Tool Snugging Diameter: Key in desired diameter and press ↵ (ENTER).

CAUTION

Tool MUST NOT be expanded past maximum diameter marked on tool Hub. On new tools, with the exception of small diameter tube tools; maximum expansion occurs when distance from end of Wedge to edge of Abrasive Section equals: Approximately 13 mm (1/2 in) on CGT12- through CGT38- Series Tools; approximately 27 mm (1-1/16 in) on CGT10- Series Tools; and approximately 15 mm (19/32 in) on CGT7- and CGT8- Series Tools *(see Figure 2-16)*. Refer to instructions packaged with your tool.

15. Adjust Conical & Parallel Runout.

CONICAL & PARALLEL RUNOUT

For aligning Tool with adjustable spindle nose, use Sunnen Runout Indicator Assembly, EC-6550.

Accurate centering of Sunnen Tools requires a concentric Alignment Bushing. For manual operation: The ID of bushing should be the same as finish diameter of workpiece. For automatic operation: The ID of bushing should be the same as starting diameter of workpiece.

For workpieces whose staring diameters fall between diameters listed, bushing should be honed out to diameter required.

Eliminate conical and parallel runout as follows:

1. Select proper Sunnen Alignment Bushing. Bushing should have ID close to snug diameter of workpiece.

CAUTION

The tool MUST NOT be over expanded with alignment bushing on tool.

2. Depress Tool Retract.

3. Slide Alignment Bushing on Tool *(see Figure 2-17)*.

CAUTION

DO NOT over expand Tool - Tool could be damaged.

4. Hold Tool Selector Switch in UP position (expand), until bushing feels snug.

5. Check that Numbered & Lettered Setscrews in Tool Holder are snug.

6. Attach Runout Indicator to Stroker Drive Shaft *(see Figure 2-18)*:

7. Align Runout Indicator with Alignment Bushing.

8. Adjust spacing of gaging points on Runout Indicator so points are as a far apart as Alignment Bushing permits *(see Figure 2-19)*.

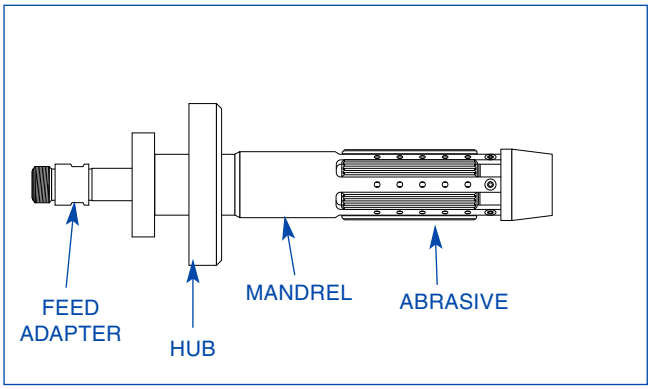


FIGURE 2-16, Tool Expansion

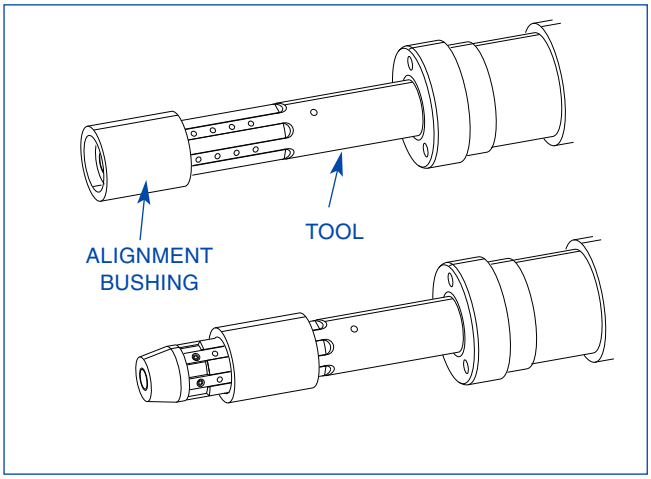


FIGURE 2-17, Alignment Bushing

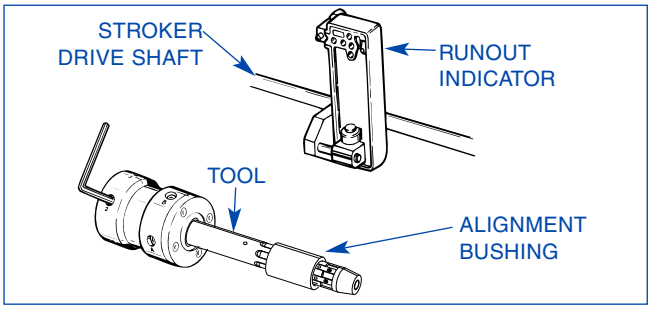


FIGURE 2-18, Runout Indicator

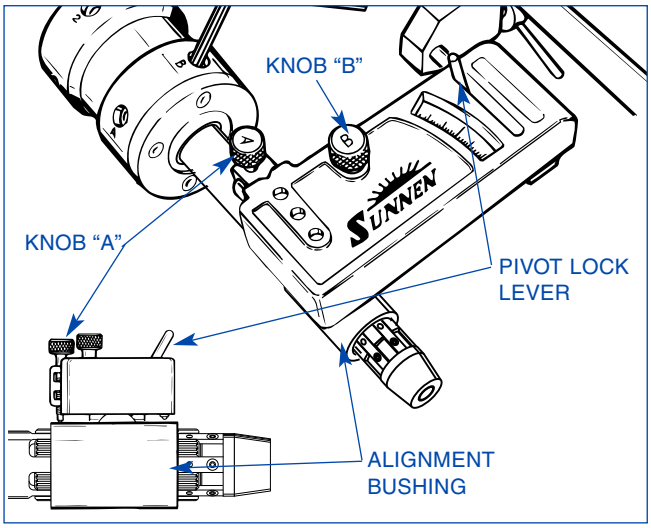


FIGURE 2-19, Indicator Adjustment

9. Release Pivot Lock Lever.

10. Turn Knob "A" in either direction to set Runout Indicator Pointer to "0" (approximate).

11. Rotate Spindle by hand to locate lowest reading on gage; readjust Knob "A" as required so low point can be located.

12. Adjust for Conical Runout using Lettered Setscrews: Loosen Screws in Spindle Nose on side with highest reading; and tighten Screws on opposite side with lowest readings *(see Figure 2-20)*.

13. Repeat as required, until conical runout has been eliminated.

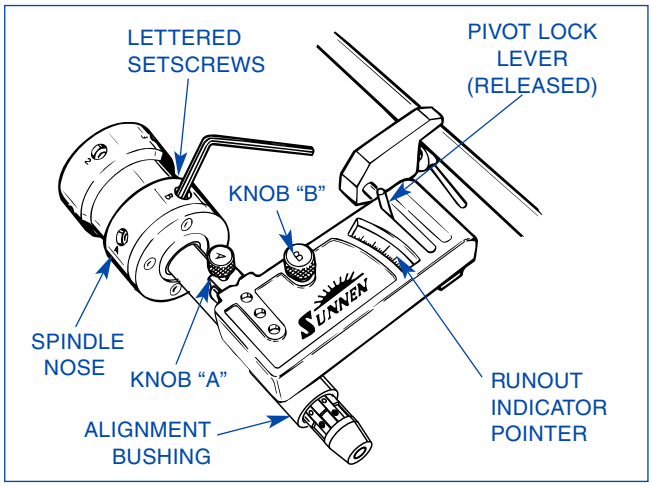


FIGURE-20, Conical Runout

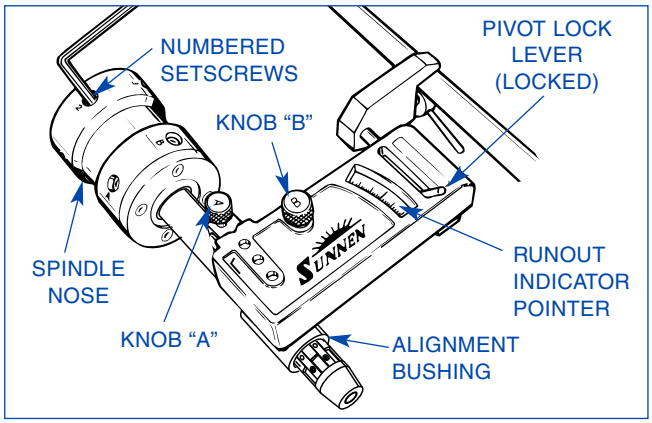


FIGURE-21, Parallel Runout

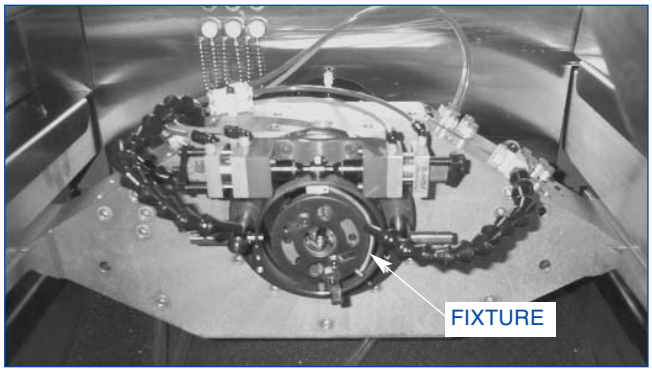


FIGURE-22, Fixture

14. Turn Knob "A" counterclockwise one full turn.

15. Move Pivot Lock Lever to lock position.

16. Turn Knob "B" in either direction to set Runout Indicator Pointer to "0" (approximate).

17. Rotate Spindle by hand to locate highest reading on gage; readjust Knob "B" as required so high point can be located.

18. Adjust for Parallel Runout using Numbered Setscrews: Loosen Screws in Spindle Nose on side with highest reading; and tighten Screws on opposite side with lowest readings *(refer Figure 2-21)*.

19. Repeat as required, until parallel runout has been eliminated.

20. Recheck Conical and Parallel Runout; readjust as required.

21. Remove Runout Indicator.

22. Hold Tool Selector Switch in DOWN ↓ position (retract), until Alignment Bushing can be slid from Tool.

23. Reinstall Guard.

SETUP - FIXTURE INSTALLATION

If your Sunnen fixtures arrive assembled to the carriage, then they have also been accurately aligned to the spindle for best honing performance. No other alignment should be necessary, but be sure to read any special instructions that come with your unique fixtures. If you are providing your own fixture or if it has been removed from carriage for any reason, it must be aligned to spindle when reinstalled.

This procedure is provided as an overview aligning the fixture base with the spindle. For details instructions; refer to instructions packaged with your fixture. To initially align Spindle and Fixture, proceed as follows:

1. Turn ON power at Master ON/OFF Switch, located on Electrical Enclosure.

2. Close all doors.

3. Release Emergency STOP Button on Operator Control Console.

4. Press POWER-ON Button. Display will read:

INITIALIZATION

WARNING

Tool MUST be retracted from part. Retract Tool if machine shut down due to power outage or other reason with tool in part. Press F1 to retract Tool.

5. Verify all doors and guards are in place.

6. Press Palm Buttons to HOME the machine. Revised MENU will appear after all drives have been initialized.

7. Install fixture to carriage. Snug; DONOT tighten bolts at this time (see Figure 2-22).

8. Enter Setup Screen for New Setup and follow directions on screen.

9. At Carriage Position Setup: Pull carriage away from tool and reposition the carriage stop block to prevent fixturing damage during fixture HOME initialization procedure *(see Figure 2-23)*.

10. Install workpiece in fixture.

11. Align and tighten fixture, using workpiece for alignment. The allowable amount of misalignment depends on your application and fixturing used.

12. Then, tighten mounting bolts.

NOTE: An alternate method is to mount a special close fitting alignment bar in the spindle, adjust its runout to nearly zero (see runout adjustment), and then use this bar to locate fixture on carriage.

13. Route and attach airlines to fixtures as needed.

14. Attach and position coolant lines on carriage/fixture.

FIXTURE INTERLOCK

The Fixture Interlock monitors automated fixturing at points during an automated cycle to insure proper fixture function (see Figure 2-24). It will stop machine cycle when improper function of fixture is detected, thus avoiding damage to machine, fixture or workpiece.

OPTIONAL EQUIPMENT

1. GAGES. Contact Sunnen Products Company for available gaging options.

2. WORKHOLDING FIXTURE. Because each part and parts handler will need specific fixturing design requirements, your Machine does not come with a Workholding Fixture. Holes are provided in Stroker Carriage for attaching a standard or custom designed Workholding Fixture. Consult your local Sunnen Field Service Engineer or Sunnen Products Company, St. Louis, MO, about your particular application.

3. COOLANT KIT (Water-Based): Because it is recommended that ONLY Sunnen Water-Based Coolant Concentrate be used in Rod Reconditioning Machine, Sunnen has available optional SCC-900 Coolant Maintenance Kit for checking and maintaining coolant.

6. WORK AREA COVERS: Work Area Covers (Guards) are included with all machines for manually loaded / unloaded applications.
Standard Cover *(see Figure 2-25)*;
CE Cover *(see Figure 2-26)*.

Consult your local Field Service Engineer or Sunnen Customer Service Department, regarding your particular application.

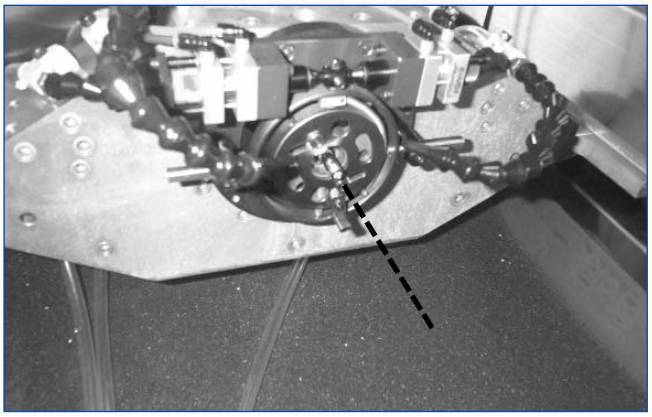


FIGURE-23, Fixture Alignment

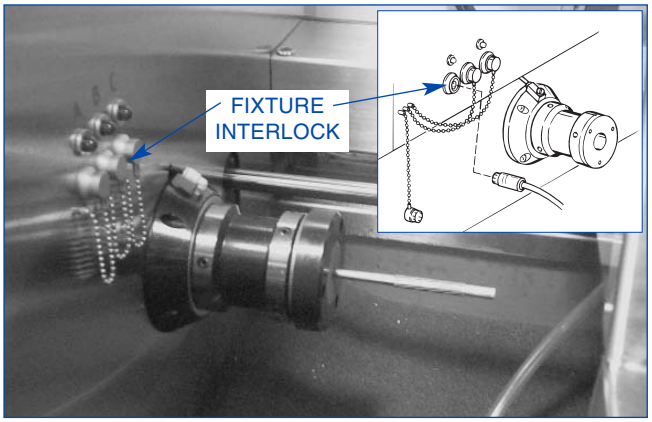


FIGURE-24, Fixture Interlock

FIGURE-25, Standard Work Area Cover

FIGURE-26, CE Work Area Cover

SECTION 3
SETUP & OPERATION

GENERAL

This section gives step-by-step operating procedures for Sunnen KGM® KrossGrinding® Machine.

SAFETY PRECAUTIONS

The following precautions should be observed to ensure maximum safety while working on or around your Machine.

• Wear proper Safety Items (such as safety glasses and other personal safety equipment as necessary or required).

• Do not wear cotton or heavy gloves while operating this equipment! If gloves must be worn, wear only the tear-away type.

• DO NOT wear loose fitting clothes or jewelry while working on or around Machine.

• Keep area around Machine free of paper, oil, water and other debris at all times.

• Keep Machine and area around machine cleaned of excessive lubricant and lubricant spills.

• Keep tools and other foreign objects clear of Machine while in operation.

• Keep tools clean and in their proper storage compartments to maintain them in proper working condition and to prolong tool life.

• Inspect Tools before using. Check for cracks, burrs or bent parts that might effect operation.

• DO NOT force tools when operating. Tools will do a better and safer job when operated at the rate for which they were designed.

• Turn OFF electrical power when performing service on your machine, which does not require power.

• Disconnect Machine from main power supply and allow drives to drain before any work is performed inside of Electrical Enclosure.

• Ensure all Guards are in place and are in proper working order.

• DO NOT override safety switches or lockouts. Where interlocking systems rely on special actuators or keys, DONOT keep spare/master actuators or keys on, around or near machine.

• Use proper lifting procedures when loading and unloading the Machine.

• Keep all non-essential persons clear of work area. Visitors, especially children, should not be permitted near the work area.

• DO NOT use machine for other than its intended use. Using these Machines for other purposes could result in damage to machine and loss of warranty.

• Be sure to work in a well lit area and to use light supplied to avoid dangerous unseen conditions which may exist otherwise.

• Use ONLY factory authorized or recommended parts or replacement accessories. Using parts or accessories other than those approved by Sunnen could result in damage to machine and loss of warranty.

• Electrostatic discharge can damage the circuitry of the electronic components used in this Machine. Use proper electrostatic controls when working with or around electronic components. Ground Machine and use wrist strap to reduce the chances of static discharge.

• Residual Voltage exists for 2-3 minutes after Master ON/OFF Switch is turned OFF. Before working inside Enclosure, wait for all fans to stop running to allow drives to drain.

INITIAL SETUP

To set up your machine for operation select “SETUP” from main menu. The machine’s control software will walk you through the setup procedure step by step on the view screen. Follow all instructions carefully. If additional information is needed at any time during set up, refer to the related special topics listed below and covered in these or related instructions.

Special Topics

Controls: See Sec. 2, Operator Controls.
Tool Runout: See Sec. 2, Conical & Parallel Runout
Fixture Setup: See separate instructions package with fixtures
Snugging on a Workpiece to Initialize Tool Dia: See Sec. 3, Setup & Operation, Tool Snugging
Setting Stroke Position: See Sect. 3, Setup & Operation, Stroke Position

In preparation for going through the setup sequence, the following preliminary steps can be helpful:

• Install and align any fixturing.

• Install CRT Tools or other tooling in machine spindle and adjust runout using Sunnen Runout Gage.

SETUP & OPERATION

Consult the following procedure when setting up your machine for operation. (The machine's control software will walk you through the setup procedure step-by-step on the view screen. Follow all instructions carefully.)

