

INSTALLATION, OPERATION & MAINTENANCE MANUAL



MINI RHINOBAR

HYDRODYNAMIC BAR FEED



2025 Mercer Road, Lexington, Kentucky 40511
859-255-5001 • Fax 859-255-6656 • www.lexairinc.com

SECTION 1 INTRODUCTION

SECTION 2 WARRANTY

SECTION 3 INSTALLATION

SECTION 4 OPERATION

SECTION 5 MAINTENANCE

SECTION 6 TROUBLESHOOTING

SECTION 7 APPENDIX A

SECTION 1 INTRODUCTION

Introduction: This unit is designed as a heavy duty hydrodynamic bar feed for use with all high speed CNC lathes, including swiss style turning centers. It is a single tube, muzzle-loading bar feed capable of handling round, hexagonal, square, and in some applications asymmetric bar stock up to 1 5/8" (41mm) in diameter.

The bar feed utilizes the hydrodynamic effect created by the rotating stock in an oil bath. As the stock begins to rotate, a hydrodynamic pressure builds beneath it lifting the stock. At optimal speed the bar becomes centered in the feed tube. Since the entire bar is supported in oil, vibrations are minimized by the damping qualities of the oil.

The barrel is a high strength aluminum alloy and is held in place by a unique clamping/bearing arrangement. This design allows easy z-axis as well as swing out movement in one simple integrated component.

The design utilizes feed tubes to accommodate the various stock sizes. There are fourteen standard feed tubes ranging from 1/4" to 1 5/8" bar capacity. Feed tube changes are made in the same manner as loading stock and are made easily without the use of special tools. Each feed tube is equipped with an integral pusher that engages the stock and translates oil pressure into the force needed to advance the stock into the lathe spindle.

Each feed tube will need a matching spindle liner that is specifically designed for the lathe. The purpose of the spindle liner is to limit stock whip in the machine spindle.

NOTE: *This bar feed is designed for maximum ease of use and safe operation. It is strongly recommended that all individuals that are likely to use or maintain this equipment thoroughly read and understand this entire manual.*

SECTION 2 WARRANTY

Statement of warranty: The products furnished hereunder are guaranteed by Lexair, Inc., against any defect in material or workmanship for a period one (1) year from the date of shipment when owned by the original buyer or first user, and maintained and operated under normal conditions. Any products furnished hereunder not manufactured by Lexair, Inc., are warranted only to the extent of the original manufacturer's warranty. Parts found to be defective in material or workmanship under this warranty shall be repaired or replaced without charge, F.O.B., original point of shipment, provided prompt notice of the defect is given and compliance with the terms of the warranty is established. LEXAIR, INC., SHALL BE LIMITED STRICTLY AND WHOLLY TO THE FOREGOING.

In no event shall Lexair, Inc. be liable for consequential or incidental damages or for any other costs, expenses or damages incurred by you attributed to any item sold hereunder.

NOTICE: The lathe must be anchored in place to prevent it from moving and altering the lathe to bar feed alignment. If this is not done, Lexair, Inc. **DOES NOT** guarantee the setup alignment or optimum bar feed performance.

SECTION 3 INSTALLATION

- 3.1. Special Tools**
- 3.2. Pre-installation Requirements**
- 3.3. Unpacking**
- 3.4. Initial Assembly**
- 3.5. Alignment**
- 3.6. Final Assembly**
- 3.7. Pusher Modification**
- 3.8. Electrical Interfacing (Standard)**
- 3.9. Testing (Standard)**
- 3.10. Electrical Interfacing (Swiss Style)**
- 3.11. Testing (Swiss Style)**

3. **Installation:** In order to achieve the highest level of performance from the bar feed it is essential that it be properly installed. This task requires mechanical aptitude, a thorough understanding of electricity, and some knowledge of the electronics of standard and swiss style CNC lathes. Please be advised that **THE MANUFACTURER ACCEPTS NO RESPONSIBILITY FOR ANY INSTALLATION CARRIED OUT BY UNTRAINED PERSONNEL.**
 - 3.1. **Special tools:** In addition to basic hand tools the following tools are required to properly assemble and install the bar feed:
 - 3.1.1. A set of alignment plugs. These can be made from the plans provided in figure A2, appendix A.
 - 3.1.2. 30 feet of 60 lb. test monofilament fishing line.
 - 3.1.3. 5/8" concrete drill.
 - 3.1.4. Heavy duty hammer drill.
 - 3.1.5. Multimeter.
 - 3.1.6. Chalk line.
 - 3.1.7. 25 foot steel tape measure.
 - 3.1.8. Teflon pipe sealing tape.
 - 3.1.9. 1/2 electrical knock out punch (7/8" diameter).
 - 3.1.10. Level.
 - 3.1.11. 15 gallons hydraulic oil (see SECTION 5).
 - 3.1.12. Appropriate spindle liner.
 - 3.2. **Pre-installation requirements:** The following requirements should be completed prior to the mechanical installation:
 - 3.2.1. The floor should be firm and in good condition.
 - 3.2.2. There should be enough space for installation of the bar feed at the spindle end of the lathe as well as adequate clearance in front of the lathe for loading the bar feed. See figure A3, appendix A.
 - 3.2.3. The lathe must be completely installed, leveled, and fully operational including the chucking system.
 - 3.3. **Unpacking:** The bar feed is delivered in two separate packing crates. One crate (approximately 850 lbs.) contains the bar feed barrel assembly and feed tubes. The other contains the front and rear pedestal assemblies as well as the hydraulic unit. Combined, these weigh approximately 600 lbs.
 - 3.3.1. Remove the heavy cardboard box covering the hydraulic unit and pedestal assemblies.

- 3.3.2. Remove the top and sides of the long crate containing the barrel assembly.
 - 3.3.3. Bring the two pallets close to the lathe.
 - 3.3.4. Remove the four lag screws from each pedestal base. Place the pedestals in line with the lathe spindle, the front pedestal, the one with the clamping arm, closest to the lathe.
 - 3.3.5. Remove the four screws that hold the hydraulic unit in place. Set the unit aside until later.
 - 3.3.6. Open the cardboard box containing the installation kit and set it in a convenient, out of the way place.
- 3.4. **Initial Assembly:**
- 3.4.1. Using a chalk line, strike a line on the floor parallel to the lathe spindle and in line with the front of the lathe. Establish by measurement a dimension from the line to the lathe spindle centerline. Using this reference dimension, position the front and rear pedestals as shown in figure A1, appendix A. *NOTE: A feed tube rack is built into one of the support webs of each pedestal and resembles a saw blade. This should be on the front side.*
 - 3.4.2. Install four (4) 5/8-11x2 1/4" leveling bolts each pedestal and adjust them so that the bottom of the base is approximately 1" above the floor. Roughly level each pedestal at the top support plate by adjusting the four (4) corner leveling screws. Be sure that all screws are in touch with the floor and the pedestals do not rock.
 - 3.4.3. Remove the clamp arm and junction box bracket by removing the two (2) 1/2-13x1 1/2 socket head cap screws from the bottom of the front pedestal support plate. Apply some grease to the square groove in the top of the pedestal support plate.
 - 3.4.4. Carefully lift and support the barrel assembly by the barrel with nylon lifting straps. Place the swing out support arm into the groove on the bottom of the front barrel clamp and attach with two cap screws. The handle should be on the front side when the barrel recuperator end is near the lathe.
 - 3.4.5. Unlock the barrel clamp swivel bearings by loosening the bearing adjustment 1/4-20 socket head cap screw located on the split side of each barrel clamp so that the bearings will slide. It may be necessary to tighten the two (2) 5/16-18 set screws to achieve this.
 - 3.4.6. Set the barrel assembly on the pedestals so that the swing out support arm rests in the square groove of the front pedestal support plate and the barrel clamps are centered over the support plates.

