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INSTALLATION INSTRUCTIONS
Static Spindle Brake for Haas TL-1 Lathes

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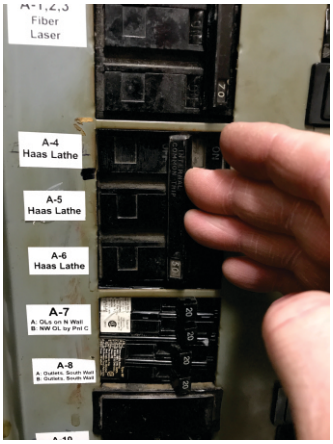
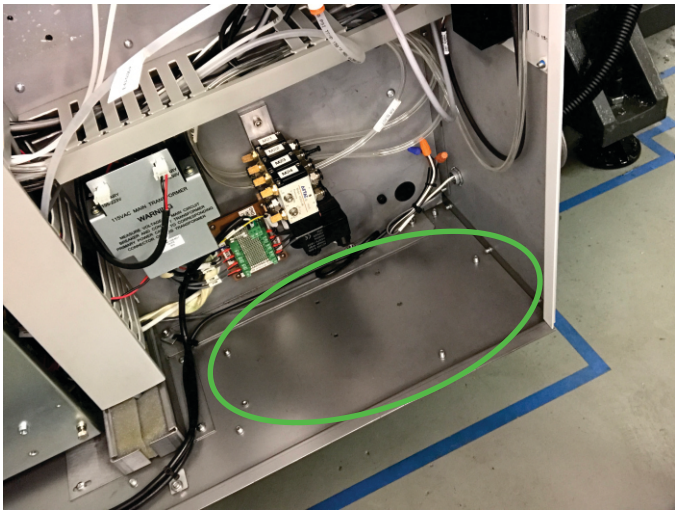


Part A: Install Actuator

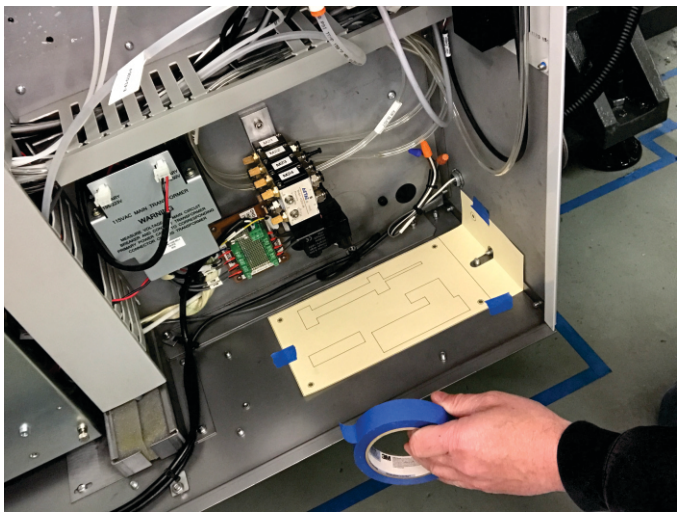
Step A1:
Remove power from the lathe.

Electric shock hazzard if power is not properly disconnected.



Step A2:

Open the control cabinet. The TL-PNEUACT pneumatic actuator installs in the space at the bottom right of the cabinet.



Step A3:

Carefully tape the installation template into position. The right edge of the template folds up 90 degrees to properly locate the cable entry hole.

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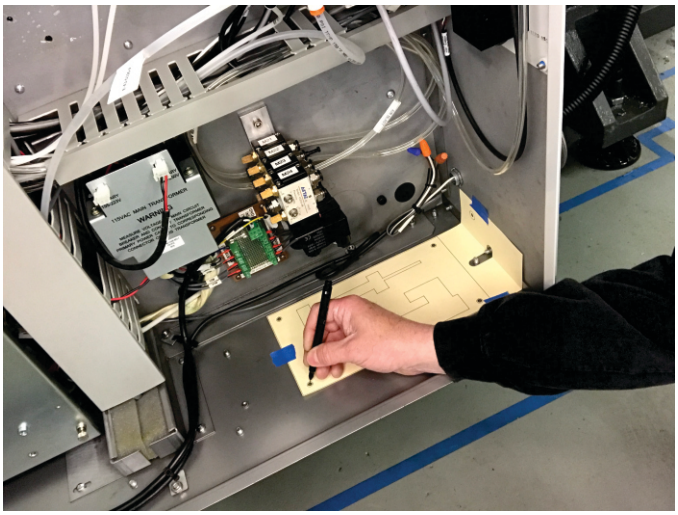
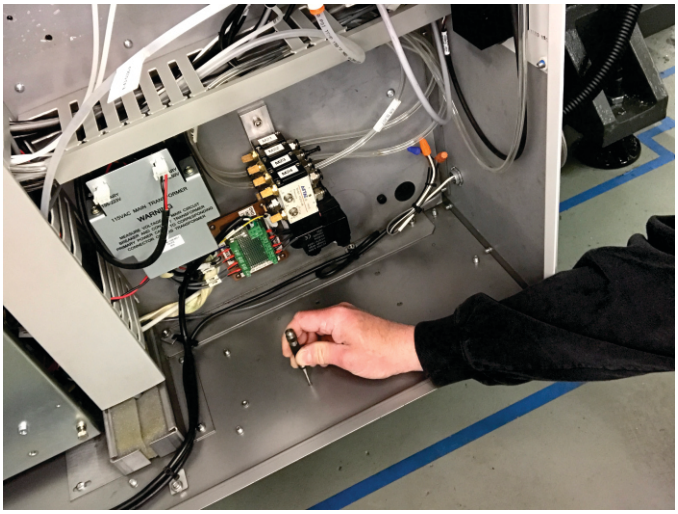


