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USING THE FINEST US & GLOBAL MATERIALS

BL SERIES BRAKE LATHE

Industry-leading combination bench lathe

OPERATIONS MANUAL

Operation Manual

Standard Operation Video

Form: 7674-T
06/24/2024
Supersedes 09-22

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Model Number _____
Serial Number _____
Date Installed _____
Service and Parts Representative _____
Phone Number _____
Sales Representative _____
Phone Number _____

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Clean Insert and Tool Holders Daily	☐	☐
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Individuals and Date Trained

_____ _____
_____ _____
_____ _____

2. Getting Started

2.1. Introduction

This manual provides operation instructions and information required to operate the BL Series Drum/Disc Lathe. This manual assumes that you are familiar with the basics of brake lathes. Section 1 provides mechanical and electrical safety information as well as basic information about the BL Series Drum / Disc Lathe. Following sections contain more detailed information about equipment, procedures, and maintenance. Italicized references (for example, Refer to “Equipment Components” page 5.) are used to refer to specific parts of this manual that provide additional information or explanation. These references should be read for additional information to the instructions presented.

The owner of the BL Series brake lathe is solely responsible for arranging technical training. The lathe is to be operated only by a qualified Hunter trained technician. Maintaining records of personnel trained is solely the responsibility of the owner or management.

For further operation instructions for BL6x and BL7x lathes with ACT / Digi-Cal, refer to “Chapter 3. ACT / Digi-Cal” of these instructions.

2.2. For Your Safety

2.2.1. Hazard Definitions

Watch for these symbols:

CAUTION
Hazards or unsafe practices, which could result in minor personal injury or product or property damage.

WARNING
Hazards or unsafe practices, which could result in severe personal injury or death.

DANGER
Immediate hazards, which will result in severe personal injury or death.

These symbols identify situations that could be detrimental to your safety and or cause equipment damage.

Important Safety Instructions

Read all instructions.

All visitors and children should be kept a safe distance from the work area.

To reduce the risk of fire, do not operate the equipment in the vicinity of open containers of flammable liquids (gasoline).

Do not let cord hang over edge of table, bench or counter, or come in contact with hot manifolds or moving parts.

Do not operate the equipment with a damaged cord or if the equipment has been dropped or damaged - until it has been examined by a qualified service technician.

If an extension cord is necessary, a cord with a current rating equal to or more than that of the equipment should be used. Cords rated for less current than the equipment may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled .

Always unplug equipment from electrical outlet when not in use. Never use the cord to pull the plug from the outlet. Grasp plug and pull to disconnect.

Remove adjusting keys and wrenches. Form a habit of checking to see that keys and adjusting wrenches are removed from tool before turning it on.

Keep the work area clean. Cluttered floors, benches and areas around the lathe invite accidents

Do not use in a dangerous environment. Do not use in damp or wet locations, or expose them to rain. Keep the work area well lighted.

Wear proper apparel. Wear no loose clothing, gloves, neckties, rings, bracelets, or other jewelry which may get caught in moving parts. Non-slip footwear is recommended. Wear protective hair covering to contain long hair.

Do not overreach. Keep proper footing and balance at all times.

Always WEAR OSHA approved safety glasses. Everyday eyeglasses only have impact resistant lenses; they are NOT safety glasses.

Also use face or dust mask if cutting operation is dusty.

Never stand on the tool. Serious injury could occur if the tool is tipped or if the cutting tool is unintentionally contacted.

Keep guards in place and in working order.

Unplug tools before servicing, when changing accessories such as blades, bits,cutters, and the like.

Secure work. Use clamps or a vise to hold work when practical. It is safer than using your hand and it frees both hands to operate tool.

Do not force a tool. It will do the job better and safer at the rate for which it was designed.

Use the right tool. Do not force a tool or attachment to do a job for which it was not designed.

Maintain tools with care. Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.

Use only Hunter recommended accessories. Consult the Brake Lathe Packages and Accessories Brochure Form 3947-T for recommended accessories. The use of non-recommended accessories may cause risk of injury to persons.

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

Never leave the tool running unattended. Turn the power “OFF.” Do not leave the tool until it comes to a complete stop.

Reduce the risk of unintentional starting. Make sure switch is in “OFF” position before plugging in.

SAVE THESE INSTRUCTIONS

2.3. Specific Safety Precautions / Power Source

Specifications for Extension Cords

When using an extension cord, be sure to use one designed to carry the current your product will draw. Make sure your extension cord is in good condition. An undersized cord will cause a drop in line voltage resulting in loss of power and

overheating. Table 1 shows the correct size to use depending on cord length and name plate ampere rating. If in doubt, use the next heavier gauge. The **smaller** the gauge number, the **heavier** the cord.

Table 1 - Minimum Gage For Extension Cord					
Ampere Rating	Volts	Total Length of cord in feet			
	120 V	25ft.	50ft.	100ft.	150ft.
	240 V	50ft.	100ft.	200ft.	300ft.
More Than	Not More Than	AWG			
0	6	18	16	16	14
6	10	18	16	14	12
10	12	16	16	14	12
12	16	14	12	Not	Recommended

Power Source Grounding Instructions

In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This tool is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.

Do not modify the plug provided - if it will not fit the outlet, have the proper outlet installed by a qualified electrician.

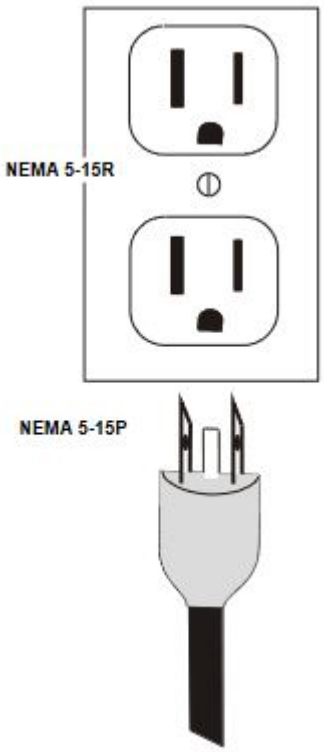
Improper connection of the equipment-grounding conductor can result in a risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do NOT connect the equipment-grounding conductor to a live terminal.

Check with a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the tool is properly grounded.

Use only 3-wire extension cords that have 3-prong grounding plugs and 3-pole receptacles that accept the tool's plug.

Repair or replace damaged or worn cords immediately.

The Lathe is intended for use on all grounded supply circuits having a nominal rating less than 110VAC or 220VAC. An example of an 110VAC outlet on this type circuit is illustrated below.



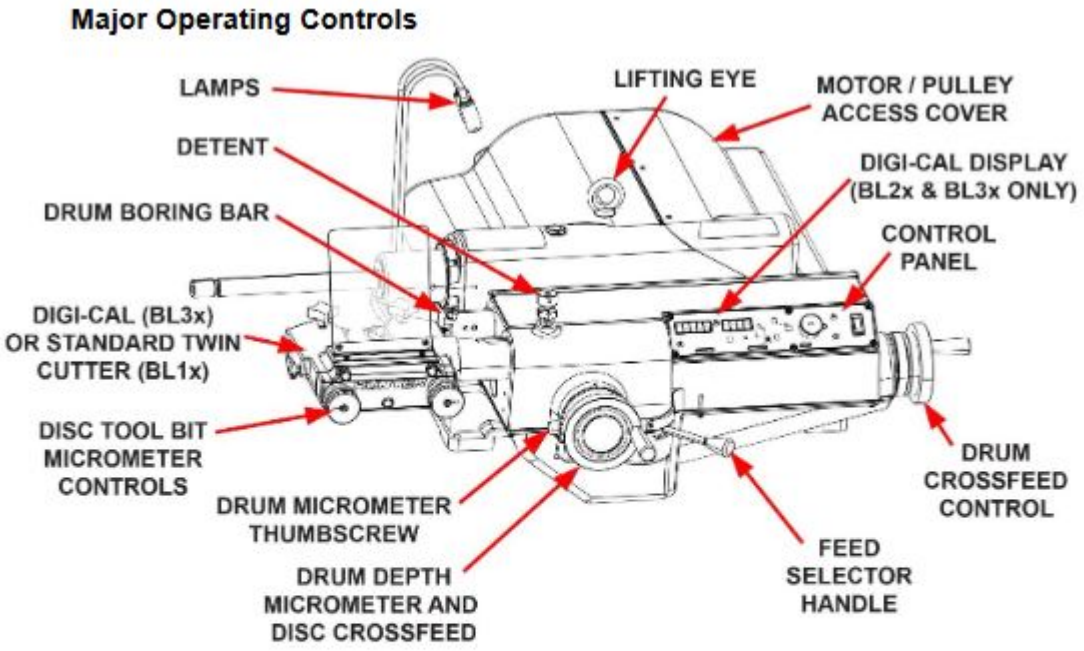
The lathe has a grounding plug that looks like the plug illustrated above. Do NOT use adaptors that allow you to bypass required equipment electrical grounding.

NOTE:	The lathe may also be used on a 220VAC nominal circuit. Contact your Service Representative for this conversion.