- 3.4.7. Attach the rear barrel clamp to the rear pedestal support plate with two (2) 1/2-13x1 1/2 socket head cap screws and two (2) 1/2 flat washers through the two (2) slotted holes. Center the screws in the slots and tighten.
- 3.4.8. Drop the brass clamping piston into the top of the front barrel clamp with the counter sink side up. The radius in the bottom must mate with the radius of the outer swivel bearing.
- 3.4.9. Reattach the clamp arm and junction box bracket to the front pedestal support plate. Center the screws in the slots and tighten.
- 3.4.10. Install the clamping screw into threaded hole in the top of the clamping arm. Move the front barrel clamp in or out slightly so that the clamping screw engages the very center of the clamping piston and tighten. Next locate the clamp 5/16-18x1 1/2 nylock position set screw located on the back of the clamping arm just above the swing out support arm. Adjust it so that it just touches the barrel clamp.

3.5. **Alignment:**

- 3.5.1. Roughly align the bar feed with the lathe spindle side to side by bumping the bar feed pedestals forward or back. Be careful to keep the pedestals square.
- 3.5.2. Next, loosen the four (4) 1/2-13 button head column clamping screws located on the lathe side of each pedestal. Raise or lower the barrel as required by turning the jack screw bolt located just behind the column. Adjust them both until the barrel is level and approximately in line with the lathe spindle.
- 3.5.3. Remove the three (3) 1/4-20 socket head cap screws that hold the barrel end cap on and remove the cap. Starting from the cap end extend the steel tape measure through the barrel, lathe spindle and chuck. Lock in place. Tie one end of the fishing line to the end of the tape measure and pull it through the spindle and barrel. Next thread the end of the line through the hole in larger alignment plug and tie a knot. Place the plug in the end of the barrel and hold it there with one (1) of the 1/4-20 socket head cap screws removed earlier. Now thread the other end through the other alignment plug and clamp it in the chuck. Pull and tie a loop in the line close to the plug. Move the lathe turret close to the plug. Attach the loop to a convenient protrusion on the turret and move turret away back to tighten the line.
- 3.5.4. Using a scale held vertically at the end of the spindle measure the position of the line relative to the spindle ID. If the line is too high then lower the rear column. Conversely, if it is too low then raise the rear column.

- 3.5.5. Place the scale vertically on the face of the bar feed recuperator and measure the position of the line relative to the opening ID. Raise or lower the front column to center the line.
 - 3.5.6. Place the scale horizontally on the end of the spindle and measure the position of the line relative to the spindle ID. Bump the rear pedestal in or out to center the line.
 - 3.5.7. Place the scale horizontally on the face of the bar feed recuperator and measure the position of the line relative to the opening ID. Bump the front pedestal in or out to center the line.
 - 3.5.8. Repeat steps 3.5.5. through 3.5.8. until the line is centered in both the spindle end and the bar feed recuperator.
 - 3.5.9. Tighten the four (4) column clamping screws of each pedestal to secure the columns in place.
 - 3.5.10. Recheck the position of the line in spindle and make any vertical corrections by adjusting the rear pedestal base leveling screws. Horizontal adjustments are made the same as before (step 7). *NOTE: the better the alignment the better the end performance will be.*
 - 3.5.11. Once the proper alignment has been achieved, drill four (4) 5/8 inch diameter holes in the floor through the four (4) slots in each pedestal base. Be sure to center the holes in the slots. Drill the holes deep enough to take the entire anchor plus 3/4 inch.
 - 3.5.12. Attach a washer and a nut on each anchor. Drive each anchor completely in with a hammer. Tighten each anchor incrementally to evenly distribute the load and to keep any one anchor from compromising the alignment.
 - 3.5.13. Do a final check of the alignment and make any adjustments.
 - 3.5.14. Remove the line and alignment plugs. Replace the barrel end cap and three (3) 1/4-20 socket head cap screws.
- 3.6. **Final assembly:**
- 3.6.1. Place the hydraulic unit between the pedestals with the electrical control cabinet facing away from the lathe. See figure A1, appendix A.
 - 3.6.2. Secure one end of the 1" diameter drain hose to the recuperator hose barb with one (1) of the 1" hose clamps. Secure the other end to the barb on the strainer housing located on the top of the hydraulic unit.
 - 3.6.3. Secure one end of the 3/4" diameter supply hose to the hose barb on the end control valve with one (1) of the 3/4" hose clamps. Secure the other end to the barb on the barrel end cap with the other 3/4" hose clamp. *NOTE: This hose will have up to 40 PSI of hydraulic oil on it.*

- 3.6.4. Push one end of the ¼” vent hose into the fitting on the top of the hydraulic unit next to the control valve. Push the other end into the fitting on the barrel end cap. With the nine (9) remaining wire ties, tie the ¾” supply hose and the ¼” vent hose together periodically down the length of the two hoses.
- 3.6.5. Unroll the cable assemblies. Remove the cover from junction box and remove the ground screw mounted on the rear of the box. Attach the junction box to the junction box bracket with two (2) 1/4-20x3/8 button head cap screws. Reinstall the ground screw through the hole in the bracket and the junction box.
- 3.6.6. Remove the bar feed’s recuperator handle nut and slip the pressure switch assembly support over the handle threads. The support should be parallel with the barrel. Tighten the nut back on the recuperator handle.

3.6.7 through 3.6.8 for Swiss Style Lathe Applications Only!