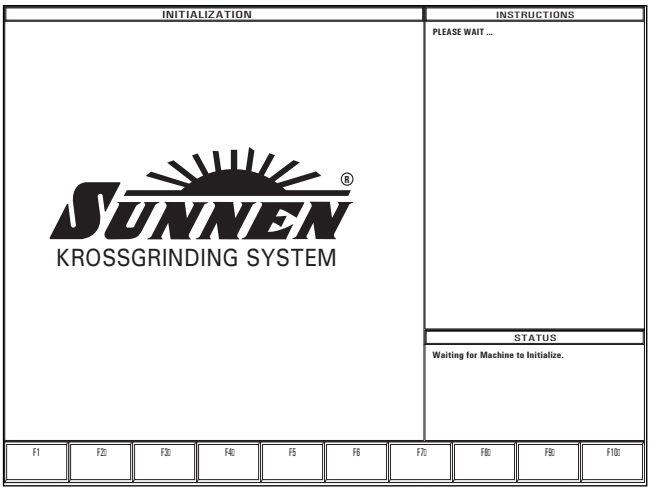
1. Turn ON power to the Machine at Master ON/OFF Switch, located on Electrical Enclosure.

INITIALIZATION

2. Close all Guards.

3. Release Emergency STOP Button on Operator Control Console.

4. Press POWER ON Button. Display will read:

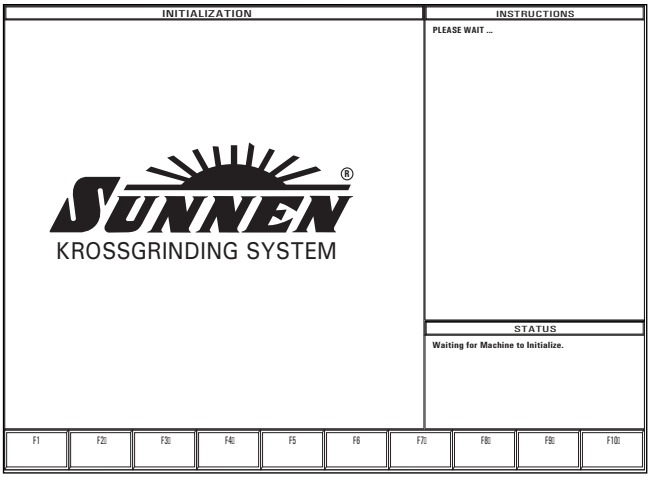


WARNING

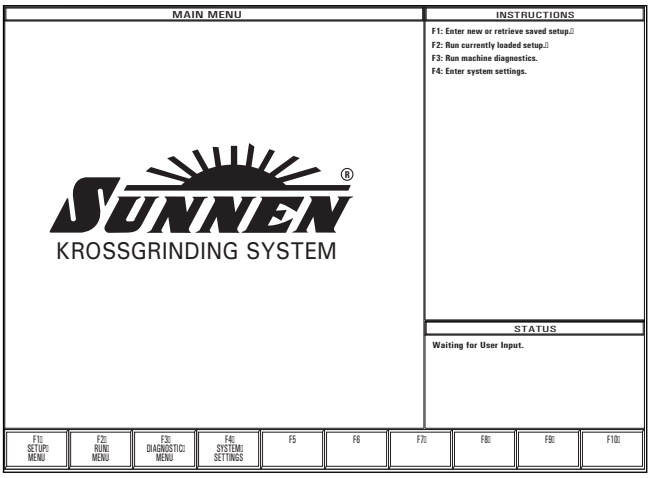
Tool MUST be retracted from part. Retract Tool if machine shut down due to power outage or other reason with tool in part. Press F1 to retract Tool.

5. Verify all Guards are in place.

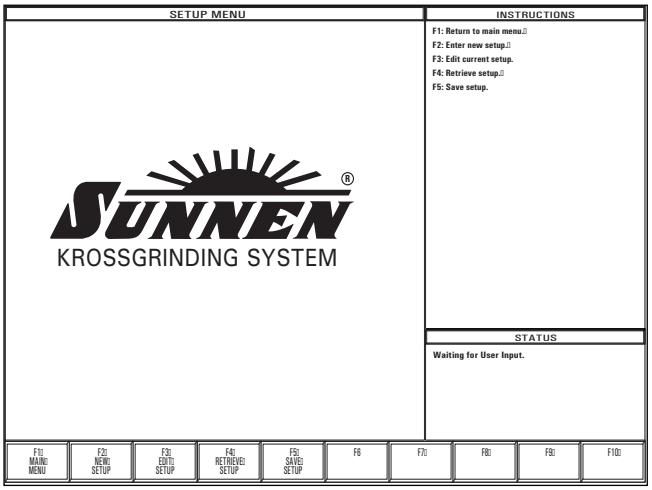
6. Press Palm Buttons to HOME carriage. Revised MENU will appear after all drives have been initialized.



• When Initialization is complete. Display will read:

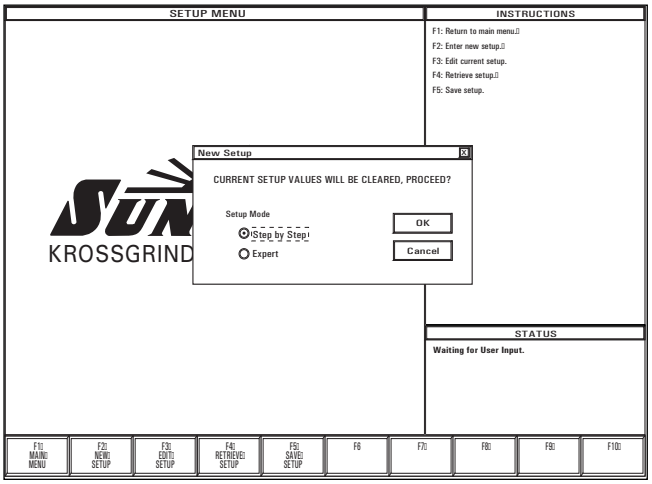


7. Press F1, SETUP MENU. Display will read:



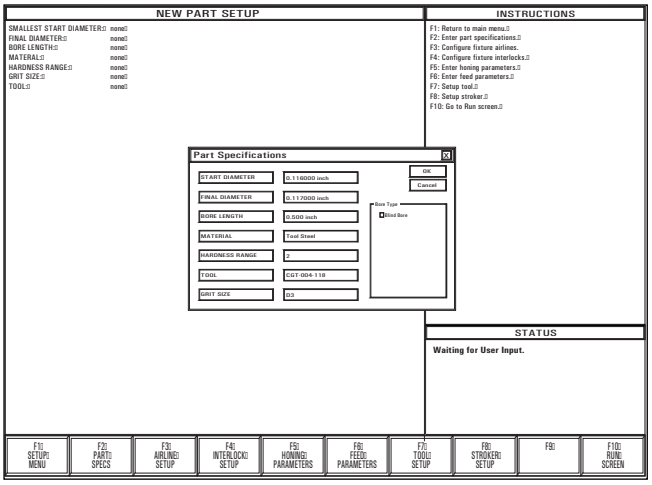
NOTE: To retrieve a previously saved setup, refer to setup options.

8. Press F2, NEW SETUP. Display will read:



Step-by-Step will walk you through each step. Expert lets you select each option.

• Select Mode, and press OK. Display will read:



9. Key in Part Specifications:

• Click on Start Diameter and enter valve using Key Pad (.5 used as an example); press OK.

START DIAMETER: .50000 inch

• Click on Finish Diameter and enter valve using Key Pad (.502 used as an example); press OK.

FINISH DIAMETER: .50200 inch

• Click on Bore Length and enter valve using Key Pad (.502 used as an example); press OK.

BORE LENGTH: 3.000 inch

• Click on Part Material and select material from drop down list (Tool Steel used as an example); press OK.

MATERIAL: Tool Steel

• Click on Part Hardness and select hardness (6 used as an example); press OK.

HARDNESS RANGE (1-6): 6

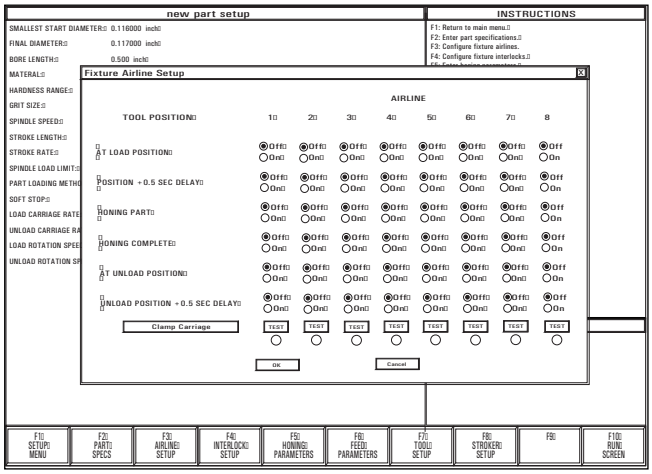
• Click on Tool and select tool from list; press OK.

TOOL: 6

• Click on Grit Size and select girt size list; press OK.

GRIT SIZE: D5

• Display will show part specifications; press OK. (If Airlines Screen does not open - press F3.) Display will read:

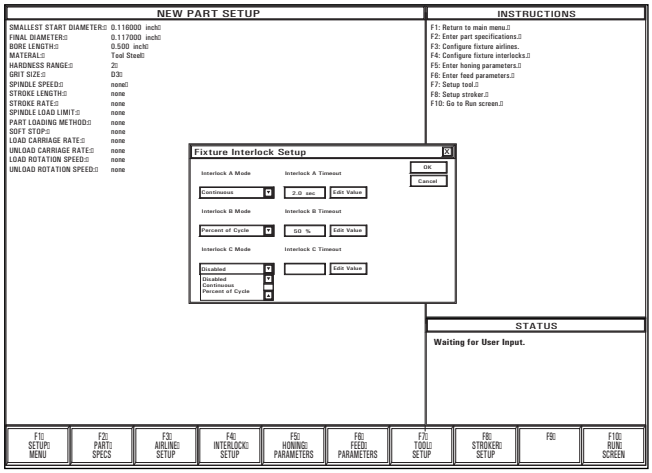


10. Fixture Airline Setup: In this example, do not change setting, leave pre-set factory defaults.

• To Change: You would select between on and off for each switch.

NOTE: In normal operation when one line is ON the others are OFF. Setting will vary depending on your particular machine configuration.

• Press OK.(If Interlock Setup Screen does not open - press F4.) Display will read:

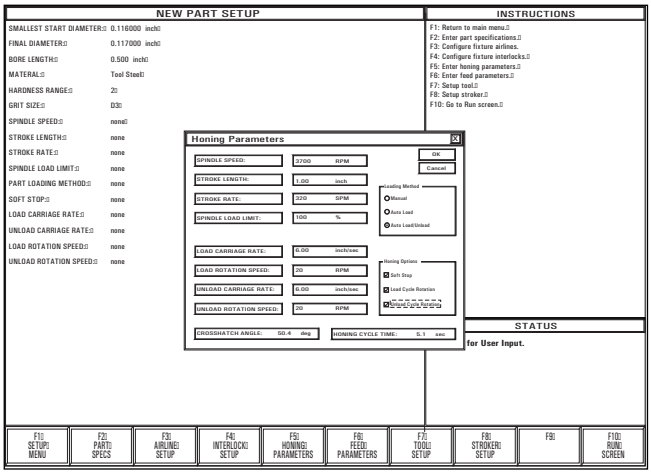


11. Interlock Setup: In this example, do not change setting, leave pre-set factory defaults.

• To Change: You would select desired settings from each of the three drop down list.

NOTE: The machine will insert a value for each setting. If you wish to change the valve, click on edit value.

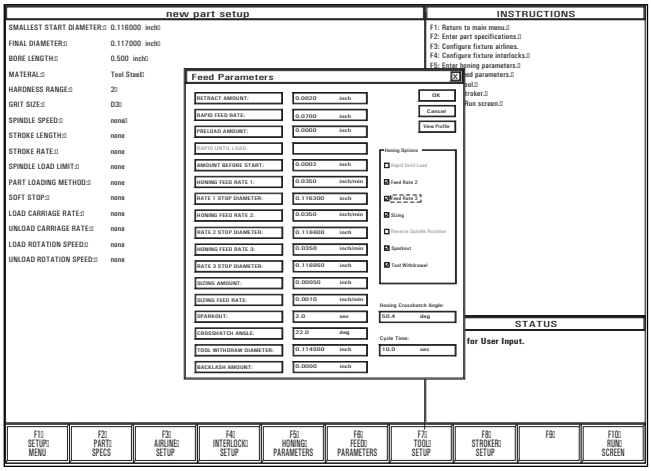
• Press OK.(If Honing Parameter Screen does not open - press F5.) Display will read:



12. Honing Parameters: Select loading method and honing options.

NOTE: The machine will insert a value for each setting. If you wish to change the value, click on that option.

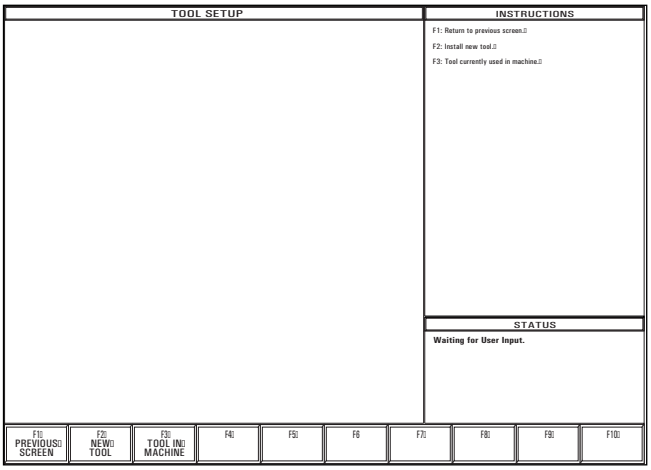
• Press OK.(If Feed Parameter Screen does not open - press F6.) Display will read:



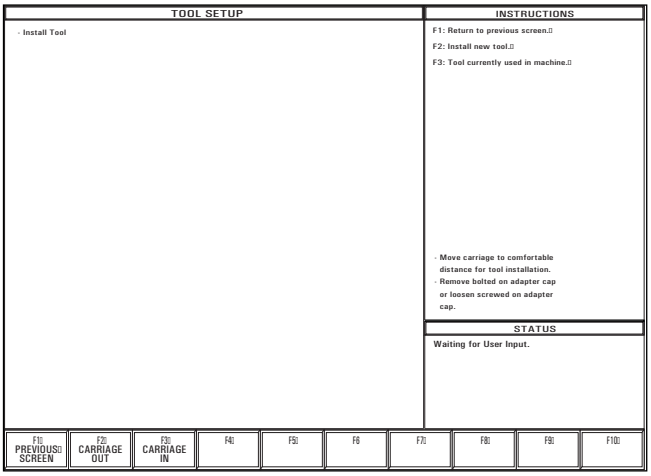
13. Feed Parameters: Select feed options.

NOTE: The machine will insert a value for each setting. If you wish to change the value, click on that option.

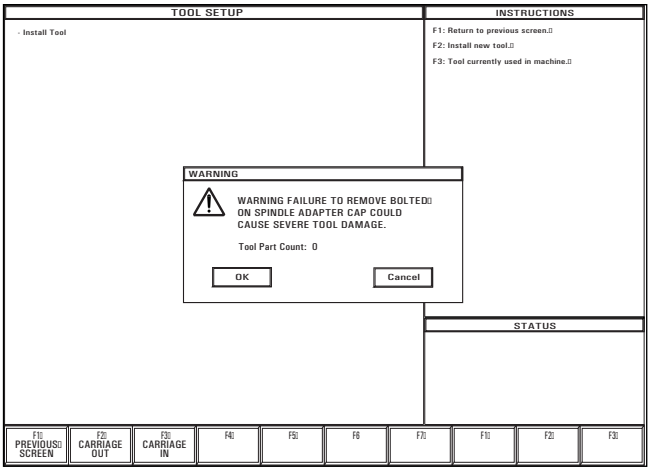
• Press OK.(If Tool Setup Screen does not open - press F7.) Display will read:



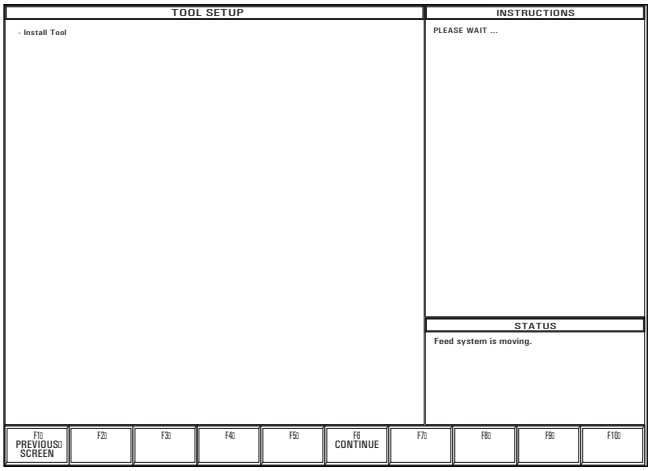
14. Tool Setup - Press F2, New Tool. Display will read:



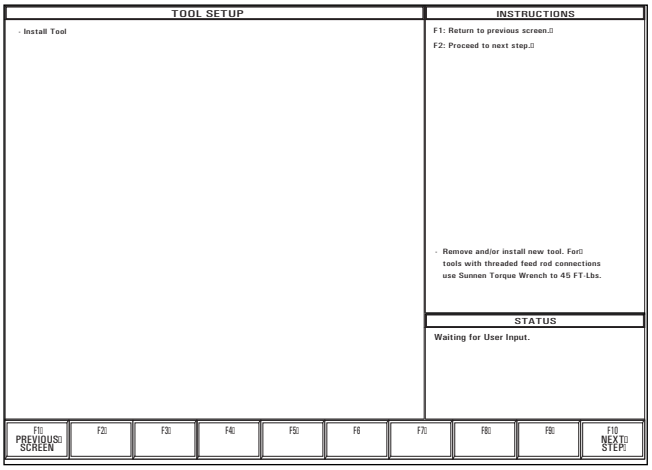
- Open Guards.
- Move Carriage to a comfortable position.
- Remove Adapter Cap.
- Press F10 when complete. WARNING will display:



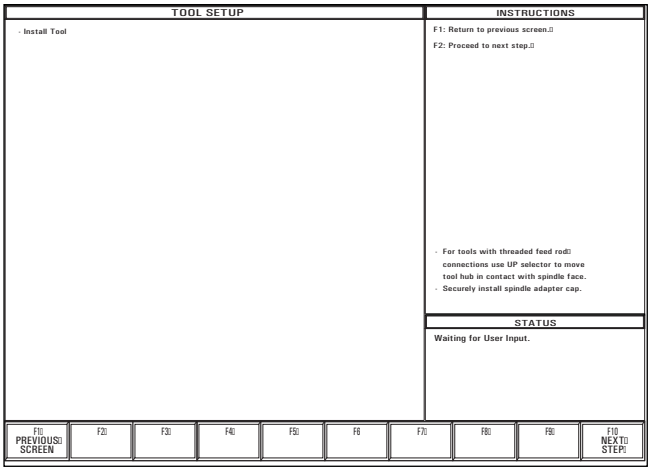
- Press OK. Display will read:



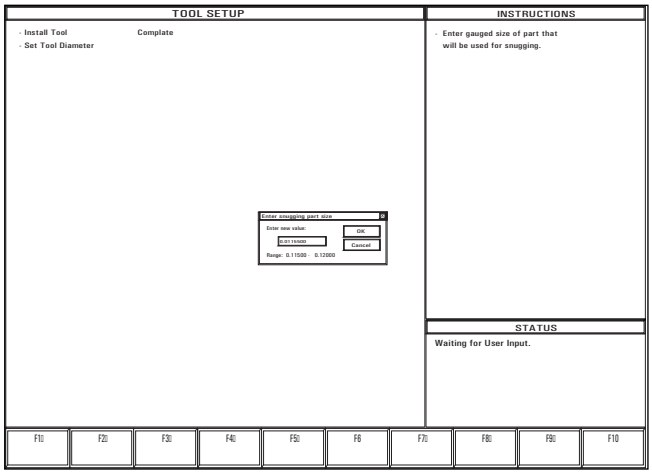
- Wait while machine advances feed rod. Press F5, CONTINUE when finished. Display will read:



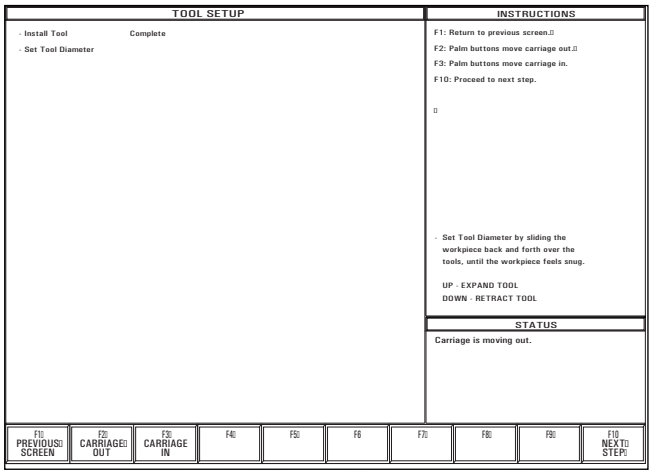
- Remove and install new Tool. Press F10, NEXT STEP when finished. Display will read:



- Install Adapter Cap. Press F10, NEXT STEP when finished. Display will read:



• Set Tool (Snugging) Diameter: Select a sample workpieceto use for snugging and key inits value. Press OK when complete. Display will read:



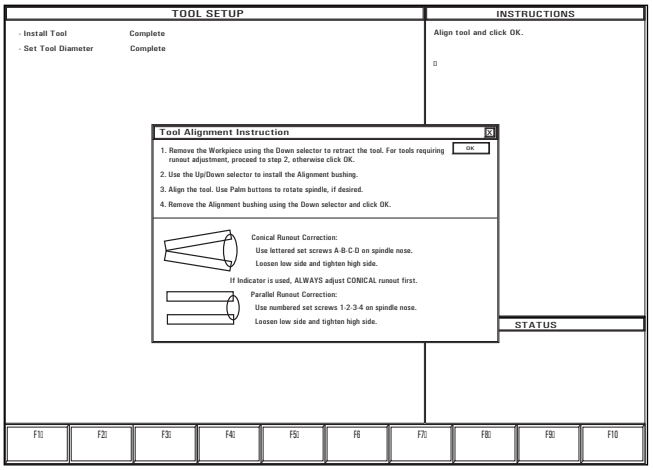
NOTE: If aligning a new tool, use an Alignment Bushing with ID close to final diameter for this step.

CAUTION

Tool MUST NOT be expanded past the maximum diameter marked on the tool Hub. With the exception of small diameter tube tools; maximum expansion occurs with the end of tool wedge approximately 13mm (1/2 in) from edge of the abrasive section of tool.

• Snug Tool: Slide bushing on tool. While sliding workpiece back and forth over abrasive section of tool, expand Tool by jogging Up/Down Selector, until workpiece feels snug.

• Press F10, NEXT STEP when finished. Display will read:



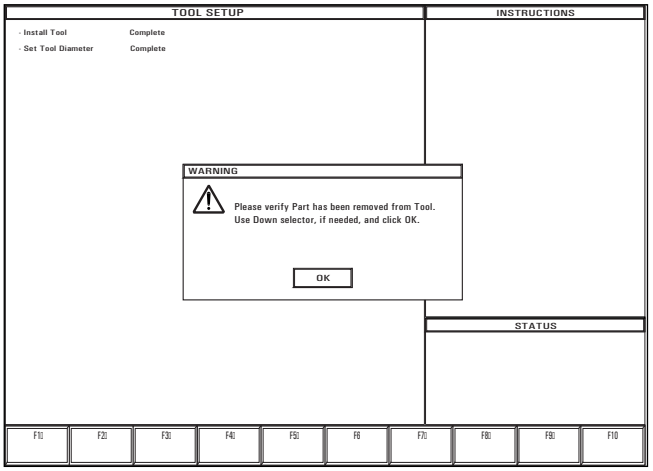
• Retract Tool by jogging Down Selector, until sample workpiece can be removed from tool.

• Install alignment bushing on tool. Use Up/Down Selector, until bushing feels snug.

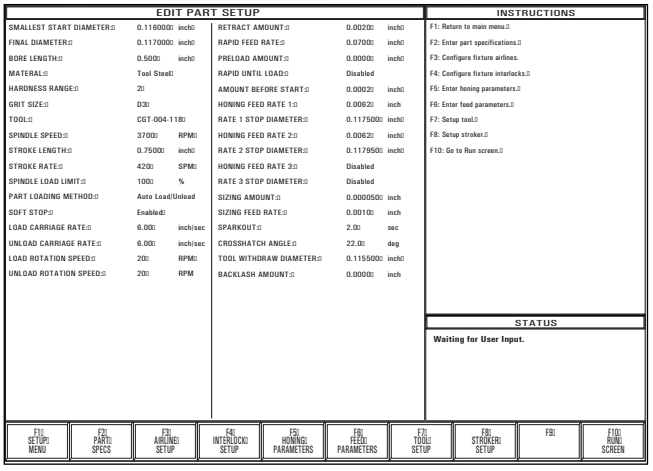
• Align tool for runout (refer to section 2).

• Retract Tool by jogging Down Selector, until sample bushing can be removed from tool.

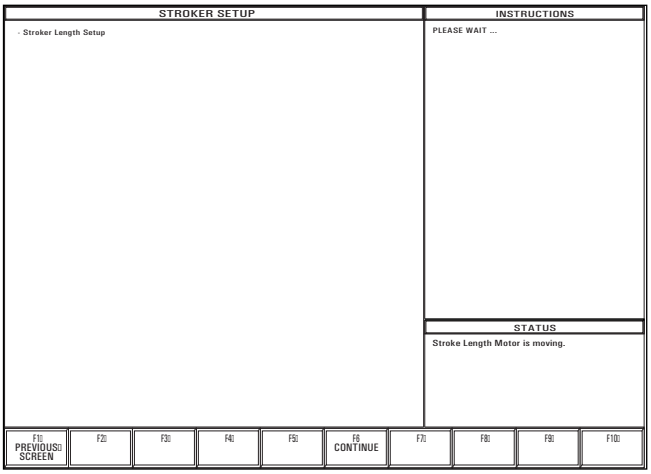
• Press OK when bushing is off tool. WARNING will display:



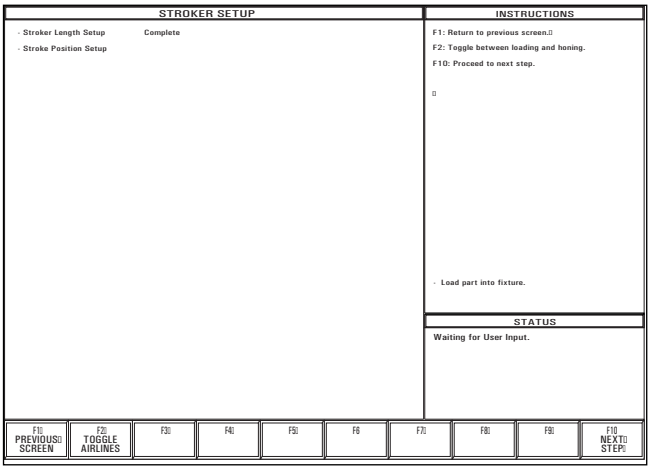
• Press OK. This will move tool to retract position. Display will read:



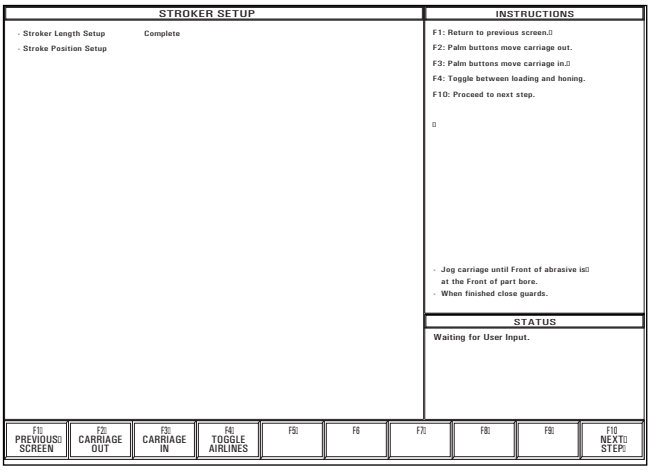
• Press F8, Stroker Setup. Display will read:



• Wait while machine adjusts stroke length. Press F5, CONTINUE when finished. Display will read:



• Load part in fixture and press F10, NEXT STEP when finished. Display will read:



• Use F2 (OUT) and F3 (IN) along with Palm Buttons or move carriage manually with your hand, to move Carriage until leading front edge of abrasive is at front of bore *(see Figure 3-1)*.

• Press F4 to toggle airlines between load position settings and honing part settings.

• Close all Guards.

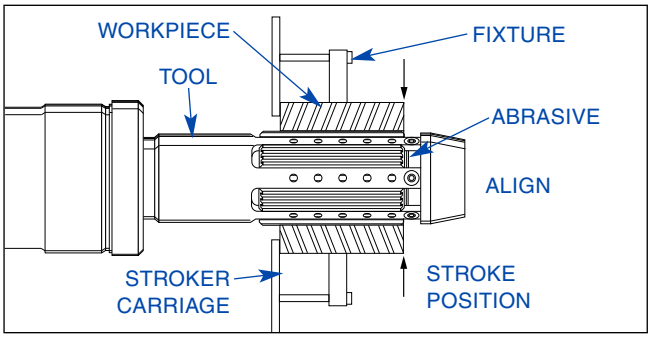
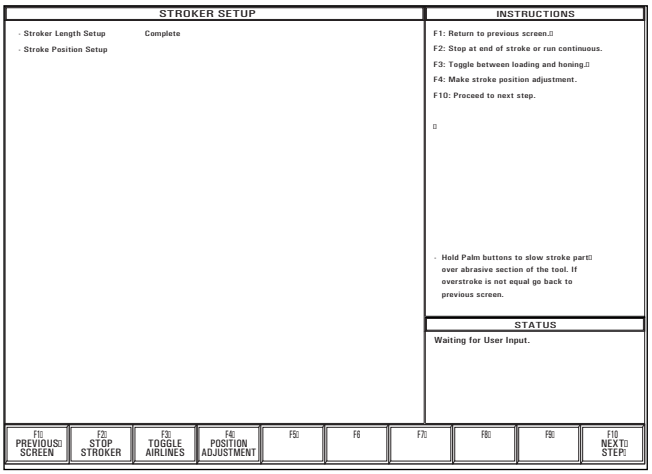


FIGURE 3-1, Set Bore Position

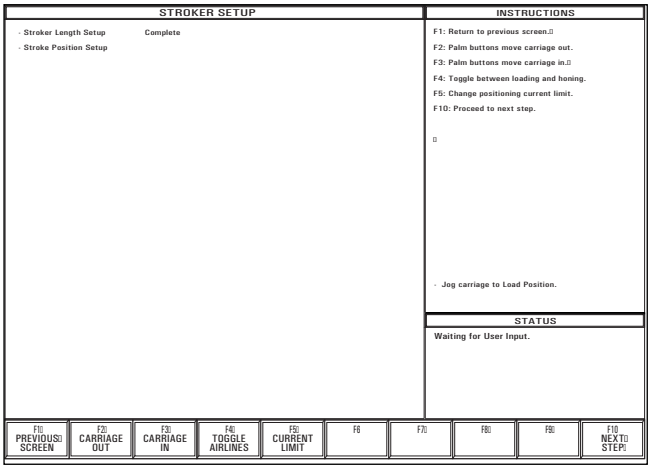
• Press F10, NEXT STEP when finished. Display will read:



• Check stroke position: Use Palm Buttons to slow stroke tool through bore several times to ensure proper clearance *(see Figure 3-2)*.

• Use F4 to adjust position.

• Press F10, NEXT STEP when finished. Display will read:



• Use F2 (OUT) and F3 (IN) along with Palm Buttons, to move Carriage Load Position *(see Figure 3-3)*.

• Press F4 to toggle airlines between load position settings and honing part settings.

• Use F5 to change positioning current limits.

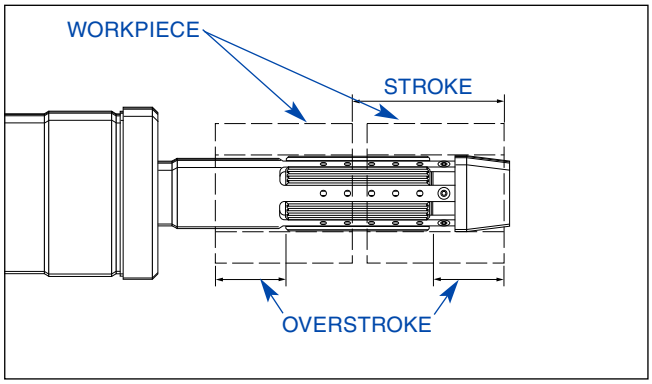


FIGURE 3-2, Overstroke

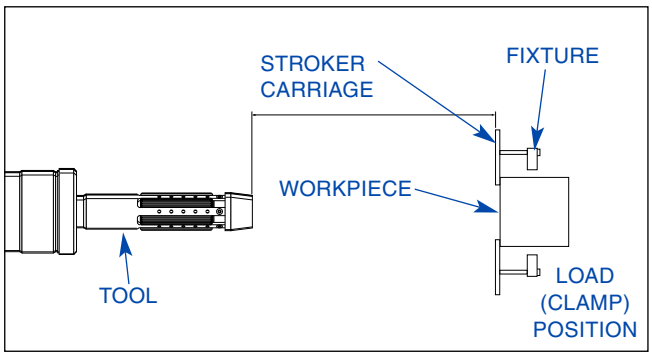


FIGURE 3-3, Load Position

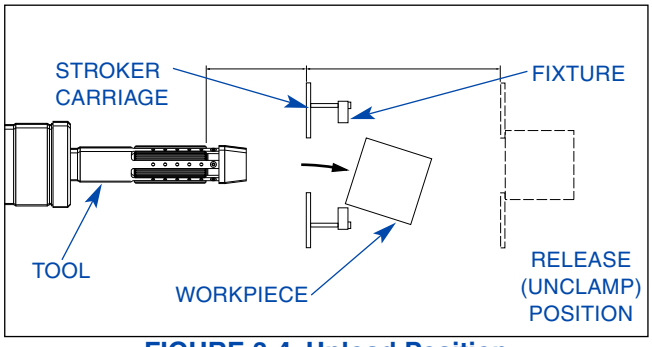
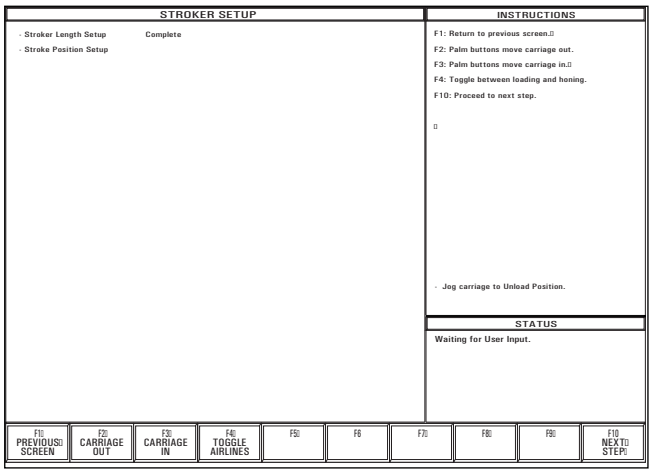


FIGURE 3-4, Unload Position

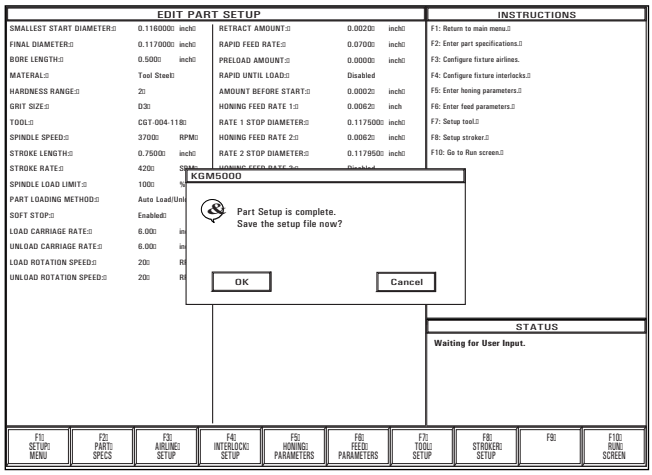
• Press F10, NEXT STEP when finished. Display will read:



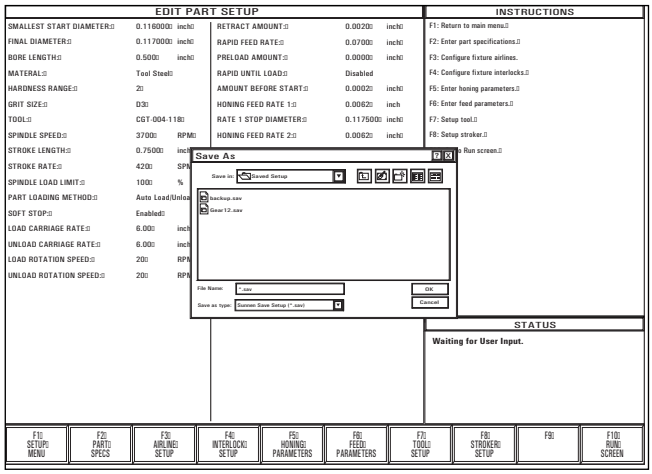
• Use F2 (OUT) and F3 (IN) along with Palm Buttons, to move Carriage Unload Position *(see Figure3-4)*.