3. Operation Information

3.1. Equipment Components

Major Operating Controls



Brake Lathe Components (Drum/Disc Lathe with ACT / Digi-Cal (BL3x) Shown)

Drum Depth Micrometer Control / Disc Crossfeed Control

The drum depth micrometer control and the disc crossfeed control is the same controller. The micrometer scale permits accurate depth-of-cut control or disc crossfeed control.

Rotate the disc crossfeed control handle clockwise to move the cutting inserts inward, or counterclockwise to move them outward.

Disc Tool Bit Micrometer Controls

Disc tool bit micrometer controls are used to make accurate cutting insert depth adjustments. Rotating the controls clockwise feeds the cutting inserts into the disc friction surface, rotating the controls counter clockwise moves them away from the disc surface

Drum Crossfeed Control

Rotate the drum crossfeed control handle clockwise, and the boring bar extends to move the cutting insert toward the inner edge of the drum diameter. Rotate the handle counter clockwise, and the insert moves toward the outer edge of the drum diameter.

Feed Selector Handle

Select “DRUM” or “DISC” automatic feed control with the feed selector handle

Control Panel

BL control panel (Version without ACT / Digi-Cal shown)

All control panels both contain the following controls / indicator:

“FEED RATE” dial is used to change feed rate from slow to fast. Slow is labeled as FINE. Fast is labeled as COURSE. The recommended range of feed rates for One Cut Pass is also specified. One Cut operation is the method of cutting a drum or disc in which, a single cut is used to remove friction surface material and provide the desired finish. This is a deep cut made at a slow feed rate.

“RETRACT DRUM BAR” indicator is a red LED that glows when the drum bar is NOT fully retracted in its home position.

“LIGHTS” button turns the two LED work light ON and OFF.

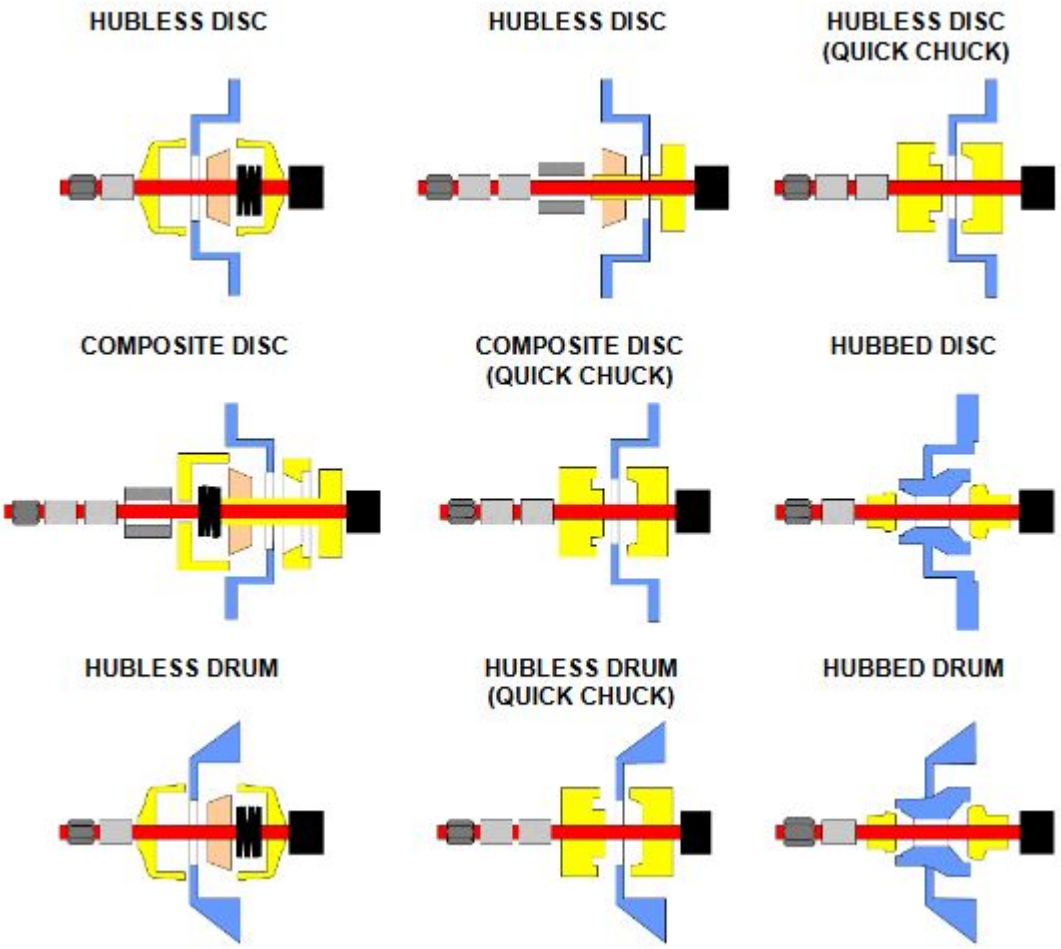
“POWER” toggle switch turns the spindle motor and controls ON and OFF.

For the additional buttons on the act / Digi-Cal control panel, refer to“Chapter 3. ACT / Digi-Cal” of these instructions

3.2. Drum and Disc Mounting

Typical Drum/Disc Mounting Configurations

These figures illustrate how typical hubbed and hubless drums and discs are mounted on the arbor. Adaptors and / or collets fit into the bearing seats or center holes as outlined below. Adaptors may be used as spacers as needed. It is important that all surfaces contacted by adaptors are as clean as possible.



NOTE:	To ensure proper operation of the lathe, the arbor and all adaptors must be clean and free of burrs and nicks.

Hubless Discs and Drums

NOTE:	The centering cone fits into the pilot hole of the drum or disc from the inside and the mounting adaptor cups clamp against the surface. Use the largest clamp cups that contact the flat mounting surface. Spacers are used to fill out the arbor shaft.

Care should be taken to ensure the following:

All contact surfaces on the arbor, the centering cone, and the adaptors are clean.

Verify that the centering cone and the adaptors are free of nicks and burrs. If the contact surfaces are not smooth, flat, and making full contact, sand with fine emery cloth or replace.

Verify that the arbor runout is no more than .0015 inch (.381 mm). The arbor should be cleaned prior to installing. If the arbor is bent, replace with a new one.

Verify that the mounting surfaces on the disc are clean and free of any high spots. These high spots may be eliminated by filing.

Proper mounting is important to ensure a correct finish.

Hubbed Discs and Drums

NOTE:	Collet adaptors fit in the bearing seats and various spacers fill out the arbor shaft so that the arbor nut can be tightened.

Care should be taken to ensure the following:

All contact surfaces on the arbor and split collets must be clean.

All grease, dirt and chips must be removed from grooves in split collets.

Verify that the arbor runout is no more than .0015 inch (.381 mm). The arbor should be cleaned prior to installing. If the arbor is bent, replace with a new one.

All grease and dirt should be cleaned from the disc or drum hub prior to mounting.

Proper mounting is important to ensure a correct finish.

⚠ CAUTION:	The BL Series lathe incorporates the use of "self-locking" split collets. When using these collets, do not overtighten the arbor nut. Tighten the arbor nut slightly tighter than hand-tight. Overtightening the arbor nut may cause the collets to "bite" into the arbor, causing damage to the arbor surface.

3.3. Spindle Speed Adjustment

Variable Speed Motor (Models BL6x or BL7x with ACT / Digi-Cal)

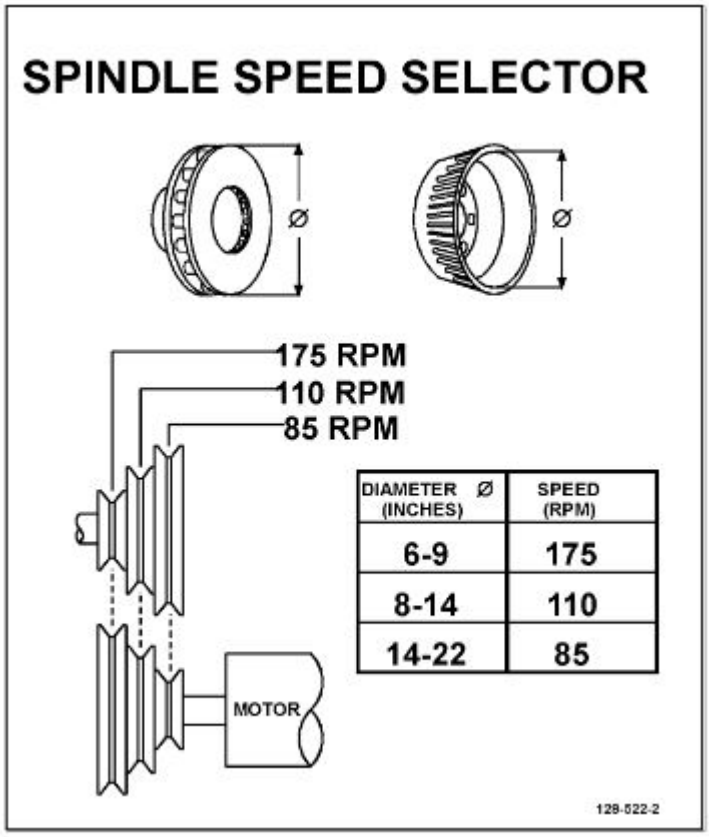
Pressing "SPEED" button located in center of control panel toggles between high,medium and low speed, indicated by the green LED switching to HIGH, MED or LOW.

