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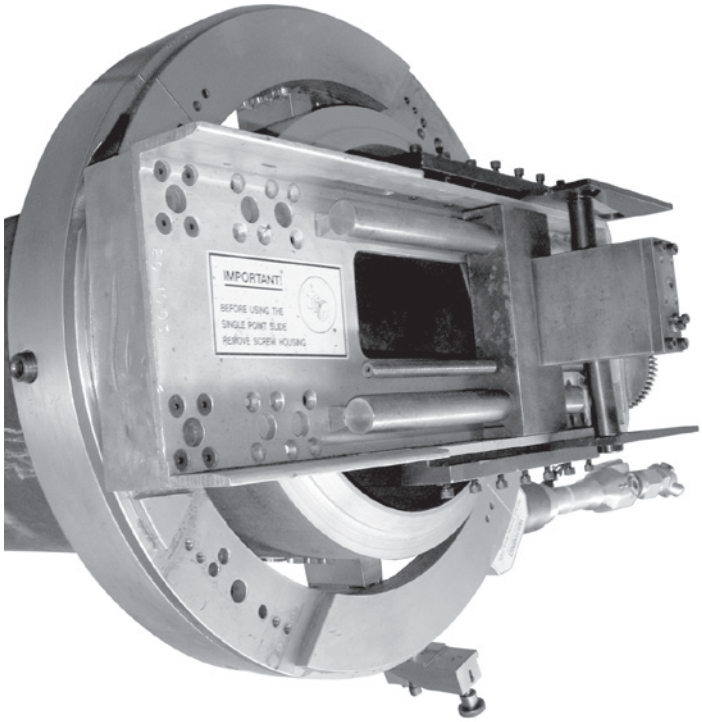
Bridge Slide Accessory for Low Clearance Split Frame

User's Manual



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Chapter 1
About the Bridge Slide

Purpose of This Manual

This manual explains how to operate and maintain the low clearance split frame bridge slide. It includes instructions for set-up, operation, and maintenance. It also contains parts lists and diagrams, and troubleshooting instructions to help you order replacement parts and perform user-serviceable repairs.

How to Use The Manual

This manual is organized to help you quickly find the information you need. Each chapter describes a specific topic on using or maintaining your equipment.

Use these instructions to operate and maintain the equipment.

Symbols and Warnings

The following symbols are used throughout this manual to indicate special notes and warnings. They appear in the outside column of the page, next to the section they refer to. Make sure you understand what each symbol means, and follow all instructions for cautions and warnings.

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

⚠ WARNING

A WARNING alert with the safety alert symbol indicates a potentially hazardous situation that **could** result in **serious injury or death**.

⚠ CAUTION

A CAUTION alert with the safety alert symbol indicates a potentially hazardous situation that **could** result in **minor or moderate injury**.

A CAUTION alert with the damage alert symbol indicates a situation that will result in **damage to the equipment**.

This is the **equipment damage alert symbol**. It is used to alert you to **potential equipment damage situations**. Obey all messages that follow this symbol to avoid damaging the equipment or workpiece on which it is operating.

IMPORTANT

An IMPORTANT alert with the damage alert symbol indicates a situation that **may** result in **damage to the equipment**.

NOTE

This symbol indicates a user note. **Notes** provide additional information to supplement the instructions, or tips for easier operation.

Manual Updates and Revision Tracking

Occasionally, we will update manuals with improved operation or maintenance procedures, or with corrections if necessary. When a manual is revised, we will update the revision history on the title page.

Current versions of E.H. Wachs Company manuals are also available in PDF format. You can request an electronic copy of this manual by emailing customer service at sales@ehwachs.com.

You may have factory service or upgrades performed on the equipment. If this service changes any technical data or operation and maintenance procedures, we will include a revised manual when we return the equipment to you.

Revision History

- February 2007—Original version R0-0207 printed.
- May 2009—Revision 1, R1-0509.
- July 2010—Revision 2, R2-0710.

Equipment Description

The bridge slide accessory is used for facing, counterboring, and beveling a pipe end surface. The slide attaches to a low clearance split frame (LCSF) machine and "bridges" the end of the pipe. A two-axis tool mount has a trip-driven radial drive that uses the LCSF's standard trip, and a manual axial drive for setting the tool depth into the face of the pipe.

The bridge slide uses a single point tool and is available with beveling templates for various form contours. The star wheel feed mechanism on the bridge slide feeds the tool slide radially in *toward* the center of the pipe. If you need to perform an operation feeding the slide out *away from* the center of the pipe (such as counterboring), you will need to disengage the trip pin and operate the slide manually using a wrench on the castle nut.

Before setting up and operating the bridge slide, you should be familiar with all of the operating and safety instructions for the low clearance split frame machine you are using. Refer to the LCSF user's manual for instructions.

Bridge Slide Components

Figure 1-1 and Figure 1-2 illustrate the components of the bridge slide. Figure 1-3 illustrates the bridge slide mounting holes on the LCSF.

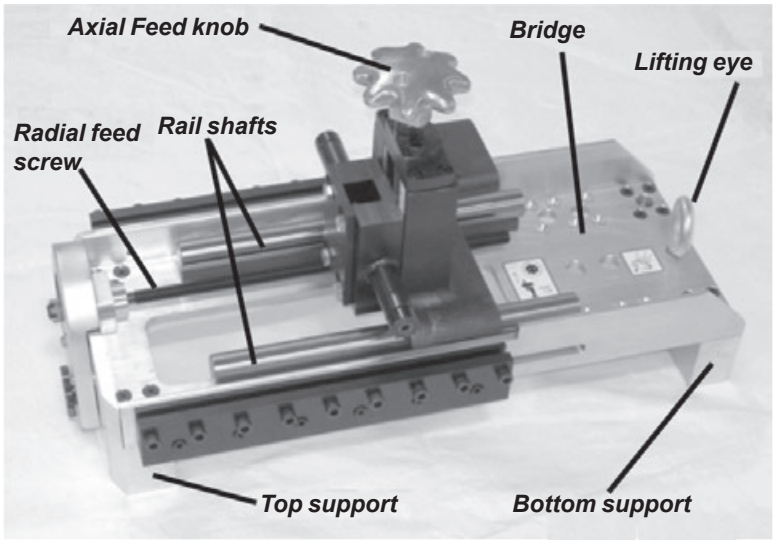


Figure 1-1. Top view of the bridge slide showing major components.

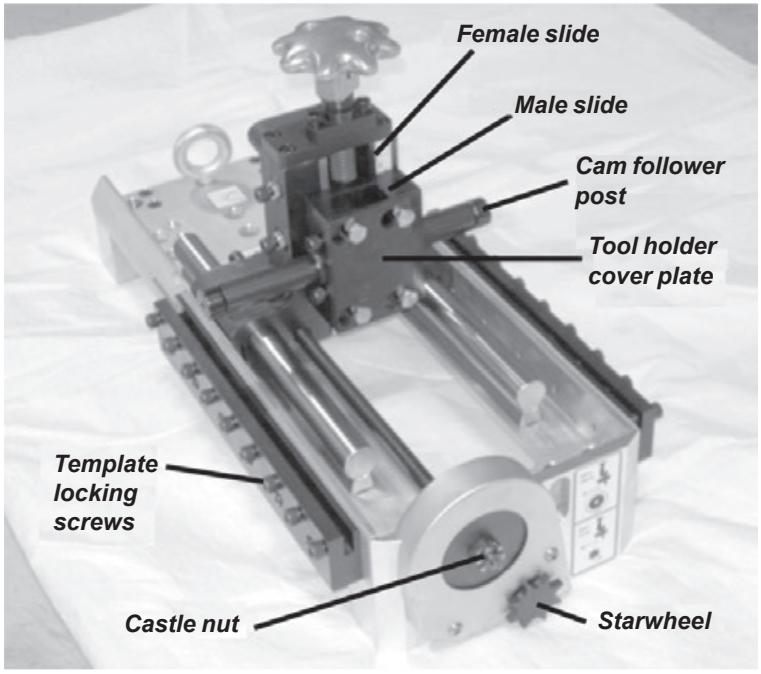


Figure 1-2. End view of the bridge slide showing major components.

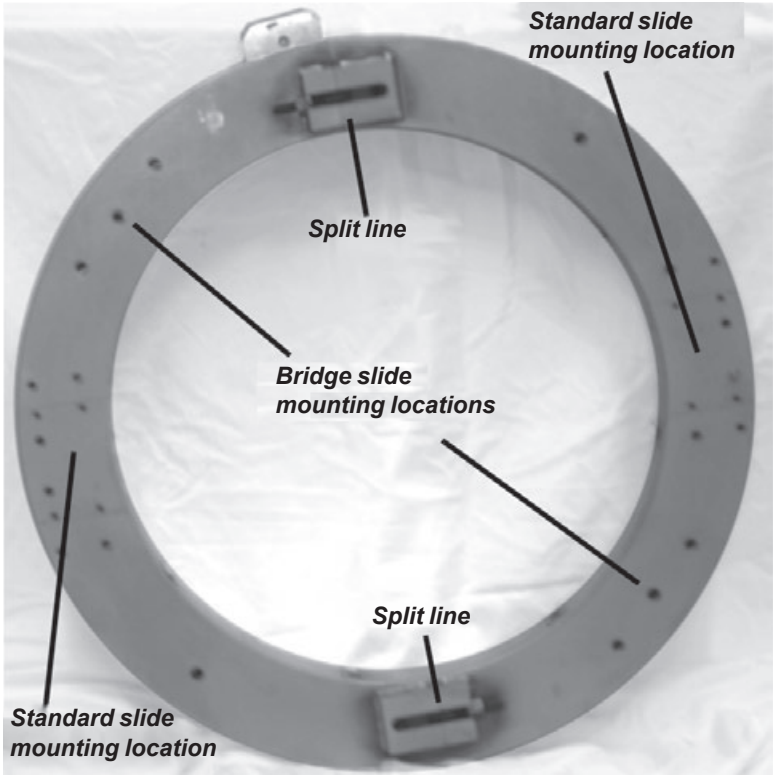


Figure 1-3. The photo shows the LCSF mounting holes for the bridge slide. (Different LCSF ring sizes will have slightly different hole patterns.)

Bridge Slide Sizes

Bridge slides are available for 12” through 48” LCSF models, as described in Table 1.

Table 1: Bridge Slide Sizes

Bridge Slide	LCSF Model
12 inch, 60-428-12	612/3 (60-000-12)
14 inch, 60-428-14	814/3 (60-000-14)
16 inch, 60-428-16	1016/3 (60-000-16)
20 inch, 60-428-20	1420/3 (60-000-20)
24 inch, 60-428-24	1824/2 (60-000-24)
28 inch, 60-428-28	2228/3 (60-000-28)
32 inch, 60-428-32	2632/3 (60-000-32)
36 inch, 60-428-36	3036/3 (60-000-36)
39 inch, 60-428-39	3339/3 (60-000-39)
42 inch, 60-428-42	3642/3 (60-000-42)
48 inch, 60-428-48	4248/3 (60-000-48)

Bridge Slide Tooling

Two tool holders are provided with the bridge slide: a single-point tool holder and a counterbore tool holder. These are shown in Figure 1-4 and Figure 1-5.

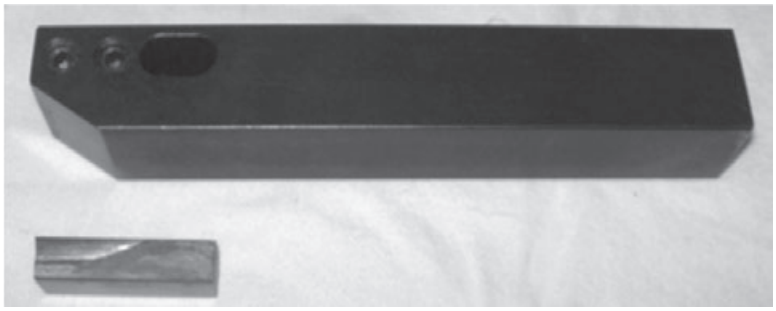


Figure 1-4. Single-point tool holder (part no. 60-707-00) *and tool.*

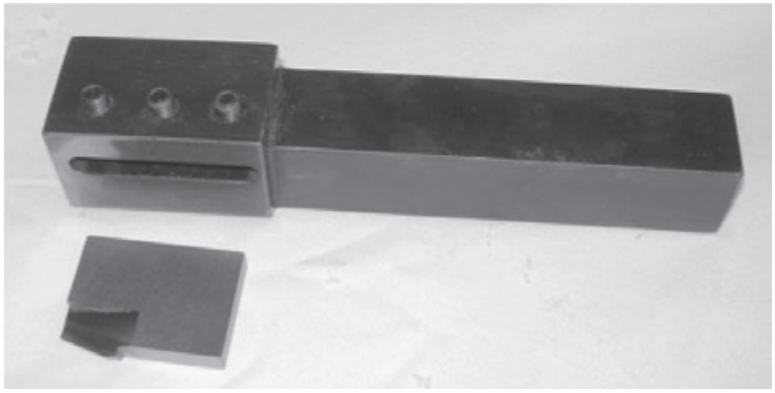


Figure 1-5. Counterbore tool holder (part no. 60-708-00) *and tool.*

Operating Envelope

The operating envelope for all bridge slide/LCSF combinations is illustrated in the figures and tables on the following pages.

Operating Envelope
12″ to 20″ LCSF Bridge Slide

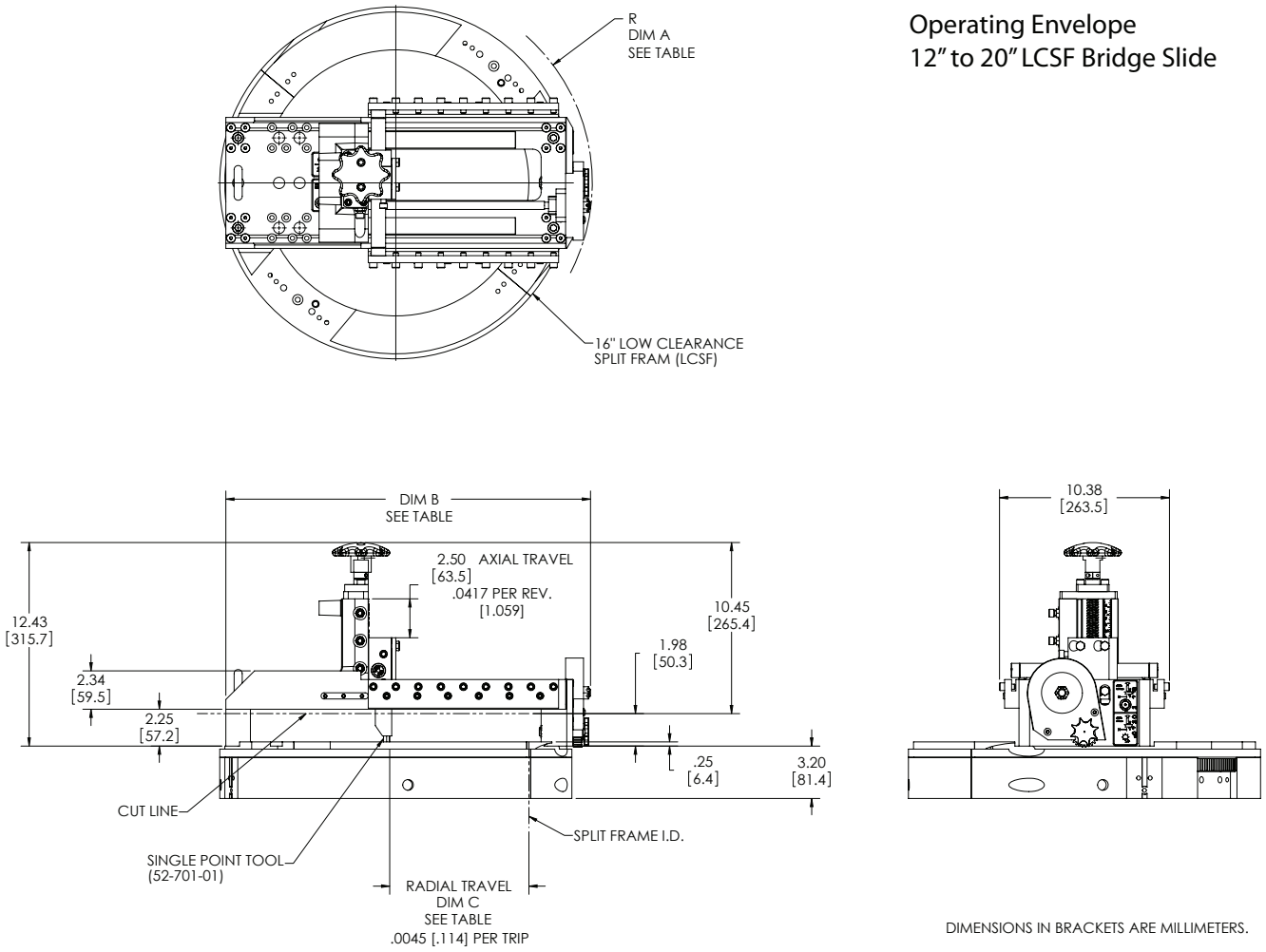


Table 2: Dimensions for 12”-20” Bridge Slides

Bridge Slide Size and Model	DIM A	DIM B	DIM C
12”, 60-428-12	10.14” (257.5 mm)	18.52” (470.3 mm)	8.75” (222.3 mm)
14”, 60-428-14	10.76” (273.2 mm)	19.77” (502.1 mm)	8.75” (222.3 mm)
16”, 60-428-16	11.99” (304.7 mm)	22.27” (565.6 mm)	8.50” (215.9 mm)
20”, 60-428-20	13.98” (355.1 mm)	26.27” (667.2 mm)	8.50” (215.9 mm)

Operating Envelope
24" to 48" LCSF Bridge Slide

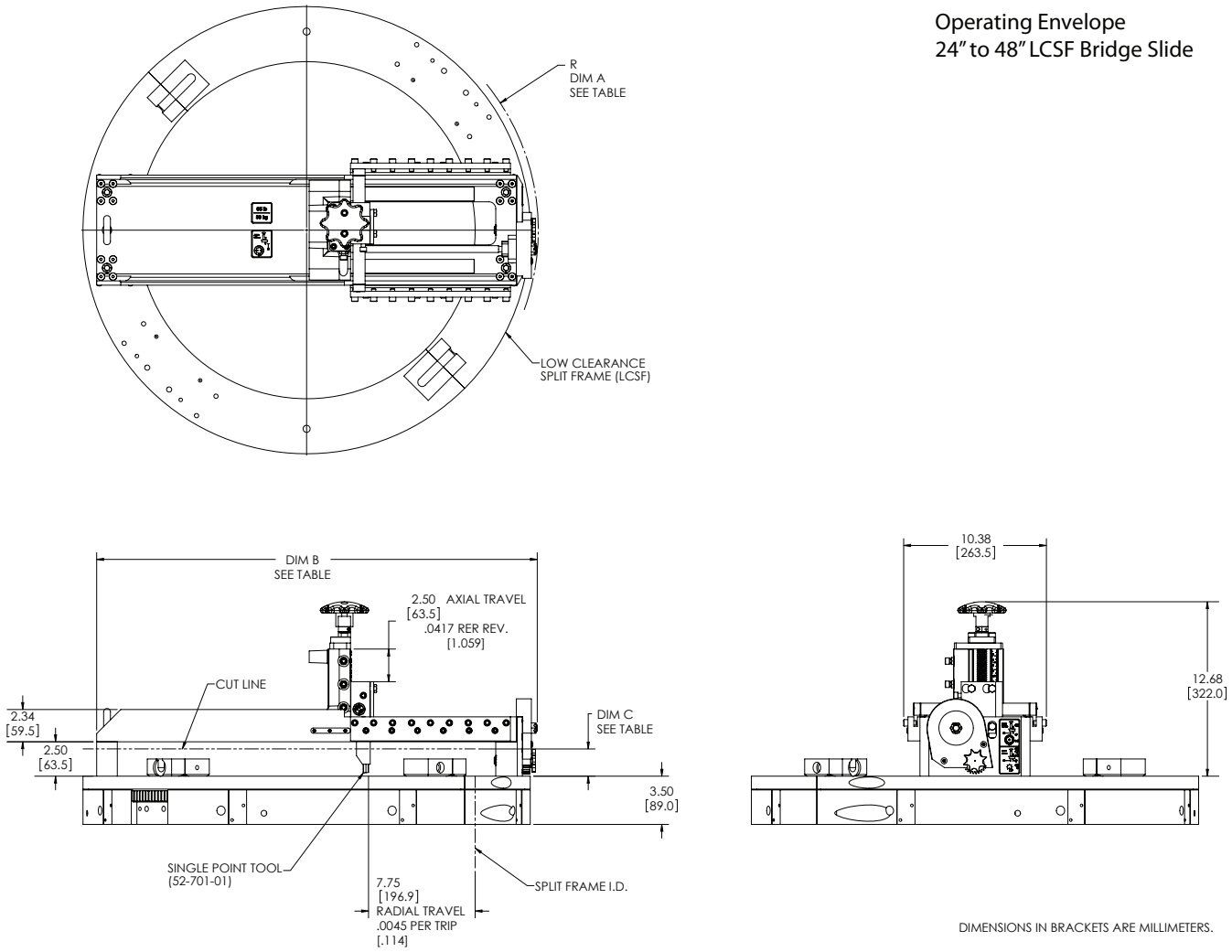


Table 3: Dimensions for 24"-48" Bridge Slides

Bridge Slide Size and Model	DIM A	DIM B	DIM C
24", 60-428-24	16.84" (427.6 mm)	32.02 (813.2 mm)	1.98" (50.3 mm)
28", 60-428-28	18.83" (478.3 mm)	36.02" (914.8 mm)	1.98" (mm)
32", 60-428-32	20.83" (529.0 mm)	40.02" (1016.4 mm)	2.17" (55.1 mm)
36", 60-428-36	22.82" (579.6 mm)	44.02" (1118.0 mm)	2.17" (55.1 mm)
39", 60-428-39	24.32" (617.7 mm)	47.02" (1194.2 mm)	2.17" (55.1 mm)
42", 60-428-42	25.81" (655.5 mm)	50.02" (1270.4 mm)	2.17" (55.1 mm)
48", 60-428-48	28.81" (731.8 mm)	56.02" (1422.8 mm)	2.17" (55.1 mm)

Chapter 2
Safety

E.H. Wachs takes great pride in designing and manufacturing safe, high-quality products. We make user safety a top priority in the design of all our products.

Read this chapter carefully before operating the bridge slide. It contains important safety instructions and recommendations.

FULL SAFETY INSTRUCTIONS AND GUIDELINES ARE IN THE MANUAL FOR YOUR LOW CLEARANCE SPLIT FRAME MACHINE. Make sure you read and understand all safety information in the LCSF manua.

Safe Operating Guidelines

Follow these guidelines for safe operation of all E.H. Wachs equipment.

Look for this symbol throughout the manual. It indicates a personal injury hazard.

- **READ THE OPERATING MANUAL.** Make sure you understand all setup and operating instructions before you begin. Keep this manual with the machine.
- **INSPECT MACHINE AND ACCESSORIES BEFORE USE.** Before starting the machine, look for loose bolts or nuts, leaking lubricant, rusted components, and any other physical conditions that may affect operation. Properly maintaining the machine can greatly decrease the chances for injury.
- **ALWAYS READ STICKERS AND LABELS.** Make sure all labels and stickers are in place, clearly legible, and in good condition. Refer to "Safety Labels" later in this chapter for label locations on the machine. Replace any damaged or missing safety labels; see the ordering information at the end of this manual.
- **KEEP CLEAR OF MOVING PARTS.** Keep hands, arms, and fingers clear of all rotating or moving parts. Always turn the machine off and disconnect the power source before doing any adjustments or service.