• Press F4 to toggle airlines between load position settings and honing part settings.

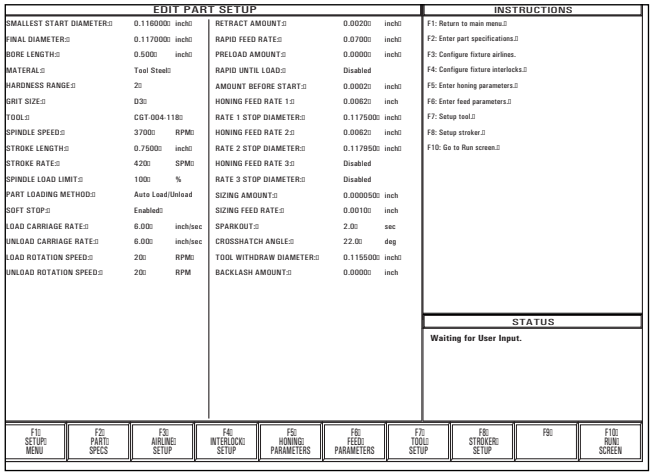
• Press F10, NEXT STEP when finished. Display will read:



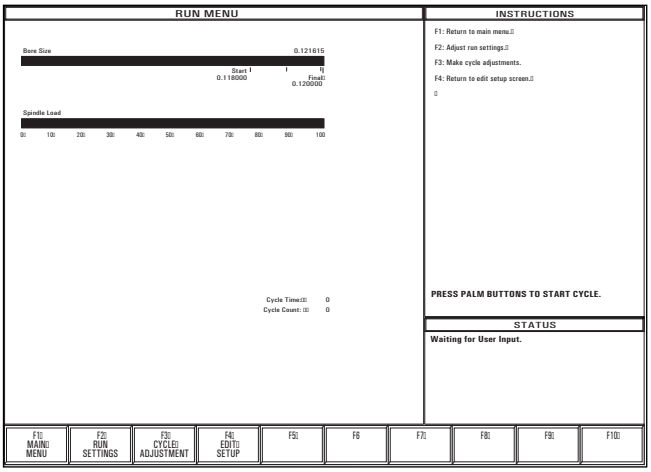
• Press OK when setup is complete. Display will read:



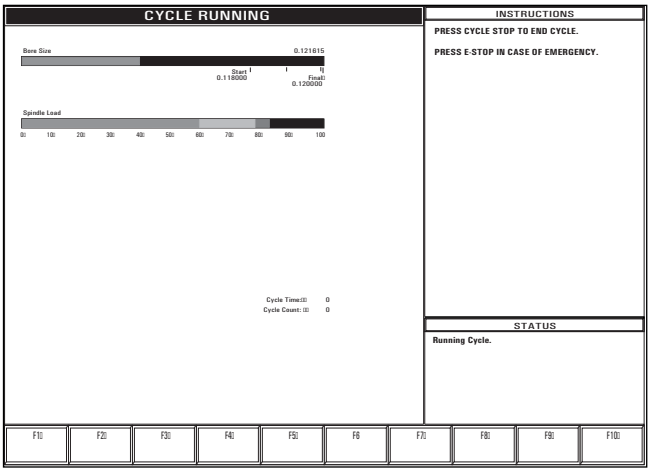
• Save Setup - Enter file name and press Save when complete. Edit Part Setup Screen will will be displayed:



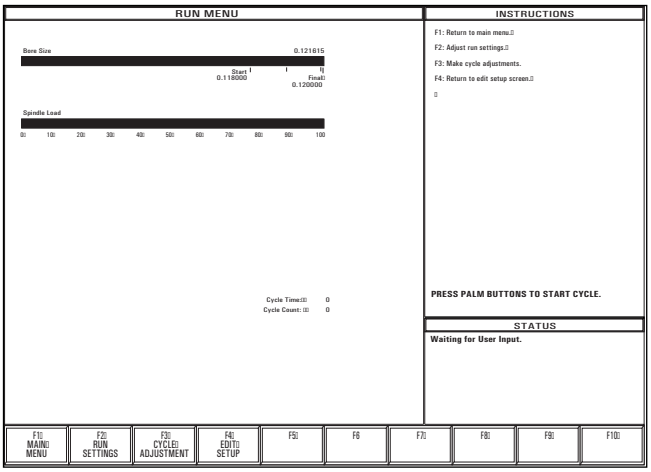
• Press F10, RUNSCREEN when finished. Display will read:



• Press Palm Buttons to start cycle. Run Cycle Screen will will be displayed:

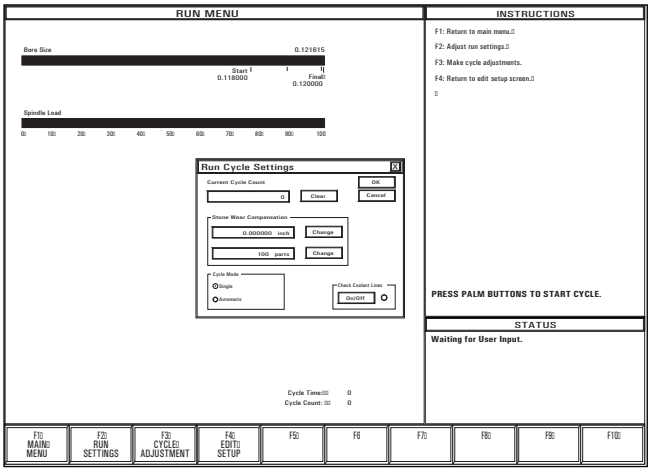


• When cycle is ended, display will read:



• Open Guards and remove workpiece.
• Gage Workpiece.
• Use "F" Keys to edit setting.
  Press F1, Main Menu.
  Press F2, Run Settings.
  Press F3, Cycle Adjustment.
  Press F4, Edit Setup.

15. Press F1 when setup is complete.
16. Load parts.
17. Press F2, Run Menu when complete.
18. Press F2, Run Settings. Display will read.



• Select Automatic Cycle Mode. Press OK when complete. Display will return to Run Menu.

19. Press Palm Buttons to Start Cycle.

SNUGGING DIAMETER

The Machine will calculate setting based on the parameters you program into the machine doing setup and the initial snug diameter. To initialize the tool diameter by snugging on workpiece, follow steps as displayed on display screen.

The basic procedure for initializing snug diameter is as follows:

1. Turn ON power at Master ON/OFF Switch, located on Electrical Enclosure.

INITIALIZATION

2. Close all Guards.
3. Release Emergency STOP Button on Operator Control Console.
4. Press POWER-ON Button. Display will read:

INITIALIZATION

WARNING

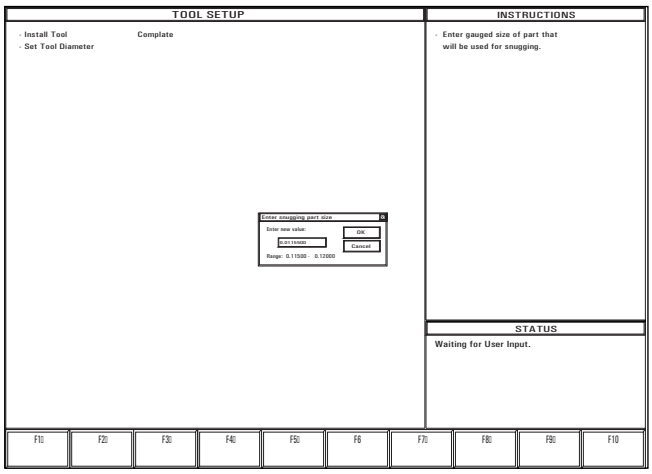
Tool MUST be retracted from part. Retract Tool if machine shut down due to power outage or other reason with tool in part. Press F2 to retract Tool.

5. Verify all Safety Guards are in place.
6. Press Palm Buttons to HOME carriage. Revised MENU will appear after all drives have been initialized.

INITIALIZATION

7. Press F1, Main Menu.
8. Press F1, Setup Menu.
9. Press F3, Edit Setup or F4, Retrieve Setup.
10. Press F7, Tool Setup.
11. Press F2, New Tool or F3, Tool in Machine. To install a new Tool *(Refer to section 2)*.
12. Set Tool Snugging Diameter:

• Set Tool (Snugging) Diameter: Select a sample workpieceto use for snugging and key inits value. Press OK when complete. Display will read:



• Select a sample workpiece with ID close to the snug diameter (.7241 used in this example).

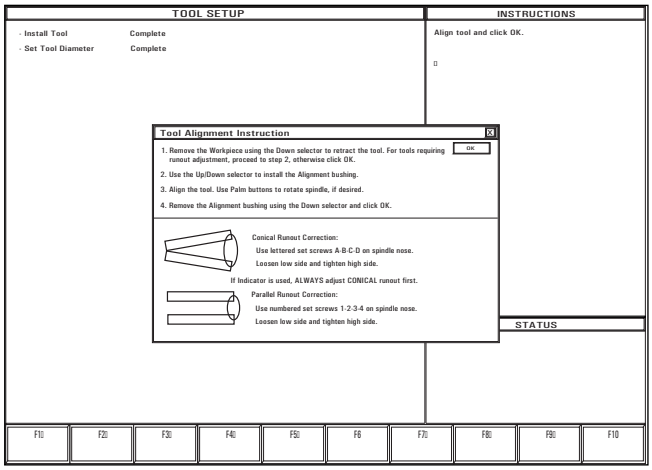
NOTE: If aligning a new tool, use an Alignment Bushing with ID close to snug diameter for this step.

CAUTION

Tool MUST NOT be expanded past the maximum diameter marked on the tool Hub. With the exception of small diameter tube tools; maximum expansion occurs with the end of tool wedge approximately 13mm (1/2 in) from edge of the abrasive section of tool.

• Snug Tool: Slide bushing on tool. While sliding workpiece back and forth over abrasive section of tool, expand Tool by jogging Up/Down Selector, until workpiece feels snug.

• Press F10, NEXT STEP when finished. Display will read:



• Retract Tool by jogging Down Selector, until sample workpiece can be removed from tool.

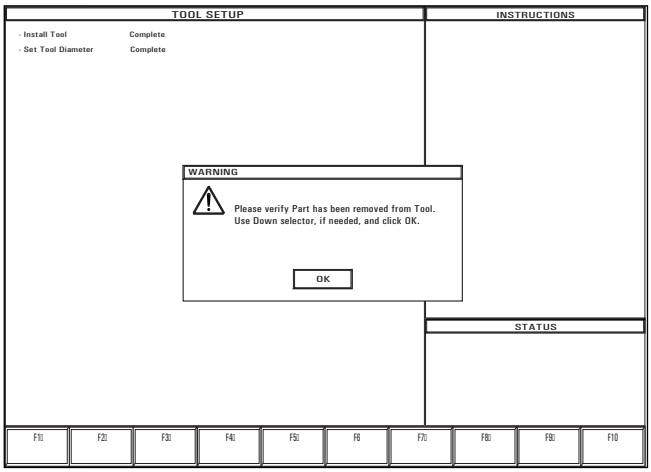
• Install alignment bushing on tool. Use Up/Down Selector, until bushing feels snug.

• Align tool for runout (refer to section 2).

• Retract Tool by jogging Down Selector, until sample bushing can be removed from tool.

• Press OK when bushing is off tool. WARNING will display:

• Press OK. This will move tool to retract position. Display will read:



STROKE POSITION (Automatic)

This option is for operating the machine in an automatic mode, for loading and unloading. The basic procedure for setting stroke position is as follows:

1. Turn ON power at Master ON/OFF Switch, located on Electrical Enclosure.

INITIALIZATION

2. Close all Guards.

3. Release Emergency STOP Button on Operator Control Console.

4. Press POWER-ON Button. Display will read:

INITIALIZATION

WARNING

Tool MUST be retracted from part. Retract Tool if machine shut down due to power outage or other reason with tool in part. Press F2 to retract Tool.

5. Verify all Safety Guards are in place.

6. Press Palm Buttons to HOME carriage. Revised MENU will appear after all drives have been initialized.

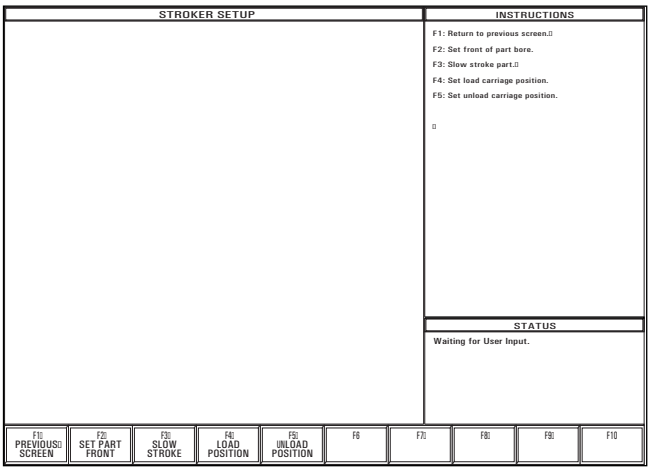
INITIALIZATION

7. Press F1, Main Menu.

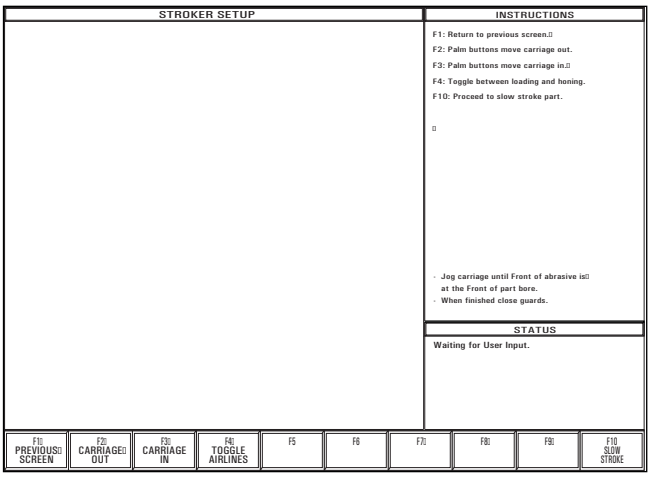
8. Press F1, Setup Menu.

9. Press F3, Edit Setup.

10. Press F8, Stroker Setup. Display will read:

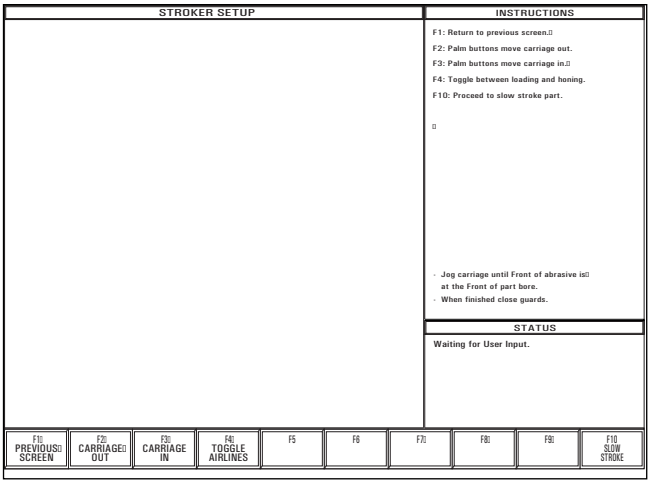


• Press F2, Set Part Front. Display will read:



• Use F2 (OUT) and F3 (IN) along with Palm Buttons, to move Carriage until leading front edge of abrasive sleeve is at front of bore *(see Figure 3-5)*.

• Press F4 to toggle airlines between load position settings and honing part settings.



• Close all Guards.