Pressing "ACT" button located in center of control panel will automatically vary speed, indicated by the green LED. The ACT feature oscillates machining speed top prevent buildup of vibration (chatter), requiring no bands or other devices.

Belt / Pulley System (Models BL0x or BL1x)

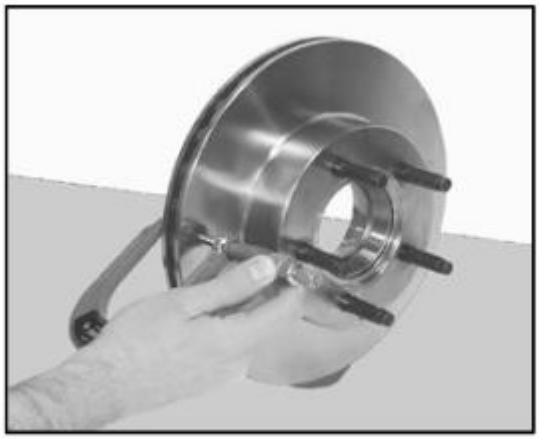
1. Disconnect the power to the lathe.
2. Lift the motor access cover to expose the motor and two pulleys
3. Release the belt tension by lifting the handle on the motor base.
4. Move the ribbed belt to the desired set of pulleys, then release the handle on the motor base.

The recommended spindle speed is determined by measuring the diameter of the workpiece. The chart below indicates the position of the belt on the pulleys.

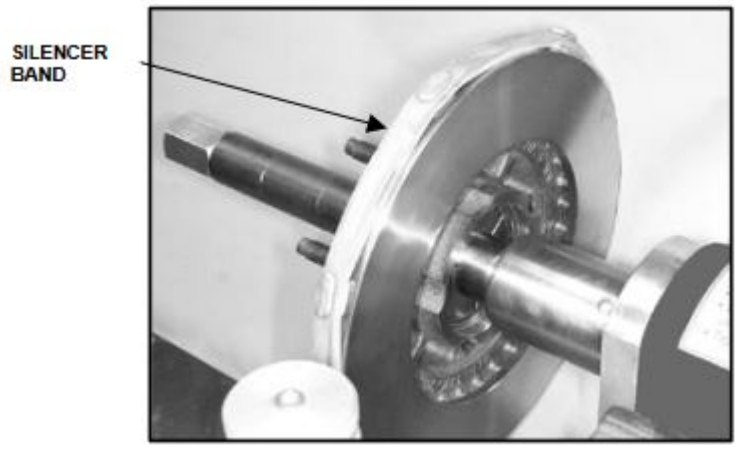


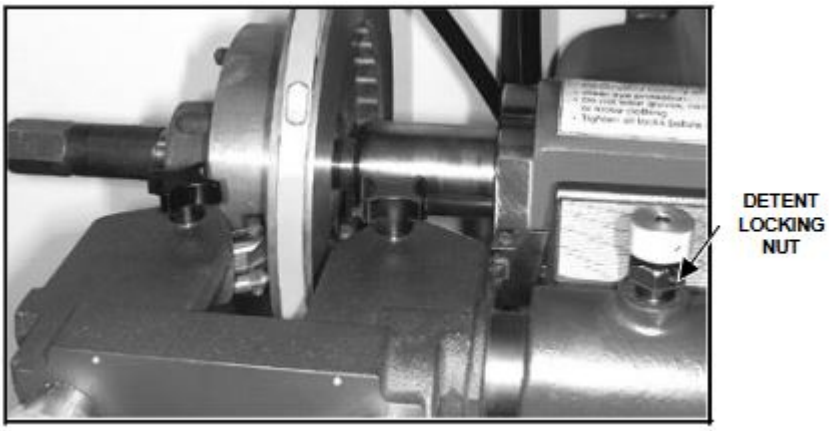
3.4. Disc Resurfacing

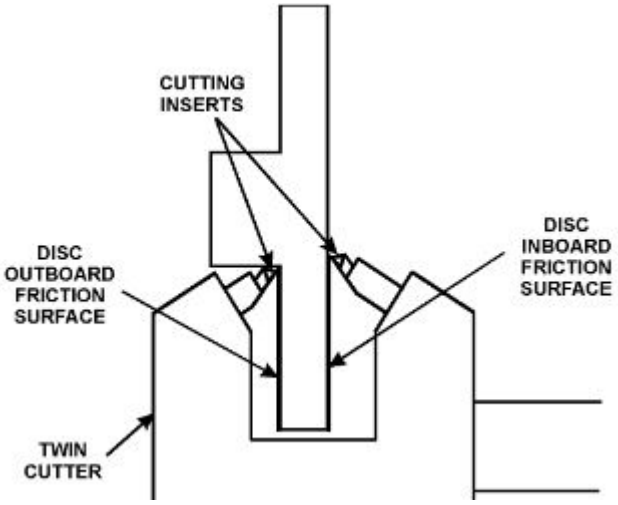
Measure the total indicated runout to determine the deepest cut necessary toresurface the disc. Refer to “2.7 Measuring Total Indicated Runout (T.I.R.)” onpage 17.



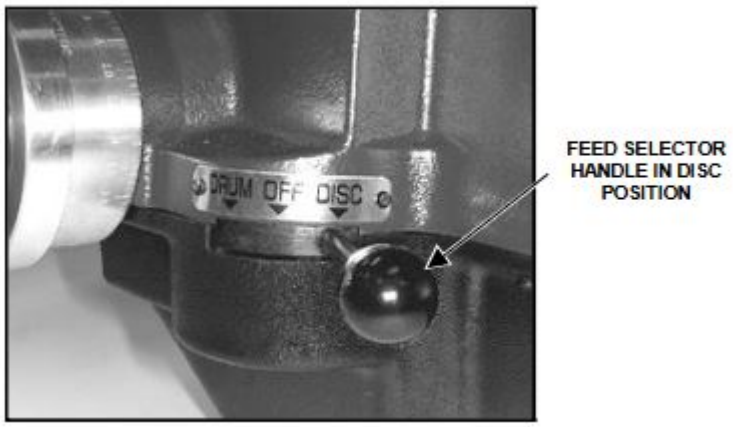
NOTE:	The minimum refinish thickness and parallelism specifications may be found in cast into the disc.







⚠ **CAUTION:** Overtightening the detent locking nut may cause damage to the detent assembly or the twin cutter.



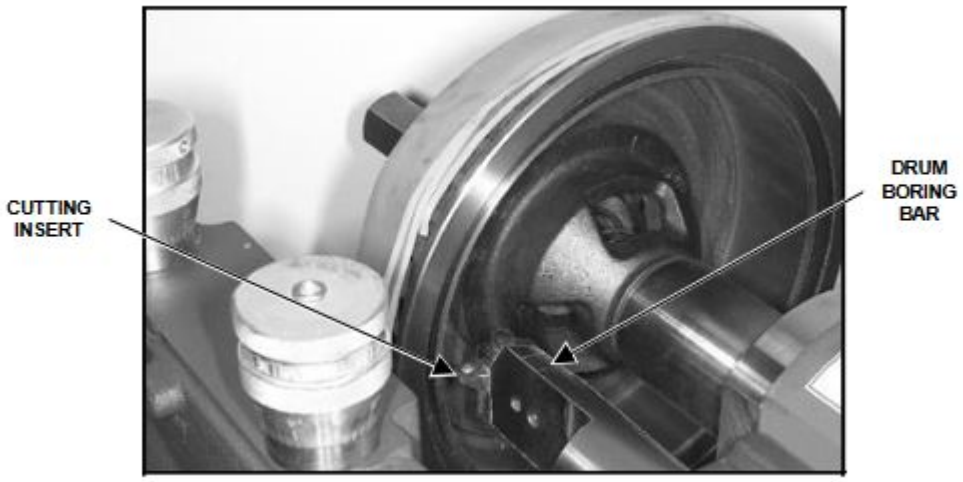
1. Choose the proper spindle speed. Refer to “2.3 Spindle Speed Adjustment” onpage 9.
2. Using a micrometer, check the thickness / parallelism of the disc from at least three points around the circumference, about 1 inch (25 mm) in from the outer diameter. If the disc thickness variation is out of specification, it should be machined. However, if the thickness is less than the minimum thickness established by the manufacturer, or if it will be less after resurfacing, the disc should be replaced.
3. Mount the disc on the arbor using the appropriate adaptors and spacers. Refer to“2.2 Drum and Disc Mounting” on page 7.
4. Stretch the silencer band around the disc.
5. Turn the power switch “ON.” The spindle and the disc will begin to turn.
6. Check the setup accuracy and workpiece condition. Refer to “2.6 Achieving Setup Accuracy and Determining Workpiece Quality/Condition” on page 15.
7. Turn the knob on the detent assembly until the roll pin is aligned with the slot in the detent locking nut.
8. Rotate the twin cutter up to position until the detent pin pops down, roughly aligning the twin cutter on center.
9. Loosen the lock knobs located over the tool holder bars.
10. Adjust the twin cutter until the cutting inserts are positioned at the inner diameter of the disc’s inboard and outboard friction surfaces.
11. Tighten the 1 inch detent locking nut slightly tighter than hand-tight.
12. Perform a scratch test to verify setup and condition of the disc. Refer to “2.6 Achieving Setup Accuracy and Determining Workpiece Quality/Condition” on page 15.
13. Measure the total indicated runout to determine the deepest cut necessary to resurface the disc. Refer to “2.7 Measuring Total Indicated Runout (T.I.R.)” onpage 17.
14. Turn the tool holder bar micrometer controls until the cutting inserts just contact the shallowest section of the disc face. (This may or may not be in a deep groove.)
15. Rotate the slip collar of the micrometer dial to zero.
16. Retract the cutting inserts away from the face of the disc.
17. While observing the micrometer dials, turn the tool holder bar controls and set the depth of cut for approximately .004 inch (1.01 mm) more than that required to resurface the disc. Lock the cutting inserts into position by tightening the locking knobs located over the tool holder bars.
18. Set the feed rate according to the desired finish of cut, as noted on the feed control dial.
19. Shift the feed selector handle to the “DISC” position. (If the lathe does not automatically feed, check to see if the Drum Retract light is on. If the light is on, manually retract the drum boring bar until the light goes out and automatic feed is engaged.)
20. Allow the cutting inserts to travel past the outer edge of the disc.