- **SECURE LOOSE CLOTHING AND JEWELRY.** Secure or remove loose-fitting clothing and jewelry, and securely bind long hair, to prevent them from getting caught in moving parts of the machine.
- **FOLLOW SAFE PROCEDURES FOR HANDLING LUBRICANTS.** Refer to the manufacturer's instructions and the Material Safety Data Sheets.

Safe Operating Environment

- Do not use this equipment in a potentially explosive atmosphere. Fire or explosion could result, with the risk of serious injury or death.
- Provide adequate lighting to use the equipment, in accordance with worksite or local regulations.
- **KEEP WORK AREA CLEAR.** Keep all clutter and nonessential materials out of the work area. Only people directly involved with the work being performed should have access to the area.

Operating and Maintenance Safety

- This equipment is to be operated and maintained only by qualified, trained personnel.
- Make sure the equipment is stable when attached to the workpiece for the operation. Ensuring stability of the installed tool is the responsibility of the operator.
- Make sure the workpiece is supported adequately for installation of the equipment. This includes supporting any workpiece "fall-off" section when severing the workpiece. Ensuring support of the workpiece is the responsibility of the operator.
- Tooling on any cutting equipment—including lathe tools, saw blades, milling tools, etc.—may get very hot. Do not touch tooling until you have made sure it is cool enough to handle.
- Wear gloves when removing or cleaning up chips and cutting debris. Chips can be very sharp and cause cuts.
- Before performing any service on the equipment, disconnect the power source. Follow all lock-out/tag-out procedures required at the worksite.

Safety Alerts in This Manual

The following alerts are used throughout this manual to indicate operator safety hazards. In all cases, these alerts include a notice describing the hazard and the means to avoid or reduce risk. Carefully read all safety alerts.

This icon is displayed with any safety alert that indicates a personal injury hazard.

⚠ WARNING

This safety alert, with the personal injury hazard symbol, indicates a potentially hazardous situation that, if not avoided, **could** result in **death or serious injury**.

⚠ CAUTION

This safety alert, with the personal injury hazard symbol, indicates a potentially hazardous situation that, if not avoided, **could** result in **minor or moderate injury**.

Protective Equipment Requirements

Protective Clothing

Wear safety shoes when operating or servicing the equipment. Serious injury could result from dropping the machine or its components.

Do not wear gloves while operating the machine. Gloves can become entangled in moving parts, resulting in serious injury. Gloves may be worn when setting up the machine or cleaning up after the operation, but take them off when operating the machine.

NOTE

Gloves should be worn when cleaning up chips and other cutting debris. Chips can be very sharp and can cause serious cuts. **Do not wear gloves when the machine is operating.**

Eye Protection

Always wear impact-resistant eye protection while operating or working near this equipment.

For additional information on eye and face protection, refer to Federal OSHA regulations, 29 Code of Federal Regulations, Section 1910.133., Eye and Face Protection and American National Standards Institute, ANSI Z87.1, Occupational and Educational Eye and Face Protection.

Hearing Protection

This equipment can produce noise levels above 80 dB. Hearing protection is required when operating the equipment. The operation of other tools and equipment in the area, reflective surfaces, process noises, and resonant structures can increase the noise level in the area.

For additional information on hearing protection, refer to Federal OSHA regulations, 29 Code of Federal Regulations, Section 1910.95, Occupational Noise Exposure and ANSI S12.6 Hearing Protectors.

Safe Operation of the Bridge Slide

Refer to "Safe Operation of the LCSF" in Chapter 2 of the *Low Clearance Split Frame User's Manual* for full safety guidelines and instructions.

Intended Uses

The bridge slide is designed to attach to a low clearance split frame mounted on open-ended pipe. The bridge slide performs weld prep operations (beveling, counterboring, and J-prep). It uses cold-cutting lathe techniques, with a variety of tooling for different cutting applications.

Make sure to follow all safety guidelines and procedures required for machining operations at the work site, including personal protective equipment (PPE). Do not use the LCSF in a manner that violates these guidelines.

Proper Use of the Bridge Slide with LCSF

- The LCSF and bridge slide should only be used by trained, qualified operators.
- The workpiece must be within the operating capacity of the LCSF and bridge slide models you are using. See operating envelope information and drawings in Chapter 1.
- Make sure the operating environment allows you to mount the machine securely and squarely on the workpiece.
- Make sure there is adequate clearance around workpiece and the LCSF/bridge slide combination to operate the machine controls as described in the operating instructions.

Misuse

- Do not attempt to mount or operate the LCSF and bridge slide on non-cylindrical workpieces.
- Do not attempt to mount or operate the LCSF and bridge slide on any workpiece to which the equipment cannot be securely mounted.
- Do not attempt to mount or operate the LCSF and bridge slide on any workpiece that is not stable enough to hold the equipment.
- Do not disable any safety feature of the bridge slide or LCSF, or remove any safety labeling. Replace worn or damaged safety labels immediately. (See "Safety Labels" later in this chapter.)

Potential Hazards

See the "Potential Hazards" section in Chapter 2 of the user's manual for your low clearance split frame machine. Follow all guidelines for avoiding hazards associated with operating the machine.

Bridge Slide Safety Features

The bridge slide incorporates the features illustrated in Figure 2-1 to reduce operating hazards.

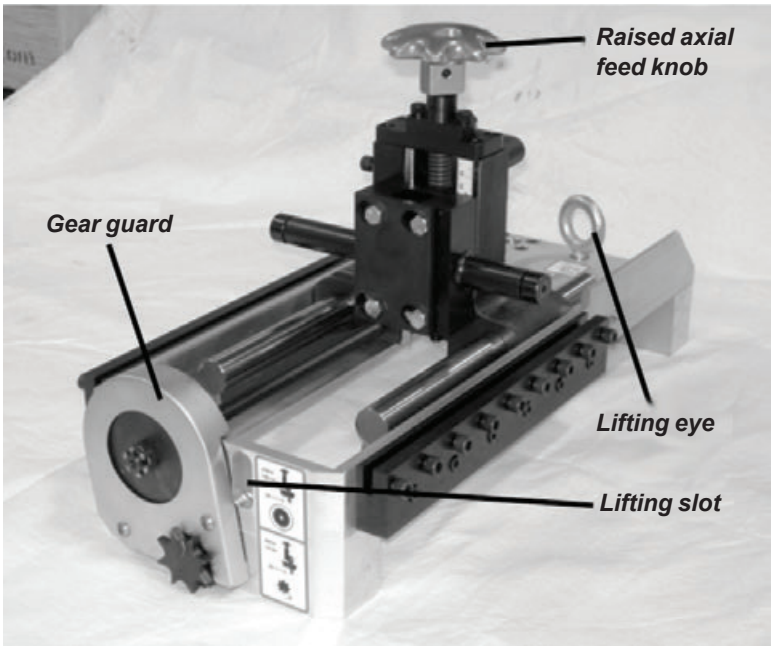


Figure 2-1. The photo illustrates the bridge slide safety features.

Gear Guard

A metal cover guards the starwheel gear and feed screw gear to prevent contact with moving parts.

Raised Axial Feed Knob

The axial feed knob is positioned at the top of the axial slide, allowing the operator to turn it without reaching across moving parts. The knob is an easy-grip design for convenient operation.

Lifting Attachments

The bridge slide is equipped with two lift points for attaching a lifting device. There is a slot for a lift hook at one end of the bridge channel, and a lifting eye installed at the other end.

Safe Lifting and Handling

- Machines or assemblies over 40 lb (18 kg) must be lifted by two people or a lifting device. All bridge slide models are greater than this weight. See the weight table in the following section.
- It is the responsibility of the end user to determine whether a machine or assembly can be lifted by two or more people. A lifting device is recommended for machines or assemblies that cannot be handled easily by two people.
- All bridge slide models are equipped with a lifting eye and a lifting slot, shown in Figure 2-1, for attaching the slide to a lift device. When using a lift device, always attach it at these points.
- Do not rig or lift the LCSF with the bridge slide attached. The assembled combination may not be balanced to enable safe lifting.
- Do not lift the assembled LCSF and bridge slide using the bridge slide lift points. The bridge slide lift points are not designed for the full weight of the assembled combination.

Machine Weights

Table 1 lists the weights for each bridge slide model.

Table 1: Bridge Slide Weights

Component	Part Number	Weight
Bridge slide for model 612 LCSF	60-428-12	55.0 lb (25.0 kg)
Bridge slide for model 814 LCSF	60-428-14	55.4 lb (25.2 kg)
Bridge slide for model 1016 LCSF	60-428-16	56.3 lb (25.6 kg)
Bridge slide for model 1420 LCSF	60-428-20	57.7 lb (26.2 kg)
Bridge slide for model 1824 LCSF	60-428-24	60.8 lb (27.6 kg)
Bridge slide for model 2228 LCSF	60-428-28	62.0 lb (28.1 kg)
Bridge slide for model 2632 LCSF	60-428-32	63.6 lb (28.9 kg)
Bridge slide for model 3036 LCSF	60-428-36	65.0 lb (29.5 kg)
Bridge slide for model 3339 LCSF	60-428-39	66.5 lb (30.2 kg)
Bridge slide for model 3642 LCSF	60-428-42	67.6 lb (30.7 kg)
Bridge slide for model 4248 LCSF	60-428-48	69.7 lb (31.6 kg)

Safety Labels

The following safety labels are on the bridge slide.

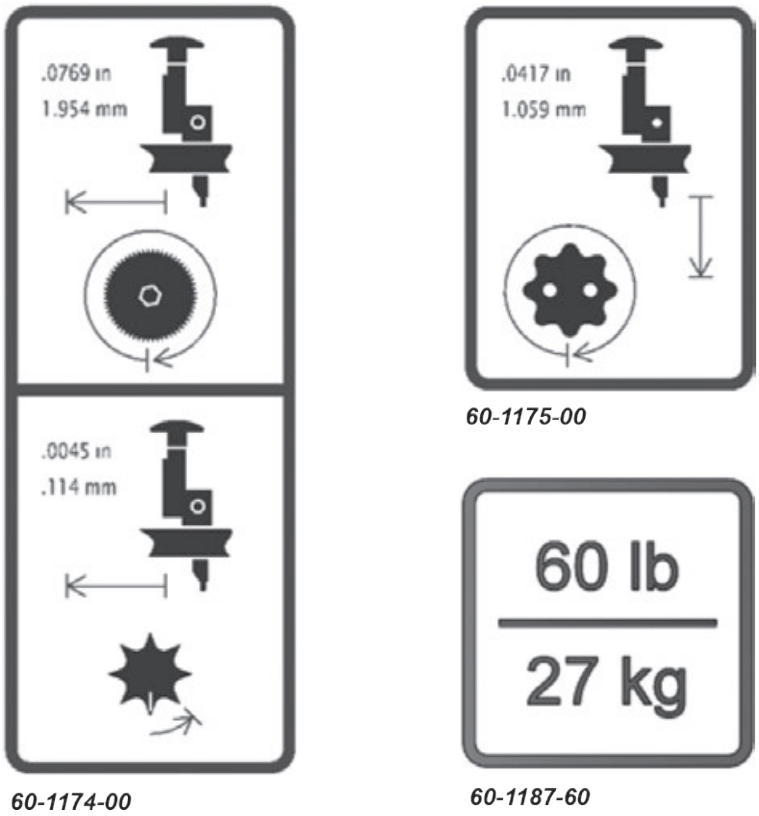


Figure 2-2. Safety and operation labels on the bridge slide are shown. (Left, radial travel label; top right, axial travel label; bottom right, weight label [varies depending on bridge slide model].)

Chapter 3
Operating Instructions

Follow the procedures in this chapter to set up the LCSF and bridge slide, and to perform counterboring and beveling operations. You should be familiar with the procedures described in the LCSF manual; refer to it for detailed instructions on operating the LCSF.

When doing a weld prep on a pipe, you will generally perform the separate operations in the following order. (Each operation is optional, depending on your specific application.)

- pipe cut-off using LCSF
- pipe squaring/facing using LCSF
- counterboring using LCSF and bridge slide
- beveling using LCSF and bridge slide.

Setting up the LCSF

The bridge slide is used across the open face of a pipe end. Thus, you do not need to split the LCSF to install it; merely mount it over the open end of the pipe.

If you are performing an operation using the bridge slide after parting the pipe with the LCSF, you do not need to reposition the machine. However, it is critical that the LCSF be centered exactly on the workpiece. This requires the use of a dial indicator that mounts to the LCSF. Use the procedure in this section to install and center the LCSF.

Rough Centering the LCSF

1. If necessary, install the LCSF onto the open end of the pipe as described in the LCSF user's manual. Select the proper extensions for the size of pipe using the clamp pad extension chart in the manual.

NOTE

When installing the LCSF on an open pipe end, the top surface of the rotating ring should be about 1-3/4 inches below the end face of the pipe—enough to allow for about 1/4-1/2 inch of clearance between the bridge slide and the pipe face. (See the operating envelope drawings in Chapter 1.)

2. Start at the location of one of the clamp pads near the top of the machine. Using a scale, measure the distance from the surface of the pipe to the inner surface of the LCSF at that location. Write the measurement down.

3. Move to the clamp pad 180° opposite the one in the previous step and measure the distance between the pipe surface and the inner surface of the LCSF. Write this measurement down.

4. Add the two measurements together. Divide the result by 2. This number is the distance the LCSF should be from the pipe at both clamp pad locations.

EXAMPLE:

- The distance at the first location is 1.7 inches.
- The distance at the second location is 2.1 inches.
- Add 1.7 to 2.1, then divide by 2. The result is 1.9 inches, which is the desired distanced between the pipe and LCSF at each location.

5. Using the scale as you make the adjustments, turn the clamp pad screws alternately until you have the same pipe-to-LCSF distance at both locations.

NOTE

LCSF machines 1824 and larger have 8 clamp pads. Rough center at 4 locations 90° apart, then tighten the remaining 4 clamp pads against the pipe.

6. Repeat this procedure at the two clamp pads locations 90° from the first two.

7. Measure at all four locations again. Re-adjust if necessary.

Setting Up the Indicator System

The instructions in this section are for the Wachs indicator system (part number 60-414-00). If you have a different indicator, use the manufacturer's specific instructions for assembly and operation.

1. Remove the motor assembly from the LCSF. This is necessary to turn the rotating ring by hand.
2. Remove the frame locking pins, if necessary.
3. Screw the threaded end of the indicator support shaft into the LCSF rotating ring:
   - For LCSFs from 612 through 1420, the indicator support shaft goes into the counterbore attachment hole on the rotating ring.
   - For LCSFs from 1824 through 4248, the indicator support shaft goes into the tool slide mounting hole on the rotating ring.
4. Assemble the dial indicator onto the support shaft.

NOTE

Make sure the inner surface of the pipe is clean and free of debris where the indicator tip touches it.

5. Move the adjustable components so that the tip of the indicator can touch the inner surface of the pipe.

Precisely Centering the LCSF

Visually divide the LCSF into four 90°-angle quadrants, with a clamping pad at the center of each quadrant. Refer to the quadrant numbers in Figure 3-1.

NOTE

1824 and larger LCSF machines have 8 clamp legs. Indicate and adjust one leg in each quadrant (at 90° around the machine), then tighten the remaining 4 legs against the pipe.

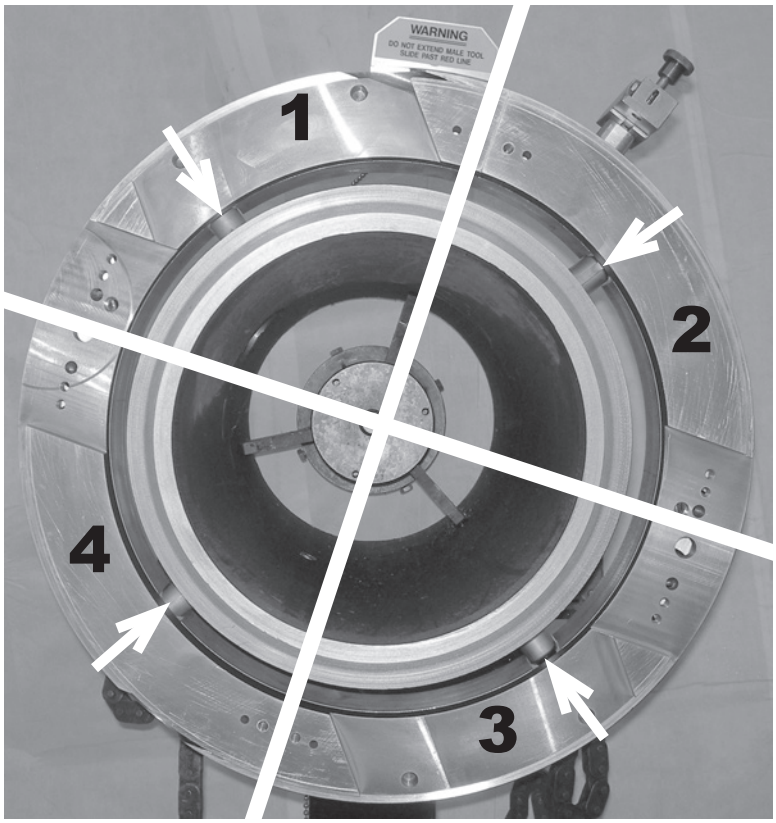


Figure 3-1. Visually divide the LCSF into four quadrants as shown. The white arrows indicate the clamp pads in each quadrant.

1. Turn the rotating ring to position the dial indicator tip at the clamp pad location in quadrant 1.
2. Put the indicator tip against the inner surface of the pipe under the clamp pad.
3. Set the indicator to 0 (zero).
4. By hand, turn the rotating ring 180° so that the indicator tip is under the clamp pad in quadrant 3.
5. The indicator dial will move into the plus or minus zone (unless the LSCF is perfectly centered across quadrant 1 and quadrant 3).
   - If the dial moved into the plus zone in quadrant 3, then quadrant 3 has to move **toward** the pipe by one-half the measurement indicated.
   - If the dial moved into the minus zone in quadrant 3, then quadrant 3 has to move **away from** the pipe by one-half the measurement indicated.
6. If the indicator has moved into the plus zone, loosen the clamp pad in quadrant 1 and tighten the clamp pad in quadrant 3. Watch the dial as you adjust the screws; it should move about half-way back to 0.

NOTE

If the difference between quadrant 1 and quadrant 3 is small (a few thousandths of an inch), you may be able to center the machine by just tightening the clamp pad where the LCSF is too close to the pipe.

7. If the indicator has moved into the minus zone, loosen the clamp pad in quadrant 3 and tighten the clamp pad in quadrant 1. Watch the dial as you adjust the screws; it should move about half-way back to 0.

8. Reset the indicator to 0 and re-check quadrants 1 and 3. Adjust if necessary.

9. Perform the same procedure for quadrants 2 and 4.

10. After adjusting quadrants 2 and 4, re-check quadrants 1 and 3.

Installing the Trip

1. Remove the standard tool slides from the LCSF, if they are attached. Place the slides in their location in the LCSF case.

2. Mount the trip assembly onto the LCSF stationary frame with one spacer (low range configuration). Refer to the LCSF manual if necessary.

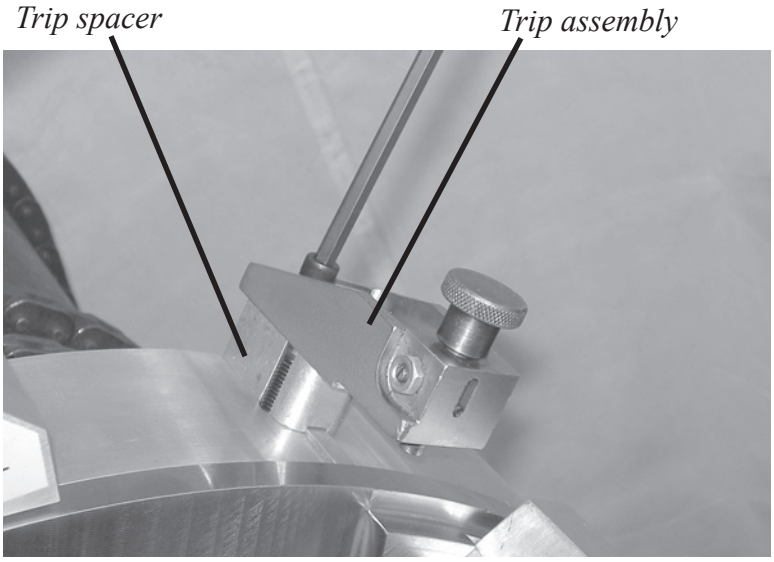


Figure 3-2. Tighten the three screws holding the trip assembly and spacer to the LCSF stationary ring.

3. Pull out the plunger on the trip to disengage it while you are setting up the bridge slide.

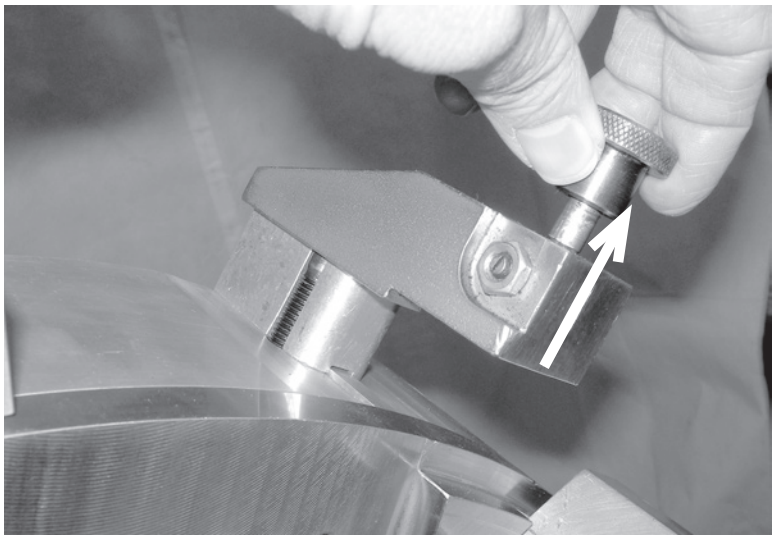


Figure 3-3. Pull the trip pin plunger out to disengage the trip.

Installing the Bridge Slide

The tool slides must be removed from the LCSF before you install the bridge slide.

NOTE

The bridge slide mounting holes are not the same as the standard slide mounting holes.

1. Position the bridge slide across the rotating ring of the LCSF, so that the bridge slide mounting screws are aligned with the slide mounting holes in the ring.

CAUTION

Use a lifting device to hold the bridge slide in place while you install it. Attach the lifting device to the lifting eye and lifting slots on the ends of the bridge slide.