• Press F10, Slow Stroke, when finished. Display will read:

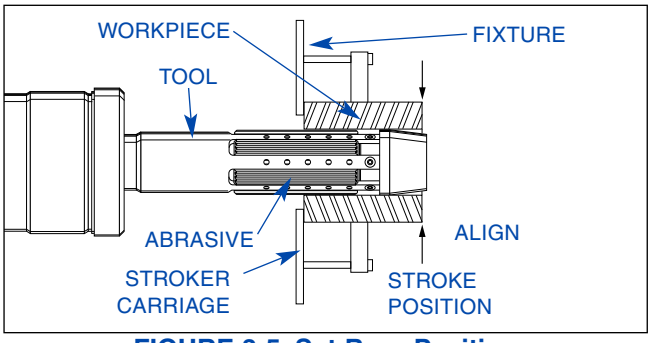


FIGURE 3-5, Set Bore Position

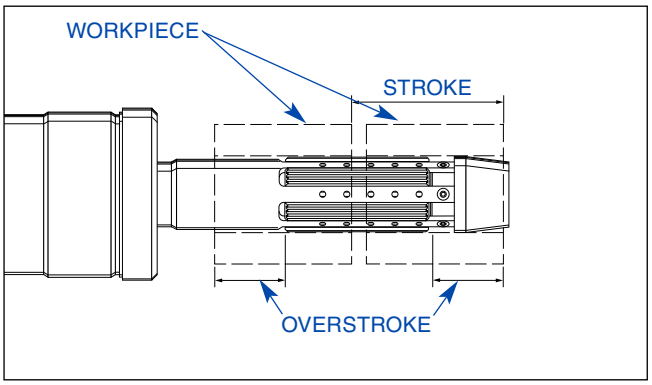


FIGURE 3-6, Overstroke

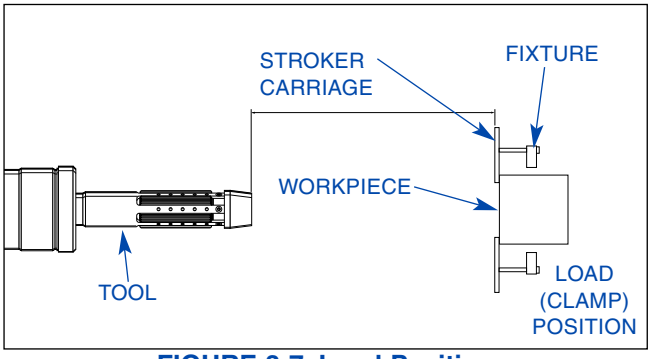
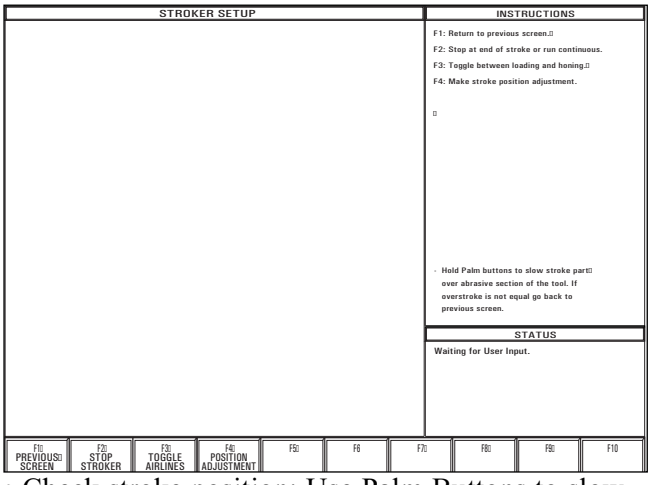


FIGURE 3-7, Load Position



• Check stroke position: Use Palm Buttons to slow stroke tool through bore several times to ensure proper clearance *(see Figure 3-6)*.

• Use F4 to adjust position.

• Press F10, Stroker Setup when finished.

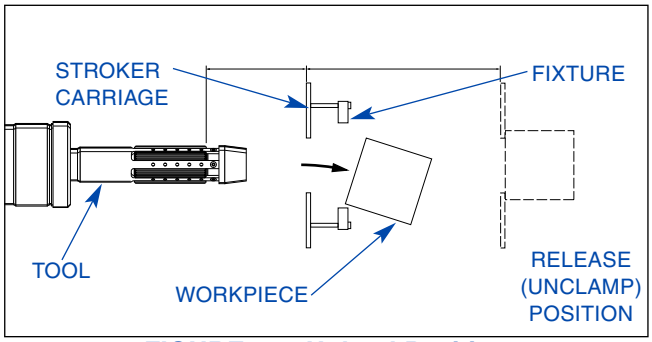
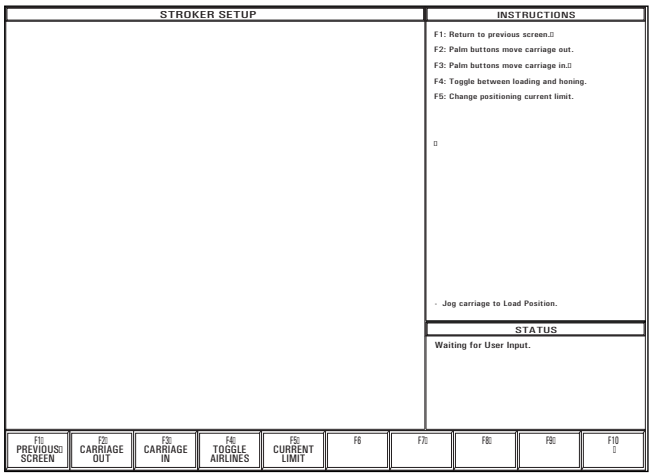


FIGURE 3-8, Unload Position

• Press F4, Load Position. Display will read:



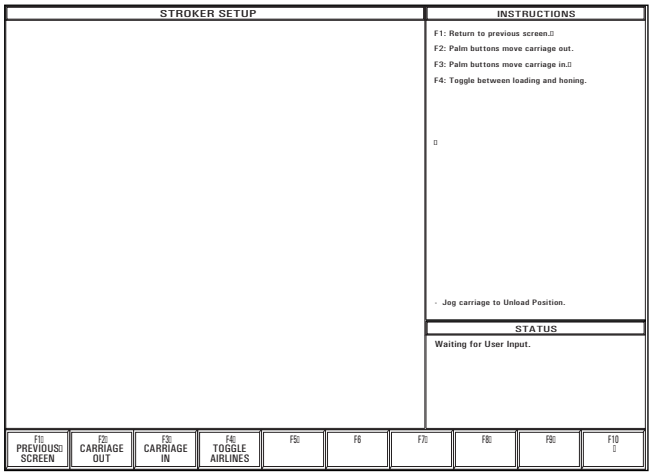
• Use F2 (OUT) and F3 (IN) along with Palm Buttons, to move Carriage Load Position *(see Figure 3-7)*.

• Press F4 to toggle airlines between load position settings and honing part settings.

• Use F5 to change positioning current limits.

• Press F10, Stroker Setup when finished.

• Press F5, Unload Position. Display will read:



• Use F2 (OUT) and F3 (IN) along with Palm Buttons, to move Carriage Unload Position *(see Figure 3-8)*.

• Press F4 to toggle airlines between load position settings and honing part settings.

• Press F10, Stroker Setup when finished.

DIAGNOSTICMENU

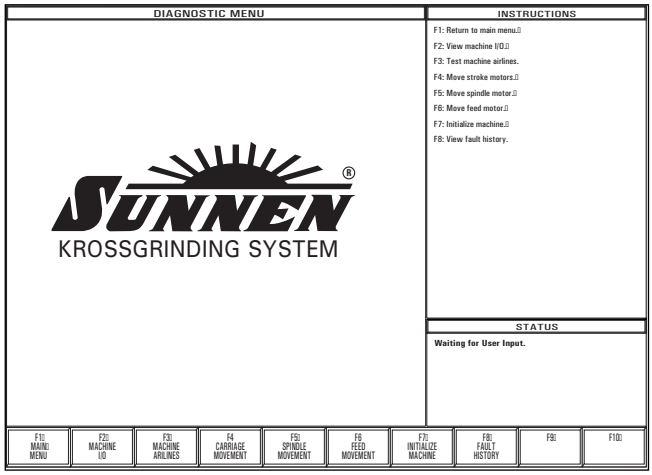
Diagnostic Menu lets operator troubleshoot Machine, run individual components, and monitor inputs to control system.

CAUTION

Extreme caution should be used when making changes using Diagnostic Menu, since improper use of some of functions may be dangerous.

• Go to MAIN MENU.

• Press F3, Diagnostic Menu. Display will read:



• Use "F" Keys to select option.
  F1, Main Menu.
  F2, Machine I/O.
  F3, Machine Airlines.
  F4, Carriage Movement (Stroker Cal.).
  F5, Spindle Movement (Spindle Cal.).
  F6, Feed Movement (Feed Cal.).
  F7, Initialize Machine.
  F8, Fault History

1. Press F2,Machine I/O:

• Use "F" Keys to select options.
  F1, Previous Screen.
  F2, Digital Input
  F3, Digital Output

2. Press F4,Carriage Movement:

• Use "F" Keys to select options.
  F1, Previous Screen.
  F2, Unlatch Carriage.
  F3, [___] Speed.
  F4, Select Motor.

3. Press F5,Spindle Movement:

• Use "F" Keys to select options.
  F1, Previous Screen.
  F2, Spindle Speed.

4. Press F6,Feed Movement:

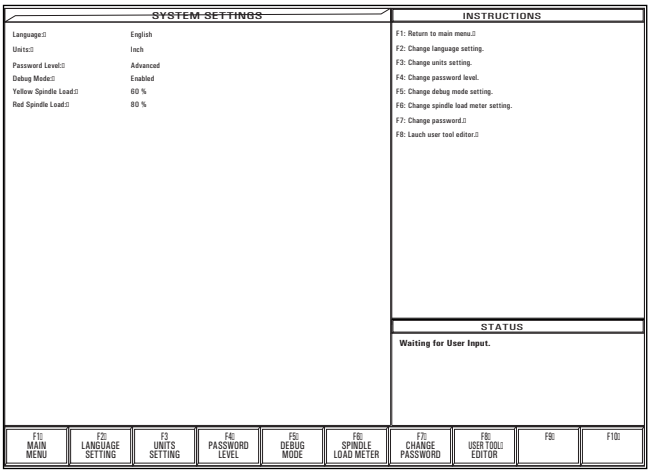
• Use "F" Keys to select options.
  F1, Previous Screen.
  F2, Feed Speed.

SYSTEM SETTINGS

SYSTEM SETTINGS screens allow operator to enter/edit machine setup functions. Proceed as follows:

• Go to MAIN MENU.

• Press F4, System Settings. Display will read:



• Use "F" Keys to select option.

F1, Main Menu.
F2, Language Setting.
F3, Units Setting.
F4, Password Level.
F5, Debug Mode.
F6, Spindle Load.
F7, Change Password.
F8, Tool Editor

TURNING MACHINE OFF

To turn OFF the Machine properly, DONOT just turn off the disconnect switch. Please follow the following steps:

1. Using the Mouse, left click on the ☒ that is located in the upper right corner of the screen.

2. This will display the exit passowrd dialog box. Enter “shutdown” (all lower case) and then click on he OK button.

3. After a few minutes, a dialog box will come up on the screen saying that it is safe to turn off the computer. At this time, you can turn off the disconnect switch.

SECTION 4
ROUTINE MAINTENANCE

GENERAL

The following routine maintenance procedures and suggested service periods are provided as a guide and are not to be construed as absolute or invariable. Local conditions must always be considered. Each Machine must be maintained individually according to its particular requirements.

CLEANING

Daily, after use, wipe exterior of Machine with a clean, dry cloth to remove any coolant, dust and grime. Empty Pail (Magnetic Separator) as required.

Monthly, wipe with a clean dry cloth. Then clean exterior of Machine with warm water and a mild detergent or mild industrial solvent. Rinse thoroughly with clean hot water and wipe dry. Lightly lubricate following lubrication instructions.

LUBRICATION

Hand lubricate various machine components called out in *Figure 4-1*, according to suggested intervals called out in *Table 4-1*.

NOTE: Intervals between lubrication will vary with amount of use your Machine receives. Lubricate all components as least once every six months.

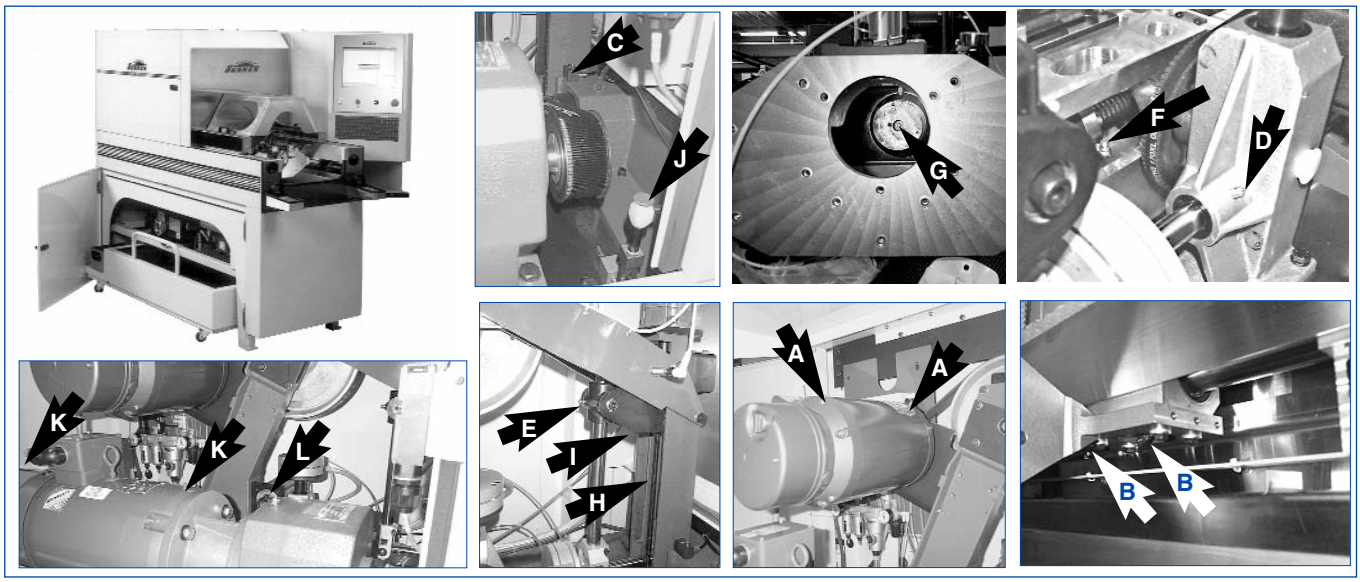


FIGURE 4-1, Lubrication Points

TABLE 4-1, Lubrication Points

ITEM	DESCRIPTION	LUBRICANT	PROCEDURE	INTERVALS
A	Stroker Motor (2-Grease Fittings)	SML170 / Polyrex EM	2 Pumps	5500 Hrs
B	Stroker Carriage (4-Grease Fitting) (Under Pillow Blocks)	Sunnen SML100 MobilTemp™ SHC 32 or MobilGrease™ 28	2 Pumps	200 Hrs
C	Stroker Drive Shaft (1-Grease Fitting) (Located on Block)		2 Pumps	200 Hrs
D#	Stroker Positioning Unit (1-Grease Fitting) (Located on back side of Unit)		2 Pumps	200 Hrs
E	Cross Shaft Pivot Assy (1-Grease Fitting)		2 Pumps	200 Hrs
F#	Ballnut (1-Grease Fitting) (Accessed thru top of Support Blk. w/Feed Sys. at tool installed location)		2 Pumps	200 Hrs
G	Feed Rod (1-Grease Fitting) (Accessed within Spindle Nose w/Feed Sys. at tool installed location)		2 Pumps	200 Hrs*
H‡	Stroke Length Screw		Brush On	200 Hrs
I‡	Pivot Slide Ways		Brush On	200 Hrs
J	Oil Gage (Lines to 2 pts. on Spindle Assy.)	Mobil SHC 626	Add/Check	200 Hrs†
K	Spindle Motor (KGM-1000NT ONLY)	SML170 / Polyrex EM	2 Pumps	5500 Hrs
L	Spindle Motor Gearbox (KGM-1000NT ONLY)	Mobil SHC 634	Drain & Fill 41.6oz/1230ml	10000 Hrs**

* Or when the tool is changed, whichever comes first.
† Use syringe supplied in accessory kit to add oil to spindle (refer to Section I).
# Photo taken from side opposite access door.
‡ Adjust stroke length from smallest to largest to gain full acess.
** Or more frequent changes may be required when operating at high RPM or operating in unusually high contaminated environments.

COOLANT LEVEL CHECK

Periodically, check level of Coolant in Coolant Reservoir; do not allow Coolant to drop below 95 liters (25 gallons). Replace Coolant as follows using only Sunnen Industrial Honing Oil or Sunnen Water-Based Coolant *(see Figure 4-2)*.

CAUTION

For instructions on inspecting and servicing water-based coolant, refer to Instructions packaged with Sunnen SCC-900 Coolant Maintenance Kit. (The SCC-900 Coolant Kit IS REQUIRED, when servicing a Rod Reconditioning Machine which is using a water-based coolant. Use only approved Sunnen Water-Based Coolant Concentrate in Rod Reconditioning Machine.)

1. Turn OFF all power to Machine at Master ON/OFF Switch.
2. Close Coolant Control Valves.
3. Open Coolant Access Doors.

CAUTION

Ensure Drain Line is over reservoir before opening valves or coolant will drain onto floor.

4. Drain and clean Filter Canister:
   - Open Drain Valve on bottom of Canister and drain completely.
   - Open Air Vent (counterclockwise) in Canister Cover; and allow canister to drain completely.
   - Check filter and replace as required. (See Coolant Filter Replacement.)
   - Clean sludge from canister.
5. Slide Coolant Reservoir out from under machine.
6. Pump coolant into an approved waste container; or remove Drip Plug in Reservoir and drip into a suitable container.
7. Dip or siphon out any remaining coolant from Reservoir.
8. Clean Sludge from Magnetic Separator and wipe clean.
9. Clean Sludge from Reservoir and wipe clean.
10. Fill Reservoir by pumping or pouring approximately 114 liters (30 gallons) of approved Sunnen Industrial Honing Oil (or Sunnen Water-Based Coolant) into Coolant Reservoir.
11. Slide Reservoir under Machine.
12. Ensure Relief Valve Hoses are returned to Reservoir.
13. Turn ON power to Machine at Master ON/OFF Switch on Electrical Control Enclosure.
14. Open Air Vent in Filter Canister Cover 1/2 turn counterclockwise.
15. Turn ON power to Machine.