- 3.6.7. *Slip the collision switch bracket over the front of the feed tube extension. The bracket shoulder should seat against the extension. Orient the collision switch so the wisker will trigger before a headstock and bar feed collision can occur. The length of the wisker may need to be modified to achieve this goal.*
- 3.6.8. *Slip the two wire clips over the collision switch wire and screw the wire clips into the threaded holes in the side of the recuperator. Allow enough slack forward of the clips to allow the removal of collision switch bracket when replacing feed tubes.*
- 3.6.9. Disconnect the DIN connector from the pressure switch. Apply four (4) turns of Teflon tape to the threads of the pressure switch and screw it into the port on the back of the bar feed recuperator. Reconnect the DIN connector to the pressure switch.
- 3.6.10. Run the control pendant under the barrel and between the front pedestal and the lathe. Hang the pendant over the swing out support arm handle by the wire loop on the back of the pendant.
- 3.6.11. Attach the interlock switch to the side of the clamping arm with two (2) #8-32 x 1/2” button head cap screws. Attach the key assembly to the front stop collar using the two (2) #8-32 x 1.75” socket head cap screws. Adjust the switch so that key moves smoothly into the interlock switch when the barrel stop collar is slid against the front barrel clamp.

- 3.6.12. Route the lathe cable(s) on the floor to the lathe electrical cabinet. Find a convenient location and punch a hole(s) in the cabinet using the 1/2 electrical knock out punch.
- 3.6.13. Remove the plastic nuts from the cable assemblies and run the wire through the hole(s) and replace the nut(s). *NOTE: The rubber sealing washer should be on the outside of the electrical cabinet.*
- 3.6.14. Adjust the front and rear barrel clamp bearing clearances so that the barrel will slide freely through the bearings without side to side play. Loosen the two (2) 5/16-18 set screws and tightening the 1/4-20 socket head cap screw to achieve the required clearance. Lock in place by snugging the two (2) set screws.
- 3.6.15. Remove the strainer housing cap and fill the hydraulic tank with oil, approximately 15 gallons. See section 5 for type.
- 3.7. **Pusher modification 1/4" to 1 5/8"**: The bar feed pushers are cut to length and assembled on site per application.
- 3.7.1. The pushers are shipped inside each feed tube. Remove the wire retainer securing the pusher to the feed tube front bushing. *NOTE: Do not remove the front bushing from the feed tube.* Doing so will result in damage to the o-ring seals.
- 3.7.2. Place the appropriate spindle liner in the spindle of the lathe and secure.
- 3.7.3. Actuate the chuck in or out so that the draw tube/spindle liner is in its rear most position. *Note: on swiss style lathes the head stock should also be in its rear most position.*
- 3.7.4. Position the bar feed with the feed tube and feed tube extension no more than 1" from the rear of the spindle liner. Lock the barrel stop collar against the rear of the front barrel clamp.
- 3.7.5. Remove the feed tube extension. Measure the distance from the rear of the chuck jaws or collet pads to the front of the bar feed recuperator.

For 1/4" to 3/8" pusher tubes add 3.75" to the measurement.
For 1/2" to 1 5/8" pusher tubes add 2.5" to the measurement.

Example: The distance from the back edge of the collet pads to the front of the bar feed recuperator = 32"

1/4" pusher tube cut off length: $32" + 3.75" = 35.75"$

3/4" pusher tube cut off length: $32" + 2.50" = 34.50"$

- 3.7.6. Measure the pusher tube from the front of the pusher cone back the determined distance and mark.
 - 3.7.7. Cut the pusher to length being sure to make a perpendicular cut. Debur thoroughly.
 - 3.7.8. Apply grease to the pusher piston o-ring and install the pusher piston securely in the pusher tube. Using figures A4 and A5, appendix A, as a reference, drill the specified diameter hole at the specified location through the pusher tube and piston. Pin in place with the supplied roll pin. *NOTE: Do not remove the piston from the pusher tube once the hole is drilled. Doing so will damage the o-ring seal.*
 - 3.7.9. Remove the rear feed tube bushing, apply grease to the piston o-ring and insert the pusher (pusher head first) into the rear of the feed tube. Reinstall the rear feed tube bushing. *NOTE: do not over tighten the set screws.*
- 3.8. **Electrical interfacing (Standard CNC Lathe Applications):** The following is a description of the bar feed electrical requirements. These descriptions should be used along with the interface diagram (figure A6) and the electrical schematic (figure A7) found in appendix A.
- 3.8.1. Hydraulic pump motor supply: The bar feed hydraulic pump is driven by a 1 hp high efficiency, dual voltage, 3 phase, 60 Hz motor. It comes from the factory wired for 208/230 VAC, but can be rewired for 460 VAC. The supply tap for the bar feed should be on a circuit of no more than 20 amps. If the motor is rewired in the field for 460 VAC the thermal overload setting should also be reset from 4 to 2.4 amps.
 - 3.8.2. Emergency Stop: The bar feed emergency stop button should be wired in series with the lathe emergency stop if the circuit is less than 1 amp. In normal operation the emergency stop switch is closed. Depressing the bar feed emergency stop button will interrupt the signal resulting in a stoppage of both machines.
 - 3.8.3. Manual control circuit: The bar feed supplies a continuous source of 24 volts DC for the operation in the manual and auto-retract modes. Operation of the bar feed requires the bar feed to be “ON” but manipulation of the manual modes are otherwise independent of the lathe modes.

- 3.8.4. Auto control circuit : When the bar feed is in the “AUTO” mode the bar feed control system provides a 24 volt DC signal for manipulation by the lathe. The lathe should turn this signal on only when it is in the auto cycle and it is running a program. Interruption of the lathe program by the operator, alarm, or other fault condition should interrupt the “AUTO” signal to the bar feed.
 - 3.8.5. Control signal voltage: This should be the input voltage required by the lathe for input signals. These signals are assumed to be less than 3 amps.
 - 3.8.6. End of Bar signal: The end of bar signal alerts the lathe that the bar feed is empty. The lathe should therefore terminate the current program and display an alarm if possible. This signal can be selected at the bar feed to be high (Normally Closed) or low (Normally Open).
 - 3.8.7. Alarm signal: The alarm signal alerts the lathe that one of the following condition has occurred at the bar feed:
 - 1. The motor thermal overload has tripped.
 - 2. A short circuit has occurred in the motor circuit.
 - 3. The Emergency Stop button has been depressed.
 - 4. The barrel has come loose and has either moved back or swung out.This signal can be selected at the bar feed to be high (Normally Closed) or low (Normally Open).
- 3.9. **Testing the Interface (Standard CNC Lathe Applications):**
- 3.9.1. Verify that the bar feed has been enabled at the lathe control.
 - 3.9.2. With the bar feed mode selector switch in MAN momentarily press the forward (▶) button while watching the rotation of the hydraulic motor fan. It should turn clockwise. If it turns counter clockwise then switch the motor supply leads L1 and L3 with each other.
 - 3.9.3. With no stock in the bar feed jog the pusher forward till it is almost to its full travel. Place the bar feed mode selector switch in AUTO and press the forward (▶) button. The bar feed is now in auto mode. Place the lathe in a mock program cycle. The bar feed should activate, reach END OF BAR and retract. The lathe should stop.
 - 3.9.4. Swing out the bar feed. This should result in an alarm at the lathe.