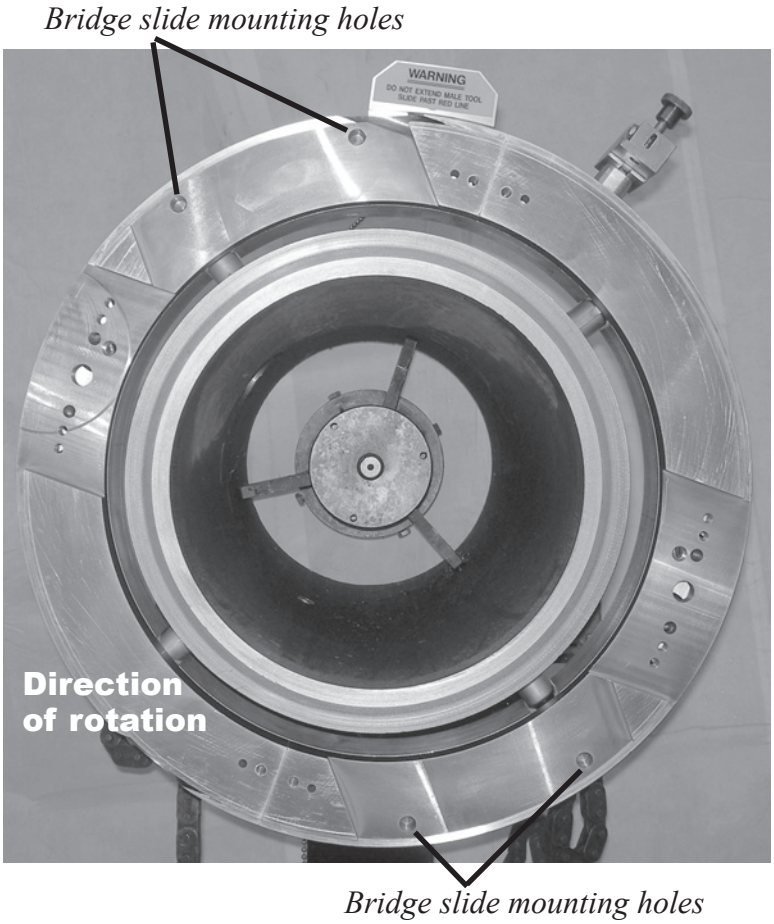


Figure 3-4. Position the bridge slide across the LCSF rotating ring at the location shown.

2. Screw in the 4 captivated bridge slide mounting screws to attach the slide to the LCSF.

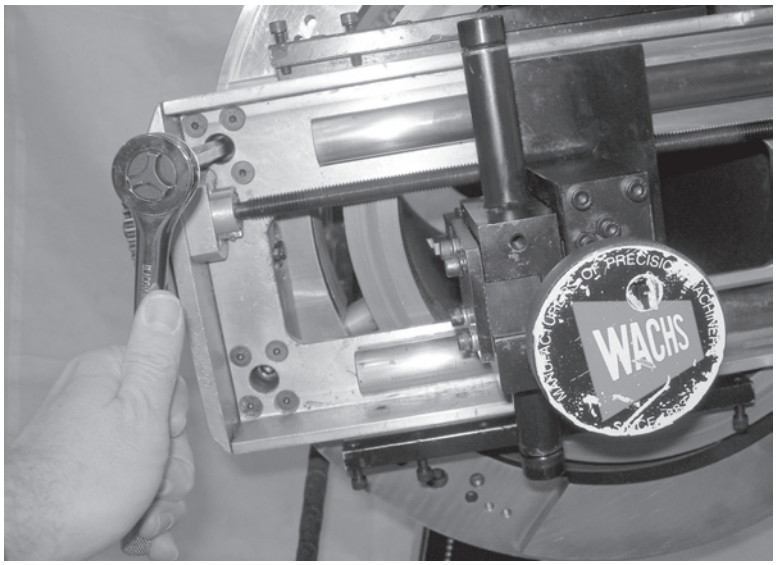


Figure 3-5. Fasten the bridge slide to the LCSF by tightening the 4 captivated screws in the 2 bottom supports.

Counterbore Operation

To counterbore with the bridge slide, you will keep the star feed trip disengaged, and will manually feed the tool slide radially. Depending on how much material you are removing for the counterbore, you will probably need to perform multiple passes, moving the tool slide radially into the pipe I.D. between each axial pass.

Counterbore Setup

Use the tool holder specifically designed to hold the counterbore tool (part no. 60-708-00).

NOTE

Use the allen wrench set provided with the LCSF to assemble and disassemble the bridge slide components.

1. Pull the trip pin plunger to retract and disengage the trip. (When counterboring with the bridge slide, the radial feed is performed manually.)

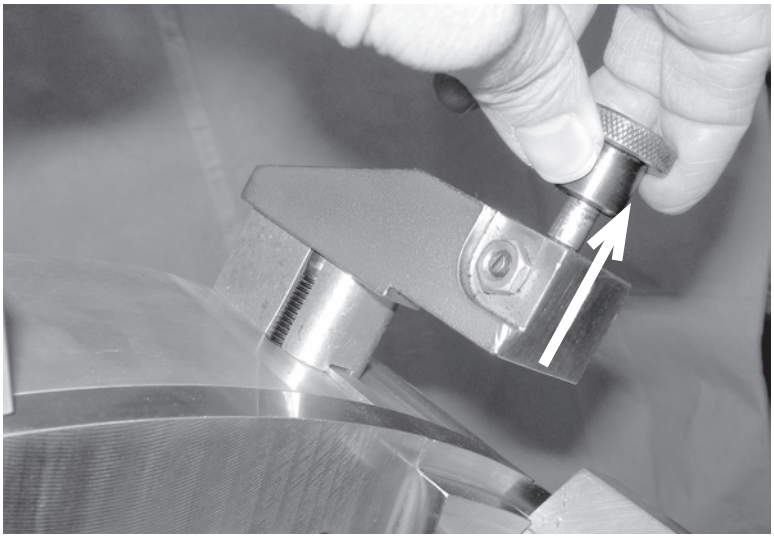


Figure 3-6. Pull the trip pin plunger out to disengage the trip for counterboring.

2. Insert the counterbore tool in the tool holder as shown in Figure 3-7. Tighten the three set screws on the tool holder.

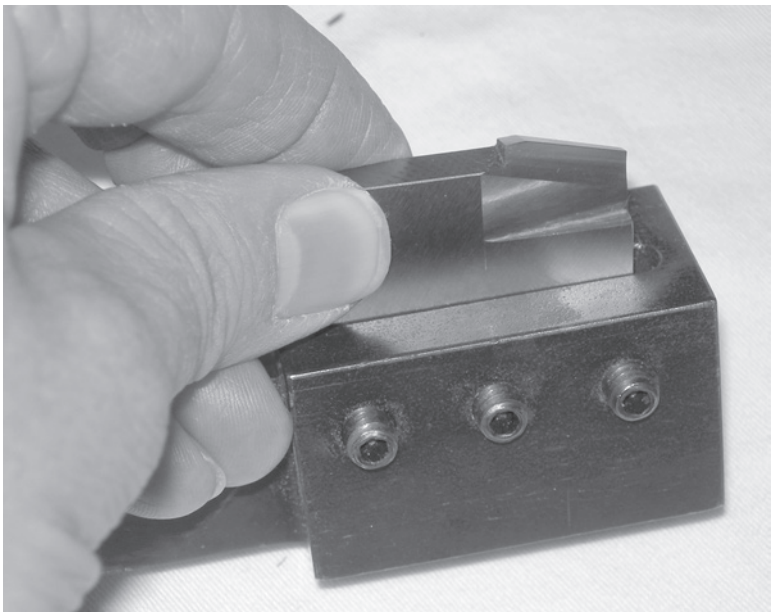


Figure 3-7. Insert the counterbore tool in the holder as shown. Tighten the three set screws on the holder.

3. Loosen the screws holding the tool holder plate on the male tool slide.

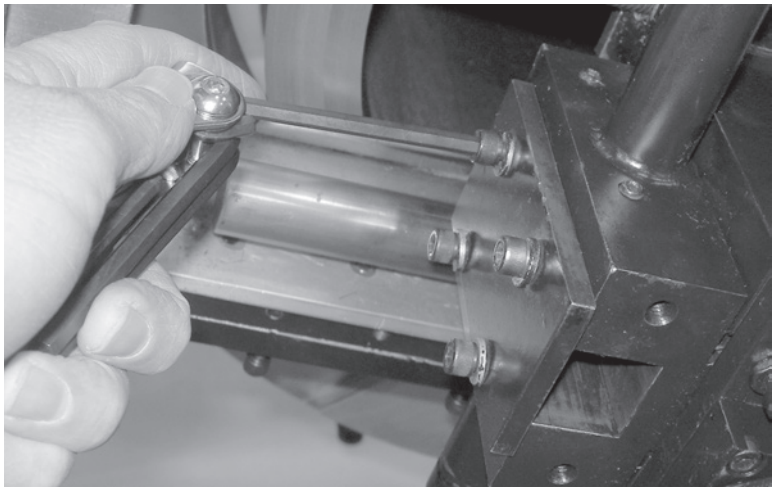


Figure 3-8. Loosen the screws on the tool holder plate to allow the tool holder to fit into the slide.

NOTE

If there is not enough clearance to reach through the slide, you can remove the tool holder plate and insert the tool holder from the outside.

4. Insert the tool holder into the tool block on the bridge slide, so that the tool faces the inner surface of the pipe. Reach through the opening in the slide with the tool holder to access the front of the tool block.

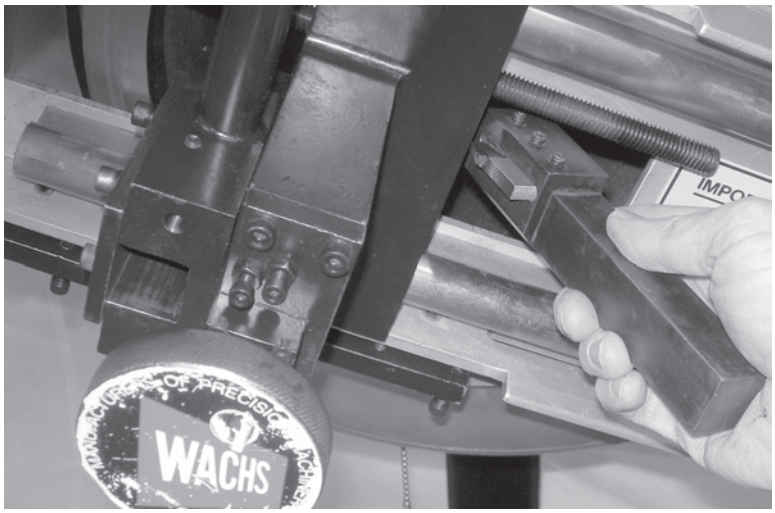


Figure 3-9. To install the tool holder, you can reach through the slide and insert the holder into the front of the tool block.

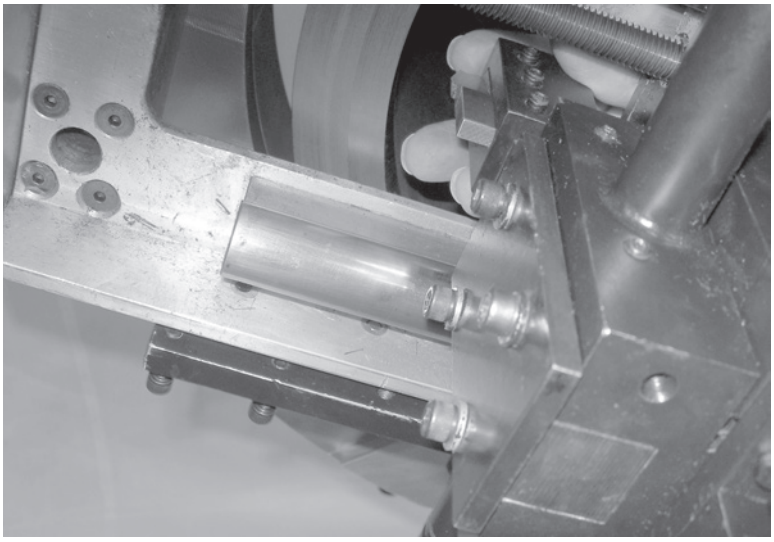


Figure 3-10. From the inside, slide the counterbore holder into the tool block with the cutting edge of the tool facing the I.D. of the pipe.

5. Tighten the screws in the tool holder plate to secure the counterbore tool holder.

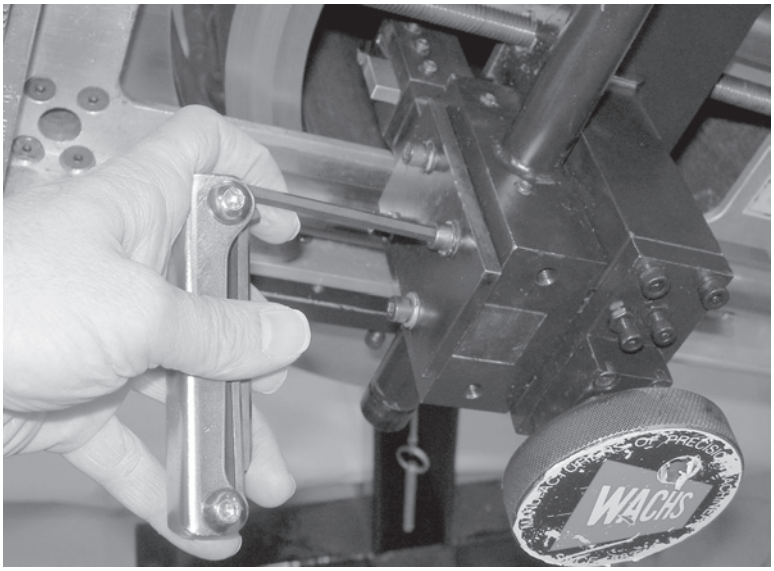


Figure 3-11. Tighten the screws in the cover to secure the counterbore tool holder in the slide.

Planning the Operation

1. Determine the amount of material that needs to be machined from the I.D. of the pipe.

Measure the existing pipe I.D. and subtract this value from the "planned" I.D. The difference is the amount of material that needs to be machined from the existing pipe I.D.

Example:

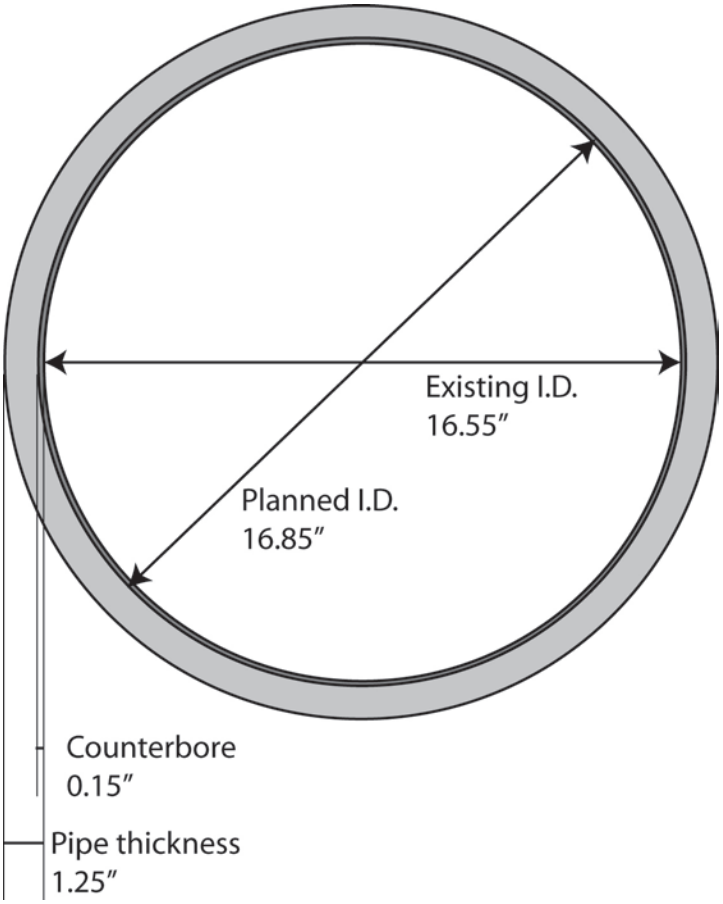


Figure 3-12. The width of the counterbore is ½ of the difference between the existing I.D. and the planned I.D.

Planned I.D. dimension	16.85"
Existing I.D. dimension	16.55"
Difference	0.30"
Divide by 2	0.15" Per side

Thus, the existing diameter needs to be counterbored to increase the existing I.D. by 0.30", or 0.15" per side.

2. Determine the thickness that can be removed with each pass.

As a rule of thumb, you can cut about 0.060" on most pipe materials without causing excess machine vibration, damaging the tooling, or stalling the machine. Depending on the material you are cutting, you may need to decrease this thickness. On some materials, you may be able to cut a thicker pass, but in general you should not exceed more than about half the width of the tool taper.

3. Determine the depth for the first counterbore pass.

Because the counterbore tool is tapered, you must start out making longer passes than the desired counterbore depth. Each pass is shorter than the previous one, until the final pass completes the I.D. of the required straight bore to the desired depth.

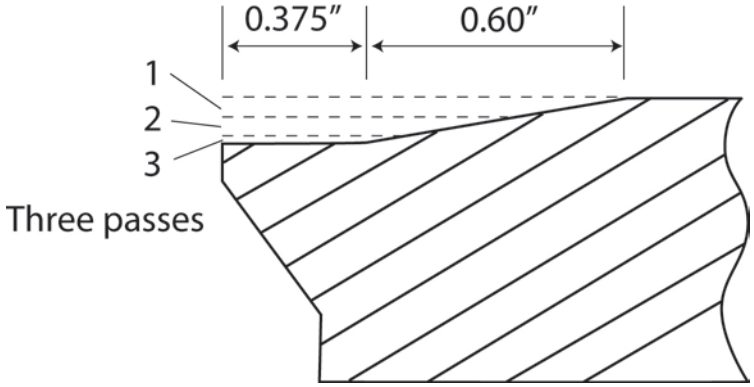


Figure 3-13. In this example, three passes with the counterbore tool are required to achieve the desired straight counterbore depth.

In Figure 3-14, the planned counterbore depth is 0.375" of straight bore. (This is a value that is specified in the weld prep detail.) A general rule of thumb is the counterbore depth is just deep enough to locate the transition of the straight bore/taper intersection out of the weld x-ray zone, or behind the end of the weld prep as shown in Figure 3-14.

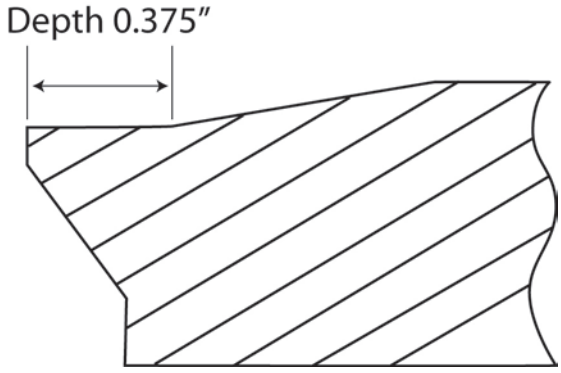


Figure 3-14. Counterbore depth

From Step 1, 0.15” needs to be removed from the wall thickness. If the taper on the counterbore tool bit is 4:1, we can determine the depth of the first counterbore pass:

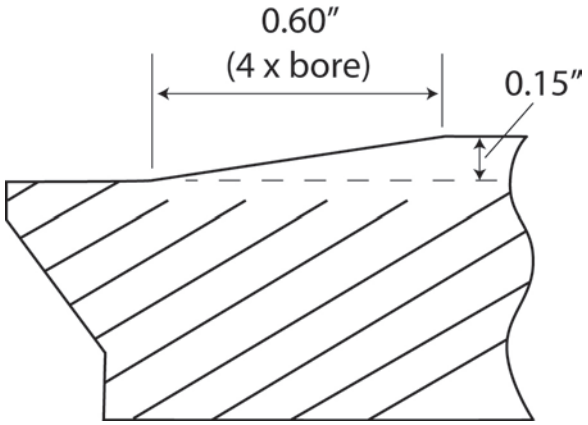


Figure 3-15. The depth of the tapered part of the bore is a function of the tool taper and the counterbore thickness.

0.15” x 4 (taper ratio) = 0.60” (length of the tapered portion)

+ 0.375” (length of straight bore)

= 0.975” (Depth of first counterbore pass)

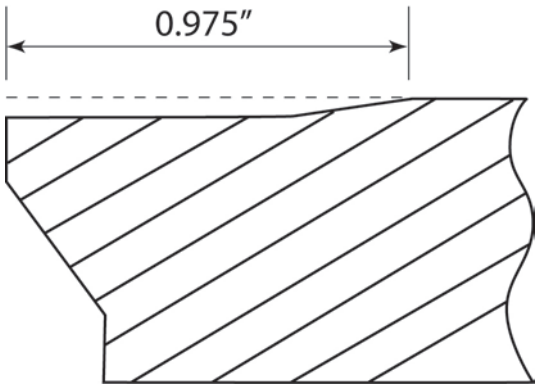


Figure 3-16. The depth of the first counterbore pass is the sum of the desired counterbore depth (0.375”) plus the depth required for the tool taper on each pass.

Cutting the Counterbore

Counterboring the I.D. of a pipe requires moving the bridge slide in opposite direction than when it is trip-driven. Therefore, you will operate the radial drive manually using a wrench with a 3/4" socket.

Note: the maximum axial travel for the bridge slide is 1.62". If you need to cut a bore deeper than that (including the length of the required taper), you will need to reposition the tool holder. First cut to the maximum travel, then reposition the slide. Loosen the tool holder cover plate and set the holder down into the pipe by the distance that still needs to be cut.

1. Make sure the slide is positioned radially so that the tool holder is inside the I.D. of the pipe.

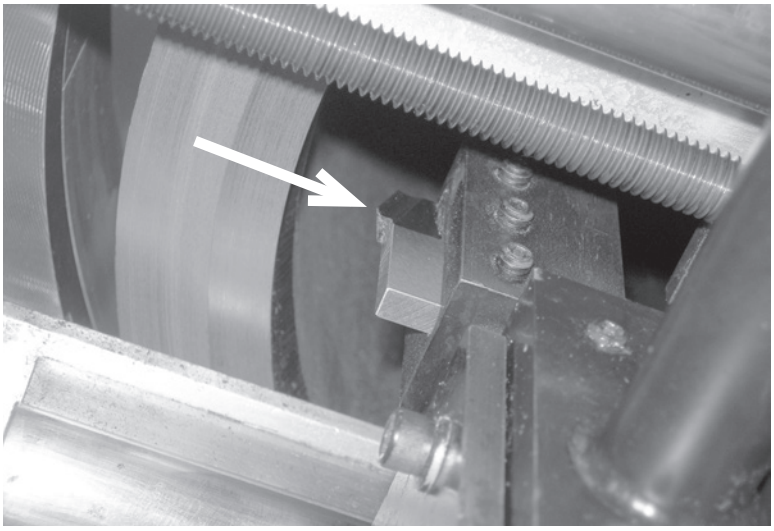


Figure 3-17. Make sure the tool is within the pipe's I.D. before advancing the male slide into the pipe.

2. Turn the feed knob counter-clockwise to advance the male slide so that the tool is inside the end of the pipe.

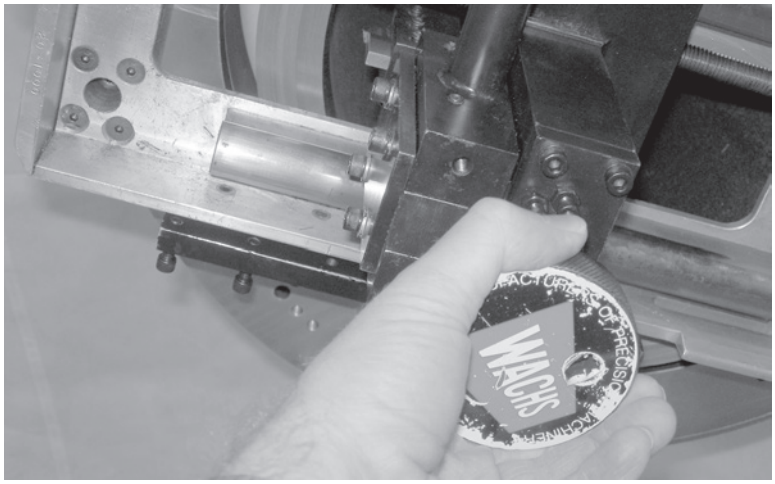


Figure 3-18. Advance the tool into the pipe by turning the feed knob counter-clockwise.