21. Disengage the feed selector.
22. Turn the power switch to “OFF.”
23. Remove the disc from the arbor and clean with brake cleaner or warm soapy water.

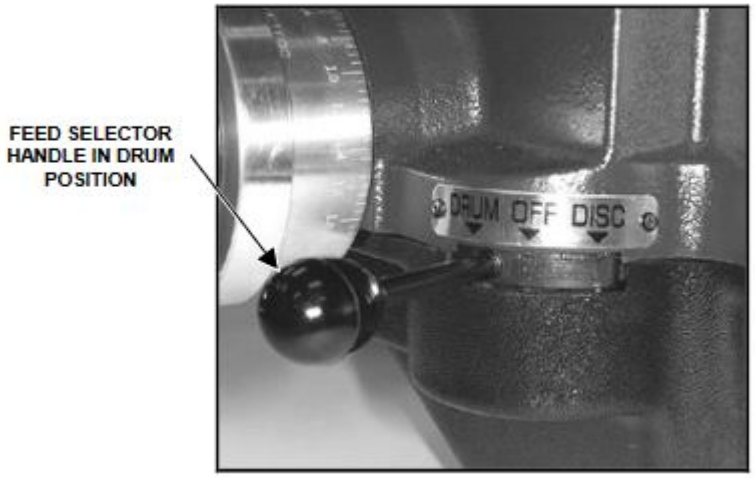
3.5. Drum Resurfacing

Check the setup and workpiece accuracy. Refer to “2.6 Achieving SetupAccuracy and Determining Workpiece Quality/ Condition” on page 15.

NOTE:	The maximum refinish diameter may be found cast into the drum.



NOTE:	If the rusty lip on the outer edge of the drum is excessive, it may be removed prior to making the full cut.



1. Choose the proper spindle speed. Refer to “2.3 Spindle Speed Adjustment” onpage 9.
2. Using a brake drum diameter gauge, check the drum diameter from at least three points around the circumference, about 1 inch (25 mm) in from the outer diameter. If the drum diameter is greater than the maximum diameter established by the manufacturer, or if it will be greater after surfacing, the drum should be replaced.
3. Loosen the detent locking nut and rotate the twin cutter so the cutting inserts point down.
4. Mount the drum on the arbor using the appropriate adaptors and spacers. Refer to “2.2 Drum and Disc Mounting” on page 7.
5. Wrap the drum silencer band snugly around the drum and secure it by sliding the buckle finger under the top layer of the band.
6. Turn the power switch “ON.” The spindle and drum will begin to turn.
7. Check the setup and workpiece accuracy. Refer to “2.6 Achieving Setup Accuracy and Determining Workpiece Quality/ Condition” on page 15.
8. Extend the drum boring bar by turning the drum crossfeed control on the right side of the feed housing. Position the boring bar cutting insert over the most worn section of the drum face. This may be a deep groove or bell-mouthcondition.
9. Perform a scratch test to verify setup accuracy and drum condition. Refer to “2.6 Achieving Setup Accuracy and Determining Workpiece Quality/Condition” on page 15.
10. Measure the total indicated runout to determine the deepest cut necessary to resurface the drum. Refer to “2.7 Measuring Total Indicated Runout (T.I.R.)” onpage 17.
11. Turn the drum crossfeed control until the cutting insert just contacts the shallowest section of the drum surface. (This may or may not be in a deep groove.)
12. Set the depth-of-cut dial to zero and lock it with the thumbscrew.
13. While observing the feed control dial, turn the handwheel and set the depth of cut for approximately .008 inch (2.03 mm) more than that required to resurface the drum.
14. Set the feed rate according to the desired finish of cut, as noted on the feed control dial.
15. Shift the feed selector handle to the “DRUM” position. Let cutting continue until the cutting insert has cleared the edge of the drum.
16. Disengage the feed selector.
17. Turn the power switch to the “OFF” position.
18. Remove drum from the arbor and clean with brake cleaner or warm soapy water.

3.6. Achieving Setup Accuracy and Determining Workpiece Quality/Condition

Checking For Setup Accuracy

NOTE:	This procedure assumes your workpiece (disc or drum) is mounted and the lathe is “ON.”

1. Determine if there is excess setup runout by inserting the box end of the5/16 inch (8 mm) wrench, 221-604-2 (provided with lathe), into the center drill end of the arbor while the spindle is turning and lightly hold the opposite end. Any detectable side-to-side movement (wobble) in the wrench indicates excess setup runout. Excess runout must be eliminated before proceeding with resurfacing.
2. If side-to-side wobble is observed, excess runout is present. Check the following for possible causes:

- A damaged or dirty disc or drum.
- Improper mounting technique.
- Damaged or dirty mounting adaptors.
- Excessively tight arbor nut.
- Damaged arbor.

Checking For Workpiece Quality/Condition

NOTE:	This procedure assumes your workpiece (drum or disc) is mounted and the lathe is “ON.”

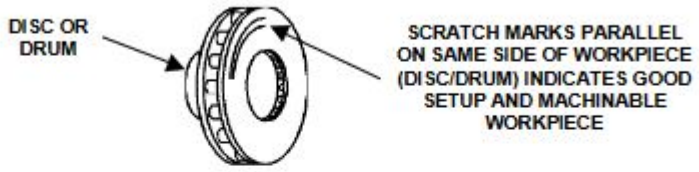
NOTE:	If your workpiece and setup runout is within specification, your scratch will go all the way around the workpiece. Stop this test and proceed with resurfacing the workpiece.

1. Bring the cutting insert up to the workpiece surface to be cut.
2. Feed the cutting insert in until it just scratches the surface.
3. Back the cutting insert away from the workpiece surface and turn the appropriate feed control one turn to feed the cutting insert to a new position on the workpiece surface.
4. Turn the lathe “OFF.”
5. Loosen the arbor nut and rotate the workpiece 180 degrees. Tighten the arbor nut.
6. Turn the lathe “ON.”
7. Inscribe another scratch on the workpiece surface as described in steps 1-2.(The scratch marks will be offset by the amount that the feed control was turned.)

Interpreting Scratch Test Results

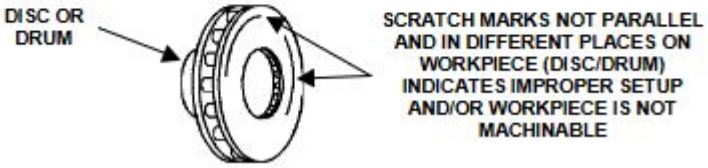
Good Setup and Workpiece

If the marks are parallel on the workpiece surface, any runout will be in the workpiece.



Bad Setup and/or Workpiece

If the marks are not parallel to each other, there is runout in the setup, and/or the face of the workpiece is bent and the workpiece should be discarded.



3.7. Measuring Total Indicated Runout (T.I.R.)

1. Feed the cutting insert in until it just scratches the surface.
2. Zero the depth-of-cut micrometer dial.
3. Find the maximum permissible runout for the vehicle being serviced. This value will be .003 inch (.762 mm) to .005 inch (1.27 mm) for most vehicles.
4. Turn the depth-of-cut knob to feed the cutting insert into the workpiece this amount.
5. If your workpiece and setup runout is within specification, your scratch will go all the way around the workpiece. Stop this test and proceed with resurfacing the workpiece.
6. If the scratch does not continue around the entire surface of the workpiece, continue feeding the cutting insert by turning the depth-of-cut knob until the scratch is 360 degrees.
7. When this is completed, the amount of T.I.R. can be determined from the micrometer dial.

4. ACT / Digi-Cal

NOTE:	The Digi-Cal display unit is an optional, **factory installed only**, that is standard on the BL6x and BL7x Brake Lathes. The Digi-Cal display unit cannot be field installed.

4.1. ACT / Digi-Cal Controls

A

Pressing “ZERO” button set current position to 0.0000.