- 3.10. **Electrical interfacing (Swiss Style Applications):** The following is a description of the bar feed electrical requirements. These descriptions should be used along with the interface diagram (figure A6) and the electrical schematic (figure A7) found in appendix A.
- 3.10.1. Hydraulic pump motor supply: The bar feed hydraulic pump is driven by a 1 hp high efficiency, dual voltage, 3 phase, 60 Hz motor. It comes from the factory wired for 208/230 VAC, but can be rewired for 460 VAC. The supply tap for the bar feed should be on a circuit of no more than 20 amps.
 - 3.10.2. Emergency Stop: The bar feed emergency stop button should be wired in series with the swiss turn emergency stop if the circuit is less than 1 amp. In normal operation the emergency stop switch is closed. Depressing the bar feed emergency stop button will interrupt the signal resulting in a stoppage of both machines.
 - 3.10.3. Control circuit: The bar feed supplies a continuous source of 24 volts DC for operation in the manual and auto modes. The bar feed requires this circuit to be interrupted by the swiss turn emergency stop. Depressing the swiss turn emergency stop button will interrupt the control circuit.
 - 3.10.4. Control signal voltage: This should be the input voltage required by the swiss turn for input signals. These signals are assumed to be less than 3 amps.
 - 3.10.5. End of Bar signal: The end of bar signal alerts the swiss turn that the bar feed is empty. The swiss turn should finish the current program cycle and then display an alarm if possible. This signal can be selected at the bar feed to be high (Normally Closed) or low (Normally Open).
 - 3.10.6. Alarm signal: The alarm signal alerts the swiss turn that one of the following condition has occurred at the bar feed:
 - 1. The motor thermal overload has tripped.
 - 2. A short circuit has occurred in the motor circuit.
 - 3. The Emergency Stop button has been depressed.
 - 4. The barrel has come loose and has either moved back or swung out.This signal can be selected at the bar feed to be high (Normally Closed) or low (Normally Open).
 - 3.10.7. Ready signal: The ready signal alerts the swiss turn that the bar feed is in auto. The absence of this signal should inhibit the start of the swiss turn auto cycle. This signal can be selected at the bar feed to be high (Normally Closed) or low (Normally Open).

3.11. Testing the Interface (Swiss Style Applications):

- 3.11.1. Verify that the bar feed has been enabled at the swiss turn control.
- 3.11.2. With the bar feed mode selector switch in MAN and the swiss turn auto cycle selected, a bar feed not ready alarm should be present. Place the bar feed mode selector switch in AUTO and press the forward (▶) button. The bar feed not ready alarm should clear.
- 3.11.3. With the bar feed mode selector switch in MAN momentarily press the forward (▶) button while watching the rotation of the hydraulic motor fan. It should turn clockwise. If it turns counter clockwise then switch the motor supply leads L1 and L3 with each other.
- 3.11.4. With no stock in the bar feed, jog the pusher forward till it is almost to its full travel. Place the bar feed mode selector switch in AUTO and press the forward (▶) button. The bar feed is now in auto mode. The bar feed should activate, reach END OF BAR and retract. The swiss turn should be in a start inhibit condition and an alarm message should be present.
- 3.11.5. Swing out the bar feed. This should result in an alarm at the swiss turn.

SECTION 4 OPERATION

- 4.1. Safety**
- 4.2. Bar feed controls**
- 4.3. Feed tube selection**
- 4.4. Feed tube removal**
- 4.5. Feed tube installation**
- 4.6. Setting flow rate**
- 4.7. Stock straightness**
- 4.8. Stock chamfer**
- 4.9. Loading**
- 4.10. Start auto mode**
- 4.11. Programming**

4. Operation:

- 4.1. **Safety:** Some previously accepted shop practices may not reflect current safety regulation and procedures, and should be re-examined to ensure compliance with the correct safety and health standards. *Please read all of the following recommendations before proceeding any further. If strict compliance with the following safety procedures is not under taken, the manufacturer accepts no responsibility for any accident thus incurred.*
- 4.1.1. **DO NOT** remove any warning or instruction tags from the machine.
 - 4.1.2. **DO NOT** operate equipment if unusual or excessive heat, noise smoke or vibration occurs. Report any of these as well as any damaged parts to the appropriate person.
 - 4.1.3. **DO NOT** reach into any control or electrical enclosure unless electrical and hydraulic power is off.
 - 4.1.4. **DO NOT** allow the operation or repair of equipment by untrained personnel.
 - 4.1.5. **DO NOT** use toxic or flammable substances as a solvent or cleaner or coolant.
 - 4.1.6. **DO NOT** alter the bar feed.
 - 4.1.7. **DO NOT** operate any equipment while any part of the body is in the proximity of a potentially hazardous area.
 - 4.1.8. **DO NOT** leave tools, work pieces or other loose items where they can come into contact with the rotating stock or moving parts of the bar feed.
 - 4.1.9. **DO** consult your supervisor when in doubt about the correct way to do a job.
 - 4.1.10. **DO** remove the power by use of the main disconnect before attempting repairs or maintenance.
 - 4.1.11. **DO** keep areas around the bar feed well lit, dry, and clear.
 - 4.1.12. **DO** keep chemical and flammable material away from the bar feed.
 - 4.1.13. **DO** make sure that all guarding is in place and in good condition.
 - 4.1.14. **DO** know where all STOP buttons are located in the event of an emergency.
 - 4.1.15. **DO** make sure that all bar feed functions are correctly programmed and that all controls are set in the desired modes.