3. Manually rotate the split frame, observing the clearance between the tool and the I.D. of the pipe. Position the machine where the tool is closest to the pipe surface.

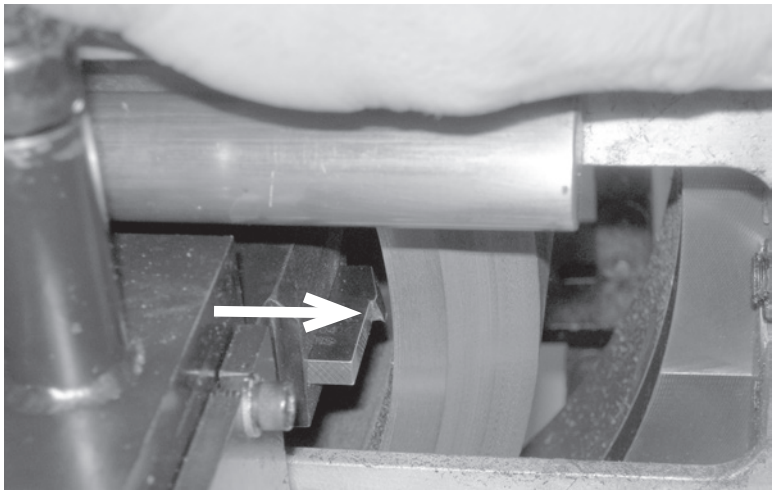


Figure 3-19. Rotate the split frame to find the point where the tool is closest to the pipe I.D.

4. Using a 3/4" wrench or socket, turn the castle nut counter-clockwise until the tool just touches the inside of the pipe.

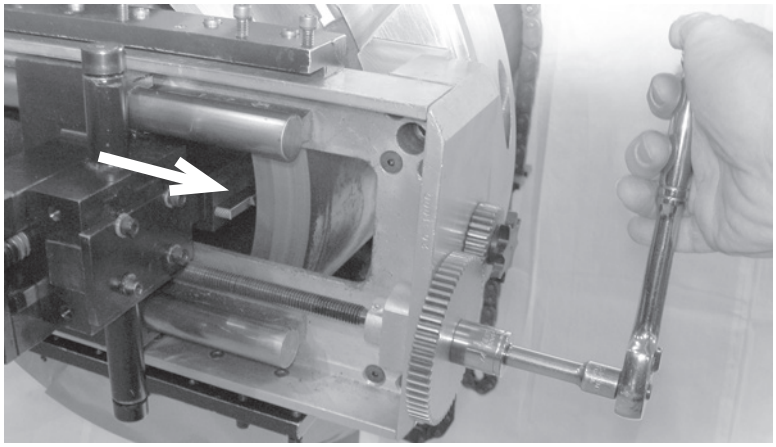


Figure 3-20. Turn the castle nut counter-clockwise to feed the tool toward the pipe I.D.

5. Manually rotate the split frame again slowly to verify that the tool clears the pipe surface all the way around. Adjust by turning the castle nut if necessary.

6. Turn the feed knob clockwise to retract the male tool slide until the tool is beyond the end of the pipe.

Figure 3-21. Retract the tool out of the pipe by turning the feed knob clockwise.

NOTE

If the cutting thickness is critical, measure the movement of the slide as you turn the castle nut.

7. Turn the castle nut counter-clockwise to advance the tool over the I.D. of the pipe. One turn of the castle nut moves the slide 0.077”. If you are going to cut 0.060”, turn the castle nut just over 3/4 of a turn.

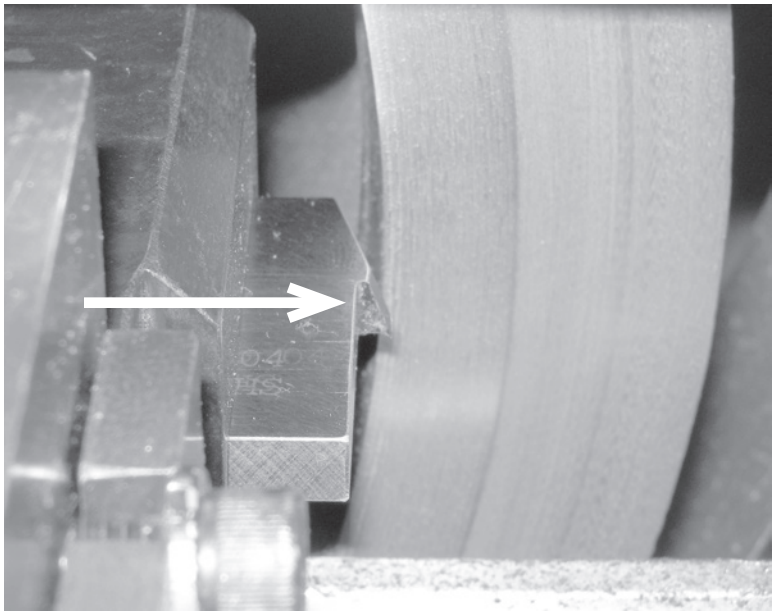


Figure 3-22. Turn the castle nut counter-clockwise to move the tool the required cutting width over the I.D. of the pipe.

8. Attach the motor to the LCSF. Refer to the LCSF user manual if necessary.

9. Start the machine. To feed the counterbore tool, turn the feed knob counter-clockwise about 1/8 turn each revolution of the LCSF.

NOTE

Each full rotation of the feed knob advances the tool 0.042”.

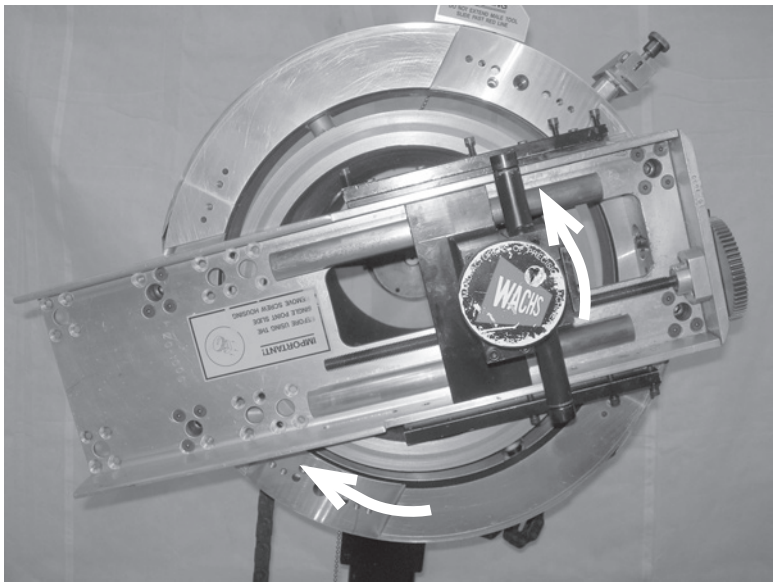


Figure 3-23. Turn the feed knob counter-clockwise as the machine rotates to advance the tool into the pipe.

10. Stop the machine periodically and measure the depth of cut.

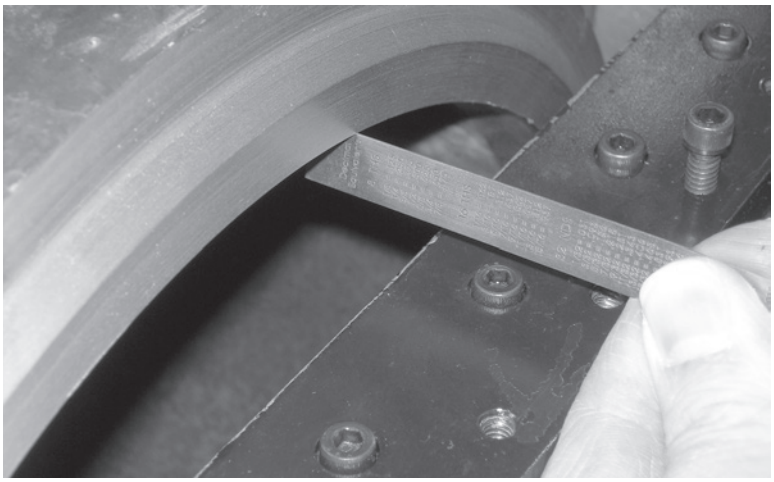


Figure 3-24. Measure the depth of the bore (to the end of the taper) as you cut the first pass.

11. When you have reached the depth of cut you calculated in the previous section (including the length of the tapered section), stop turning the feed knob.

12. Let the LCSF make at least one complete rotation to finish the cut, then stop the machine.

13. Turn the feed knob clockwise to retract the male slide until the tool is past the I.D. of the pipe.

NOTE

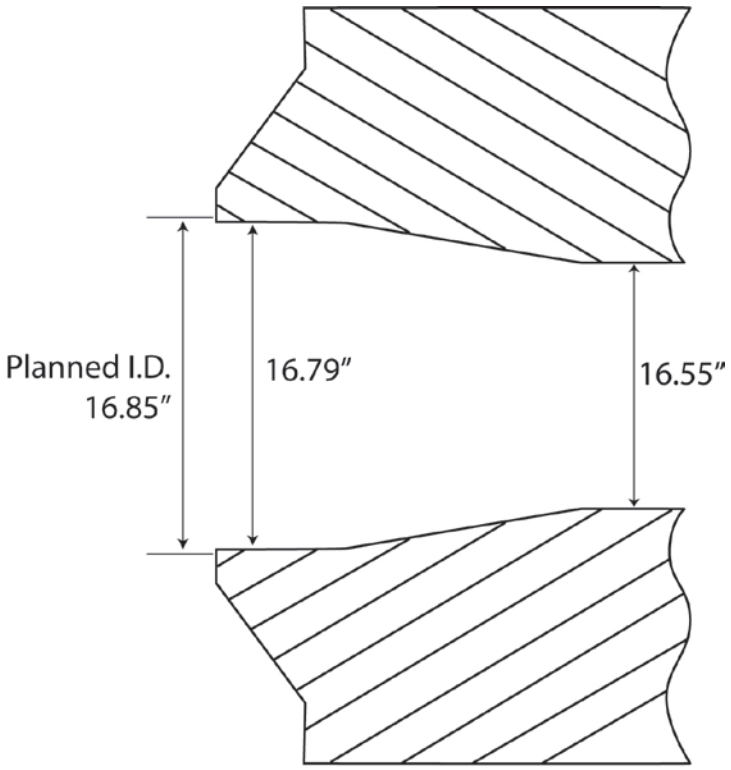
Each turn of the castle nut moves the tool radially about 0.077". For a 0.060" thick pass, turn the nut about 3/4 turn.

14. Turn the castle nut counter-clockwise to move the tool the thickness of the next cutting pass over the I.D. of the pipe. Remove the wrench before starting the LCSF.

15. Start the machine and complete the second pass in the same way as the first. Blend the taper of the second pass into the taper of the first and stop the machine.

16. Perform an accurate measurement of the I.D. after each pass so that you know how much material still needs to be removed. When the material remaining is less than the thickness of each cut, you are ready to make the final pass.

17. For the final pass, measure the bored I.D. Subtract this measurement from the planned I.D. Divide the result by 2 to determine the thickness of the final pass. See the example in Figure 3-25.



pipe thickness not to scale

Measured I.D.: 16.79"
Planned I.D.: 16.85"
Material to remove = 16.85 - 16.79 = 0.06"
Thickness of pass = 0.06/2 = 0.03"

Figure 3-25. In this example, the thickness of the final pass will be 0.03".

18. Measuring carefully, turn the castle nut to move the tool the final pass thickness over the pipe I.D. Perform the final pass, blending the taper when you reach the end of the previous pass.

19. Stop the machine and retract the male slide using the feed knob. Remove the counterbore tool from the tool holder. If you are finished preparing the end of the pipe, remove the bridge slide.

Bevel Operation

The bridge slide uses templates to perform O.D. beveling of the pipe face. Various templates are available to do different beveling profiles.

A straight bevel is generated by the tool slide following a template with a tracking slot at the angle of the desired bevel profile. Figure 3-26 shows a set of straight beveling templates.

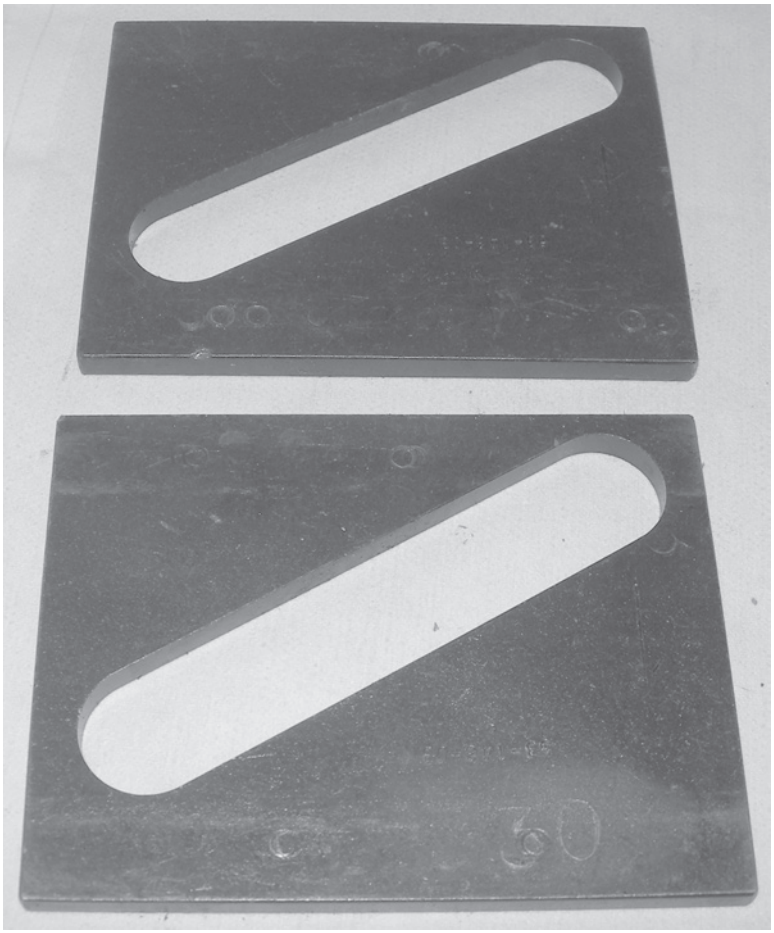


Figure 3-26. Two identical straight bevel templates are used for the specified bevel angle.

A compound bevel is generated by the tool slide following a template with a tracking slot at different angles, representing the angles of the desired bevel profile. Figure 3-27 shows a set of compound beveling templates.

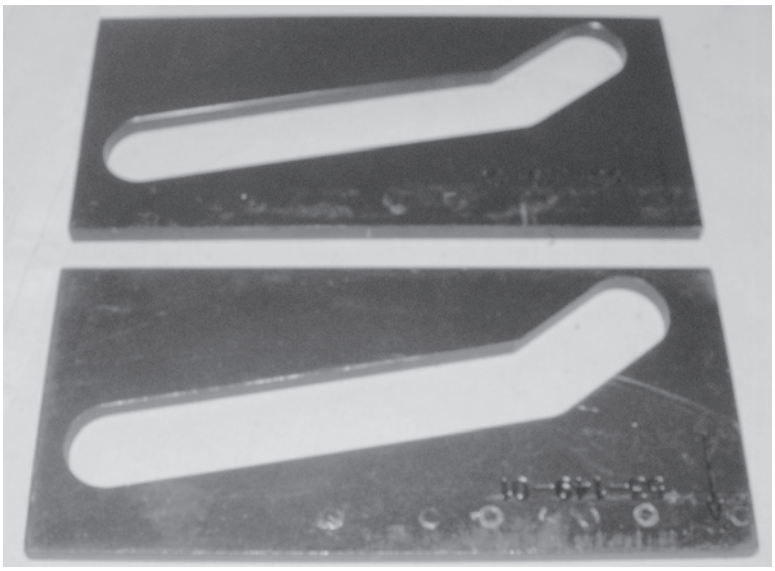


Figure 3-27. Two identical compound bevel templates are used for the specified bevel profile.

Follow the appropriate procedure in this section to set up and cut a bevel on the O.D. of the pipe. These procedures assumes you have installed the LCSF and bridge slide as described earlier in the chapter.

Machine Setup for Beveling

1. If necessary, remove the drive motor from the LCSF and pull the trip pin out to the retracted position.
2. Insert the single-point tool in the tool holder as shown in Figure 3-28. Tighten the set screw on the tool holder.

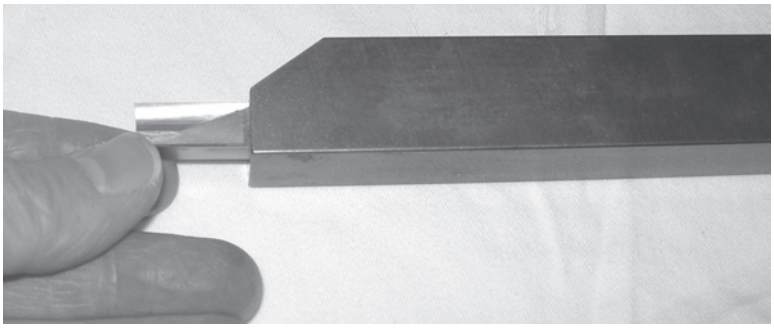


Figure 3-28. Insert the single-point tool in the holder as shown. Tighten the set screw (on the back) on the holder.

3. Retract the male tool slide to its farthest back position by turning the feed knob clockwise.

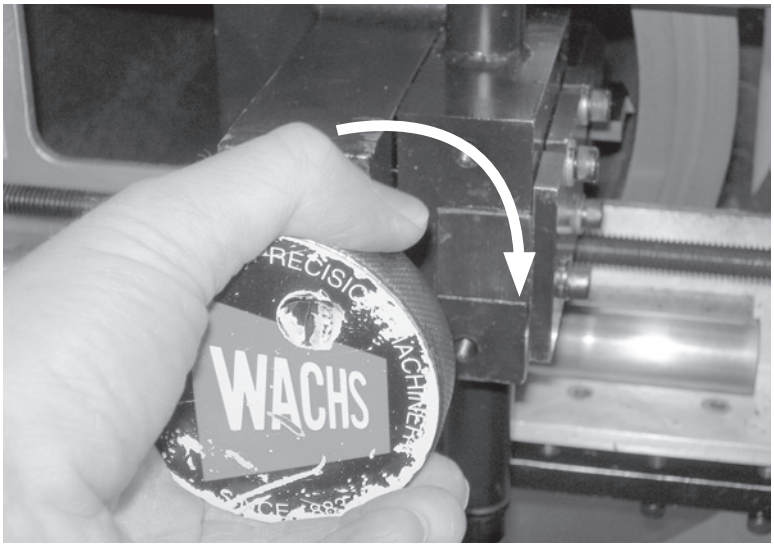


Figure 3-29. Retract the male tool slide using the feed knob.

4. Loosen the screws holding the tool holder plate on the male tool slide.

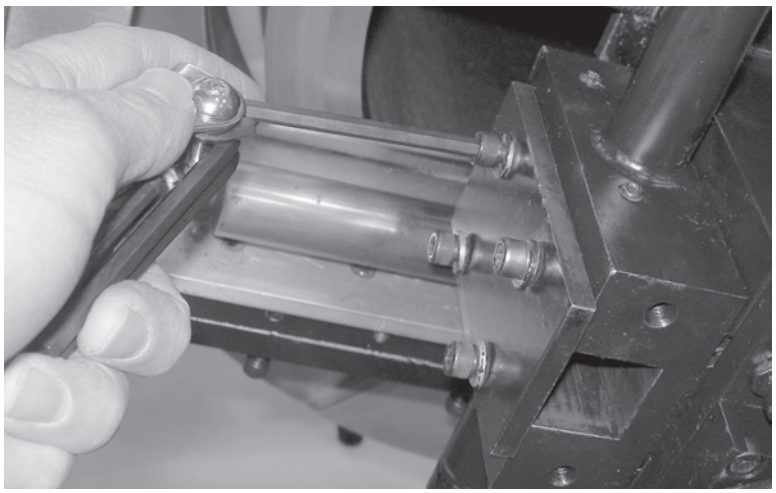


Figure 3-30. Loosen the screws on the tool holder plate to allow the tool holder to fit into the slide.

5. Remove the tool holder plate and insert the tool holder into the male tool slide.

NOTE

If there is enough clearance to reach through the slide, you can insert the tool holder from the inside without removing the tool holder plate.

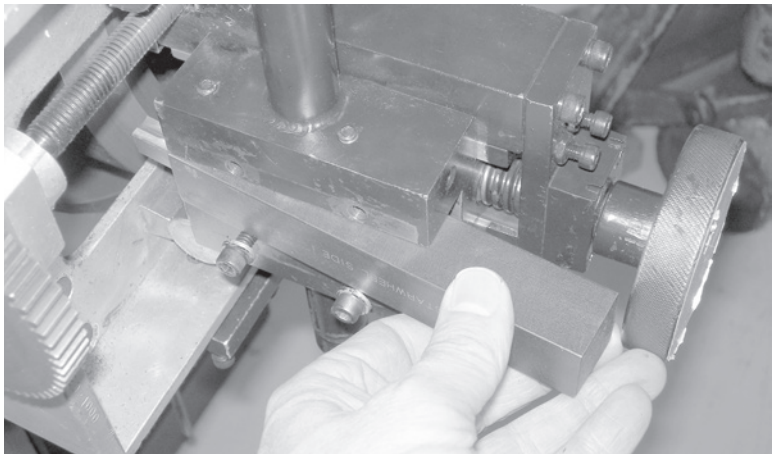


Figure 3-31. Remove the tool holder cover and insert the tool holder into the slide.

6. Replace the tool holder plate. Insert the screws and tighten them until they are just snug.

Straight Beveling Setup

1. Using a 3/4" wrench or socket, turn the castle nut to position the tip of the tool just past the O.D. of the pipe.

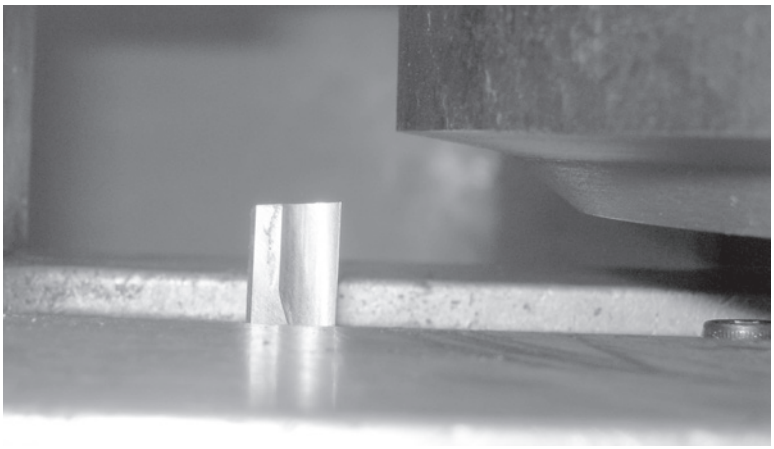


Figure 3-32. Turn the castle nut to position the bit just past the O.D. of the pipe.