Pressing “CAL” button starts calibration mode.

Pressing “TOGGLE DISP” button toggles between three different display modes asindicated by the green LED next to DRUM or ROTOR located above the numbersand the green LEDs next to DIAMETER, THICKNESS or DEPTH below the numbers:.

- Rotor Depth / Depth Display Mode,
- Rotor Thickness Display Mode.
- Drum Diameter / Depth Display Mode.

Pressing “IN / MM” button toggles between inches or millimeters. Green LED next to IN. or MM indicates mode. The display units may be changed at any time during the operation of the Digi-Cal unit.

Pressing “ACT” button located in center of control panel will automatically vary speed, indicated by the green LED. The ACT feature oscillates machining speed to prevent buildup of vibration (chatter), requiring no bands or other devices.

Pressing “SPEED” button located in center of control panel toggles between high,medium and low speed, indicated by the green LED switching to HIGH, MED or LOW.

4.2. Calibration

4.2.1. When is Calibration Required?

When is Calibration Required?

Calibration is required for measuring disc thickness and drum diameter.

Calibration is not required to measure disc and drum depth-of-cut and total indicated runout.

The Digi-Cal unit requires calibration when:

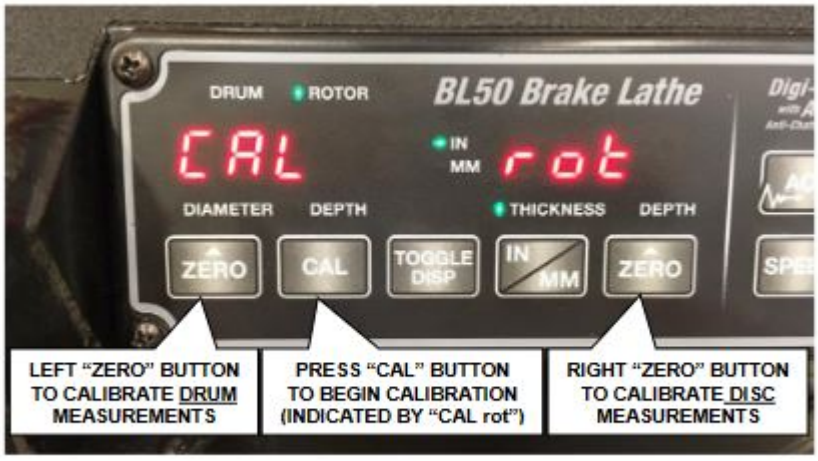
- Insert holders are replaced or moved.

- After cutting inserts are replaced or rotated.

The Digi-Cal unit may be re-calibrated at any time. Disc and/or drum thicknesscalibration may be performed at any time.

> **WARNING:** The brake lathe power switch must be in the "OFF" position during calibration to prevent possible serious injury to the user.

4.2.2. Prepare for Calibration

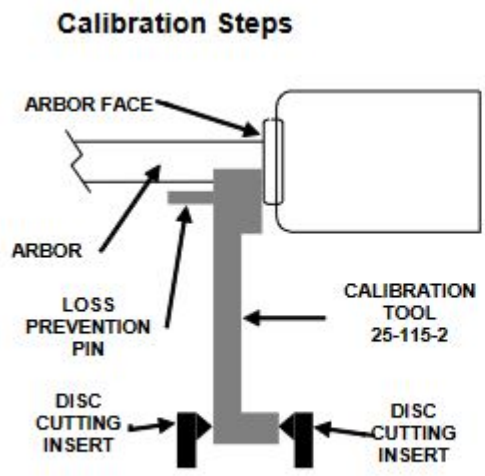


Calibration Buttons

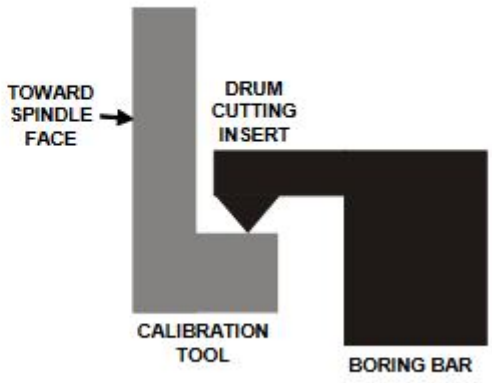
1. Connect the BL power cord to an AC outlet.
2. Verify that the BL power switch is in the "OFF" position.
3. Locate the supplied calibration tool, 25-115-1.
4. Locate the "CAL" button and both "ZERO" button on the Digi-Cal unit.

4.2.3. Calibration Steps

Calibration Steps



Drum Diameter Calibration



Drum Diameter Calibration

Use of the Calibration tool during the Following Calibration Steps.

NOTE:	Calibration **must** be performed with the 1 inch arbor installed.

1. Press the “CAL” button on the DigiCal unit.
2. Display will now show “CAL” and “rot” on the Digi-Cal displays, indicating it is ready for disc thickness calibration.
3. Move the twin cutter to the disc cutting position..
4. Place the curved recess of the calibration tool against the arbor shaft and flush with the arbor face.
5. Hold the end of the calibration tool between the cutting inserts. Slowly turn each micrometer control knob until the cutting inserts just touch the calibration tool,suspending it between them. The cutting inserts should be at approximately the same position on each side of the calibration tool. (See first figure above.)
6. Press the right, “ZERO” button to calibrate the Digi-Cal for disc measurements.
7. Display will now show “CAL” and “dIA” or “CAL” and “dru” in display, indicating it is ready for drum diameter calibration.
8. Rotate the twin cutter out of the way, such that cutting inserts are pointing up.
9. Place the curved recess of the calibration tool against the 1 inch arbor shaft and flush with the arbor face. The tip of the calibration tool should face the spindle.
10. Position the calibration tool and the drum cutting insert so the end of the calibration tool extends just beyond the drum cutting insert.
11. Using the drum depth control, slowly feed the drum cutting insert out until it touches the inside of the calibration tool. Gently swinging the calibration tool up and down should produce a slight scraping sound between the calibration tool and the cutting insert. (See second figure above.)
12. Press the left “ZERO” button to calibrate the Digi-Cal for drum measurements.
13. The unit will automatically exit the calibration mode when calibration is complete.

4.3. Measuring the Disc Total Indicated Runout (T.I.R.)

Measuring the Disc Total Indicated Runout (T.I.R.)

1. With the disc mounted on the spindle, position the twin cutter so the cutting inserts are on either side of the disc, near the outer diameter.
2. Place the BL power switch in the “ON” position, and verify that the disc is rotating.
3. Press the “TOGGLE DISP” button until “ROTOR” and “DEPTH” is indicated by the green LEDs. Numeric values will be displayed in each window of the disc display.
4. Slowly turn either disc micrometer control knob clockwise, until the cutting insert is near the disc. The “high point” of the disc friction surface is located where the insert scratches the disc.
5. Press the disc “ZERO” button of the disc micrometer control knob used in step 4. The disc display should read “0.000.”
6. Turn the disc micrometer control knob until the cutting insert scratches a circle around the entire disc friction surface.
7. The “zeroed” disc display now shows the T.I.R. for the disc.

4.4. Measuring True Minimum Disc Thickness for a One-Cut Cleanup Pass

Measuring True Minimum Disc Thickness for a One-Cut Cleanup Pass

With the data provided by the Digi-Cal, the technician can determine the necessaryamount of material to remove from the disc for a one-cut resurfacing operation, orreplace the disc if it is undersized.

Using this unique procedure, the Digi-Cal can measure and combine the deepest wear points on opposite sides of the disc, with total indicated runout (T.I.R.), to calculate the true minimum disc thickness.

This also, allows the technician to determine beforehand, if the disc will be undersized after resurfacing and eliminates:

- The need for multiple passes on the disc.

- The potential for removing too much material from the disc.

NOTE:	The Digi-Cal display unit must be calibrated before measuring disc thickness. Calibration is not necessary to measure depth-of-cut only.

NOTE:	The following procedures are arranged so that disc wear/condition is determined before machining, in order to maximize technician efficiency.

4.4.1. Preliminary Steps

Preliminary Steps

1. With the disc mounted on the spindle, position the twin cutter so the cutting inserts are oneither side of the disc.
2. Place the BL power switch in the “ON” position, and verify that the disc is rotating.
3. Press the “TOGGLE DISP” button until “ROTOR” and “DEPTH” is indicated by the greenLEDs. Numeric values will be displayed in each window of the disc display.