- 4.2. **Bar feed controls:**
- 4.2.1. **Emergency stop button:** If the bar feed emergency stop button is depressed the CNC machine as well as the bar feed will be shut down. None of the controls will function. Turn the emergency stop button clockwise to reset. If the bar feed was in auto it will require the forward (▶) button to be pressed to set the bar feed back to auto mode.
 - 4.2.2. **Mode selector switch:** The mode selector switch selects between the manual (MAN) and the automatic (AUTO) modes.
 - 4.2.3. **Forward jog button:** In the manual mode the forward (▶) jog button advances the stock toward the machine spindle. In the automatic mode the forward button latches the bar feed into the auto mode:
 - 4.2.4. **Reverse jog button:** The reverse (◀) jog button retracts the bar feed pusher. It will work when the bar feed is in the swung out position. If, while loading a new bar, the pusher was not fully retracted it may be retracted without resetting the barrel.
- 4.3. **Feed tube selection:** Feed tubes available in sizes from 1/4” to 1 5/8” diameter primarily in increments of 1/8”. For best performance the feed tube and stock size should match as closely as possible. NOTE: a matching spindle liner is required for each size feed tube.
- 4.4. **Feed tube removal:**
- 4.4.1. Be sure the bar feed mode selector switch is in the MAN mode.
 - 4.4.2. Evacuate any remaining oil from the feed tube by manually running the bar feed in reverse until air shows in the supply line.
 - 4.4.3. Loosen the clamping screw four or five turns to unclamp the barrel. Slide the barrel along its axis to clear the machine sheet metal as required. Pull straight out on the swing out support arm to clear the front of the machine.
 - 4.4.4. Remove the snap ring from the front of the feed tube extension. Remove the bushings from the extension and store.
 - 4.4.5. Loosen the two #10-32 button head cap screws that hold the feed tube in.
 - 4.4.6. Grab the feed tube extension and rotate the feed tube 5 degrees counter clockwise so that the heads of the two screws will clear the key slot.
 - 4.4.7. Pull the feed tube from the bar feed and set it in the feed tube rack.

- 4.5. **Feed tube installation:**
- 4.5.1. Be sure the bar feed mode selector switch is in the MAN mode.
 - 4.5.2. Loosen the clamping screw four or five turns to unclamp the barrel. Slide the barrel along its axis to clear the machine sheet metal as required. Pull straight out on the swing out support arm to clear the front of the machine.
 - 4.5.3. Install the feed tube extension with the three #8-32 button head cap screws to the selected feed tube.
 - 4.5.4. Insert the feed tube into the barrel. As the feed tube front bushing nears the bar feed recuperator align the key slot with the #10-32 button head cap screws.
 - 4.5.5. Rotate the feed tube 5 degrees clockwise to engage the screws. Tighten the two #10- 32 button head cap screws to lock the feed tube in place.
 - 4.5.6. Install the correct bushings into the feed tube extension and install the retaining ring to the front of the extension.
- 4.6. **Setting flow rate:** It is important to properly set the oil flow rate prior to running a job for a particular feed tube. If it is too low the bar feed will be starved and performance will be diminished. If it is too high, the possibility exists for the recuperator to over flow.
- 4.6.1. With the feed tube installed and no stock in the barrel, manually advance the pusher completely into the lathe.
 - 4.6.2. Hold the forward (▶) button down until the oil flow is seen in the drain hose.
 - 4.6.3. Continue holding the forward (▶) button and increase or decrease the pressure on the bar feed control valve until the level of the oil in the drain hose is maintained 1” to 2” below the recuperator hose fitting.
- 4.7. **Stock straightness:** In order to obtain maximum performance, the stock should be straight. The following is the preferred method of checking for stock straightness. From the resulting information you can easily tell the extent of the straightness of the bar. NOTE: some bent bars may be cut in half and run successfully.
- 4.7.1. Place the bar on two V blocks and arrange three dial indicators as shown in Figure A8b, appendix A
 - 4.7.2. Rotate the bar and determine the highest point on indicator #1.
 - 4.7.3. Set the three dial indicators to “0” and mark the highest point on the bar.

- 4.7.4. Rotate the bar 180 degrees and determine the deflection of the three dial indicators.
 - 4.7.5. Rotate the bar and determine the highest point at the middle dial indicator. Note the changes on all three indicators and the angle relative to the 0 mark on the bar.
 - 4.7.6. Rotate the bar 180 degrees and note the angular position corresponding to the lowest point on the middle indicator and the changes of the three indicators in that position.
 - 4.7.7. Turn the bar again and find the highest point in indicator #3.
 - 4.7.8. Turn the bar 180 degrees. Note the angle of the lowest point on indicator #3 and the changes on all three indicators in that position.
- 4.8. **Stock chamfer: One end of all bars must be chamfered.** It is essential that all concerned with the use of the bar feed realize the importance of chamfering the bar end where it engages the push rod cone. Failure to chamfer the bar ends correctly will result in excessive vibration, inferior performance, and possible damage to the bar feed.
- 4.8.1. The end that engages the pusher shall be chamfered at a 60 degree included angle and concentric to within 0.006" of the stock centerline.
 - 4.8.2. The chamfer shall reduce the diameter by 30%. See Figure A8a, appendix A.
 - 4.8.3. When turning tubing a plug having the proper chamfer should be inserted into the bar end.
- 4.9. **Loading:**
- 4.9.1. Be sure the bar feed mode selector switch is in the MAN mode.
 - 4.9.2. Evacuate any remaining oil from the feed tube by running the bar feed in the reverse until air shows in the supply line.
 - 4.9.3. Loosen the clamping screw four or five turns to unclamp the barrel. Slide the barrel along its axis to clear the machine sheet metal as required. Pull straight out on the swing out support arm to clear the front of the machine.
 - 4.9.4. Insert the stock into the bar feed barrel completely.
 - 4.9.5. Push straight in on the swing out support arm until the front barrel clamp fully engages the clamping arm. Slide the barrel along its axis until the stop collar engages the barrel front clamp and re-tighten the clamping screw.
 - 4.9.6. With the chuck/collet open jog the stock forward until the stock is just through the chuck/collet.
 - 4.9.7. Close the collet.

- 4.10. **Start auto mode:** With the bar stock loaded turn the bar feed mode selector switch to the AUTO position and press the forward (▶) button. The green indicator light on the top of the control pendant will illuminate to indicate the bar feed is in auto and under control of the machine.

- 4.11. **Programming:** Programming the bar feed is very straightforward. It does, however, require that some kind of stop be used on the turret. The stop can be dedicated, or the back of the cut off tool. To feed the stock to length follow these steps:
 - 4.11.1. Position the stop approximately .060" past the cut off position.
 - 4.11.2. Open the chuck/collet.
 - 4.11.3. Dwell to allow the stock to advance to the stop.
 - 4.11.4. Feed the stock to length.
 - 4.11.5. Close the chuck/collet
 - 4.11.6. Machine part.

SECTION 5 MAINTENANCE

- 5.1. Hydraulic unit**
- 5.2. Feed tubes**

5. **Maintenance:** The bar feed is designed for easy maintenance with a minimum amount of work. Proper maintenance will keep it running smoothly and safely for many years to come.

CAUTION: Before beginning any maintenance procedure make sure all electrical power is switched off and all hydraulic pressure is released.