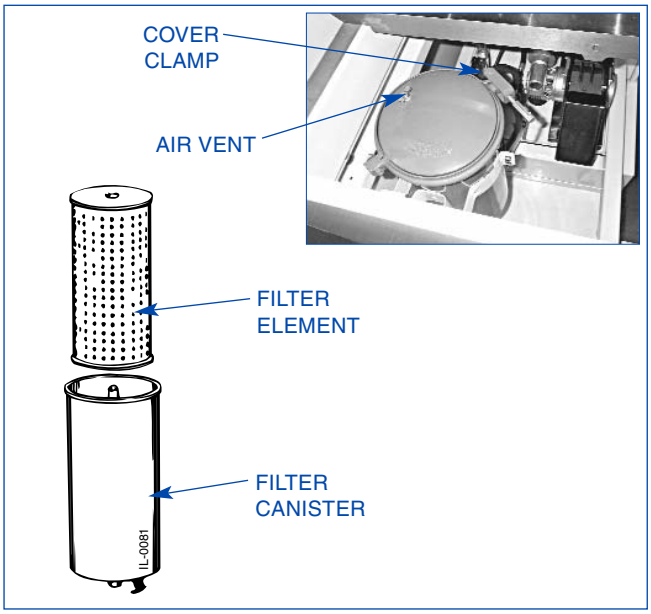


FIGURE 4-2, Coolant Filter

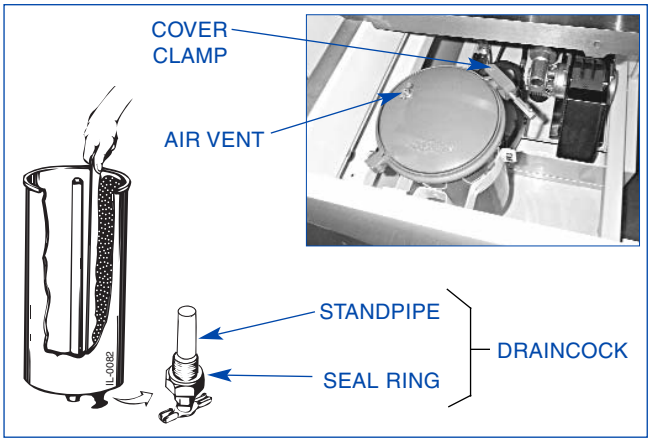


FIGURE 4-3, Filter Canister

16. Press POWER ON Button.
17. With coolant Intake Hose held above pump fitting, prime pump by filling hose with coolant.

CAUTION

DONOT run pump without priming.

18. Return Intake Hose to coolant cart when pump begins moving coolant.
19. As coolant fills Filter Canister, air will escape through Air Vent. When coolant appears in partially opened Vent, close Vent. Then wipe any coolant from around Vent.
20. Open Coolant Control Valves.
21. Slowly pour an additional 19 liters (5 gallons) of approved Coolant into Work Tray, to top off System as Filter Canister fills. Coolant System holds a total of 133 liters (35 gallons) of Coolant
22. Press E-STOP Button and close Coolant Control Valves.

COOLANT FILTER REPLACEMENT

To replace Filter Element, proceed as follows *(see Figure 4-2)*.

1. Turn OFF power to Machine at Master ON/OFF Switch on Electrical Control Enclosure.
2. Open Coolant Access Doors.
3. Open Drain Valve on bottom of Canister.
4. Open Air Vent (counterclockwise) in Canister Cover; and allow canister to drain completely.

CAUTION

Ensure Drain Line is over reservoir before opening valves or coolant will drain onto floor.

5. Close Drain Valve and Air Vent.
6. Loosen Cover Clamp Ring and remove Cover and Clamp Ring.
7. Slowly pull dirty Filter Element out of Canister and place in Magnetic Separator Dump Pail to drain.
8. Clean Canister as required (see Filter Canister Cleaning).
9. Remove new Filter Element from Protective bag and insert into Canister; rotate element slightly so it will slide down center post more easily.
10. Replace Covers, centering carefully on rubber gaskets to assure no leakage. Then replace Clamp Ring and tighten Hex Bolt in Clamp Halves until halves meet, then tighten T-Handle.
11. Open Air Vent in Filter Canister Cover 1/2 turn counterclockwise.
12. Turn ON power to Machine at Master ON/OFF Switch on Electrical Control Enclosure.
13. Press POWER ON Button.
14. With coolant Intake Hose held above pump fitting, prime pump by filling hose with coolant.

CAUTION

DONOT run pump without priming.

15. Return Intake Hose to coolant cart when pump begins moving coolant.
16. As coolant fills Filter Canister, air will escape through Air Vent. When coolant appears in partially opened Vent, close Vent. Then wipe any coolant from around Vent.
17. Open Coolant Control Valves.
18. Discard old Filter Element.
19. Pour collected coolant into Work Tray.
20. Press E-STOP Button and close Coolant Control Valves.

FILTER CANISTER CLEANING

Periodically clean Filter Canister as follows (see Figures 4-2 & 4-3).

1. Turn OFF power to Machine at Master ON/OFF Switch on Electrical Control Enclosure.
2. Open Coolant Access Doors.
3. Open Drain Valve on bottom of Canister.
4. Open Air Vent (counterclockwise) in Canister Cover; and allow canister to drain completely.

CAUTION

Ensure Drain Line is over reservoir before opening valves or coolant will drain onto floor.

5. Close Drain Valve and Air Vent.
6. Loosen Cover Clamp Ring and remove Cover and Clamp Ring.
7. Slowly pull dirty Filter Element out of Canister and place in Magnetic Separator Dump Pail to drain.
8. Remove Drain Hose from Drain Valve.
9. Remove Standpipe from bottom of Canister, using 1-1/2" Open End Wrench.
10. Scrape Sludge from inside of Canister, using a long piece of wood or other soft material.
11. Flush out remaining sludge with solvent. Dispose of sludge and filter.
12. Clean Standpipe and threaded fitting in Canister.
13. Inspect Standpipe Seal Rings and replace as required.
14. Coat Standpipe (threaded fitting) with Sealant and reinstall in Canister.
15. Close Drain Valve and attach Drain Hose.
16. Remove new Filter Element from Protective bag and insert into Canister; rotate element slightly so it will slide down center post more easily.
17. Replace Covers, centering carefully on rubber gaskets to assure no leakage. Then replace Clamp Ring and tighten Hex Bolt in Clamp Halves until halves meet, then tighten T-Handle.
18. Open Air Vent in Filter Canister Cover 1/2 turn counterclockwise.
19. Turn ON power to Machine.
20. Press POWER ON Button.
21. With coolant Intake Hose held above pump fitting, prime pump by filling hose with coolant.

CAUTION

DONOT run pump without priming.

22. Return Intake Hose to coolant cart when pump begins moving coolant.
23. As coolant fills Filter Canister, air will escape through Air Vent. When coolant appears in Vent, close Vent. Wipe any coolant from around Vent.
24. Pour collected coolant into Work Tray.
25. Press E-STOP Button and close Coolant Control Valves.

PNEUMATIC LINES CHECK

Inspect Pneumatic Lines and Fittings monthly for leaks or damaged parts (see Figure 4-4). Replace parts as required.

FILTER ELEMENT REPLACEMENT

Filter Element in airline Regulator should be cleaned or replaced annually or when there is a noticeable drop in air pressure. To clean or replace Filter Element proceed as follows:

1. Turn OFF power to Machine at Master ON/OFF Switch on Electrical Control Enclosure.

2. Shut OFF air supply at Shut-Off Valve or disconnect In-Coming Factory airline.

CAUTION

Plunger is held in Unit by a Spring. Use care in disassembling to prevent Spring from being lost.

3. Filter Regulator *(see Figure 4-5)*:

- Unscrew Threaded Bowl from Body and lay aside.
- Remove Baffle and Filter Element by removing Screw and Washer.
- Wipe Bowl and internal parts clean.
- Install new Filter Element and Baffle using Screw and Washer.
- Screw Threaded Bowl, with O-Ring onto Body.

4. Mist Separator *(see Figure 4-6)*:

- Unscrew Threaded Bowl from Body and lay aside.
- Unscrew Baffle and and remove Element from Shaft.
- Wipe Bowl and internal parts clean.
- Install new Filter Element on Shaft; then screw Baffle onto end of Shaft.

NOTE: Replacement Elements and parts are available through Unit manufacturer or your local supplier.

- Screw Bowl, with O-Ring, on Body and firmly tighten.

5. Ambient Dryer *(see Figure 4-7)*:

- Remove Capscrews holding Housing in place.
- Remove Filter Element by unscrewing from Shaft.
- Install new Filter Element on Shaft.
- Replace bowl and capscrews.

NOTE: Replacement Elements and parts are available through Unit manufacturer or your local supplier.

6. Turn ON air supply at Shut-Off Valve or reconnect In-Coming Factory airline at Quick-Disconnect.

7. Close top access Cover to Machine.

8. Turn ON power to Machine at Master ON/OFF Switch, on Electrical Control Enclosure.

DRAIN FILTER REGULATOR

All filtering units are equipped with automatic drains and pumped to the ground.

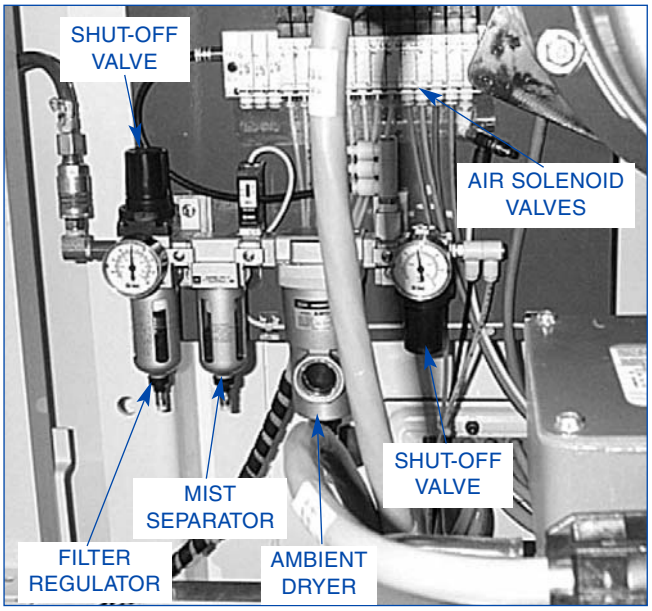


FIGURE 4-4, Pneumatics

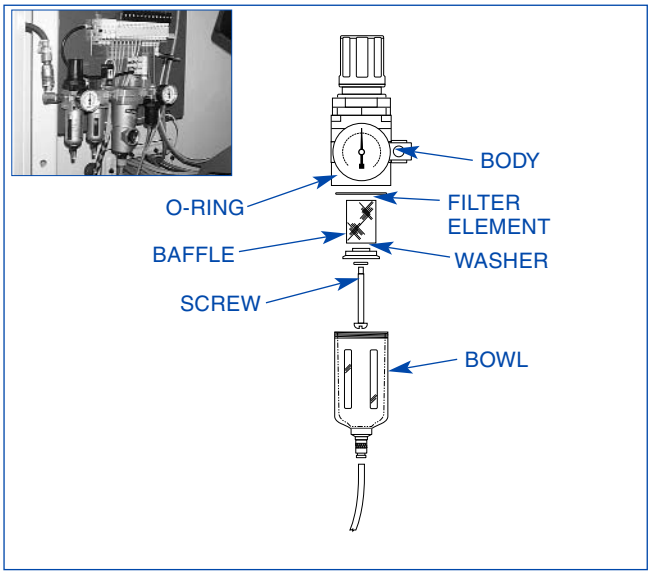


FIGURE 4-5, Airline Filter/Regulator

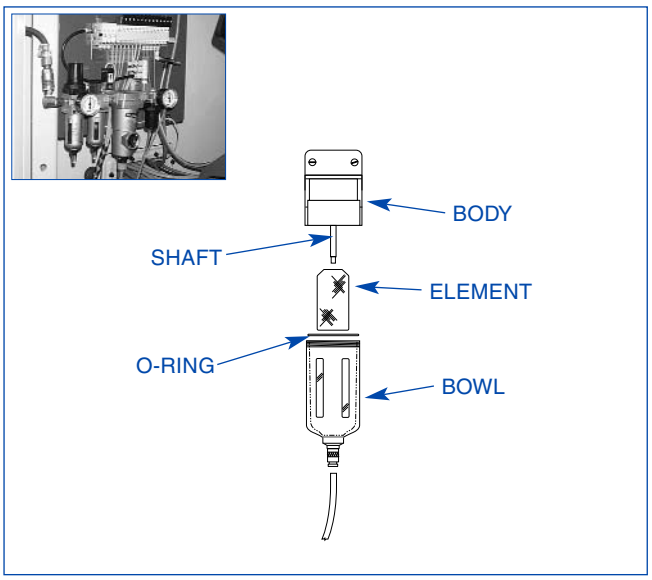


FIGURE 4-6, Mist Separator

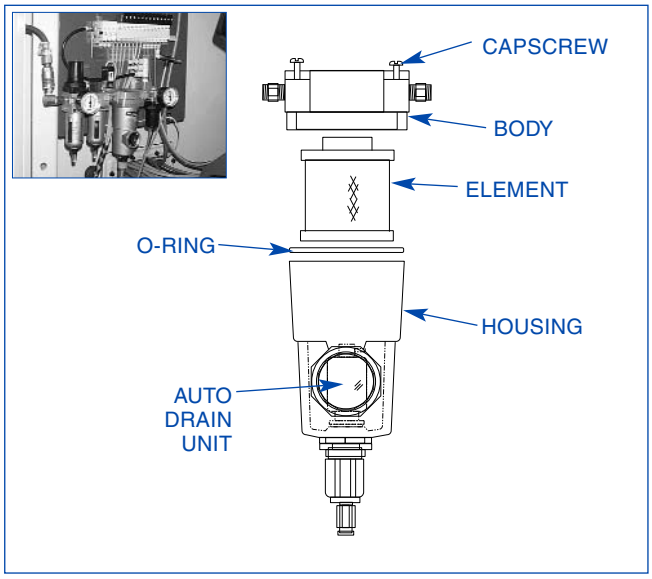


FIGURE 4-7, Ambient Dryer

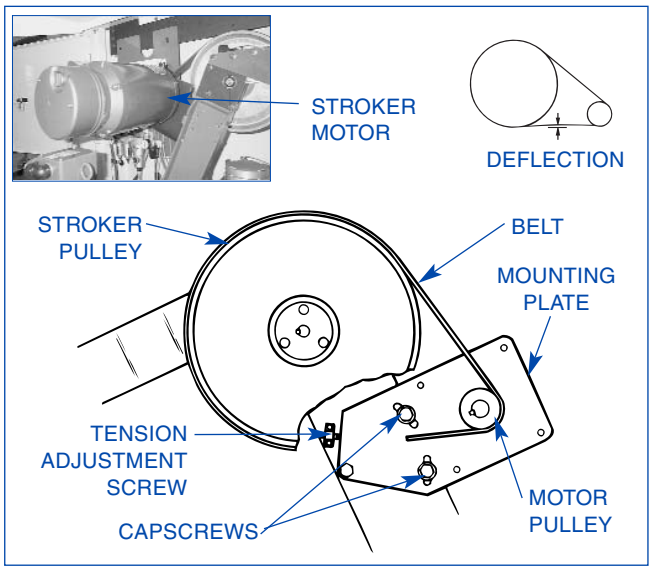


FIGURE 4-8, Stroker Motor Belt

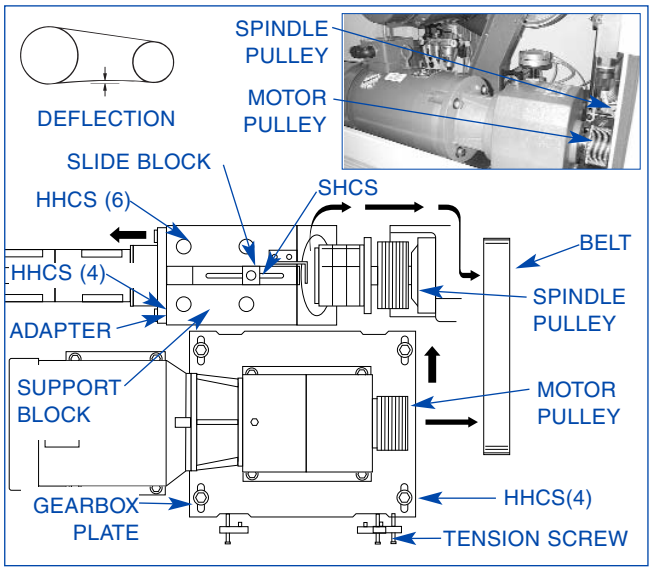


FIGURE 4-9, Spindle Motor/Gearbox Belt

BELT REPLACEMENT - STROKER MOTOR

To replace Drive Belt on Stroker Motor proceed as follows *(see Figure 4-8)*:

1. Turn OFF power to Machine at Master ON/OFF Switch on Electrical Control Enclosure.
2. Open access Cover to Machine.
3. Loosen Tension Adjusting Screw.
4. Loosen three (3) mounting Bolts in Stroker Motor Mounting Plate.
5. Lift and slide Stroker Motor to remove Belt.
6. Install new Belt.
7. Adjust Tension Adjusting Screw as required to get a belt deflection of 3,5mm at 33,4 N-force (9/64 in at 7.5 lbs.-force).
8. Tighten mounting Bolts in Stroker Motor Mounting Plate.
9. Close access Cover to Machine.
10. Turn ON power to Machine.

BELT REPLACEMENT - SPINDLE MOTOR/GEARBOX

To replace Drive Belt on Spindle Motor/Gearbox proceed as follows *(see Figure 4-9)*:

1. Remove tool from spindle.
2. Turn OFF power to Machine at Master ON/OFF Switch on Electrical Control Enclosure.
3. Open access Doors to Machine.
4. Loosen four (4) Hex Hd. Capscrews in Motor Plate.
5. Slide Spindle Motor Gearbox toward Feed Assembly.

NOTE: Refer to Repair Parts Catalog for detailed parts breakdown.

6. Remove four (4) Hex Hd. Capscrews from Feed Motor Adapter.
7. Grasp Feed Motor Adapter and slide Feed Unit out until it stops.

CAUTION

Limit rotation of Ball Screw to prevent Nut from leaving Ball Screw.

8. Remove six (6) Socket Hd. Capscrews from Ball Screw Nut; and remove Torque Arm and turn Ball Screw Housing as required to gain access to Screws.
9. Remove six (6) Socket Hd. Capscrews from Ball Screw Flange and remove flange.
10. Remove six (6) Hex Hd. Capscrews from Support Block and remove block.
11. Remove old Belt and install new Belt.
12. Reinstall Support Block and Ball Screw Flange.
13. Gasp Feed Motor Adapter and slide Feed Unit with Ball Screw Nut in. Reinstall Capscrews.
14. Reinstall Torque Arm; tighten Capscrew in arm until light contact is made with Slide Block.