4.4.2. Measuring Grooved Disc Thickness

1. Visually inspect both friction surfaces of the disc to determine if a significant groove is present on either / both surfaces. If none is present, refer to “Measuring Non-Grooved Disc Thickness” on page 24.
2. Turn the disc crossfeed handle, and position the right cutting insert at the deepest groove in the inboard surface of the disc.
3. Slowly turn the right disc micrometer control knob clockwise until the right cutting insert begins to scratch the friction surface of the disc in the deepest groove, then press the right disc “ZERO” button. The right disc display should now read 0.000.
4. Turn the right disc micrometer control knob counterclockwise to back the cutting insert away from the face of the disc.
5. Turn the disc crossfeed handle, and position the left cutting insert at the deepest groove in the outboard surface of the disc.
6. Slowly turn the left disc micrometer control knob clockwise until the left cutting insert begins to scratch the friction surface of the disc in the deepest groove, then press the left disc “ZERO” button. The left disc display should now read 0.000.
7. Turn the left disc micrometer control knob counterclockwise to back the cutting insert away from the face of the disc.
8. Turn the disc crossfeed handle, and position both cutting inserts at the outer edge of the disc.
9. If there is a ridge on the outer edge of the disc, carefully machine the ridge from both sides of the disc using multiple machining passes if required.
10. Allow the cutting inserts to travel past the outer edge of the disc.
11. Adjust the left and right disc micrometer controls so the display reads 0.000.
12. Press the “TOGGLE DISP” button until “ROTOR” and “THICKNESS” is indicated by the green LEDs. The right window only will display a value. The disc display now shows the true, measured disc thickness.
13. Set the depth-of-cut. Refer to “Setting Depth-of-Cut” on page 24.

4.4.3. Measuring Non-Grooved Disc Thickness

1. Position the cutting inserts at the inner diameter of the inboard and outboard friction surfaces of the disc.
2. Turn both disc micrometer control knobs until each insert just scratches the disc.
3. Slowly turn the disc crossfeed handle counterclockwise, to feed the cutting inserts across both friction surfaces toward the outer edge of the disc.
4. Watch both surfaces of the disc. If the scratch disappears before reaching the outer edgeof the disc, stop turning the crossfeed handle, and feed the appropriate cutting insert in until the scratch resumes.
5. Continue feeding the inserts across the disc.
6. When the cutting inserts approach the outer edge of the disc, press each disc “ZERO”button. Each disc display should read 0.000.
7. If there is a ridge on the outer edge of the disc, carefully machine the ridge from both sides of the disc using multiple machining passes if required.
8. Allow the cutting inserts to travel past the outer edge of the disc.
9. Adjust the left and right disc micrometer controls so the display reads 0.000.
10. Press the “TOGGLE DISP” button until “THICKNESS” is indicated by the green LED. The right window only will display a value. The right side of the disc display now shows the true, measured disc thickness.
11. Set the depth-of-cut.

4.4.4. Setting Depth-of-Cut

1. If the measured thickness is within specification, back the inserts away from the surface and position the cutting inserts at the inner diameters of the disc.
2. Press the “TOGGLE DISP” button until “DEPTH” is indicated by the green LED.
3. Turn both disc micrometer control knobs until 0.000 is displayed in each window of the disc display.
4. Continue turning both micrometer control knobs clockwise until the desired depth-of-cut is displayed for each side of the disc (usually adding .004 inch per side is sufficient).
5. Lock the cutting inserts into position by tightening the locking knobs located over the tool holder bars.
6. Proceed with machining. Refer to “2.4 Disc Resurfacing” steps 17-23 on page 10.

4.5. Measuring the Drum Total Indicated Runout (T.I.R.)

Measuring the Drum Total Indicated Runout (T.I.R.)

1. Verify that the BL power switch is in the “ON” position and the drum is rotating.
2. With the drum mounted on the spindle, position the twin cutter so the cutting inserts are pointing down. Extend the drum boring bar so the cutting insert is positioned inside the drum.
3. Press the “TOGGLE DISP” button until ”DRUM” and “DEPTH” is indicated with green LEDs.
4. Slowly turn the drum crossfeed control until the cutting insert is near the drum face. As the cutting insert approaches the drum face, begin turning the drum depth control, untilthe cutting insert begins to scratch the friction surface of the drum. This is the “low point”of the drum diameter.
5. Press the drum “ZERO” button. The drum display should read 0.000.
6. Turn the drum depth control handle to feed the cutting insert into the drum friction surface until the insert scratches a circle around the entire drum.
7. The “zeroed” drum display now shows the T.I.R. for the drum.

4.6. Measuring True Maximum Drum Diameter to Achieve a One-Cut Cleanup Pass

Measuring True Maximum Drum Diameter to Achieve a One-CutCleanup Pass

With the data provided by the Digi-Cal, the technician can determine the necessaryamount of material to remove from the drum for a one-cut resurfacing operation, orreplace the drum if it is oversized.

Using this unique procedure, the Digi-Cal can measure and combine the deepest wear point on the drum, with total indicated runout (T.I.R.), to calculate the true maximum drum diameter.

This also, allows the technician to determine beforehand, if the drum inner diameter will be oversize after resurfacing and eliminates:

- The need for multiple passes on the drum.

The potential for removing too much material from the drum.

NOTE:	The Digi-Cal display unit must be calibrated before measuring inner drum diameter. Calibration is not necessary to measure depth-of-cut only.

NOTE:	The following procedures are arranged so that drum wear/condition is determined before machining, in order to maximize technician efficiency.

4.6.1. Preliminary Steps

Preliminary Steps

1. With the drum mounted on the spindle, turn the drum crossfeed handle until the cutting insert approaches the outer edge of the drum.
2. Place the BL power switch in the “ON” position, and verify that the drum is rotating.
3. Press the “TOGGLE DISP” button until “DRUM” and “DEPTH” is indicated by the greenLEDs.

4.6.2. Measuring Grooved Drum Diameter

Measuring Grooved Drum Diameter

1. Visually inspect the friction surface of the drum to determine if a significant groove is present. If none is present, refer to “Measuring Non-Grooved Disc Thickness” on page24.
2. Extend the drum boring bar, and position the cutting insert at the deepest groove in the friction surface of the drum.
3. Slowly turn the drum depth control knob counterclockwise until the cutting insert begins to scratch the friction surface of the drum in the deepest groove, then press the drum“ZERO” button. The drum display should now read 0.000.
4. Turn the drum depth control knob clockwise to back the cutting insert away from the friction surface of the drum.
5. Turn the drum crossfeed handle, and position the cutting insert at the outer lip of the drum.
6. Carefully machine the ridge from the outer edge of the drum using multiple machiningpasses if required.
7. Allow the cutting insert to travel past the outer edge of the drum.
8. Adjust the drum depth control to read 0.000.
9. Press the “TOGGLE DISP” button until “DRUM” and “DIAMETER” is indicated by thegreen LEDs. The drum display now shows the true, measured drum diameter.
10. Set the depth-of-cut. Refer to “Setting Depth-of-Cut” on page 24.

4.6.3. Measuring Non-Grooved Drum Diameter

Measuring Non-Grooved Drum Diameter Allow the cutting insert to travel past the outer edge of the drum.

1. Position the cutting insert at the inner diameter of the drum friction surface.
2. Turn the drum depth control knob until the cutting insert just scratches the drum friction surface.
3. Slowly turn the drum crossfeed handle counterclockwise, to feed the cutting insert across the friction surface toward the outer edge of the drum.
4. Watch the friction surface of the drum. If the scratch disappears before reaching the outer edge of the drum, stop turning the drum crossfeed handle, and feed the cutting insert in until the scratch resumes.
5. Continue feeding the insert across the drum.
6. When the cutting insert approaches the outer edge of the drum, press the drum “ZERO”button. The drum display should 0.000.
7. If there is a ridge on the outer edge of the drum, carefully machine the ridge using multiple machining passes if required.
8. Allow the cutting insert to travel past the outer edge of the drum.
9. Readjust the drum depth control to read 0.000.
10. Press the “TOGGLE DISP” button until “DRUM” and “DIAMETER” is indicated by the green LEDs. The drum display now shows the true, measured drum diameter.
11. Set the depth-of-cut.

4.6.4. Setting Depth-of-Cut

Setting Depth-of-Cut

1. If the measured diameter is within specification, back the insert away from the surface of the drum and position the cutting insert at the inner diameter of the drum.
2. Press the “TOGGLE DISP” button until “DRUM” and “DEPTH” is indicated by the green LEDs.
3. Turn the drum depth control knob counterclockwise until 0.000 is displayed in the drum display window.
4. Continue turning the drum depth control knob counterclockwise until the desired depth-of-cut is displayed for the drum (usually adding .004 inch to 0.000 is sufficient).
5. Lock the cutting insert into position by tightening the drum micrometer thumbscrew.
6. Proceed with machining. Refer to “2.5 Drum Resurfacing” steps 13-17 on page 13.