5.1. **Hydraulic unit:**

- 5.1.1. **Hydraulic oil:** The hydraulic tank should be drained and any sediment removed once a year. If the environment is especially dirty change the oil more frequently. The bar feed uses 15 gallons of anti-wear ISO 100 hydraulic oil. The recommended oil is Shell Telles AW 100. However, there are equivalents.
- 5.1.2. **Oil level:** The hydraulic oil level should be checked weekly and maintained between the minimum and maximum marks on the tank sight gage.
- 5.1.3. **Strainer basket:** The strainer basket should be removed and emptied weekly.
- 5.1.4. **Intake filter:** The pump inlet filter should be cleaned once a year.
- 5.1.5. **Control Valve:** The hydraulic control valve should be disassembled and inspected once a year. It is a good precaution to replace all rubber parts at this time.
- 5.1.6. **Hoses:** All hoses should be inspected periodically for cracks or punctures and replaced as needed.

5.2. **Feed tubes:**

- 5.2.1. **Feed tube O-Rings:** The o-rings on the exterior of the feed tube bushings should be inspected every time the feed tube is changed. Replace any worn or torn o-rings.
- 5.2.2. **Pusher seals:** The pusher seals should be replaced whenever they become worn. If the pusher fails to retract properly, it is an indication that the seals are worn. At this time it is advisable to replace the rest of the internal seals.
- 5.2.3. **Pusher bearings:** The pusher cone bearings should be inspected once a year. Any bearing assembly that does not turn smoothly or exhibits excessive play should be replaced.

SECTION 6 TROUBLESHOOTING

6.1. Bar feed vibrations

6. Troubleshooting:

- 6.1. **Bar feed vibrates:** While it is impossible to eliminate all vibration at all speeds the bar feed should operate smoothly without excessive vibration. The most common causes of vibration are as follows:
 - 6.1.1. **Misalignment:** The bar feed must be precisely aligned with the machine spindle and both the bar feed and the machine should be firmly bolted to the floor.
 - 6.1.2. **Feed tube and/or spindle liner clearance:** Excessive clearance between the stock and feed tube and or spindle liner will result in more vibration. It is recommended to use feed tubes and spindle liners that will maintain the optimal stock clearance of 1/32" to 1/16".
 - 6.1.3. **Stock straightness:** The straightness of the stock is very important. The straighter the stock the better it will perform. *NOTE: some bent stock can be cut in half and run successfully.*
 - 6.1.4. **Bar chamfer:** If the stock is not chamfered at the correct angle, or to the correct diameter, or is not concentric with the stock centerline you can expect an increase in vibration.
 - 6.1.5. **Stock material:** Stock with high density and flexibility, such as brass or copper, can not be run as fast as most other stock materials.
 - 6.1.6. **Stock shape:** The stock shape will effect the vibration. Hex will run almost as well as round stock. Square and asymmetrical shaped stock will not run quite as well as hex. Allowances in RPM will have to be made.

SECTION 7 APPENDIX A

- A1 Components & Layout**
- A2 Alignment Plugs**
- A3 Required Floor Space**
- A4 Pusher Drill & Pin Information**
- A5 Pusher Drill & Pin Information**
- A6 Interface Diagram**
- A7 Electrical Diagram**
- A8 Stock Straightness & Chamfer**

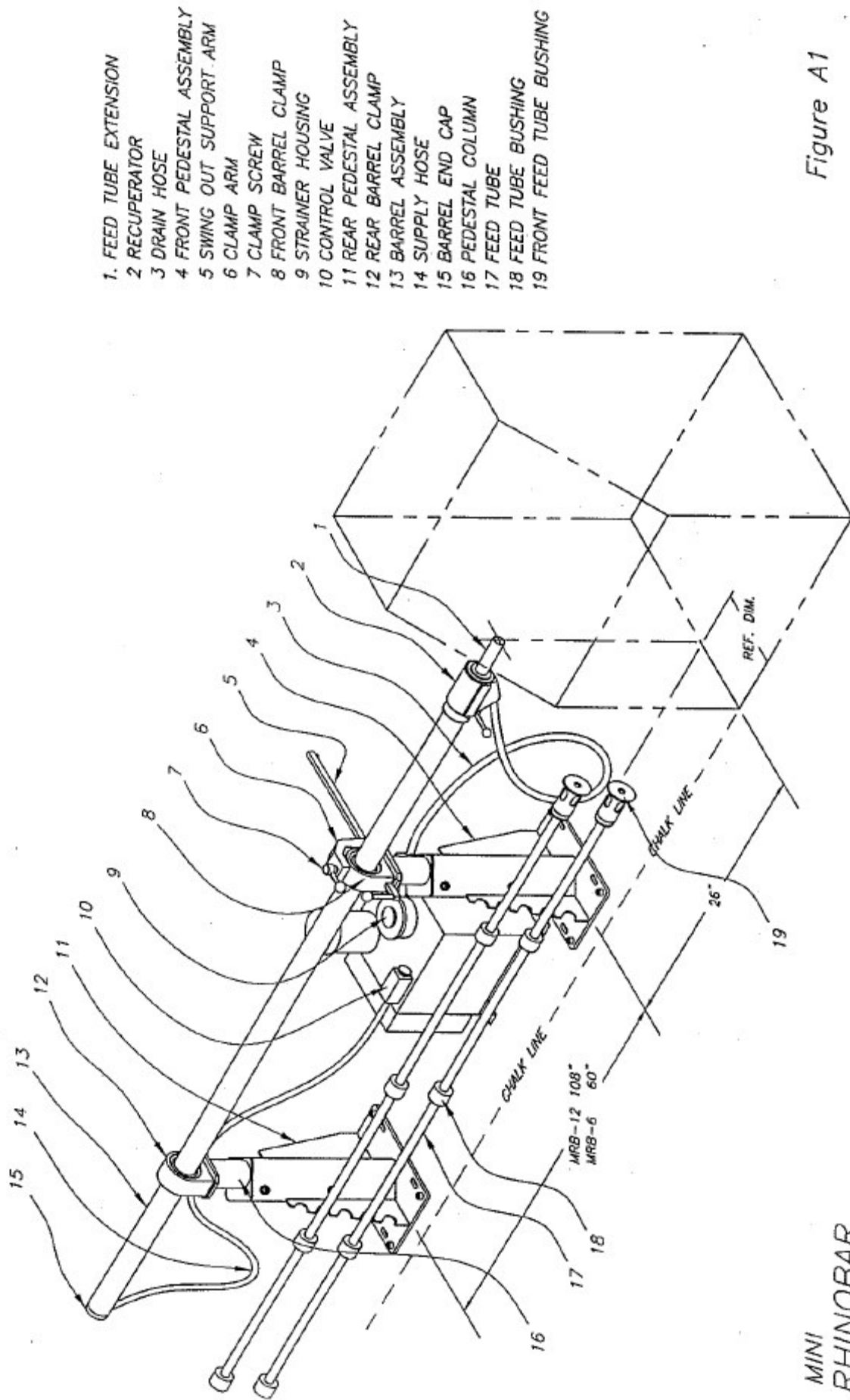
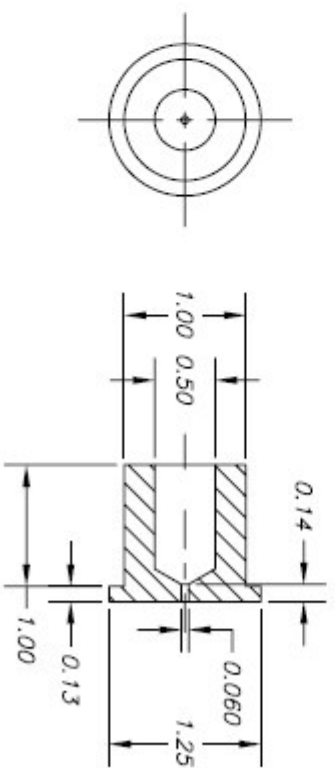
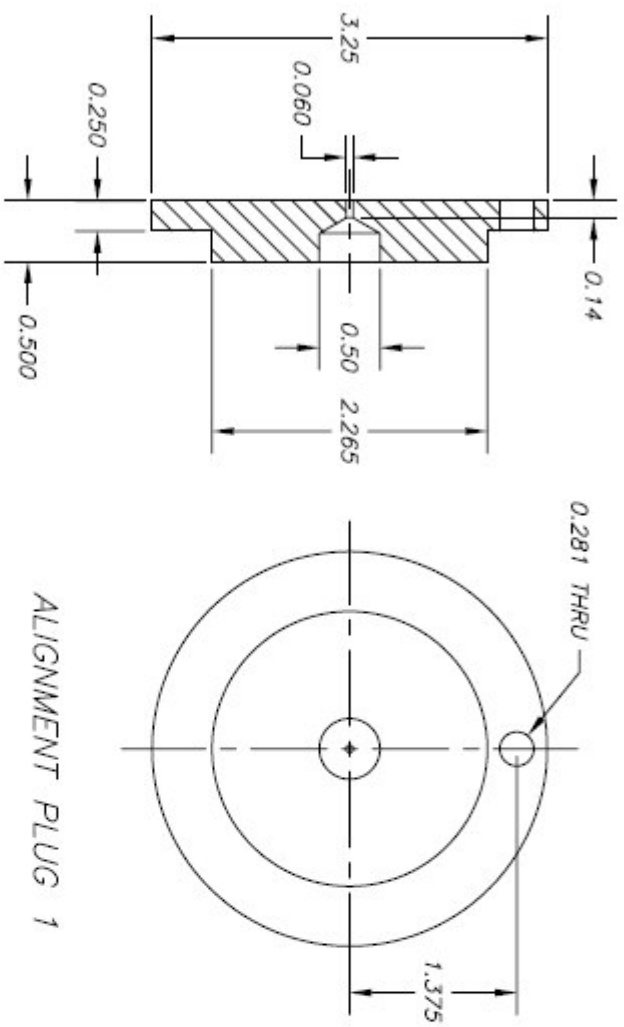