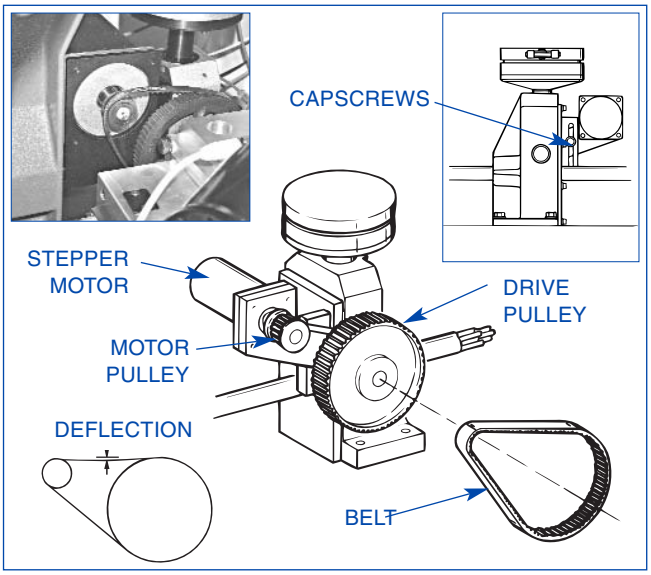


FIGURE 4-10, Stepper Motor Belt

15. Tighten Jam Nut.

16. Adjust Tension Adjusting Screw as required to get a belt deflection of 3,5mm at 33,4 N-force (9/64 in at 7.5 lbs.-force).

17. Tighten Hex Hd. Capscrews in Motor Plate.

18. Verify motor pulley & spindle pulleys are aligned: Use a straight edge to align pulleys; reposition motor pulley as required.

19. Close access Doors to Machine.

20. Turn ON power to Machine.

CAUTION

Feed motor calibration MUST be performed or severe damage can occur to machine. *(Refer to Feed Motor Calibration.)*

BELT REPLACEMENT - STEPPER MOTOR

To replace Drive Belt on Stroke Position Stepper Motor, proceed as follows *(see Figure 4-10)*:

1. Turn OFF power to Machine at Master ON/OFF Switch, on Electrical Control Enclosure.

2. Open access Cover to Machine.

3. Loosen one (1) Hex Head Capscrew in Motor Mounting Block to release belt tension.

4. Remove old Belt.

5. Install new Belt.

6. Pull up on Motor to adjust Belt Tension and tighten Hex Head Capscrew in Motor Mounting Block.

7. Close access Cover to Machine.

8. Turn ON power at Master ON/OFF Switch.

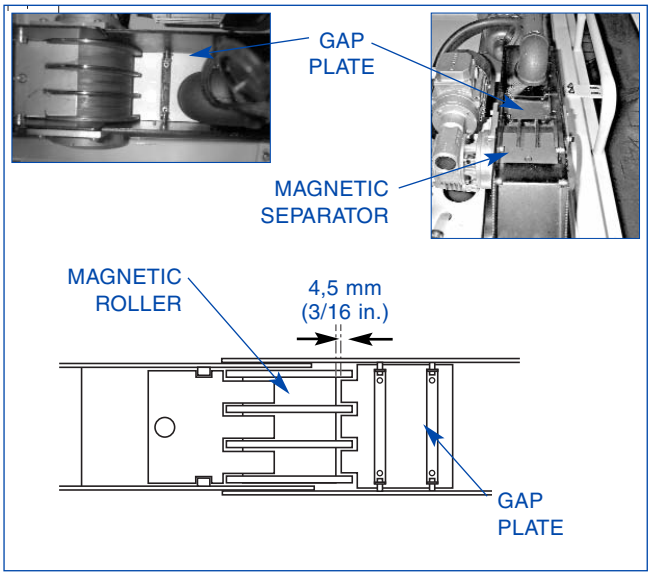


FIGURE 4-11, Magnetic Separator

MAGNETIC SEPARATOR

Magnetic separator should be checked, cleaned, and adjusted as follows:

1. Water-Based Coolant: Clean discharge chute daily. When using water-based coolant, sludge, which builds up in chute often, hardens if machine is turned off for 8 hours or more. Therefore, sludge should be cleaned off chute at start of each shift. When using honing oil as a coolant, sludge rarely if ever hardens in chute and will not have to be checked as often.

2. Whenever Coolant Reservoir is moved, check angle of Overflow Elbow. Elbow should be angled at 45º, as measured from floor. If elbow is at a higher angle, coolant level in magnetic separator can become too high and overflow discharge chute.

NOTE: A certain amount of coolant will be carried into sludge bucket along with sludge. After gravity separates coolant from sludge, there is normally an inch or more of coolant, which collects in bucket. This coolant can be dipped out and returned to reservoir.

3. Periodically: Drain Inlet Hopper, wipe clean, and adjust Gap Plate as required *(see Figure 4-11)*. Proper Gap setting is 4,5mm + 1mm (3/16 in + 1/16 in).

FEED MOTOR CALIBRATION

If the Feed Motor is ever separated from the Feed Rod, the Feed System will need to be calibrated. This can be done as follows *(see Figure 4-12)*:

1. Go to Diagnostic Menu and select Feed Movement (F6).

2. Using UP/DOWN Selector Switch move the feed rod so that it is almost flush with the front of the spindle nose.

3. Install Feed Calibration Plate on the spindle so that it fits flush with the spindle nose.

4. Press F3, Set Feed Offset and then press the Palm Buttons.

5. When completed, the screen will revert back to the standard feed diagnostic screens.

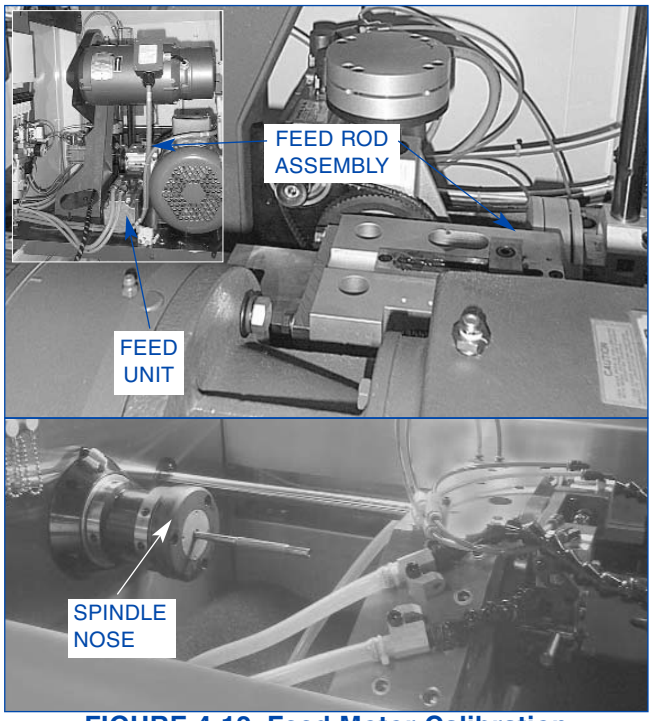


FIGURE 4-12, Feed Motor Calibration

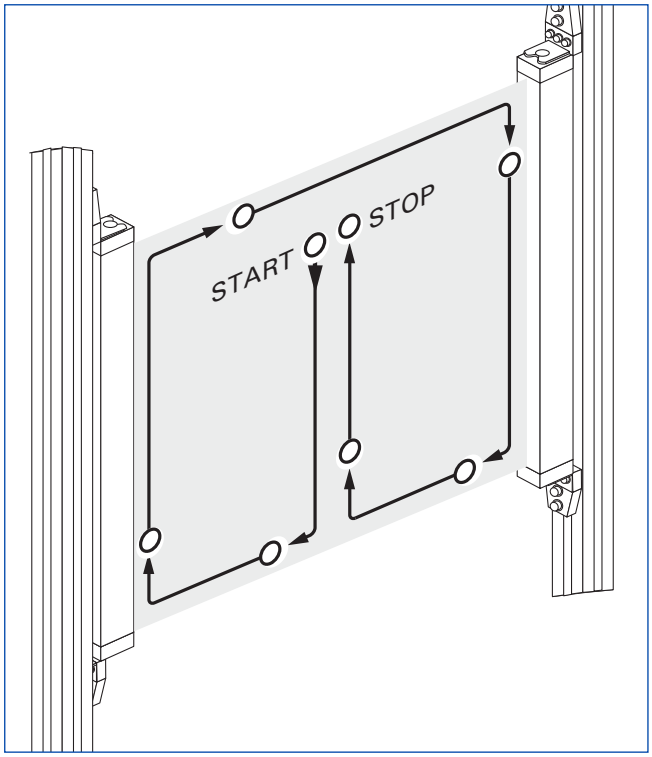


FIGURE 4-13, Light Curtain

LIGHT CURTAIN FUNCTION TEST

(CE Machines Only) Check Light Curtain operation as follows *(see Figure 4-13)*:

WARNING

The test outlined below must be performed at installation, according to employer's regular inspection program and after any maintenance, tooling change, setup, adjustment, or modification to Light Curtain System or the guarded machine. Where a guarded machine is used by multiple operators or shifts, it is suggested that the test be performed at each shift or operation change. Testing ensures that Light Curtain and machine control system work properly to stop the machine. Failure to test properly could result in injury to personnel.

1. Interrupt light curtain system with proper size test object (Test object size: 30 mm diameter). When using the test object, guide it through the detection zone as shown below. At least one individual beam indicator must be lit while test object is anywhere in detection zone.

2. Start machine. While machine is in motion, interrupt detection zone with test object. Machine should stop immediately. Never insert test object into dangerous parts of machine.

3. With machine at rest, interrupt detection zone with test object. Verify that machine will not start with test object in detection zone.

4. Verify that braking system is working properly. Machine must come to a quick controlled stop when light curtain is interrupted. Drive faults, spindle coasting and stroker coasting are unacceptable.

LIGHT CURTAIN CLEANING

Accumulation of oil, dirt and grease on the front filter of the light curtain transmitter and receiver can affect the system operation. Clean filters with a mild detergent or glass cleaner. Use a clean, soft, lint-free cloth. Painted light curtain surfaces may be cleaned with a mild de-greasing cleaner or detergent.

NOTES

SECTION 5
TROUBLESHOOTING

GENERAL

This section contains Troubleshooting information in table form which should be used when problems occur with machine. The table lists problems encountered, possible causes, and solutions for problems along with reference to section of manual where detailed instructions may be found to correct problems.

OPERATIONAL TROUBLESHOOTING

For suggestions on correcting problems with bore conditions or with Rod Reconditioning operation; consult Table 5-1.

TABLE 5-1, Operational Troubleshooting Index

PROBLEM	PROBABLE CAUSE	SOLUTIONS	SEC.
Stone not cutting (Honing Dial Needle moves too slowly	1. Stone Glazing	A. Dress stone B. Increase cutting pressure C. Increase stroking speed D. Use softer stone E. Check coolant*	 4
	2. Stone Loading	A. Dress stone B. Increase stroking speed C. Use softer stone D. Use coarser stone E. Check coolant*	 4
Slow stock removal (Honing Dial Needle moves too slowly)	1. Improper spindle speed 2. Inadequate stone feed up 3. Improper stone	A. Increase spindle speed A. Increase cutting pressure A. Use softer stone B. Use coarser stone	
	4. Improper or diluted coolant*	A. Check coolant*	4
Poor stone life (Honing Dial Needle moves) too fast)	1. Excessive stone feed up 2. Inadequate spindle speed 3. Improper stone	A. Decrease cutting pressure A. Increase spindle speed A. Use harder stone B. Use coarser stone	2 2
	4. Improper or dilute coolant*	A. Check coolant*	4
Bellmouth (Bore longer than 2/3 stone length)	1. Mandrel not trued 2. Short or unbalanced part 3. Improper stone 4. Improper stone length	A. True stone & shoes A. Shorten stroke length A. Use softer stone A. Shorten stone only slightly on each end	 2
Bellmouth (Bore shorter than 2/3 stone length)	1. Mandrel not trued 2. Short or unbalanced part 3. Improper stone 4. Improper stone length	A. True stone & shoes A. Shorten stroke length A. Use softer stone A. Shorten stone & shoes equally to 1-1/2 times bore length	 2

*NOTE: Many honing problems, such as poor stone life, and rough finish, are caused by wrong coolant; insufficient coolant, dirty coolant, or contaminated coolant. Use ONLY clean, Sunnen Industrial Honing Oils or Water-Based Coolant. Make sure that coolant is neither diluted nor "cut" with other coolants. Keep solvents and cleaning fluids away from Machine.

PROBLEM	PROBABLE CAUSE	SOLUTIONS	SEC.
Barrel	1. Mandrel not trued	A. True stone & shoes	
	2. Improper stone length	A. Use longer stone or shorten guide shoes on both ends	
		B. Use mandrel with longer stone & shoes	
	3. Improper stone	A. Use finer stone	
Taper in Open Hole	1. Workpiece is not being reversed	A. Reverse workpiece on mandrel	
	2. Mandrel not trued	A. True stone & shoes	
	3. Improper stroke	A. Lengthen overstroke on tight end	
	4. Stroker Arm and Spindle not aligned	A. Align Stroker Arm and Spindle	
Taper in Blind Hole	1. Improper stone length	A. Shorten stone and shoes to 3/4 length of bore	
		B. True stone & shoes frequently	
	2. Inadequate oil flow	A. Adjust Oil Nozzle	
	3. Inadequate relief in blind end	A. Provide sufficient relief	
		B. Short stroke tight end	
		C. Use hard tip stone	
Out-Of-Round	1. Undersize honing tool	A. Change honing tool	2
	2. Mandrel not true	A. True stone & shoes	
	3. Workpiece flexing (thinwall)	A. Decrease cutting pressure	2
	4. Improper stone	A. Use softer stone	
Waviness	1. Improper mandrel or stone length	A. Use mandrel with sufficient stone length to bridge waviness in bore	
Rainbow	1. Improper mandrel	A. Use L, BL or multi-stone mandrel (stone length should be 1-1/2 times bore length	
	2. Improper stroke	A. Shorten overstroke	
	3. Improper stone	A. Use softer stone	
Rough Finish	1. Improper feed	A. Decrease cutting pressure	2
	2. Mandrel not trued	A. True stone & shoes to exact hole dia.	
	3. Improper stone	A. Use finer stone	
	4. Improper or diluted coolant*	A. Check coolant*	4
	5. Soft or exotic materials	A. Use bronze mandrel or bronze shoes	
Scratches in Bore (Random)	1. Improper feed	A. Decrease cutting pressure	2
	2. Improper stone	A. Use finer stone	
		B. Use softer stone	
	3. Improper mandrel	A. If using hard steel mandrel, change to soft steel mandrel; If using soft steel mandrel, change to bronze mandrel	
	4. Improper or diluted coolant*	A. Check coolant*	4

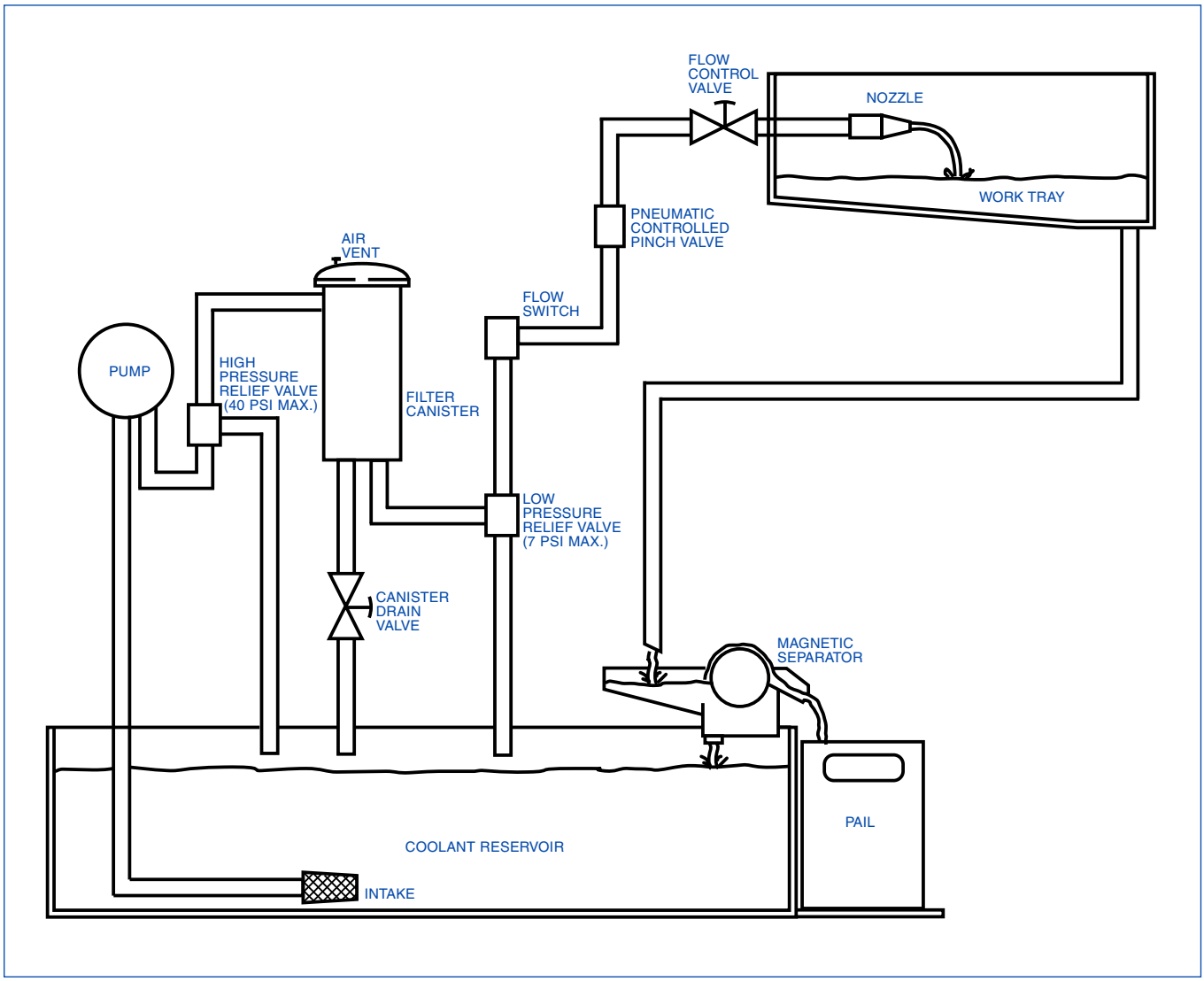
*NOTE: Many honing problems, such as poor stone life, and rough finish, are caused by wrong coolant; insufficient coolant, dirty coolant, or contaminated coolant. Use ONLY clean, Sunnen Industrial Honing Oils or Water-Based Coolant. Make sure that coolant is neither diluted nor "cut" with other coolants. Keep solvents and cleaning fluids away from Machine.