IMPORTANT

Do not turn the castle nut while you are installing and positioning the templates.

2. Place the templates with their slots over the cam follower posts as shown in Figure 3-44. Position the templates so that the cam follower wheel is near the end of the template slot away from the center of the pipe.

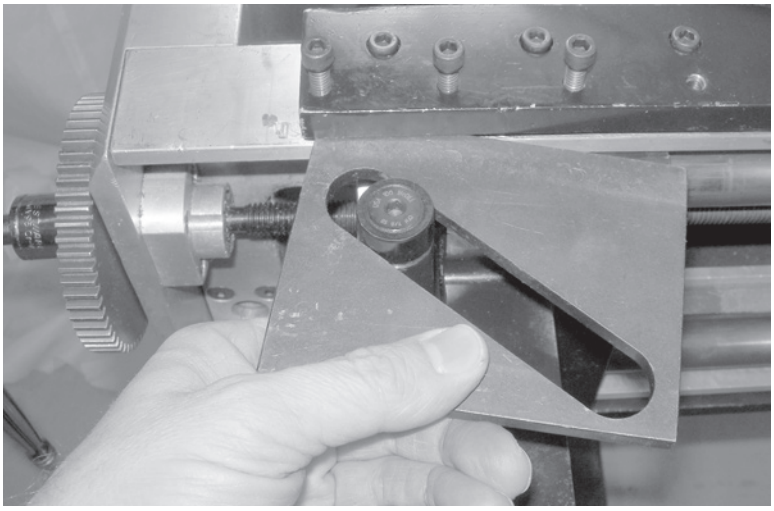


Figure 3-33. Insert the template on the cam follower so that the wheel is near the end of the slot.

3. Loosen the screws on the tool holder cover so that the holder can move if it contacts the pipe while you turn the feed knob.

4. Advance the male tool slide by turning the feed knob counter-clockwise. Guide the bases of the templates into the mounting slots as you advance the slide.

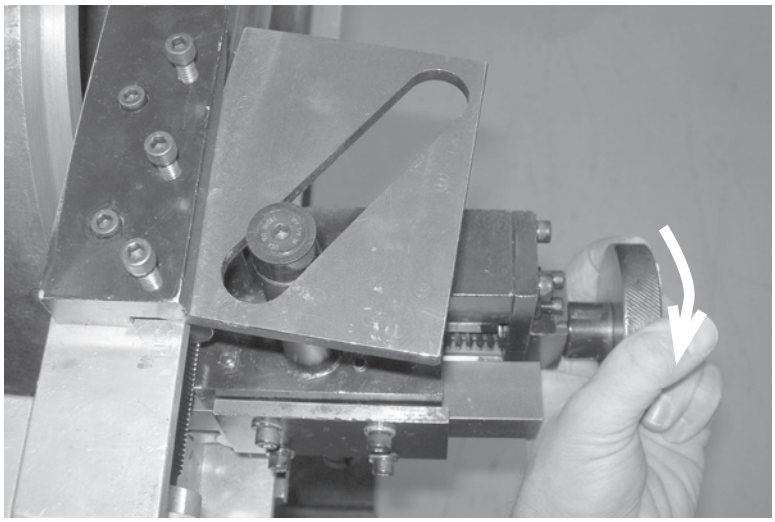


Figure 3-34. Turn the feed knob counter-clockwise to advance the slide and push the templates into their slots.

5. Advance the slide until the bases of the template plates are fully seated in their slots.

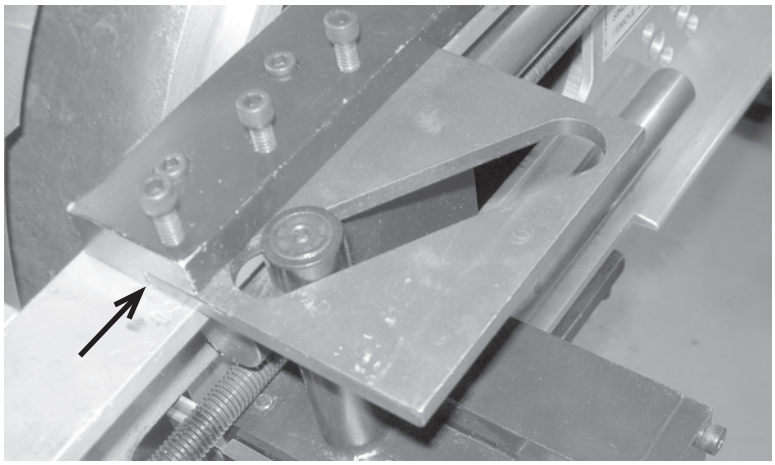


Figure 3-35. The template is fully seated in its slot.

6. Tighten the locking screws on the templates securely. Use at least three screws on each template.

IMPORTANT

The screws holding the template must be tight, or the template may pull out of the slot as the slide advances.

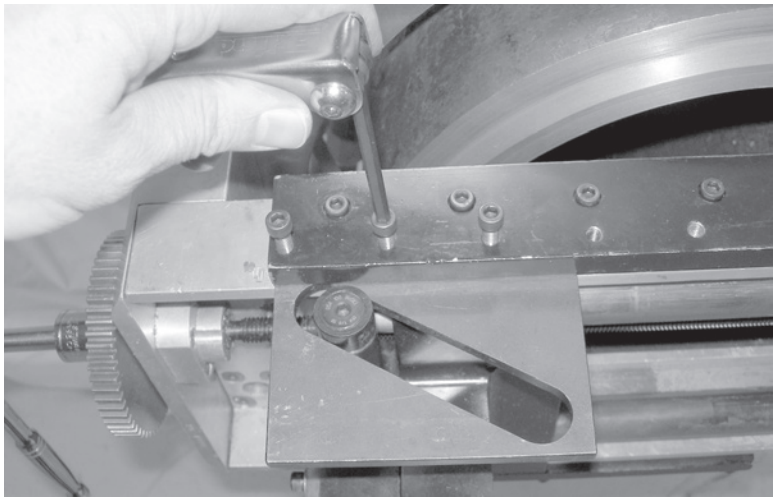


Figure 3-36. Tighten the screws holding the template.

7. Insert a hex wrench through the hole in the feed knob and remove the screws holding the end block to the slide. Rotate the knob to access each screw in turn.

NOTE

The screws in the end block are captivated and will not fall out.

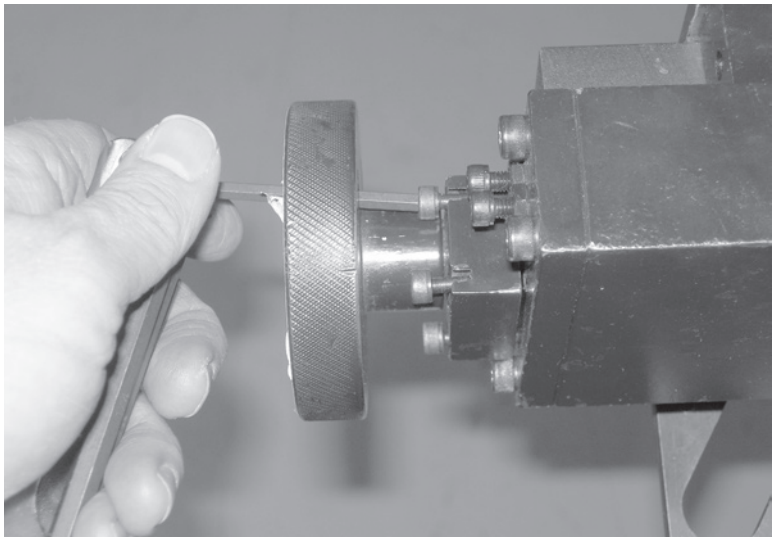


Figure 3-37. Use a hex wrench to remove the four screws in the end block. Rotate the feed knob to access each screw.

8. Turn the feed knob counter-clockwise to unscrew and remove it.

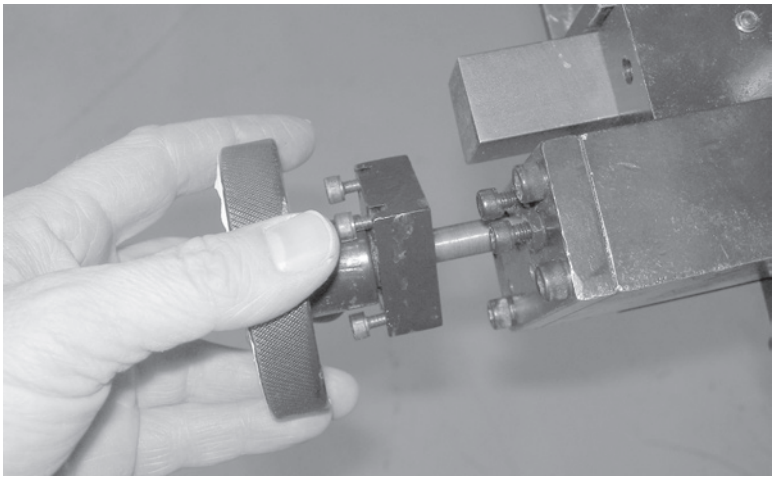


Figure 3-38. With the end block loose, turn the feed knob counter-clockwise to remove the feed screw.

9. The knob, end block, and feed screw will come out of the slide. Set the assembly aside in the machine storage case.

10. Loosen the tool holder cover screws and move the tool holder forward to the desired cutting depth along the side of the pipe. Typically, about 1/4” per pass is appropriate; multiple passes are usually required, as shown in Figure 3-40.

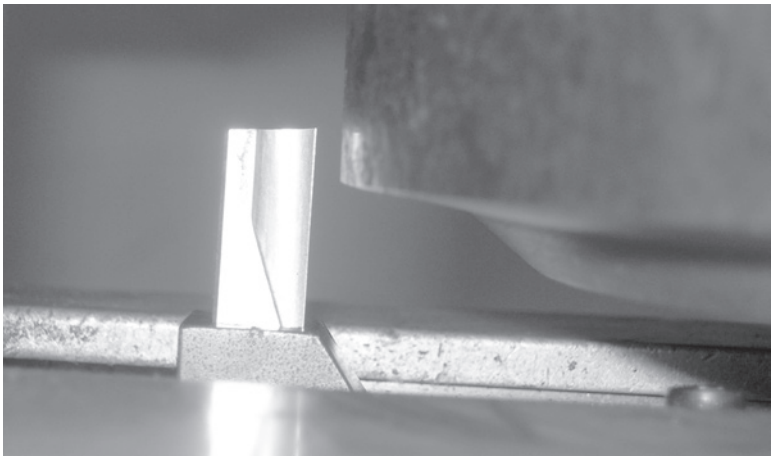


Figure 3-39. Position the tool to remove the appropriate width of cut.

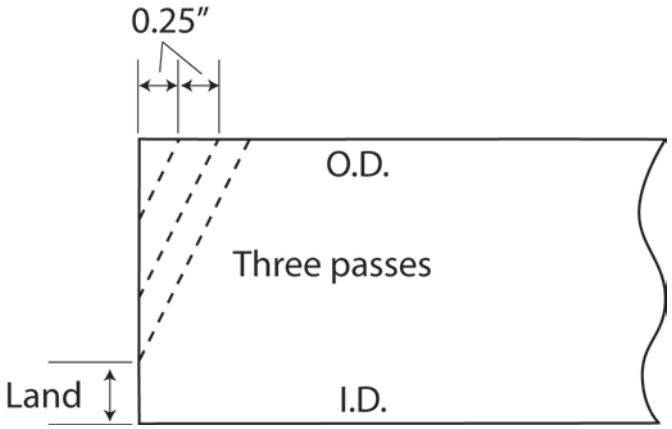


Figure 3-40. The diagram shows a straight bevel using multiple passes. Set the tool holder depth about 1/4" further back along the pipe O.D. for each pass.

Note: On the first pass, the cut shown in Figure 3-41 will be performed.

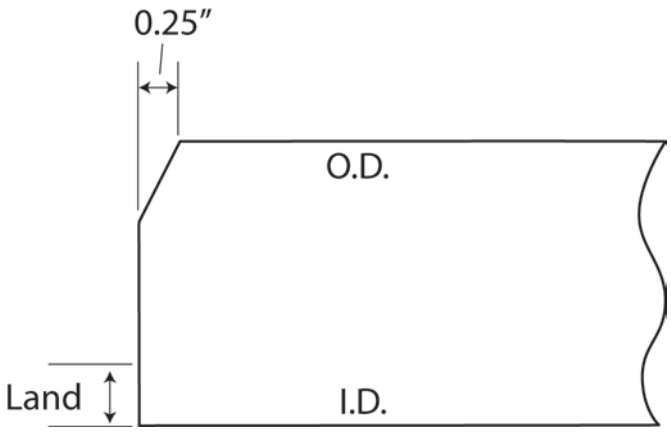


Figure 3-41. The illustration shows the profile of the first pass with the straight bevel template.

11. Tighten the tool holder cover screws securely.

Compound Beveling Setup

1. Using a 3/4” wrench or socket, turn the castle nut to position the tip of the tool over the location on the pipe face at the transition point (where the two bevel angles meet) of the proposed surface prep.

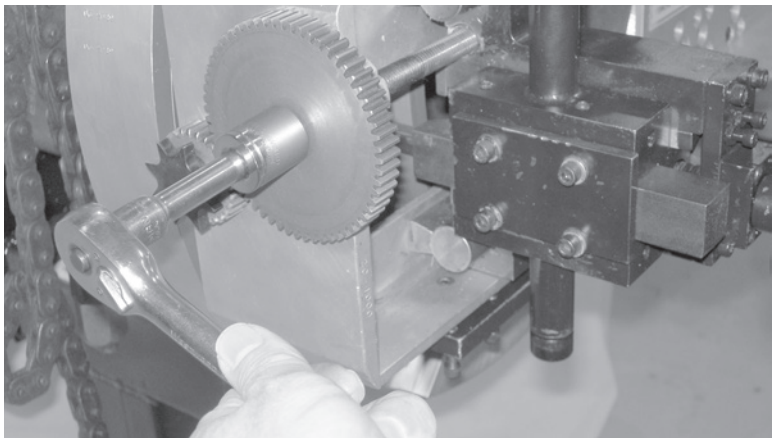


Figure 3-42. Turn the castle nut to move the tool bit into position over the pipe face.

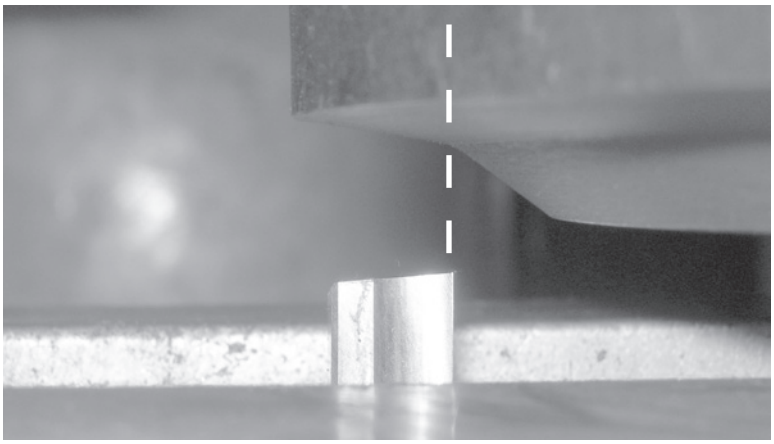


Figure 3-43. Adjust the radial position until the bit is located at the proposed bevel's transition point (shown on a beveled pipe for illustration).

2. Place the templates with their slots over the cam follower posts as shown in Figure 3-44. Position the templates so that the cam follower wheel is at the transition point of the template.

IMPORTANT

Do not turn the castle nut while you are installing and positioning the templates.

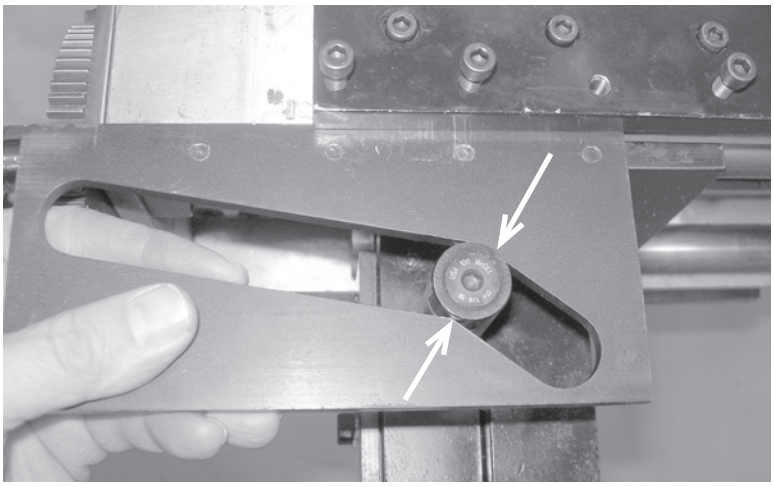


Figure 3-44. Insert the template on the cam follower so that the wheel is at the transition point of the bevel.

3. Loosen the screws on the tool holder cover slightly so that the tool holder can slide back if the tool contacts the pipe face as you position the templates.

4. Advance the male tool slide by turning the feed knob counter-clockwise. Guide the bases of the templates into the mounting slots as you advance the slide. Keep the cam follower wheels at the transition points.

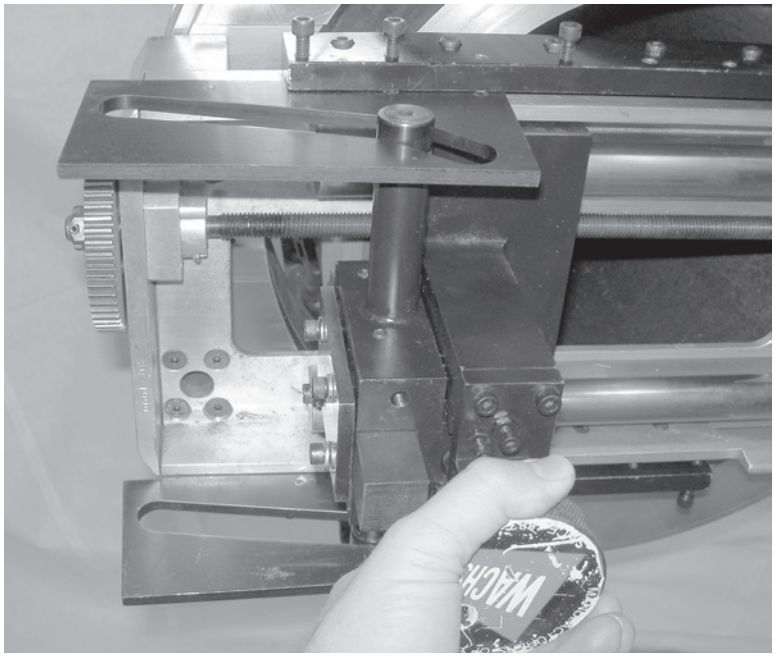


Figure 3-45. Turn the feed knob counter-clockwise to advance the slide and push the templates into their slots.

5. Advance the slide until the bases of the template plates are fully seated in their slots, while the transition points are still located on the cam follower wheels.

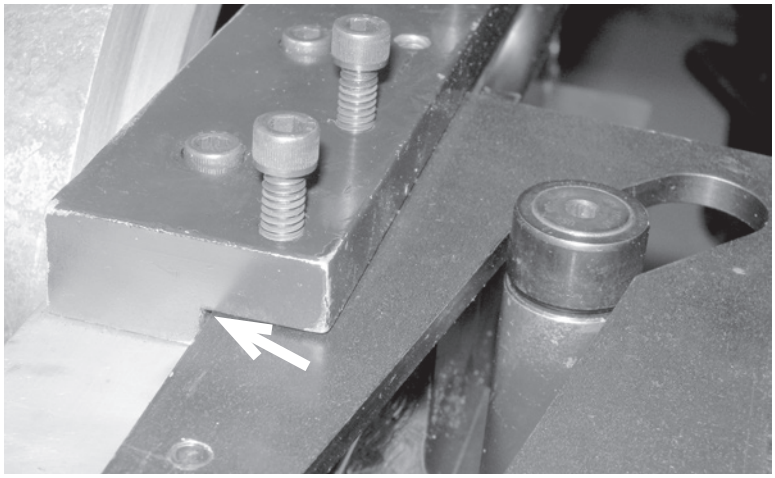


Figure 3-46. The template is fully seated in its slot.

6. Tighten the locking screws on the templates securely. Use at least three screws on each template.

IMPORTANT

The screws holding the template must be tight, or the template may pull out of the slot as the slide advances.

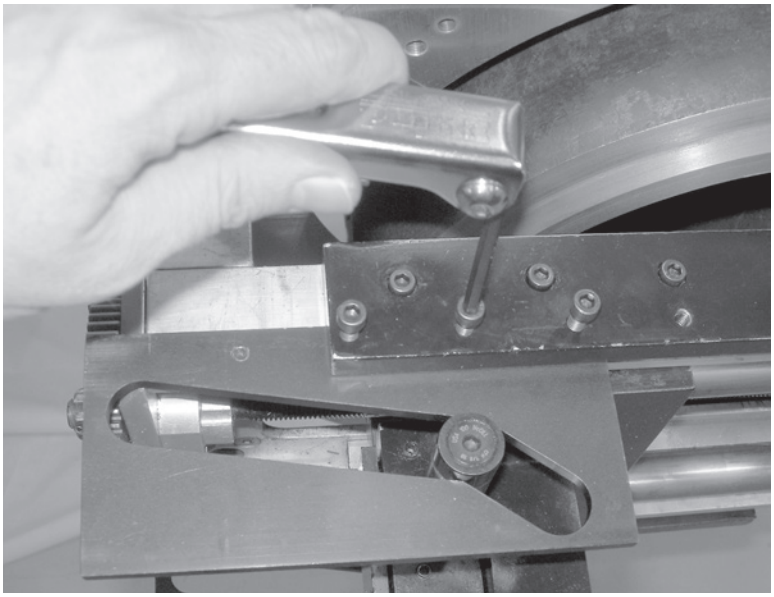


Figure 3-47. Tighten the screws holding the template.

7. Retract the tool holder so the tool is not touching the pipe face. Move it far enough back so the tool will clear the pipe face when you move the slide out to the pipe O.D. Snug the tool holder plate screws.

NOTE

The screws in the end block are captivated and will not fall out.

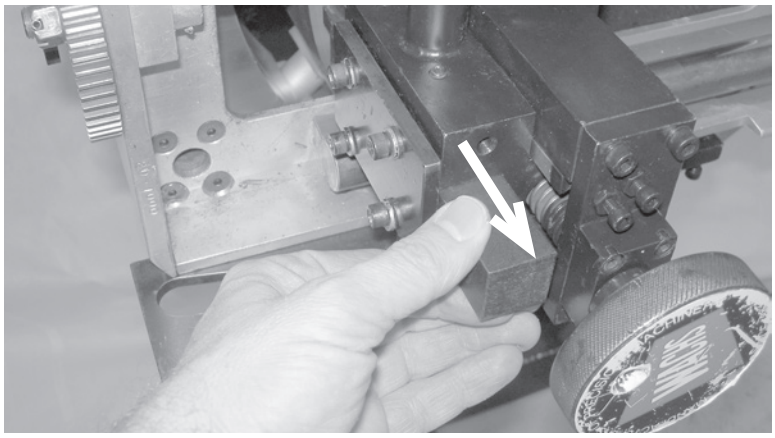


Figure 3-48. Pull the tool holder back so that the tool stays clear of the pipe face while adjusting the slide.