Step A4:

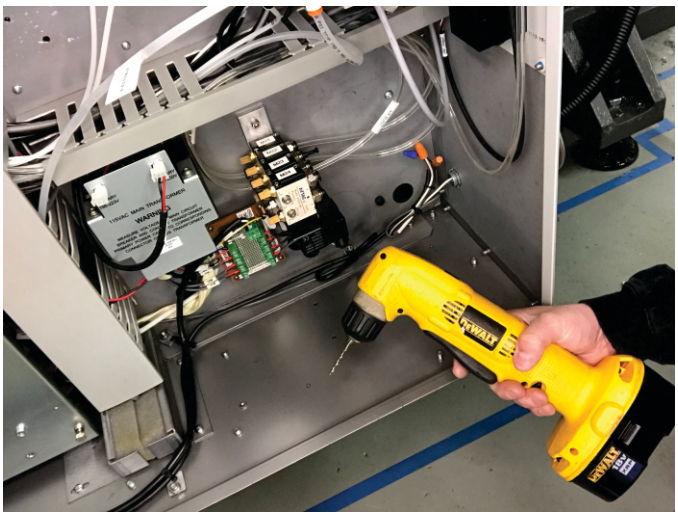
Use a Sharpie® to mark the five (5) screw hole locations.

- 4 holes marks on the floor
- 1 hole mark is on the side flap



Step A5:

Centerpunch the five (5) hole locations.



Step A6:

Drill **7/32”**, four (4) floor places.

(to keep holes accurately on-center, consider drilling first with a 1/8” bit followed by the 7/32” bit)

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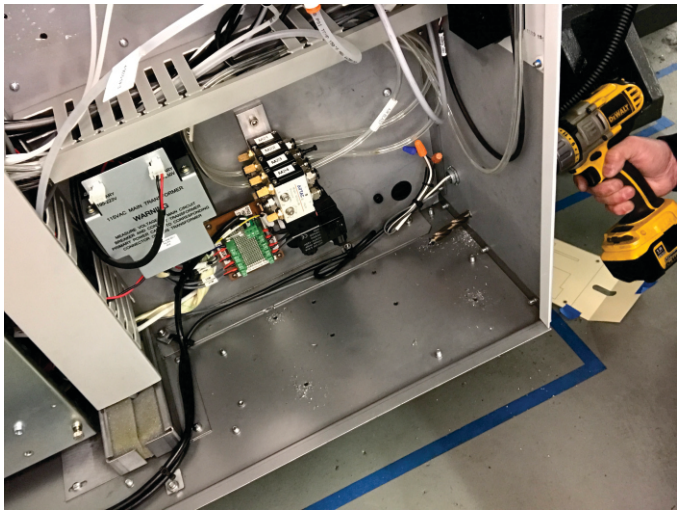
Step A7:

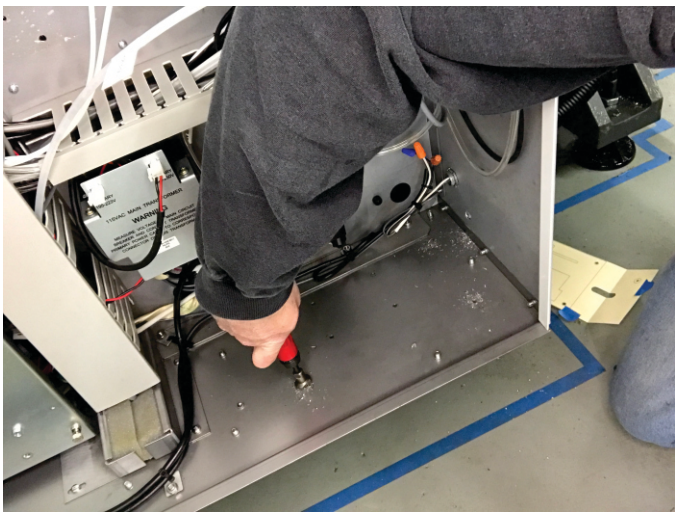
To keep the cable entry hole on target, drill a 1/8” hole first.



Step A8:

Enlarge the cable entry hole to **15/32”**. To keep this hole on center “step drill” using these progressively larger drill sizes:

- #7,
- then 3/8”
- then **15/32”**



Step A9:

Remove burrs, top and bottom, five (5) places.