5. Maintenance

5.1. Equipment Maintenance

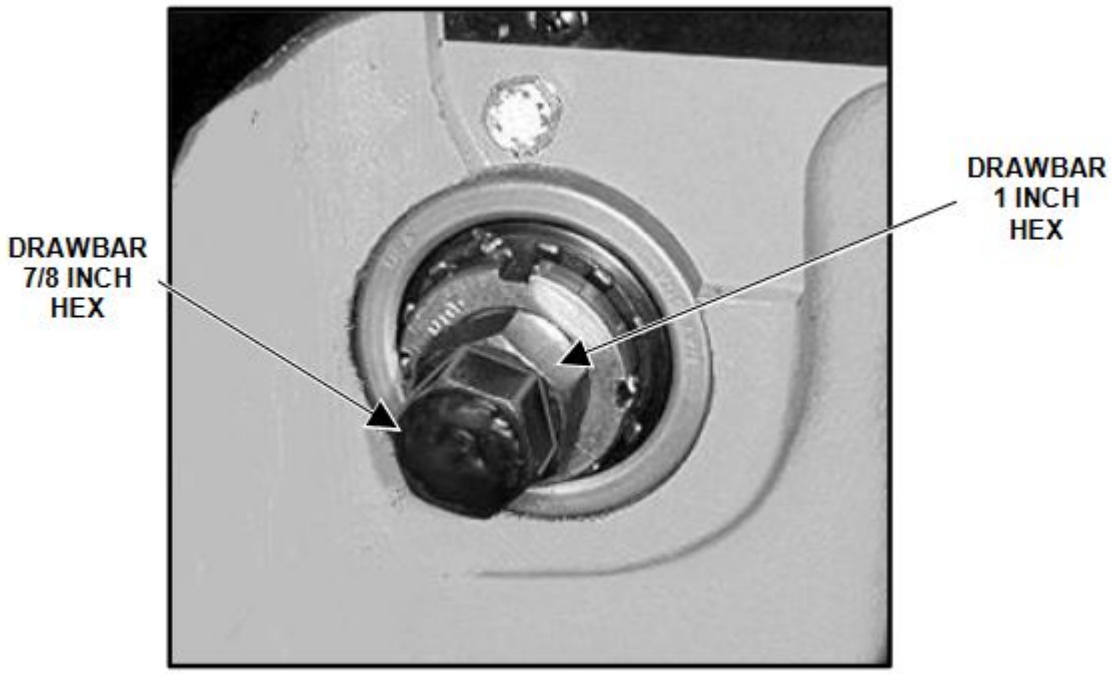
Keep the brake lathe and your working area clean. Do not use compressed air to remove debris from the lathe—foreign material may be propelled into the air and strike you or bystanders.

- After use, all machined surfaces of the lathe should be cleaned well with a vaporizing solvent to prevent rusting.
- The motor access cover and miscellaneous painted surfaces can be cleaned with ordinary soap and water. Do not allow water to accumulate inside or around the lathe.
- Clean and de-burr split collets, clamp cups, cones and all other adaptors daily.
- Clean tool holders and cutting inserts daily.
- Replace cutting inserts when worn. Traditional carbide inserts should be rotated and/or replaced when approximately .100 inch (2.54 mm) total material has been removed from the insert. This will enable the cutting insert to maintain the best surface finish.
- Wipe down adaptors and machined surfaces with anti-rust preventive weekly.
- Lubricate the main support shaft once per year. The grease fitting is located on the left side of the main housing.
- Lubricate the drum boring bar once per year. The grease fitting is located on the underside of the feed housing, inside the lower cover. The cover must be removed to access the fitting.
- Moderately grease drum feedscrew, rotor feedscrew, and all four 130-146-2thrust bearings once per year.

5.2. Arbor Replacement

5.2.1. Installation

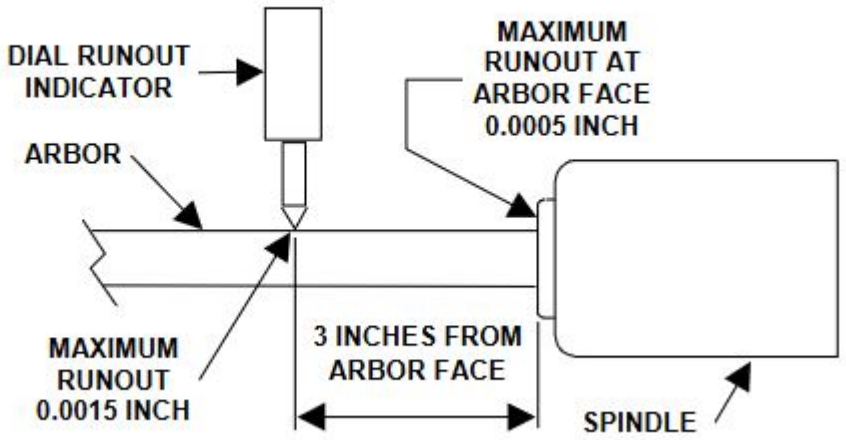
Insert the drawbar into the spindle and tighten the 1 inch hex to 30-50 ft-lbs.



1. Loosen the 1 inch hex collar on the drawbar and remove the drawbar from the spindle
2. Verify that the spindle and arbor tapers are clean and free from nicks and burrs. Clean if necessary.

3. Insert the drawbar into the spindle and tighten the 1 inch hex to 30-50 ft-lbs.
4. Slide the arbor into the spindle.
5. Turn the drawbar 7/8 inch hex by hand to draw the arbor into the spindle.
6. Tighten the 7/8 inch hex to 12-15 ft-lbs.

The following figure illustrates installed arbor, maximum runout measurements:



5.2.2. Removal

1. Loosen the drawbar 7/8 inch hex until the taper “pops."
2. Continue turning the 7/8 inch hex by hand to remove the arbor.

5.3. Verifying Adaptor Integrity

All clamp cups, spacers, cones, split collets, and adaptors used for mounting drums and discs must have all mating surfaces smooth and perpendicular to the spindle shaft.

Grease and dirt must be removed from slots in split collets for collets to center properly.

Verify that arbor runout is within maximum allowed specifications.

Install each mounting piece individually on the arbor, and check runout on the mating surfaces using a dial indicator. Runout maximum for mating surfaces is 0.0005 inch.

If runout exceeds the maximum allowed, machine the mating surfaces to bring themwithin the required maximum.

5.4. Using the (Optional) Compensation Spacer (46-432-2)

As its name implies, the (self-centering) compensation spacer can be used to compensate for over tightening, as well as, minor setup irregularities. This adaptor must be kept clean for it to function properly.

5.5. Workpiece Preparation

Clean the workpiece thoroughly with a vaporizing cleaner or warm soapy water.

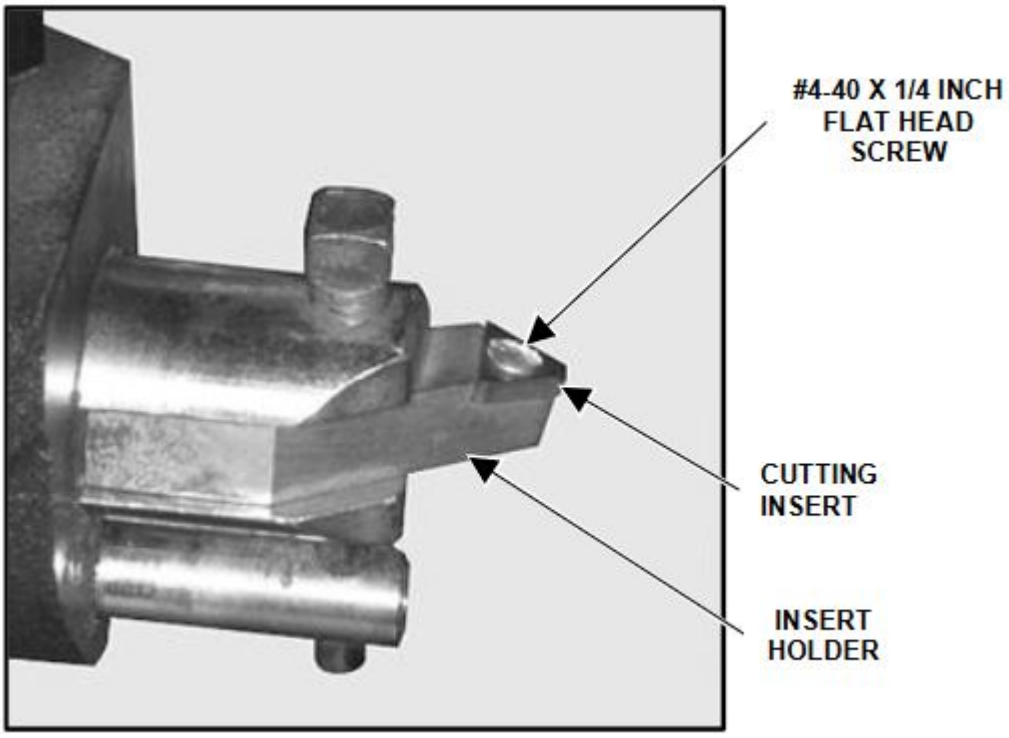
Remove all rust and corrosion from the inner and outer mounting surfaces of hublessworkpieces using Emory paper or an electric hand drill equipped with a wire brush attachment.

Clean all grease and dirt from bearing surfaces of hubbed workpieces.

5.6. Replacing Cutting Inserts

5.6.1. Removal

1. Disconnect the lathe AC power cord from the outlet.
2. Loosen and remove the #4-40 X 1/4 inch flat head screw securing the cutting insertto the insert holder.
3. Remove the cutting insert.



5.6.2. Installation

Secure the cutting insert to the insert holder with one #4-40 X 1/4 inch flat headscrew.

1. Clean the insert holder with a wire brush, and the cutting insert with a cloth.
2. Position and carefully seat the cutting insert on the insert holder, with the desiredcutting surface oriented toward the workpiece.
3. Align the insert mounting hole with the mounting hole in the insert holder.
4. Secure the cutting insert to the insert holder with one #4-40 X 1/4 inch flat headscrew.
5. Connect the lathe AC power cord to the outlet.