8. Insert a hex wrench through the hole in the feed knob and remove the screws holding the end block to the slide. Rotate the knob to access each screw in turn.

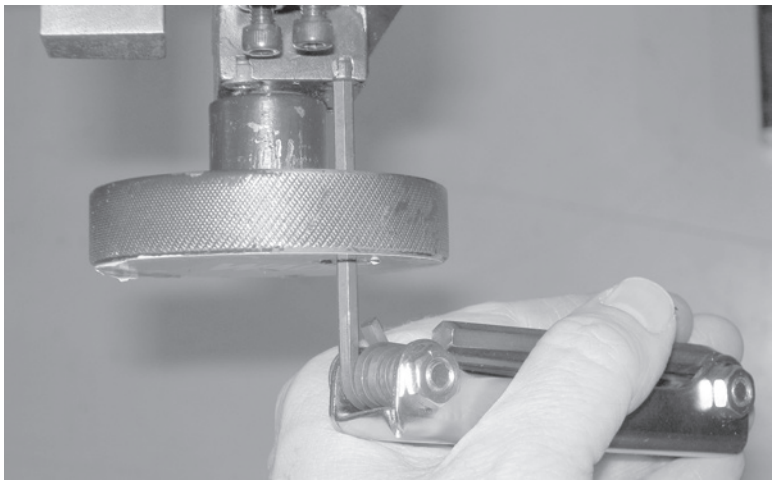


Figure 3-49. Use a hex wrench to remove the four screws in the end block. Rotate the feed knob to access each screw.

9. Turn the feed knob counter-clockwise to unscrew and remove it.

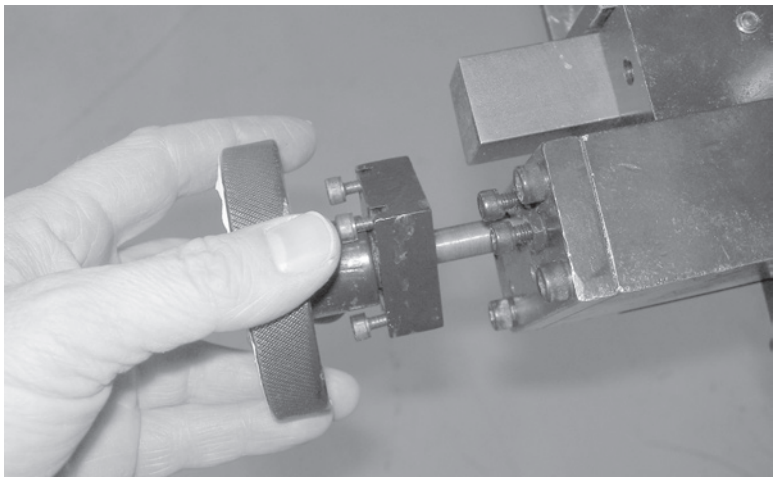


Figure 3-50. With the end block loose, turn the feed knob counter-clockwise to remove the feed screw.

10. The knob, end block, and feed screw will come out of the slide. Set the assembly aside in the machine storage case.

11. Using a 3/4" wrench or socket, turn the castle nut to position the tip of the tool just past the O.D. of the pipe.

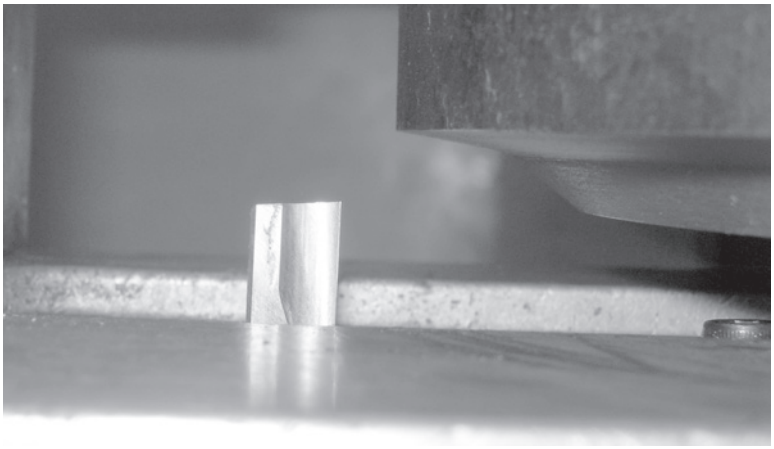


Figure 3-51. Turn the castle nut to position the bit just past the O.D. of the pipe.

12. Loosen the tool holder cover screws and move the tool holder forward to the desired cutting depth along the side of the pipe. Typically, about 1/4" per pass is appropriate; multiple passes are usually required, as shown in Figure 3-53.

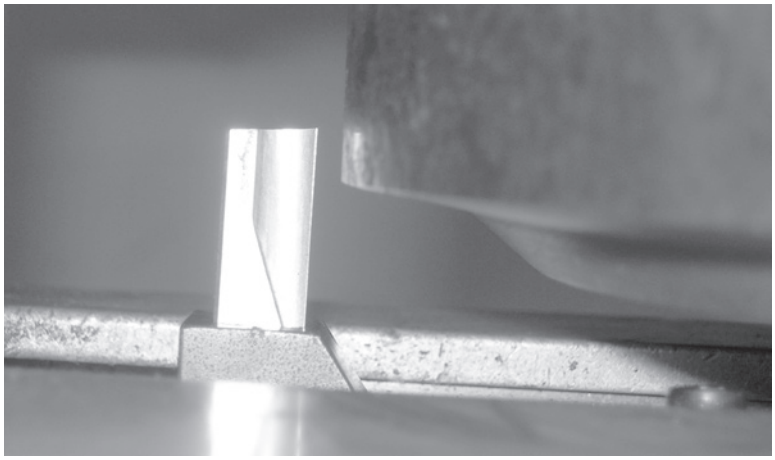


Figure 3-52. Position the tool to remove the appropriate width of cut.

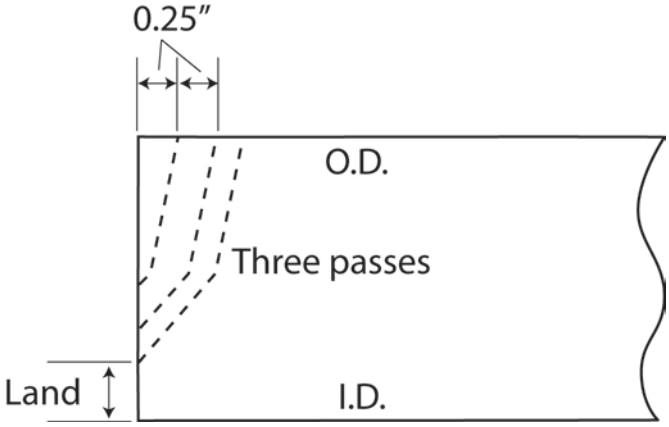


Figure 3-53. The diagram shows a compound bevel using multiple passes. Set the tool holder depth about 1/4" further back along the pipe O.D. for each pass.

Note: On the first pass, the cut shown in Figure 3-54 will be performed.

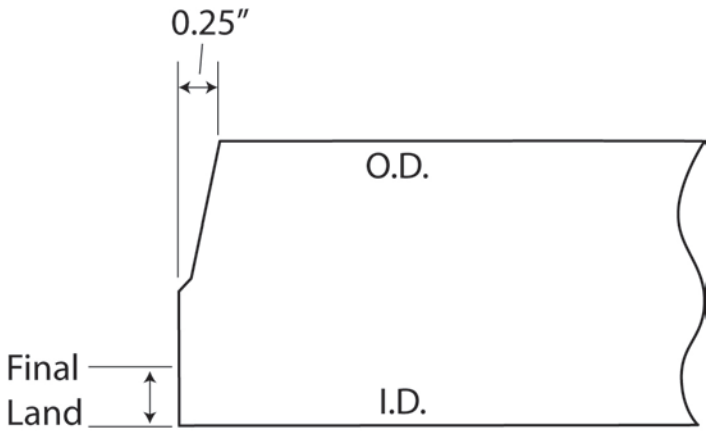


Figure 3-54. The illustration shows the profile of the first pass with the compound bevel template.

13. Tighten the tool holder cover screws securely.

Cutting the Bevel

1. Push the trip pin in to engage the trip.

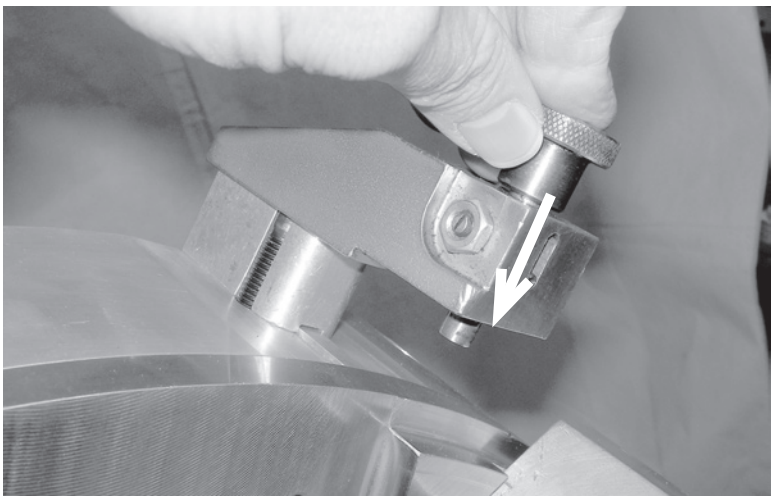


Figure 3-55. Push the trip pin in to engage the trip.

2. Manually rotate the rotating ring to align the star wheel with the trip. Time the star wheel by setting one point of it perpendicular to the ring.

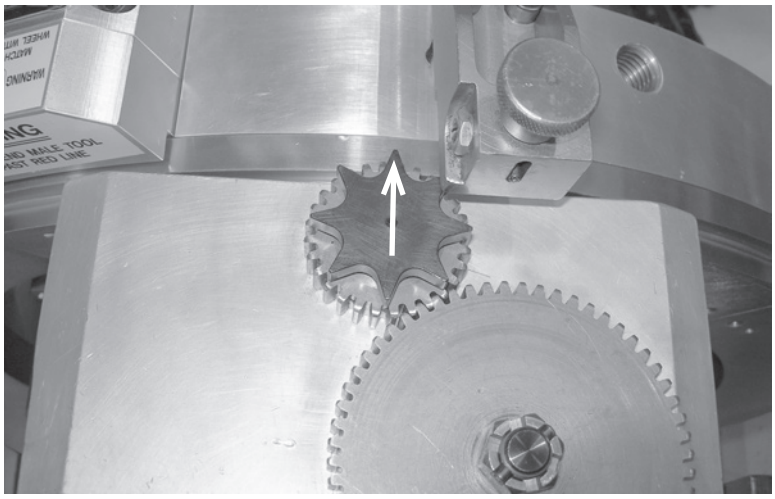


Figure 3-56. Set a point of the star wheel perpendicular to the LCSF ring, and make sure the trip engages the point of the wheel as you rotate the ring.

3. Install the motor on the LCSF.

4. Start the motor. Make sure the star wheel strikes the trip properly as the machine rotates.

5. The tool will follow the bevel profile until it comes out of the face surface of the pipe. When the tool is clear, turn off the motor.

6. Loosen the tool holder cover screws and slide the tool holder back. Snug the screws.

7. Using a 3/4” wrench or socket, turn the castle nut counter-clockwise to position the tip of the tool just past the O.D. of the pipe.

8. Loosen the tool holder screws and slide the tool holder out to position the tool for the next pass. Tighten the tool holder cover screws securely.

9. Operate the machine again and complete the second pass. Retract the tool holder again and turn the castle nut to reset the slide for the next pass.

Note: After each pass, measure the distance from the end of the bevel you have machined to the land location on the pipe face. (You may want to mark the land location on the pipe.) When you are within one pass of reaching the land, set the machine for the final pass.

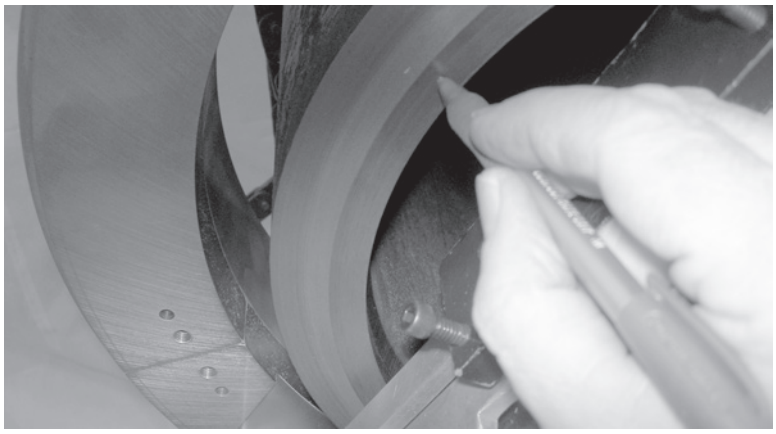


Figure 3-57. You can mark the final land location on the pipe to see when you are getting close to the final pass.

10. To set the final pass, loosen the tool holder cover screws and retract the tool holder slightly.

11. Using a 3/4" wrench or socket, turn the castle nut to position the tip of the tool at the land position on the face of the pipe. Push the tool holder forward so the tool is touching the pipe at the land location; adjust it slightly by turning the castle nut.

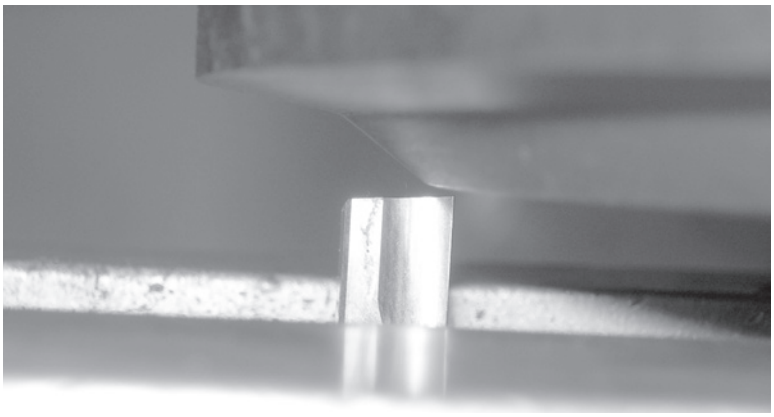


Figure 3-58. Set the tip of the bit against the pipe face at the specified land position.

12. Using a scale, measure the distance from the end of the tool holder to the tool holder plate. Write this measurement down.

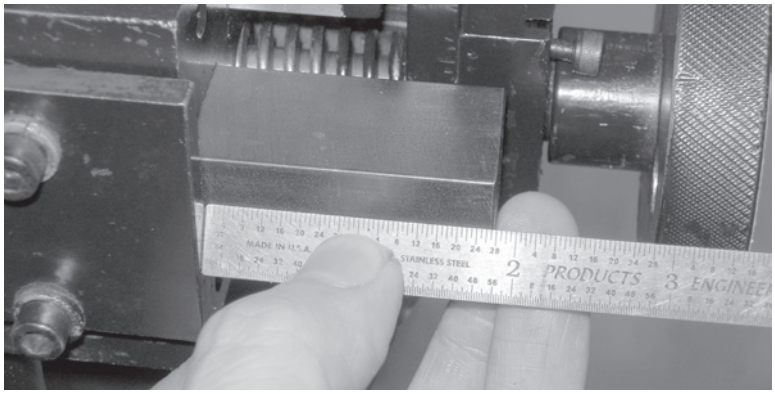


Figure 3-59. With the bit at the land position, measure the distance from the tool holder plate to the end of the tool holder.

13. Retract the tool holder and turn the castle nut to position the tool past the O.D. of the pipe.

14. Push the tool holder forward and slowly turn the castle nut until the tool tip just touches the O.D. of the pipe.

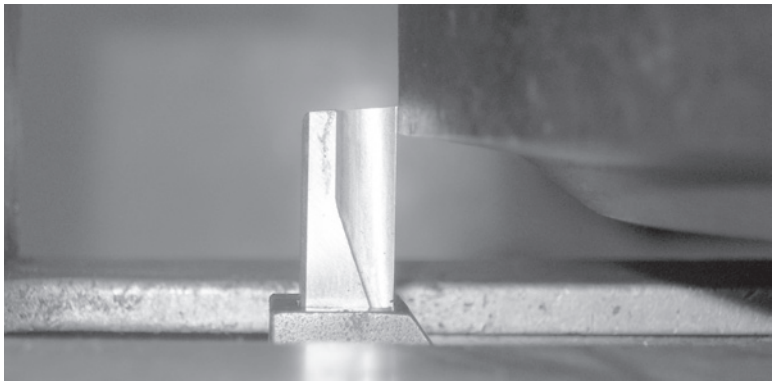


Figure 3-60. Position the bit so it touches the O.D. of the pipe.

15. Using the scale, position the tool holder exactly where it was when you measured it previously. Tighten the tool holder cover screws securely.

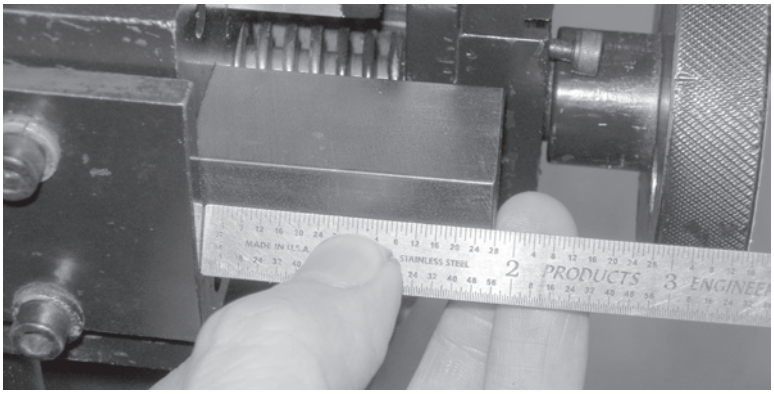


Figure 3-61. Slide the tool holder in to position the end of it the same distance from the tool holder plate as you measured previously.

16. Operate the machine to perform the final pass. The tool will exit the face of the pipe at the land location.

J-Prep Operation

If you need to do a J-prep profile, follow the setup procedure for the straight bevel in the previous section, but cut the bevel according to the following instructions.

You will use a radius tool to finish the J-prep. The figures in this section explain how to use the radius of the tool to calculate the operating dimensions for the straight bevel.

1. Calculate the amount of material you will need to leave on the land side of the pipe face. (This is dimension "B" in Figure 3-62.)

2. Perform the straight bevel operation, stopping on each pass as you reach the "B" dimension on the pipe face. You can stop and measure as you cut, or mark the location on the pipe face before you start. See Step 1 in Figure 3-64.

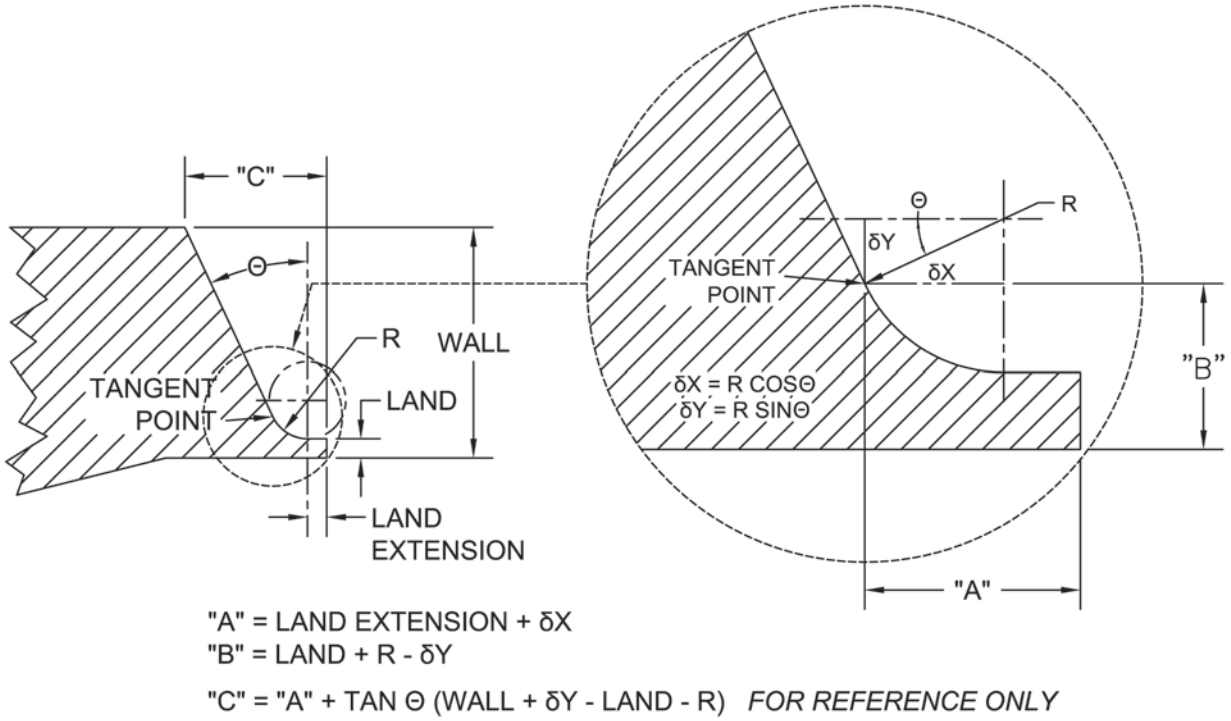


Figure 3-62. Formulas for calculating bevel dimensions for a J-prep.

Table 1: Example J-Prep Dimensions

Bevel Θ	R	Land	Land Extension	Wall	"A"	"B"	"C" Reference Only
20°	0.250"	0.125"	0.125"	1.50"	0.3599"	0.2895"	0.8005"
30°	0.188"	0.125"	0.063"	1.50"	0.2258"	0.2190"	0.9654"
37.5°	0.188"	0.063"	0.0"	2.00"	0.1492"	0.1366"	1.5790"

Figure 3-63. Example dimensions for common bevel angles and J-prep radii.

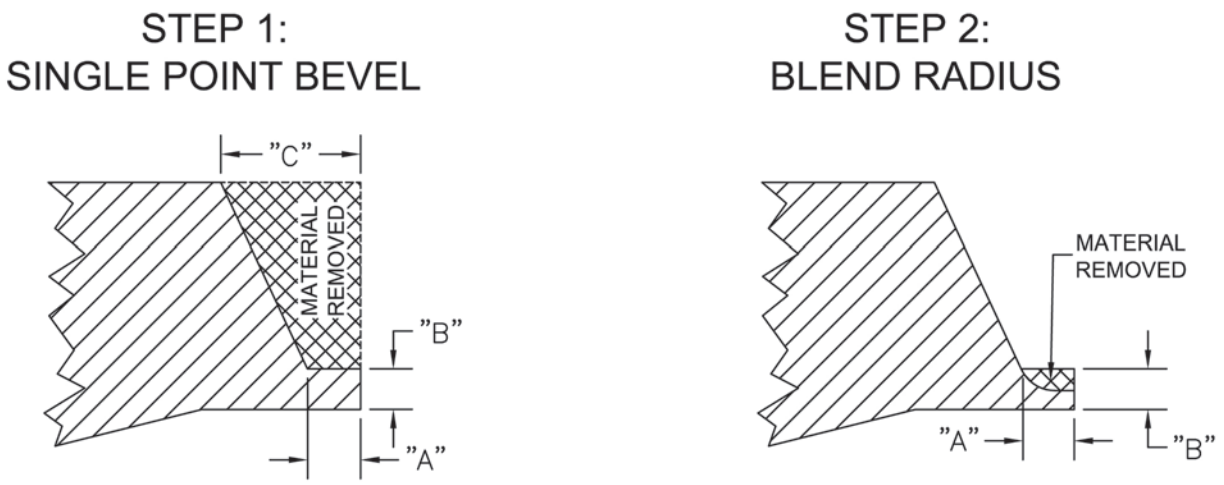


Figure 3-64. Cutting the J-prep.