CHECKLIST
SETUP & OPERATION SEQUENCE

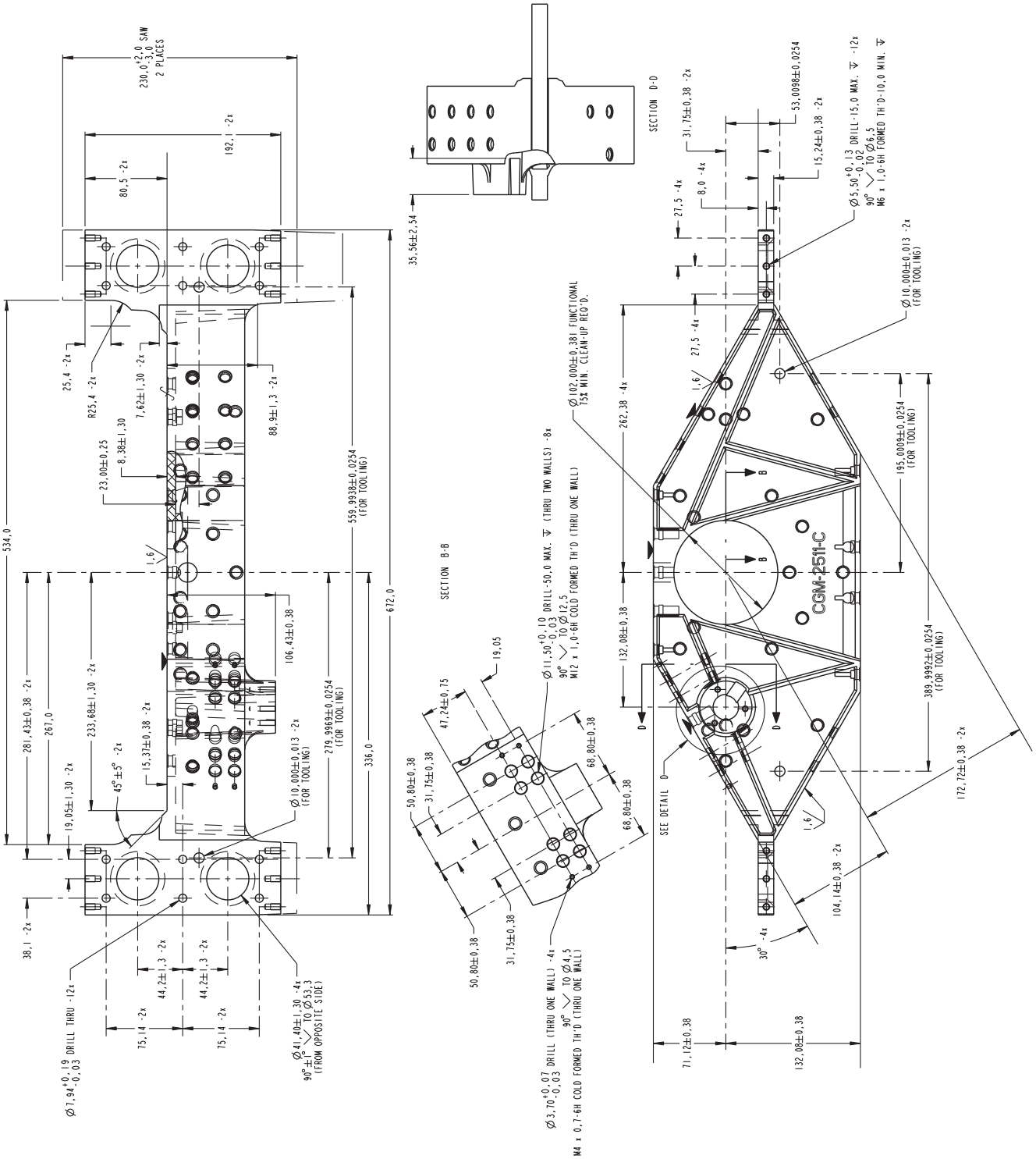
- ❑ Install Workholding Fixtures.
- ❑ 1. Turn ON Main Power.
- ❑ 2. Close all Guards.
- ❑ 3. Release E-Stop.
- ❑ 4. Press Power ON.
- ❑ 5. Verify all Guards are in place.
- ❑ 6. Press Palm Buttons.
- ❑ 7. Press F1, Setup Menu.
- ❑ 8. Press F2, New Setup.
- ❑ 9. Key in Parts Specifications (F2, per instructions on screen).
- ❑ 10. Set Fixture's Airlines (F3, per instructions on screen).
- ❑ 11. Set Interlock (F4, per instructions on screen).
- ❑ 12. Key in Honing Parameters (F5, per instructions on screen).
- ❑ 13. Key in Feed Parameters (F6, per instructions on screen).
- ❑ 14. Press F7, Tool Setup.
- ❑ Press F2, New Tool (Install tool per instructions on screen):
- ❑ Open Guards.
- ❑ Position Carriage at a comfortable position.
- ❑ Remove Adapter Cap.
- ❑ Press F10, Next Step (Warning to remove cap).
- ❑ Press OK (feed rod will advance).
- ❑ Remove old tool and install new tool. Then press F10, Next Step.
- ❑ Install Adapter Cap. Then press F10, Next Step.
- ❑ Set Snugging Diameter. Then press OK.
- ❑ Install Sample Workpiece/Alignment Bushing.
- ❑ Snug tool. Then press F10, Next Step.
- ❑ Retract tool and remove Workpiece.
- ❑ Install Alignment Bushing.
- ❑ Align too for Runout.
- ❑ Retract tool and remove Bushing.
- ❑ Press OK (Warning).
- ❑ Press OK (tool will retract).
- ❑ Press F8, Stroker Setup.
- ❑ Load part. Then press F10, Next Step.
- ❑ Use Palm Buttons to align front edge of Abrasive with front of Bore.
- ❑ Close Guards. Then press F10, Next Step.
- ❑ Use Palm Buttons to slow stroke (check stroke position). Press F10, Next Step.
- ❑ Use Palm Buttons to set load position. Press F10, Next Step.
- ❑ Use Palm Buttons to set unload position). Press F10, Next Step.
- ❑ Press OK (setup complete).
- ❑ Enter setup name. Then press SAVE.
- ❑ Press F10, Run Screen.
- ❑ Open Guards and position coolant lines.
- ❑ Close Guards.
- ❑ Turn ON coolant.
- ❑ Press Palm Buttons to start cycle.
- ❑ When cycle is ended; open Guard and remove workpiece.
- ❑ Gage Workpiece.
- ❑ Use "F" keys to edit setting (per instructions on screen).
- ❑ 15. Press F1 when setup is complete.
- ❑ 16. Load parts.
- ❑ 17. Press F2, Run Menu.
- ❑ 18. Press F2, Run Settings.
- ❑ Select Automatic Cycle Mode. Then press OK.
- ❑ 19. Press Palm Buttons to Start Cycle.

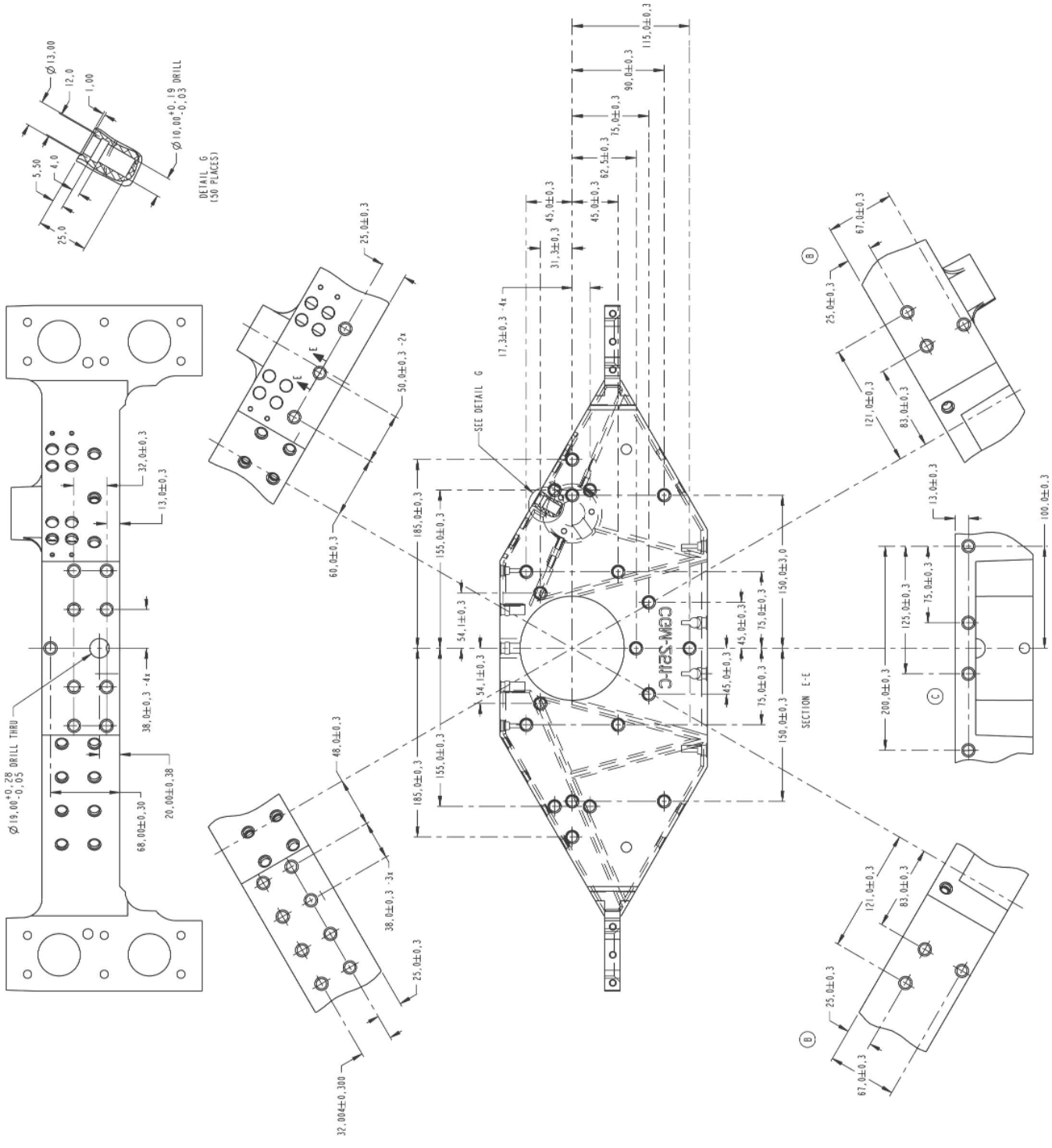
NOTES

COOLANT
FLOW DIAGRAM



STROKER CARRIAGE
HOLE PATTERN




DETAIL G
(50 PLACES)
SEE DETAIL G
SECTION E-E
CGM-25M-C

DECLARATION OF CONFORMITY (CE)

EC declaration of conformity

according to the EU Machinery Directive 2006/42/EG, Annex II, 1.A

Manufacturer:
Sunnen Products Co.,
7910 Manchester
63143 St. Louis, Missouri USA

Person residing within the Community authorised to compile the relevant technical documentation:
Julian Hooper
Sunnen Products Ltd.,
Centro 1 Maxted Rd
HP2BL Hemel Hempstead, Hertfordshire

Description and identification of the machinery:

Make:	KGM-5000NTCG	Horizontal Honing Machine
Serial no:	XXXX	

It is expressly declared that the machinery fulfils all relevant provisions of the following EU Directives:

2006/42/EG:2006-05-17	EU Machinery Directive 2006/42/EG
2004/108/EG:2004-12-15	Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC

Reference to the harmonised standards used, as referred to in Article 7(2):

EN 60204-1:2006	Safety of machinery – Electrical equipment of machines – Part 1: General requirements

SAMPLE
CE DOCUMENT

St. Louis, Missouri USA, 2011.11.07

Place, date

Signature
Michael C. Haughey
Chief Operating Officer

Like any machinery, this equipment may be dangerous if used improperly. Be sure to read and follow instructions for operation of equipment.

FRACTION / DECIMAL / MILLIMETER EQUIVALENTS CHART

INCH FRACTION	INCH DECIMAL	MILLIMETER	INCH FRACTION	INCH DECIMAL	MILLIMETER	INCH FRACTION	INCH DECIMAL	MILLIMETER
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. . . .	.007874	0,2000	19/64	.296875	7,5406	. . . .	.669291	17,0000
. . . .	.011811	0,3000	5/16	.312500	7,9375	43/64	.671875	17,0656
1/64	.015625	0,3969	. . . .	.314961	8,0000	11/16	.687500	17,4625
. . . .	.015748	0,4000	21/64	.328125	8,3344	45/64	.703125	17,8594
. . . .	.019685	0,5000	11/32	.343750	8,7313	. . . .	.708661	18,0000
. . . .	.023622	0,6000	. . . .	.354331	9,0000	23/32	.718750	18,2563
. . . .	.027559	0,7000	23/64	.359375	9,1281	47/64	.734375	18,6531
1/32	.031250	0,7938	3/8	.375000	9,5250	. . . .	.748031	19,0000
. . . .	.031496	0,8000	25/64	.390625	9,9219	3/4	.750000	19,0500
. . . .	.035433	0,9000	. . . .	.393701	10,0000	49/64	.765625	19,4469
. . . .	.039370	1,0000	13/32	.406250	10,3188	25/32	.781250	19,8438
3/64	.046875	1,1906	27/64	.421875	10,7156	. . . .	.787402	20,0000
1/16	.062500	1,5875	. . . .	.433071	11,0000	51/64	.796875	20,2406
5/64	.078125	1,9844	7/16	.437500	11,1125	13/16	.812500	20,6375
. . . .	.078740	2,0000	29/64	.453125	11,5094	. . . .	.826772	21,0000
3/32	.093750	2,3813	15/32	.468750	11,9063	53/64	.828125	21,0344
7/64	.109375	2,7781	. . . .	.472441	12,0000	27/32	.843750	21,4313
. . . .	.118110	3,0000	31/64	.484375	12,3031	55/64	.859375	21,8281
1/8	.125000	3,1750	1/2	.500000	12,7000	. . . .	.866142	22,0000
9/64	.140625	3,5719	. . . .	.511811	13,0000	7/8	.875000	22,2250
5/32	.156250	3,9688	33/64	.515625	13,0969	57/64	.890625	22,6219
. . . .	.157480	4,0000	17/32	.531250	13,4938	. . . .	.905512	23,0000
11/64	.171875	4,3656	35/64	.546875	13,8906	29/32	.906250	23,0188
3/16	.187500	4,7625	. . . .	.551181	14,0000	59/64	.921875	23,4156
. . . .	.196850	5,0000	9/16	.562500	14,2875	15/16	.937500	23,8125
13/64	.203125	5,1594	37/64	.578125	14,6844	. . . .	.944882	24,0000
7/32	.218750	5,5563	. . . .	.590551	15,0000	61/64	.953125	24,2094
15/64	.234375	5,9531	19/32	.593750	15,0813	31/32	.968750	24,6063
. . . .	.236220	6,0000	39/64	.609375	15,4781	. . . .	.984252	25,0000
1/4	.250000	6,3500	5/8	.625000	15,8750	63/64	.984375	25,0031
17/64	.265625	6,7469	. . . .	.629921	16,0000	1	1.000000	25,4000
. . . .	.275591	7,0000	41/64	.640625	16,2719	1-1/16	1.062500	26,9880

FORMULAS:

MULTIPLY		BY		TO GET
INCHES (in)	x	25.4	=	MILLIMETERS (mm)
FEET (ft)	x	0.3048	=	METERS (m)

MULTIPLY		BY		TO GET
MILLIMETERS (mm)	x	0.03937	=	INCHES (in)
METERS (m)	x	3.281	=	FEET (ft)

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SUNNEN PRODUCTS COMPANY
7910 Manchester Road, St. Louis, MO 63143 U.S.A.
Phone: 314-781-2100 Fax: 314-781-2268
U.S.A. Toll-Free Sales and Service:**1-800-325-3670**
International Division Fax: 314-781-6128

http://www.sunnen.com
e-mail: sunnen@sunnen.com

Switzerland – Sunnen AG
Phone: ++ 41 71 649 33 33 Fax: ++ 41 71 649 34 34
www.sunnen.ch e-mail: info@sunnen.ch

Italy – Sunnen Italia S.R.L.
Phone: 39 02 383 417 1 Fax: 39 02 383 417 50
www.sunnenitalia.com e-mail: sunnen@sunnenitalia.com

France – Sunnen SAS
Phone: +33 01 69 30 0000 Fax: +33 01 69 30 1111
www.sunnen.fr e-mail: info@sunnen.fr

Belgium – Sunnen Benelux BVBA
Phone: +32 38 80 28 00 Fax: +32 38 44 39 01
www.sunnen.be e-mail: info@sunnen.be

UK – Sunnen Products Ltd.
Phone: ++ 44 1442 39 39 39 Fax: ++ 44 1442 39 12 12
www.sunnen.co.uk e-mail: hemel@sunnen.co.uk

Poland – Sunnen Polska Sp. Z o.o.
Phone: +48 22 814 34 29 Fax: +48 22 814 34 28
www.sunnen.pl e-mail: sunnen@sunnen.pl

Russia – Sunnen RUS
Phone: +7 495 258 43 43 Fax: +7 495 258 91 75
www.sunnen.ru e-mail: sunnen@sunnen-russia.ru

Czech Republic – Sunnen S.R.O.
Phone: +420 383 376 317 Fax: +420 383 376 316
www.sunnen.cz e-mail: sunnen@sunnen.cz

China – Shanghai Sunnen Mechanical Co., Ltd.
Phone: 86 21 5813 3322 Fax: 86 21 5813 2299
www.sunnensh.com e-mail: shsunnen@sunnensh.com

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