Figure A1

MINI
 RHINOBAR



ALIGNMENT PLUG 2



ALIGNMENT PLUG 1

Figure A2

REQUIRED FLOOR SPACE TO LOCATE MINI RHONOBAR INCLUDING
FEED TUBE REMOVAL AND STOCK LOADING.

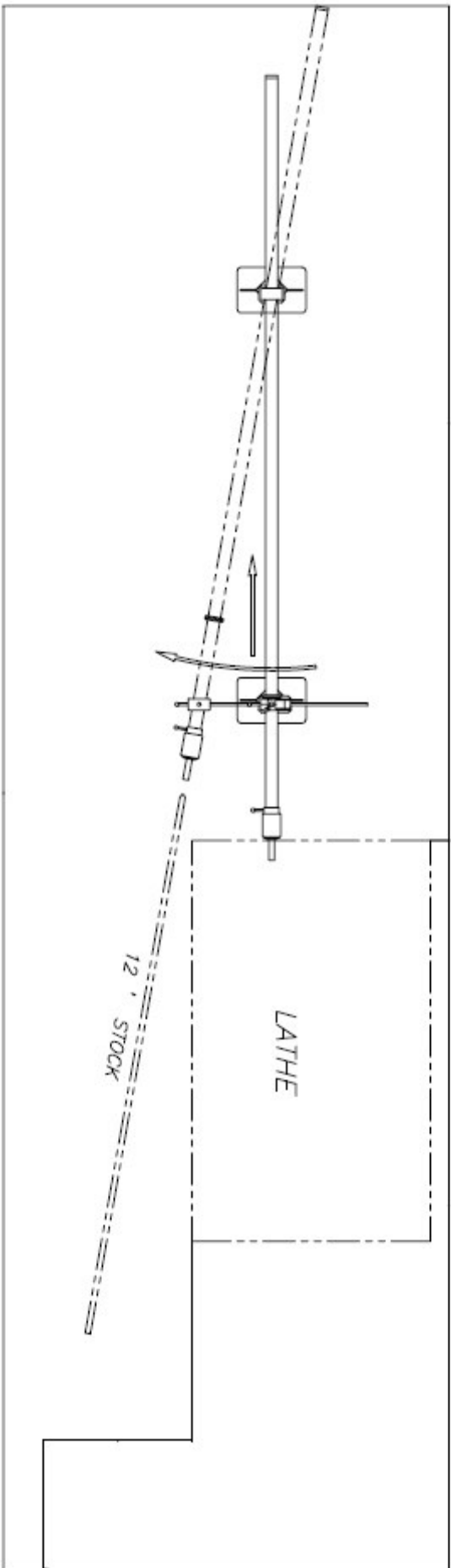
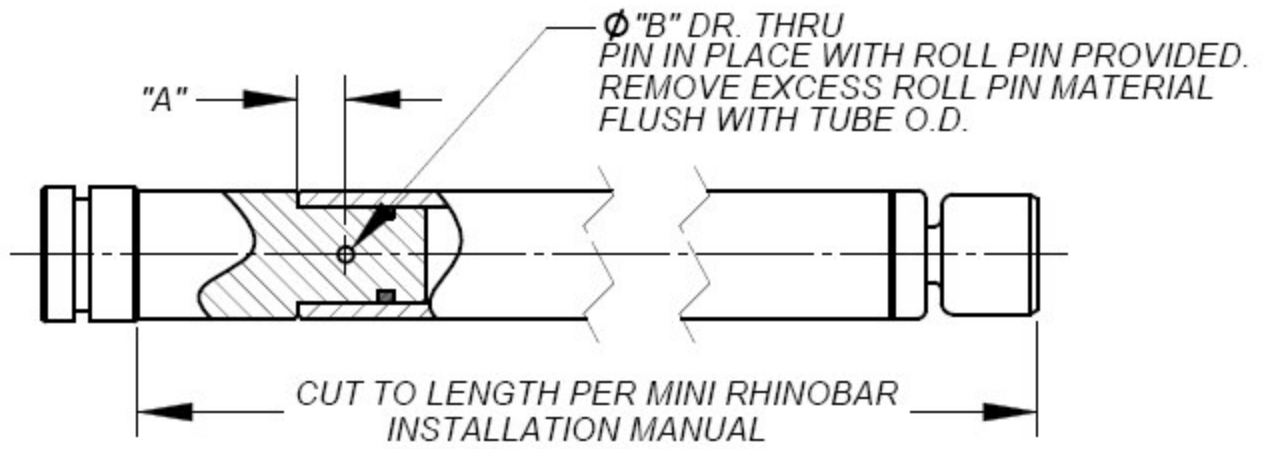
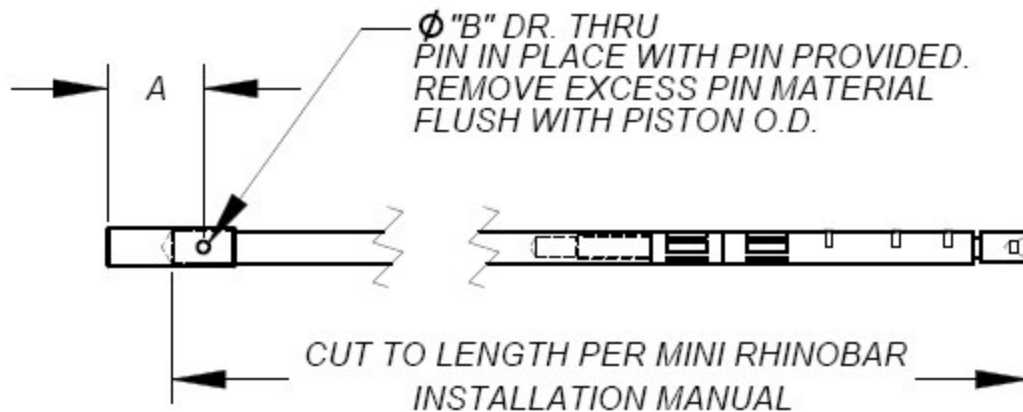