3. Remove the straight bevel templates from the bridge slide.
4. Remove the single point tool and insert the radius tool. The radius tool fits in the single-point tool holder.
5. Replace the feed knob on the bridge slide.
6. Turn the feed knob until the radius tool is close to the pipe face.
7. Align a straightedge along the inner surface of the pipe out to the radius tool. Using a 3/4" wrench or socket, turn the castle nut until the edge of the radius tool is precisely aligned with the I.D. of the pipe.
8. Using an indicator or other measuring device, turn the castle nut clockwise to move the radius tool out along the pipe face by the thickness of the desired land measurement.
9. Start the LCSF.
10. Turn the feed knob counter-clockwise to advance the radius tool into the pipe. Continue feeding until the radius blends into the bottom of the bevel (Step 2 in Figure 3-64).

Chapter 4
Maintenance

LUBRICATION

Lubricate the following components each time you use the bridge slide.

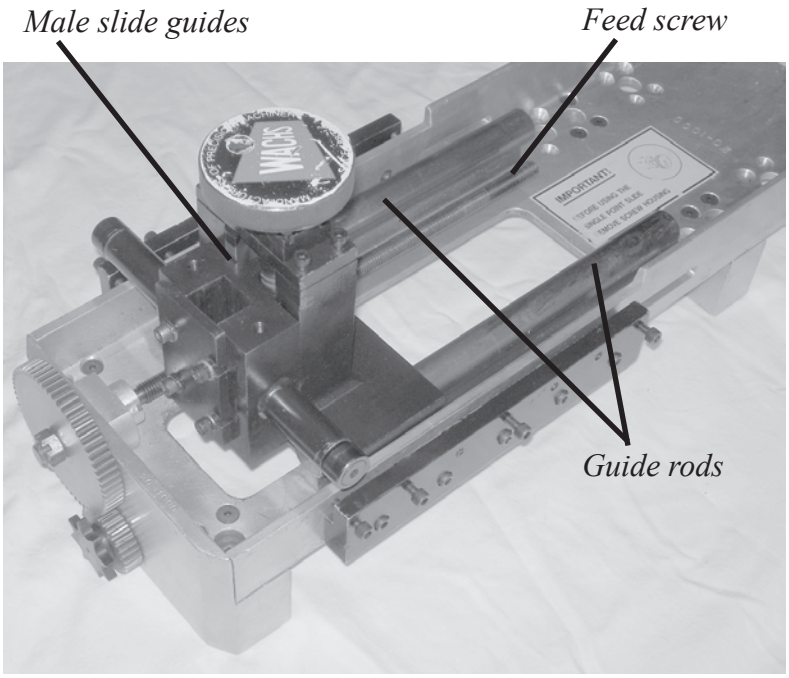


Figure 4-1. Lubricate the bridge slide at the indicated locations.

Machine Adjustments

On a regular basis, check all fasteners to make sure they are tight. In particular, check the tightness of the castle nut on the end of the feed screw and the castle nut on the inside end of the starwheel shaft.

Male Slide Feed Tension

You can adjust the tension on the male tool slide. It should be tight enough so that the feed knob does not turn freely. You should be able to turn the knob with one hand, but it should feel fairly snug.

An adjustable wedge shim lets you set the male slide tension. Figure 4-2 and Figure 4-3 show the adjustment screws for adjusting the wedge; there are two screws at the front of the slide and one screw at the back.

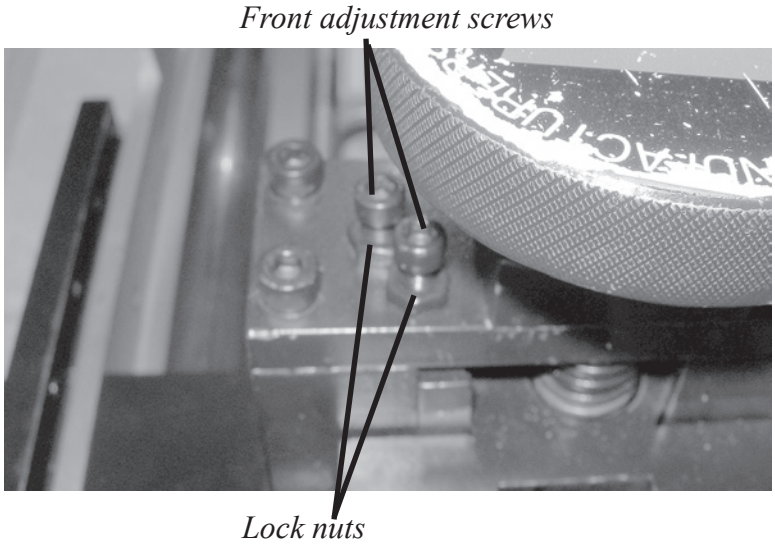


Figure 4-2. Front adjustment screws for male tool slide tension.

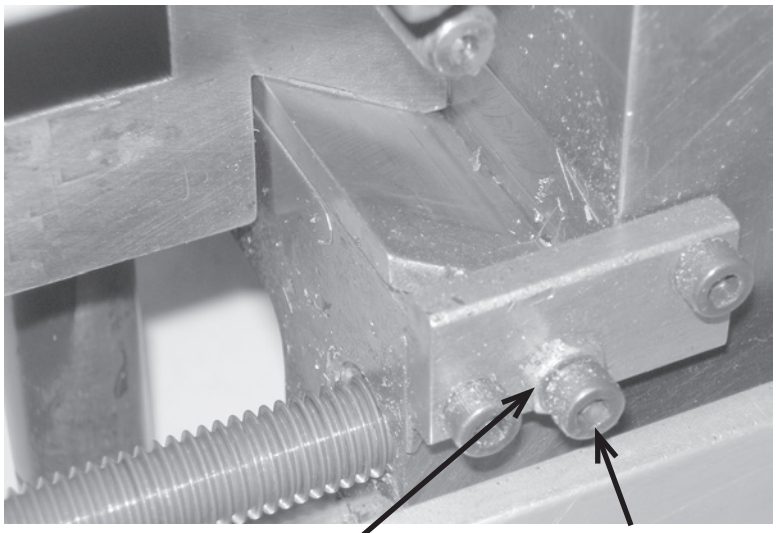


Figure 4-3. Back adjustment screw for male tool slide tension.

You will first need to remove the feed knob. Use the following procedure to remove the knob and adjust the tension.

1. Turn the feed knob counter-clockwise to feed the male slide forward (in) to the end of travel. This will take most of the tension out of the spring.

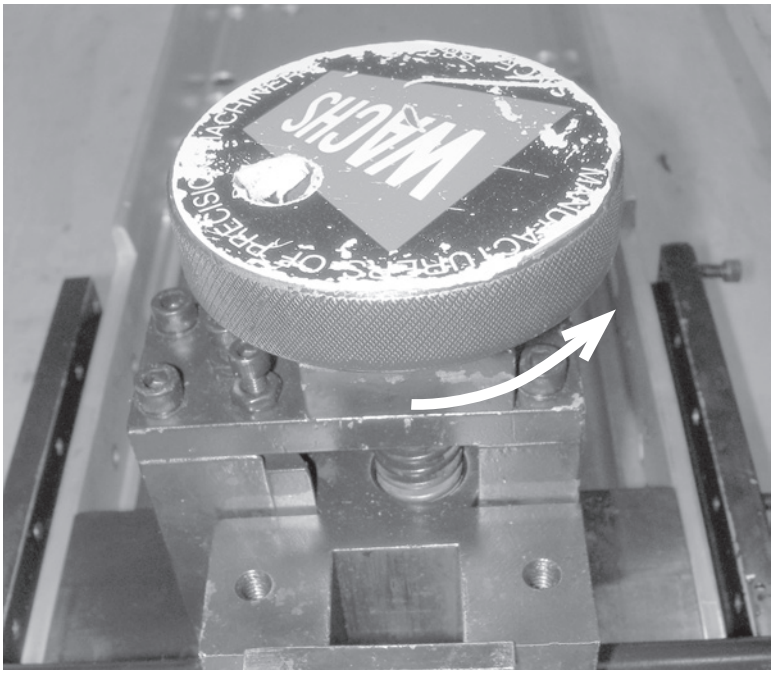


Figure 4-4. Feed the male slide all the way forward.

NOTE

The screws are captivated in the end block and will not fall out.

2. Insert a hex wrench through the hole in the feed knob and remove the screws holding the end block to the slide. Rotate the knob to access each screw in turn.

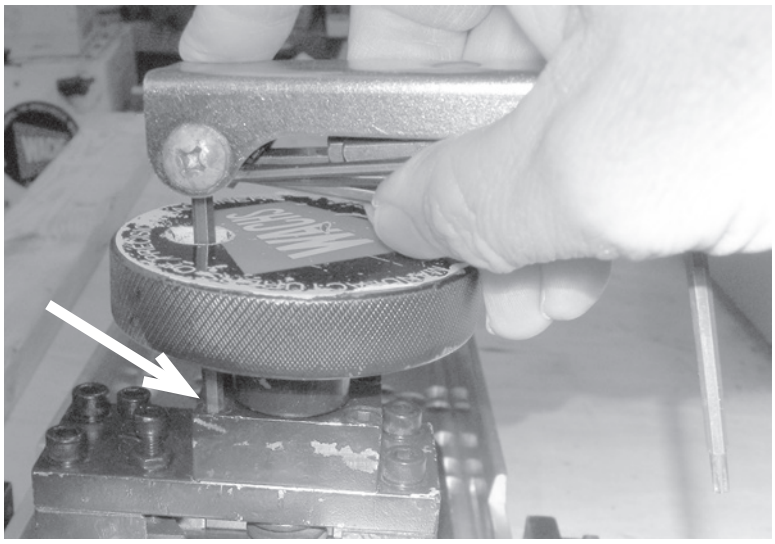


Figure 4-5. Use a hex wrench to remove the four screws in the end block. Rotate the feed knob to access each screw.

3. Turn the feed knob counter-clockwise to unscrew and remove it. The knob, end block, and feed screw will come out of the slide.

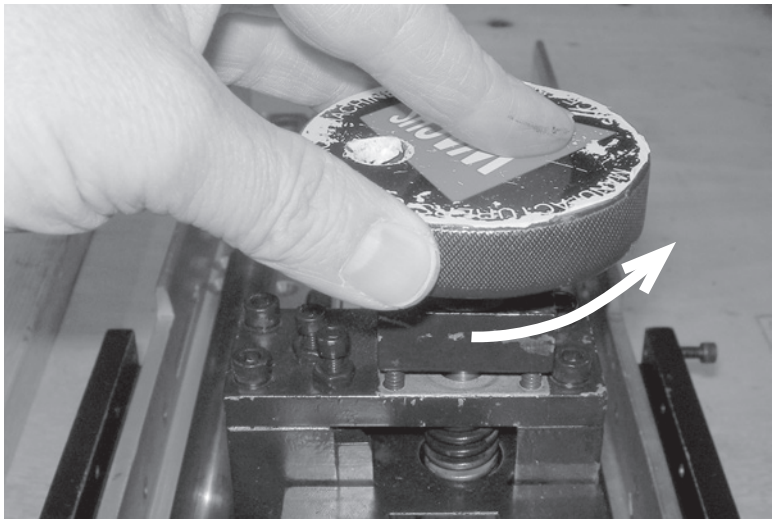


Figure 4-6. With the end block loose, turn the feed knob counter-clockwise to remove the feed screw.

NOTE

Unscrew each spring plate screw a few turns at a time until they are all removed.

4. Remove the spring plate on the end of the slide. Hold the plate down as you remove the screws.

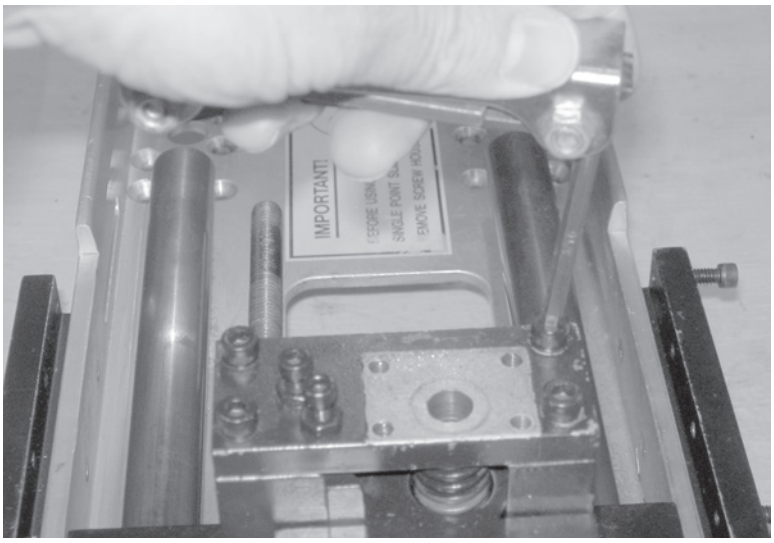


Figure 4-7. Remove the screws holding the spring plate. Turn each screw out a few turns at a time so that the spring pushes the plate up evenly.

5. Remove the spring. Replace the spring plate.

6. Loosen the lock nuts on both front adjustment screws and the back adjustment screw.

7. ***To tighten the male slide tension***, retract the back adjustment screw and screw in the front adjustment screws.

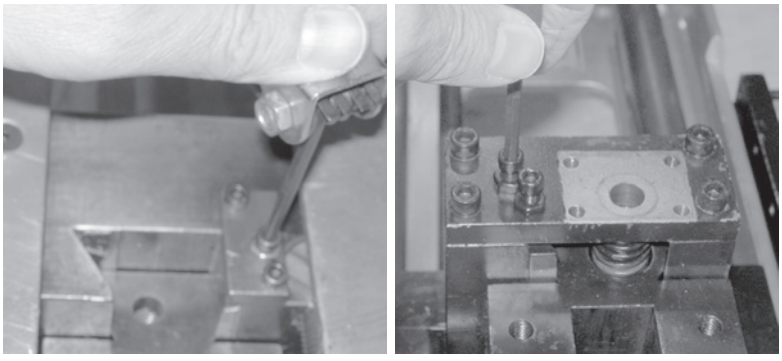


Figure 4-8. To tighten the slide tension, retract the back adjustment screw (left), then screw in the front adjustment screws.

8. ***To loosen the male slide tension***, retract the front adjustment screws and screw in the back adjustment screw.

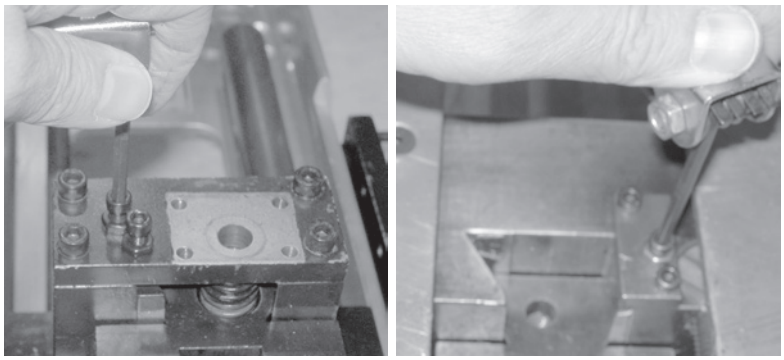


Figure 4-9. To loosen the slide tension, retract the front adjustment screws (left), then screw in the back adjustment screw.

9. Adjust the tension by about 1/2 turn of the screws. (You will need to re-install the feed knob to check the tension.)

10. Tighten down the two front adjustment screws.

11. Remove the spring plate and replace the spring. Put the spring plate back on and tighten the four screws.

12. Insert the feed screw back through the spring plate and turn the feed knob clockwise to reinstall the assembly. When the knob becomes snug, position the end block so that the screws line up with the holes in the spring plate.

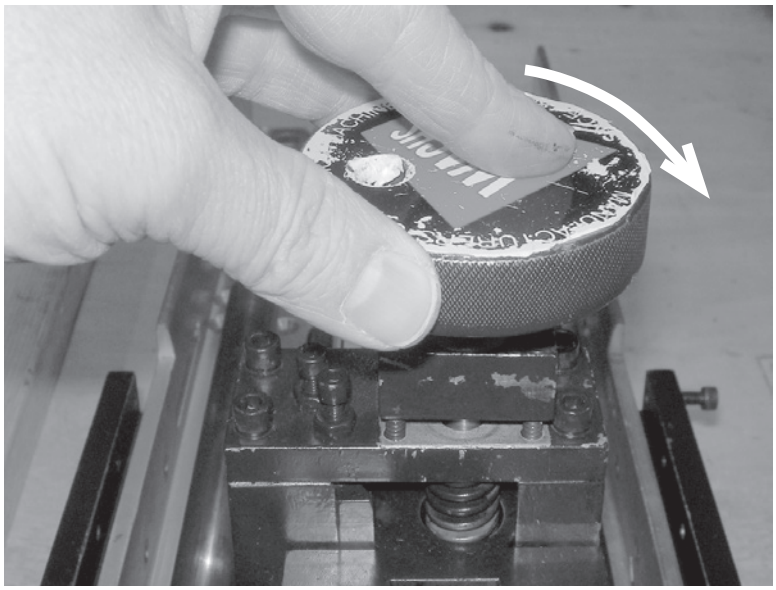


Figure 4-10. Insert the feed screw back through the end block and screw it into the slide by turning the knob clockwise.

13. Tighten the screws in the end block by inserting a hex wrench through the hole in the feed knob. Turn the knob **clockwise** from one screw to the next so that you do not loosen the feed screw.

14. Check the tension on the feed knob. Make sure you can turn it both directions to move the male slide.

Chapter 5
Parts List and Ordering Information

To order spare or replacement parts, see the ordering instructions below. Refer to the exploded view drawings and the parts lists that accompany them for assembly and parts identification.

Ordering Information

To place an order, request service, or get more detailed information on any E.H. Wachs products, call us at one of the following numbers:

U.S.:	800-323-8185
International:	847-537-8800

Ordering Replacement Parts

When ordering parts, refer to the parts lists earlier in this chapter. Please provide the part description and part number for all parts you are ordering.

Repair Information

Please call us for an authorization number before returning any equipment for repair or factory service. We will advise you of shipping and handling. When you send the equipment, please include the following information:

- Your name/company name
- Your address
- Your phone number
- A description of the problem or the work to be done.

Before we perform any repair, we will estimate the work and inform you of the cost and the time required to complete it.

Warranty Information

Enclosed with the manual is a warranty card. Please fill out the registration card and return to E.H. Wachs. Retain the owner's registration record and warranty card for your information.

Return Goods Address

Return equipment for repair to the following address.

E.H. Wachs
600 Knightsbridge Parkway
Lincolnshire, IL 60069 USA

ACCESSORIES

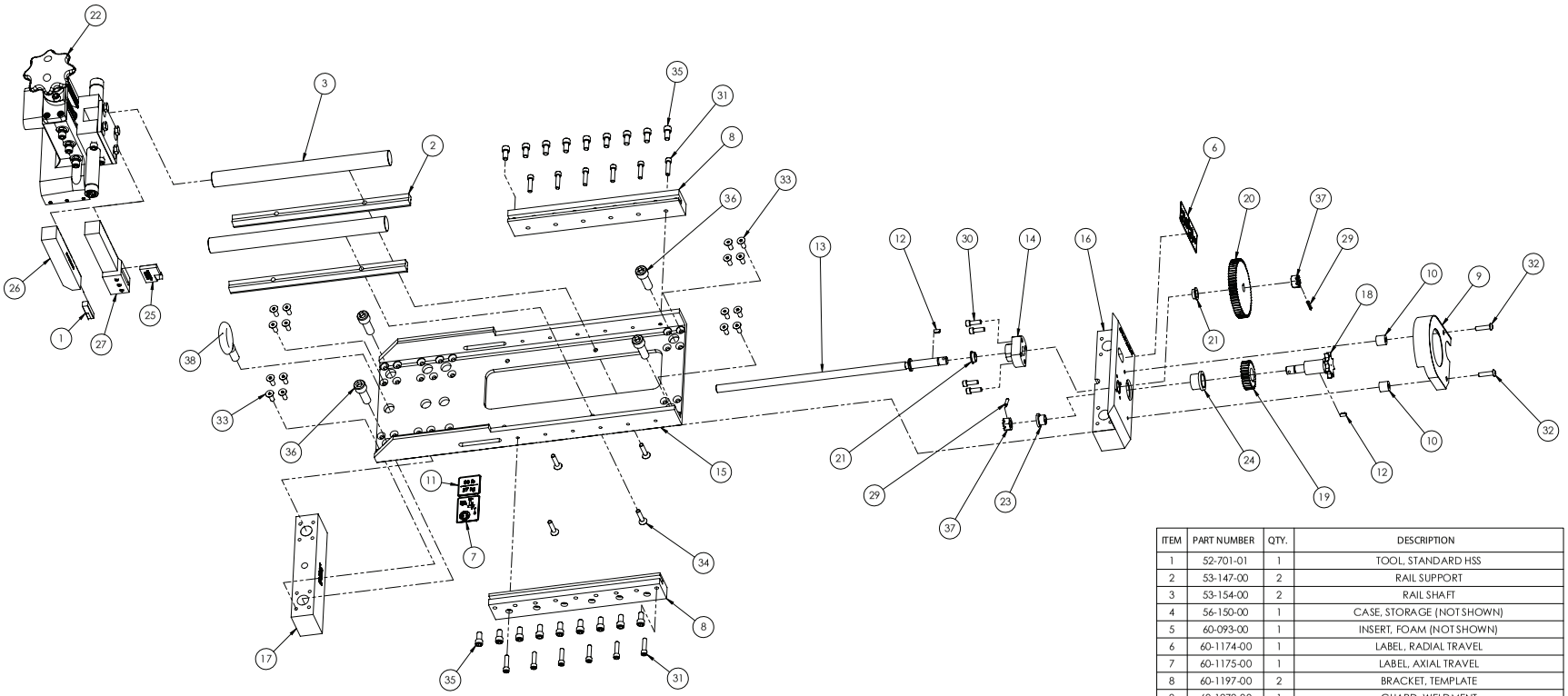
Use the part numbers in the following table to order accessories.

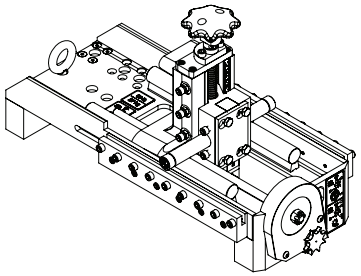
Table 1: Bridge Slide Accessories

Part Number	Description
60-707-00	Single point tool holder
60-708-00	Counterbore tool holder
52-701-01	HSS single point tool
60-700-04	4:1 taper counterbore tool bit
53-409-02	37.5° straight bevel template
53-409-03	30° straight bevel template
53-409-05	20° straight bevel template
53-409-11	10° x 37.5° compound bevel template
53-409-12	10° x 30° compound straight template
53-409-13	10° x 20° compound straight template
52-701-01	Brazed-on carbide single point tool
52-711-01	R 3/32" HSS single point tool (other radii available on request)
60-414-00	Dial indicator

Drawings and Parts Lists

Use the drawings on the following pages to identify and order spare or replacement parts.