6. Troubleshooting

6.1. Troubleshooting

SYMPTOM	PROBABLE CAUSE	SOLUTION
Excess Arbor Runout	Dirt on locking taper	Clean the taper on the arbor and inside the spindle before arbor is re-installed.
	Bent Arbor	Replace the arbor.
Excess Workpiece Runout	Arbor nut too tight	It is not recommended to use a wrench to tighten the workpiece. HAND TIGHTEN ONLY
	Dirty or warped workpiece	All rust, grease and dirt must becleaned from mounting surfacesof the workpiece.
	Dirty or dinged adaptors	Adaptors must be kept clean.Reface or replace any damagedadaptors.
Poor SurfaceFinish	Worn or chipped insert	Rotate or replace insert as needed.
	Insert loose in tool holder	Insert must be securely locked into the boring bar.
	Tool holder loose in boring bar	Tool holder must be securely locked into the boring bar.
	Dirt and chips under insert and tool holders	Clean tool holder and boring bar each time insert is rotated.
	Feed rate too high	Reduce the feed rate. Refer to spindle speed selector chart located on front control panel
Chatter(BL0x or BL1xLathesWithout ACT)	No stabilizer used	Install the proper stabilizer for the workpiece. (Refer to BL Information Card Form 4076-T)
	Spindle speed too high	Refer to spindle speed selector chart located on front control panel.
	Improper mounting techniques	Use the largest clamping cups possible and use proper adaptors for composite pieces.

7. Glossary

ACT	Anti-Chatter Technology. Spindle speed automatically varies to prevent chatter from developing.
Arbor	A shaft that extends from the spindle of the lathe, to which adaptors, and drums or discs are mounted.
Backing Plate	An adaptor piece used with the three jaw chuck system.
Boring Bar	A bar that holds a single tool holder, and is used to machine drums.
Brake DrumDiameter Gauge	A tool used to measure the inside diameter of a drum.
Brake Squeal	Noise produced by vibration of brake pads against calipers. Usually due to improper surface finish on disc, or improper assembly of pads into calipers.
Caliper	Hydraulic slave cylinder assembly that actuates brake pads in a disc brake system.
Carbide Inserts	Replaceable, indexable cutting tips that are made of carbide. Carbide is used for inserts because it is very wear resistant.
Centering Cone	A mounting accessory that is used to center hubless drums and discs.
Chatter	Unacceptable surface finish produced on drum or disc. Usually has a herringbone appearance. Possible causes: spindle speed too high, no silencer used, workpiece not mounted rigid enough. A high-pitch, chattering sound will be produced during cut.
Chatter Band	Elastic band, sometimes with lead weights, that is stretched around the outside diameter of a drum or disc to eliminate chatter.
Clamp Cup	A mounting accessory that is used to clamp hubless drums and discs. A centering cone must be used with clamp cups.
Composite Disc	A hubless disc with a stamped steel center section. Typically, very susceptible to chatter.
Discard Dimension	A maximum drum diameter or minimum disc thickness. This value is cast into the drum or disc. If the drum or disc is at this dimension or beyond, it must be replaced.
Disc Truer	An assembly that holds two tool holders, and is used to machine both sidesof a disc at once.
Feed Rate	The rate at which cutting tips move across the face of the drum or disc,expressed in inches/revolution or inches/minute.
Finish Cut	The final cut taken on a drum or disc. The purpose of this cut is to produce the desired surface finish. This is usually a light cut taken at a slow feedrate.
Hubbed Disc	A disc that contains bearing races.
Hubbed Drum	A drum that contains bearing races.
Hubless Adaptor	A mounting accessory that is used to mount hubless discs. It can be faster to use than clamp cups and a centering cone.
Hubless Disc	A disc that does not contain bearing races.
Hubless Drum	A drum that does not contain bearing races.
Inserts	Replaceable, indexable cutting tips
Insert Holder	A device that holds the cutting inserts. Three are required: left side of disc truer, right side of disc truer, and drum boring bar.
Locking Taper	A taper machined onto two mating parts such that when the parts are mated the frictional forces are so great will not rotate or move with respect to one another. No clamping forces are required to keep the parts joined, but considerable force is required to separate the items. This is an extremely rigid and accurate method of joining arbors and spindles. The included angle in a locking taper is typically between 2 and 3 degrees.

Machine	To remove material from a surface by cutting.
Machine-To-Dimension	The maximum drum diameter or minimum disc thickness that may be achieved after cutting. This dimension is set to allow some material to wear before the discard dimension is attained
Micrometer	A tool used to measure the thickness of discs.
Micrometer Dial	A device on a lathe used to accurately set depth-of-cut.
Micro-Finish	Surface finish measured in fine units, such as micro-inches.
Micro-Inch	One micro-inch = one millionth of an inch or, 0.000001 inch.
Negative Rake	See rake angle. If the cutter face is angled downward, the tool has negative rake. 6 cutting tips per insert. A negative rake insert is more durable than a positive rake insert. This will provide longer insert life when cutting items of uneven and inconsistent hardness, such as, used drums and discs.
Non-Directional Finish	A finish applied to discs with an abrasive disc after they have been cut. Used to reduce chance of brake squeal.
One-Cut Operation	The method of cutting a drum or disc in which, a single cut is used to remove friction surface material and provide the desired finish. This is adeep cut made at a slow feed rate.
Positive Rake	See rake angle. If the cutter face is inclined upward, the tool has positive rake. 3 cutting tips per insert due to geometry. Can be used to reduce chatter on solid (non-vented) discs.
Rake Angle	The angle of the cutter face relative to horizontal.
Rough Cut	A cut taken on a drum or disc for the purpose of removing large amounts of material without concern for resulting surface finish. This cut is taken at the highest possible feed rate. A rough cut is always followed by a finish cut.
Silencer	A device, attached to the workpiece that is used to eliminate chatter whencutting.
Split Collet	A mounting accessory that is used with hubbed drums and discs. This device contacts the bearing races and provides both centering and clamping. A collet tightens onto the arbor and provides better centering than a taper adaptor.
Spindle	The driven rotating member of a brake lathe. The arbors and attachments are installed into the end of the spindle.
Spindle Speed	The rate at which the spindle is turning. Expressed in RPM. Must always beset according to workpiece diameter.
Stabilizer	See silencer.
Surface Finish	Measurement of texture of drum or disc after cut. Expressed in micro-inches.
Surface Roughness	Same as surface finish.
Swirl Finish	Same as non-directional finish.
Taper Adaptor	A mounting accessory that is used with hubbed drums and discs. This device contacts the bearing races and provides both centering and clamping.
Three Jaw Chuck	A brake lathe adaptor used to hold hubless and composite, drums and discs. Superior to cones in terms of centering accuracy and repeatability. Operates on the same principles as the chucks used in industrial machine shop environments.
Tool Holder	Same as insert holder.
Total Indicated Runout(T.I.R.)	The total movement of an indicator when appropriately applied to a surface to measure its variations.
Turning	Typically, the workpiece machining process in which the fixed position cutting tool is moved across the surface of the rotating workpiece.
Twin Cutter	A more common term for disc truer.
Workpiece	A disc or drum.

8. Warranty Information

Hunter Engineering Company warrants new equipment to be free from defects in material and workmanshipunder normal conditions of use for a period of three (3) years from the date of installation. Exceptions tothis warranty are listed below.

- Field labor is covered under this warranty for a period of six (6) months.
- ADASLinkTMTM units carry a one (1) year warranty and remain under warranty as long as aunits carry a one (1) year warranty and remain under warranty as long as a subscription is maintained thereafter.subscription is maintained thereafter.
- DAS 3000 units, including electronic circuit boards, carry a one (1) year warranty.
- Printers carry a one (1) year warranty.
- Normal consumables and wear items are not covered. Exception is batteries, which are warranted for a period of six (6) months for a period of six (6) months.
- Product that has been subject to abuse, misuse, alterations, accident, exposure to the elements,tampering, unreasonable use, or not maintained in a reasonable or necessary manner.
- Replacement parts purchased through the Hunter Service Center and no longer covered by machine warranty are warranted for a period of six (6) months machine warranty are warranted for a period of six (6) month

In case of any warranty claim, it will be necessary to contact your local authorized Hunter Service Representative. To have an item considered for warranty, it must be returned to Hunter Engineering Company for inspection and evaluation. This must be done on a freight prepaid basis. If after our inspection the product proves to be defective, and is within the time frame specified, we will repair or replace the item at no additional cost.

This is Hunter Engineering Company’s only warranty with respect to new equipment. Hunter Engineering Company disclaims all other warranties to the extent permitted by law. This express warranty and any implied warranties of merchant ability and fitness for a particular purpose shall not extend beyond the warranty period. Hunter Engineering Company is not responsible for any incidental or consequential damages, including, but not limited to, loss of business.

We do not authorize any person to assume for us any other liabilities with our products. Any remaining warranty may be transferred to subsequent purchasers by forwarding the purchaser’s name, address,phone number and equipment serial number to:

Hunter Engineering Company

Customer Service Department

11250 Hunter Drive

Bridgeton, MO 63044

(800) 448-6848

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