Figure A3



BAR SIZE	"A" DIM.	"B" DIM.
1/2	.375	.094
5/8	.375	.094
3/4	.375	.125
7/8	.375	.125
1	.375	.125
1 1/16	.375	.125
1 1/8	.375	.125
1 1/4	.375	.125
1 3/8	.375	.125
1 1/2	.375	.125
1 5/8	.375	.188

FIGURE- A4



BAR SIZE	"A" DIM.	"B" DIM.
1/4	.75	.094
5/16	.75	.094
3/8	.75	.125

FIGURE- A5

TURNING CENTER

MINI RHINOBAR

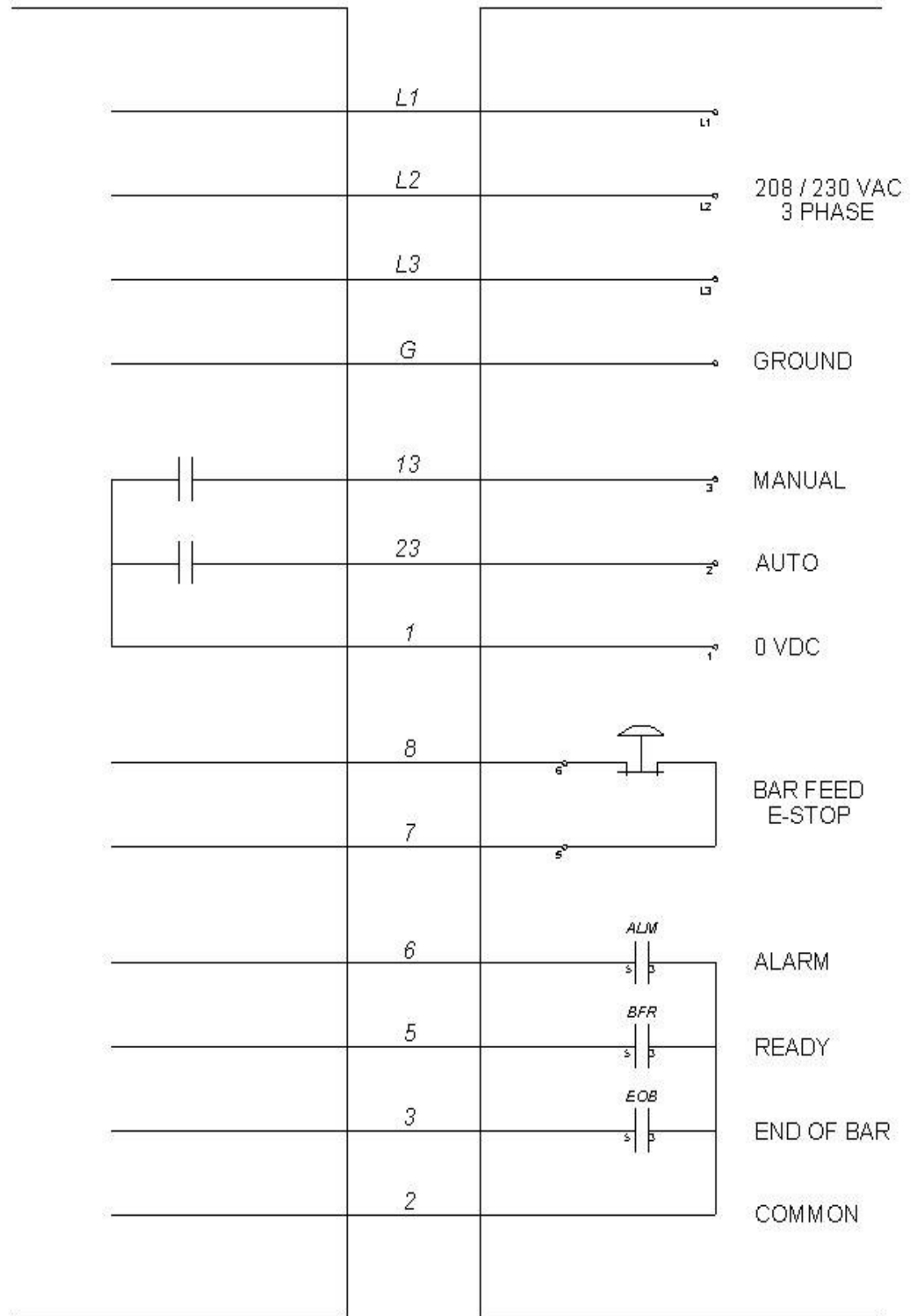


FIGURE A6