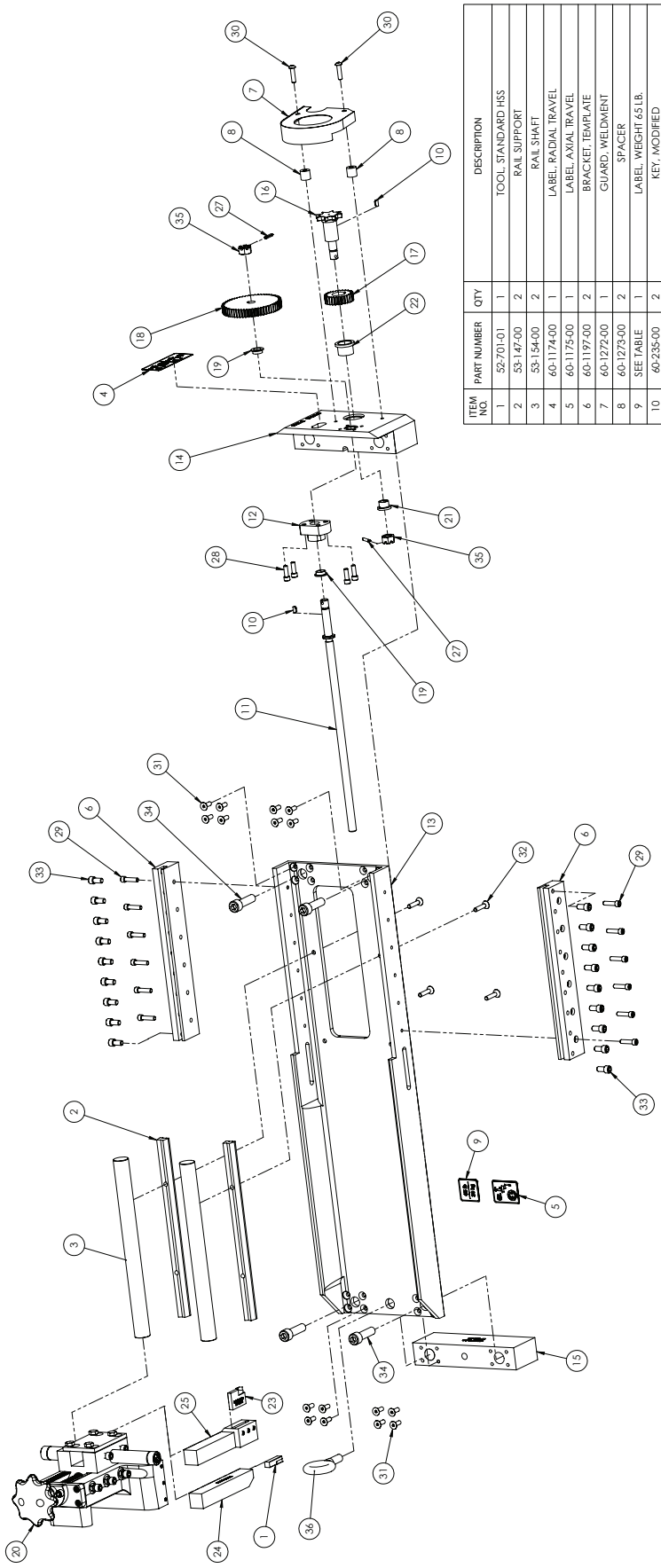


Parts and Assembly
12" to 20" LCSF Bridge Slide

TABLE

BRIDGE SLIDE MODEL	BRIDGE	* (ITEM 33 QTY.)
60-428-12	60-272-12	14
60-428-14	60-272-14	14
60-428-16	60-272-16	16
60-428-20	60-272-20	16

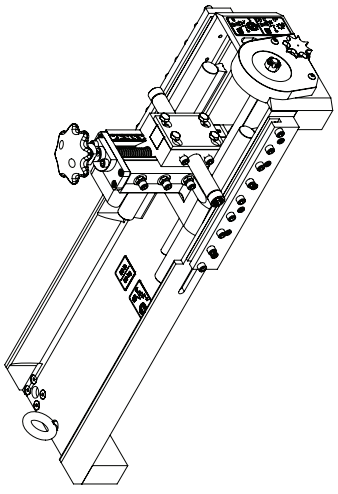
ITEM	PART NUMBER	QTY.	DESCRIPTION
1	52-701-01	1	TOOL, STANDARD HSS
2	53-147-00	2	RAIL SUPPORT
3	53-154-00	2	RAIL SHAFT
4	56-150-00	1	CASE, STORAGE (NOT SHOWN)
5	60-093-00	1	INSERT, FOAM (NOT SHOWN)
6	60-1174-00	1	LABEL, RADIAL TRAVEL
7	60-1175-00	1	LABEL, AXIAL TRAVEL
8	60-1197-00	2	BRACKET, TEMPLATE
9	60-1272-00	1	GUARD, WELDMENT
10	60-1273-00	2	SPACER
11	60-1287-60	1	LABEL, WEIGHT 60 LB.
12	60-235-00	2	KEY, MODIFIED
13	60-270-00	1	SCREW, FEED
14	60-271-00	1	BLOCK, FEED SCREW
15	SEE TABLE	1	BRIDGE
16	60-273-01	1	SUPPORT, TOP 12"-20"
17	60-274-01	1	SUPPORT, BOTTOM 12"-20"
18	60-275-00	1	STARWHEEL
19	60-276-00	1	GEAR, STARWHEEL
20	60-277-00	1	GEAR, FEED SCREW
21	60-288-00	2	BEARING, SHOULDER
22	60-300-01	1	SUBASSEMBLY, LCSF BRIDGE SLIDE
23	60-325-00	1	BUSHING
24	60-326-00	1	BUSHING
25	60-700-04	1	4-1 TAPER COUNTERBORE TOOL FOR SF204/3-SF1420/3
26	60-707-00	1	HOLDER, BRIDEGSLIDE SW TOOL ASSEMBLY
27	60-708-00	1	HOLDER, C'BORE TOOLING ASSEMBLY
28	60-MAN-03	1	BRIDGE SLIDE USER MANUAL (NOT SHOWN)
29	90-036-57	2	PIN, 5/32 X 3/4 ROLL
30	90-050-07	4	SHCS, 1/4-20 X 3/4
31	90-050-10	12	SHCS, 1/4-20 x 1
32	90-052-10	2	BHCS, 1/4-20 x 1
33	90-053-07	*	FHCS, 1/4-20 X 3/4
34	90-053-12	4	FHCS, 1/4-20 X 1-1/4
35	90-060-06	18	SHCS, 5/16-18 X 5/8
36	90-090-15	4	SHCS, 1/2-13 X 1-1/2
37	90-095-10	2	NUT, 1/2-20 HEX SLOTD
38	90-099-91	1	EYE BOLT, 1/2-13
39	90-800-09	1	WRENCH, 1/2 COMBINATION (NOT SHOWN)
40	90-800-68	1	SOCKET, 1/2 DRV x 3/4 6PT (NOT SHOWN)



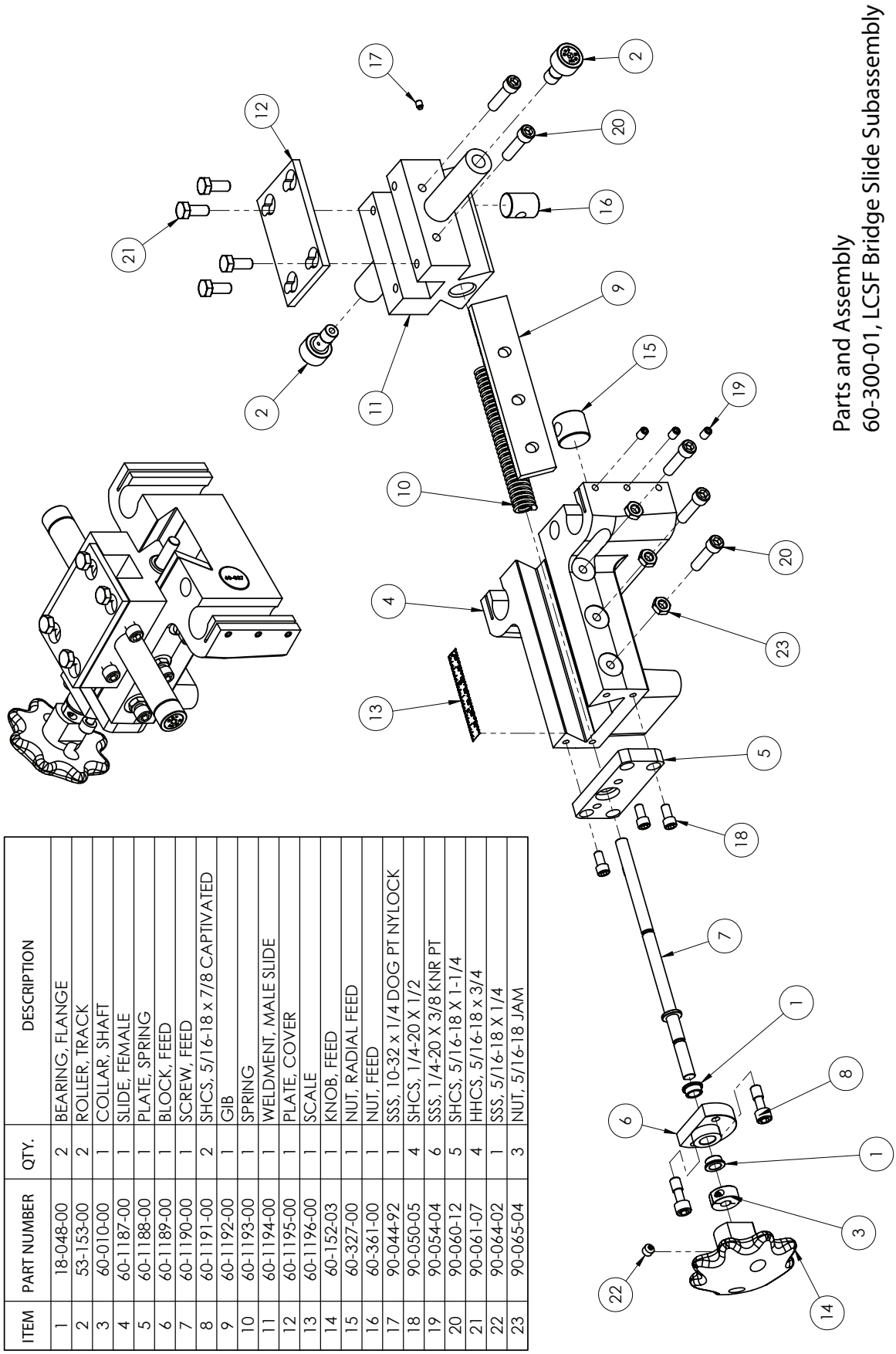
ITEM NO.	PART NUMBER	QTY	DESCRIPTION
1	52-701-01	1	TOOL, STANDARD HSS
2	53-147-00	2	RAIL SUPPORT
3	53-154-00	2	RAIL SHAFT
4	60-1174-00	1	LABEL, RADIAL TRAVEL
5	60-1175-00	1	LABEL, AXIAL TRAVEL
6	60-1197-00	2	BRACKET, TEMPLATE
7	60-1272-00	1	GUARD, WELDMENT
8	60-1273-00	2	SPACER
9	SEE TABLE	1	LABEL, WEIGHT 65 LB.
10	60-235-00	2	KEY, MODIFIED
11	60-270-00	1	SCREW, FEED
12	60-271-00	1	BLOCK, FEED SCREW
13	SEE TABLE	1	24" BRIDGE
14	60-273-00	1	SUPPORT, TOP
15	60-274-00	1	SUPPORT, BOTTOM
16	60-275-00	1	STARWHEEL
17	60-276-00	1	GEAR, STARWHEEL
18	60-277-00	1	GEAR, FEED SCREW
19	60-288-00	2	BEARING, SHOULDER
20	60-300-01	1	SUBASSEMBLY, LCSF BRIDGE SLIDE
21	60-325-00	1	BUSHING
22	60-326-00	1	BUSHING
23	60-700-04	1	4-1 TAPER COUNTERBORE TOOL FOR SF204/3-SF1420/3
24	60-707-00	1	HOLDER, BRIDEGSLIDE SW TOOL ASSEMBLY
25	60-708-00	1	HOLDER, C'BORE TOOLING ASSEMBLY
26	60-MAN-03	1	BRIDGE SLIDE USER MANUAL (NOT SHOWN)
27	90-036-57	2	PIN, 5/32 X 3/4 ROLL
28	90-050-07	4	SHCS, 1/4-20 X 3/4
29	90-050-10	12	SHCS, 1/4-20 x 1
30	90-052-10	2	BHCS, 1/4-20 x 1
31	90-053-07	16	FHCS, 1/4-20 X 3/4
32	90-053-12	4	FHCS, 1/4-20 X 1-1/4
33	90-060-06	18	SHCS, 5/16-18 X 5/8
34	90-090-17	4	SHCS, 1/2-13 X 1-3/4
35	90-095-10	2	NUT, 1/2-20 HEX SLOTD
36	90-099-91	1	EYE BOLT, 1/2-13
37	90-800-09	1	WRENCH, 1/2 COMBINATION (NOT SHOWN)
38	90-800-68	1	SOCKET, 1/2 DRV x 3/4 6PT (NOT SHOWN)

TABLE

BRIDGE SLIDE MODEL	BRIDGE	WEIGHT LABEL
60-428-24	60-272-24	60-1287-65
60-428-28	60-272-28	60-1287-65
60-428-32	60-272-32	60-1287-65
60-428-36	60-272-36	60-1287-65
60-428-39	60-272-39	60-1287-70
60-428-42	60-272-42	60-1287-70
60-428-48	60-272-48	60-1287-70

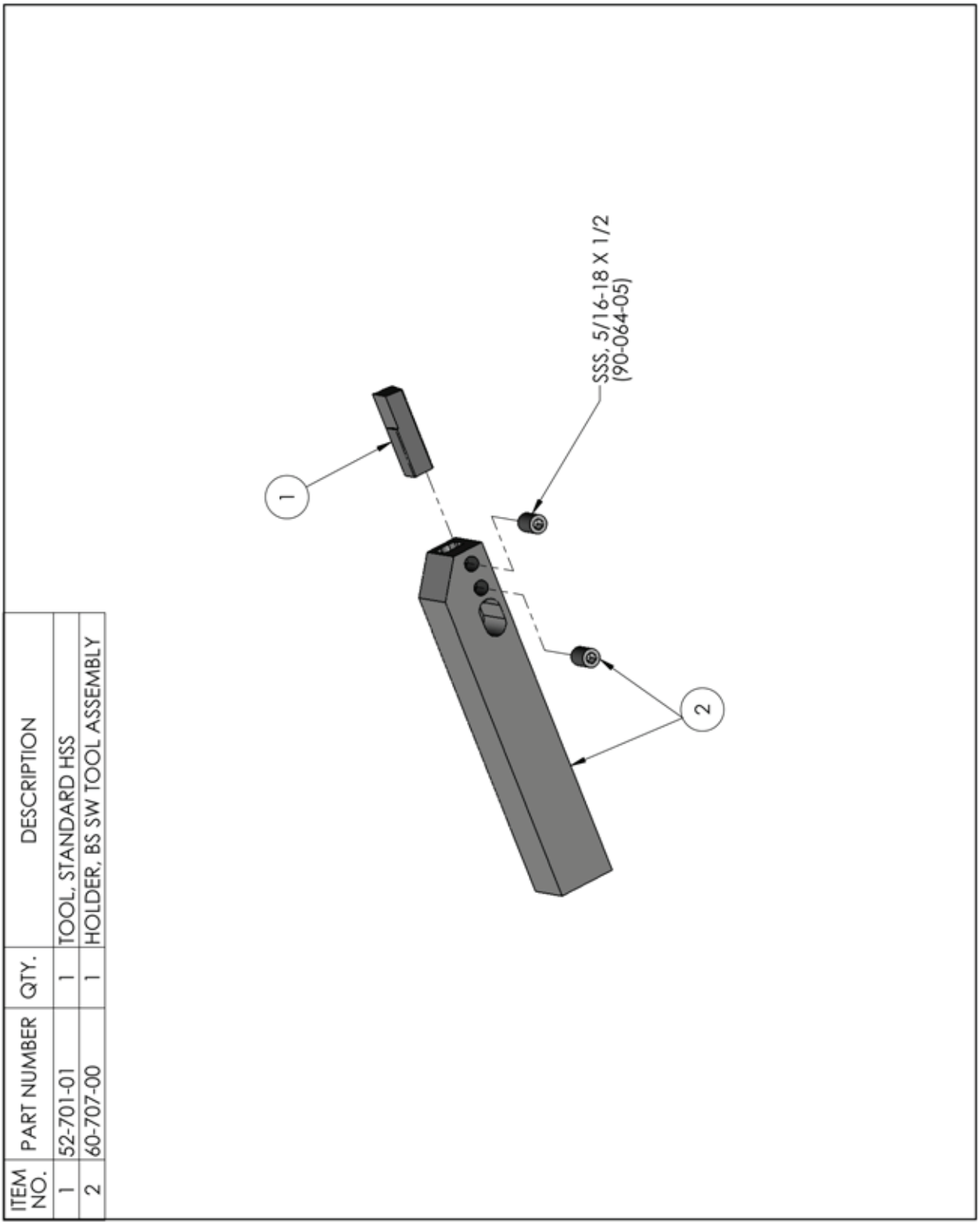


Parts and Assembly
24" to 48" LCSF Bridge Slide



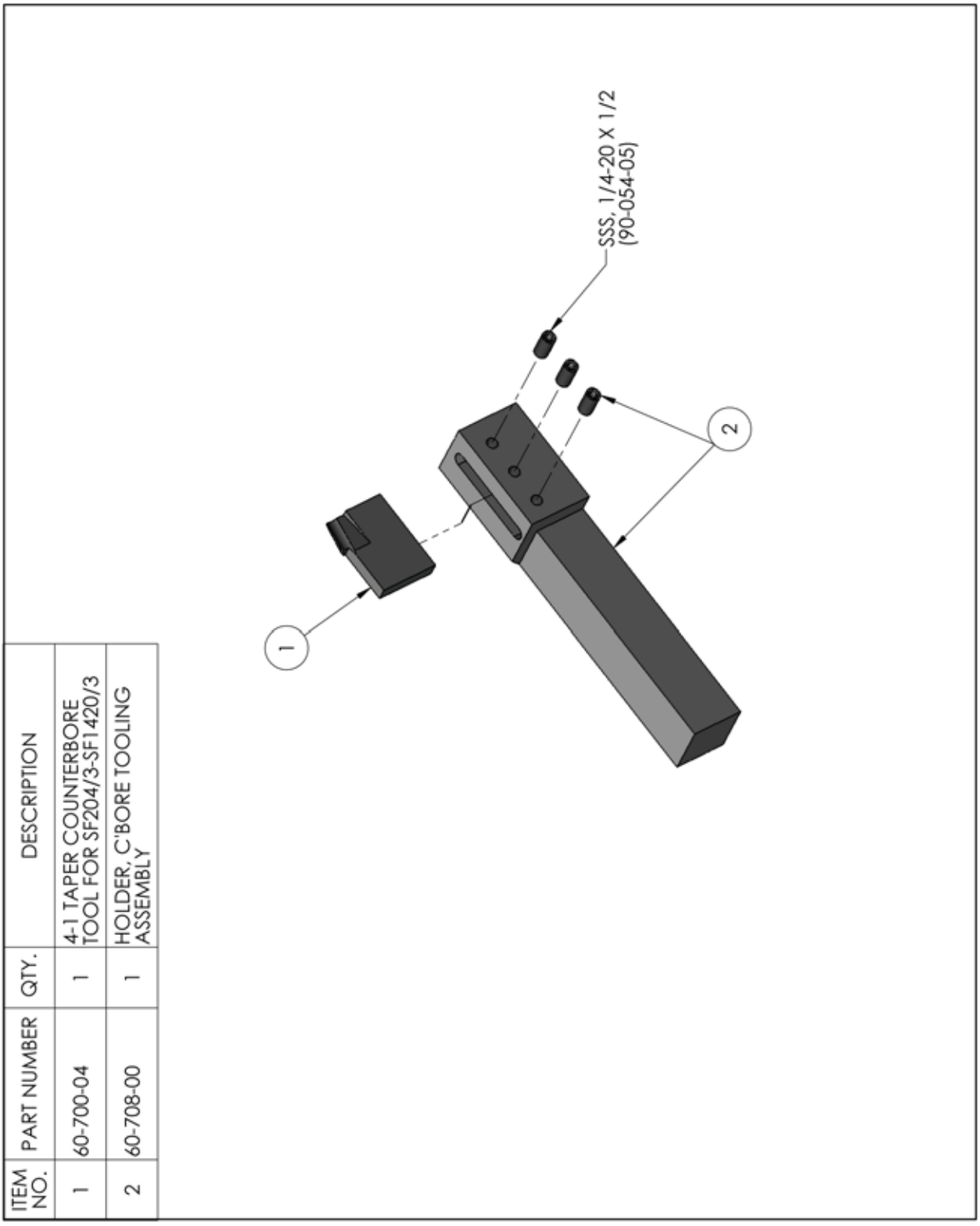
Parts and Assembly
60-300-01, LCSF Bridge Slide Subassembly

ITEM	PART NUMBER	QTY.	DESCRIPTION
1	18-048-00	2	BEARING, FLANGE
2	53-153-00	2	ROLLER, TRACK
3	60-010-00	1	COLLAR, SHAFT
4	60-1187-00	1	SLIDE, FEMALE
5	60-1188-00	1	PLATE, SPRING
6	60-1189-00	1	BLOCK, FEED
7	60-1190-00	1	SCREW, FEED
8	60-1191-00	2	SHCS, 5/16-18 x 7/8 CAPTIVATED
9	60-1192-00	1	GIB
10	60-1193-00	1	SPRING
11	60-1194-00	1	WELDMENT, MALE SLIDE
12	60-1195-00	1	PLATE, COVER
13	60-1196-00	1	SCALE
14	60-152-03	1	KNOB, FEED
15	60-327-00	1	NUT, RADIAL FEED
16	60-361-00	1	NUT, FEED
17	90-044-92	1	SSS, 10-32 x 1/4 DOG PT NYLOCK
18	90-050-05	4	SHCS, 1/4-20 X 1/2
19	90-054-04	6	SSS, 1/4-20 X 3/8 KNR PT
20	90-060-12	5	SHCS, 5/16-18 X 1-1/4
21	90-061-07	4	HHCS, 5/16-18 x 3/4
22	90-064-02	1	SSS, 5/16-18 X 1/4
23	90-065-04	3	NUT, 5/16-18 JAM



ITEM NO.	PART NUMBER	QTY.	DESCRIPTION
1	52-701-01	1	TOOL, STANDARD HSS
2	60-707-00	1	HOLDER, BS SW TOOL ASSEMBLY

Single point tool assembly.



ITEM NO.	PART NUMBER	QTY.	DESCRIPTION
1	60-700-04	1	4-1 TAPER COUNTERBORE TOOL FOR SF204/3-SF1420/3
2	60-708-00	1	HOLDER, C'BORE TOOLING ASSEMBLY

Counterbore tool assembly.

E.H.WACHS

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