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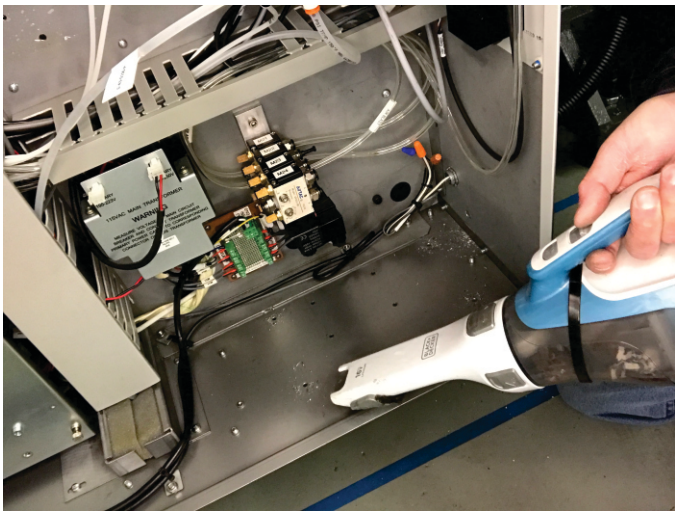
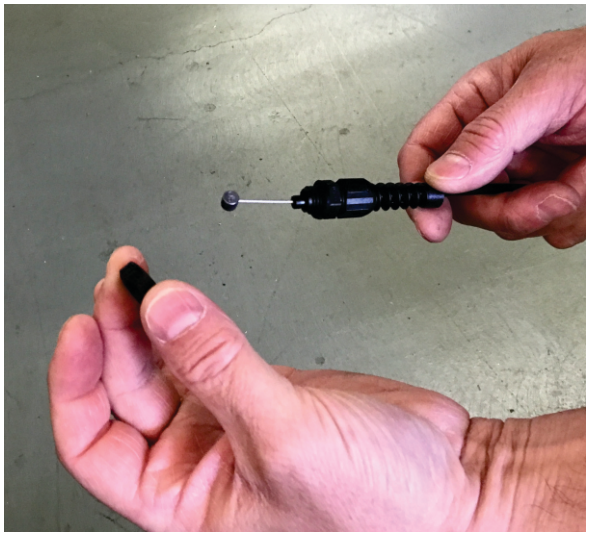


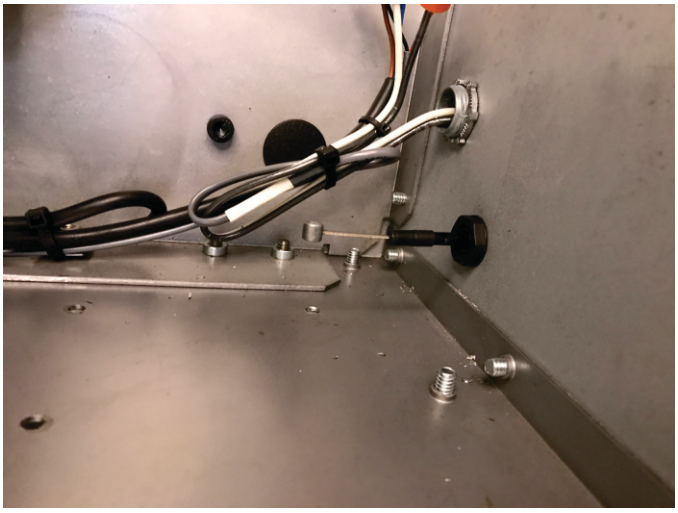
Step A10:

Vacuum out the drilling debris.



Step A11:

Remove the plastic lock-nut from the cable gland.



Step A12:

Feed the actuation cable in through the side of the cabinet. Anchor it in place with the lock-nut that was removed in step 11.

Loosen the grip adjustment on the right side for the cable gland to allow the cable jacket to slide freely in and out.

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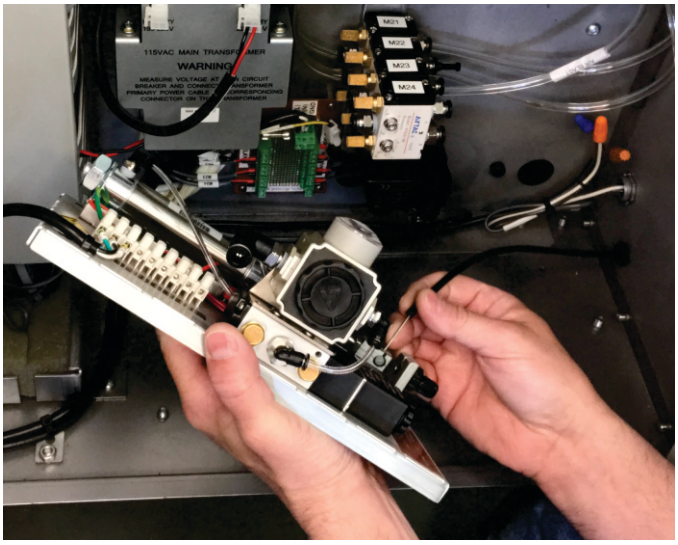
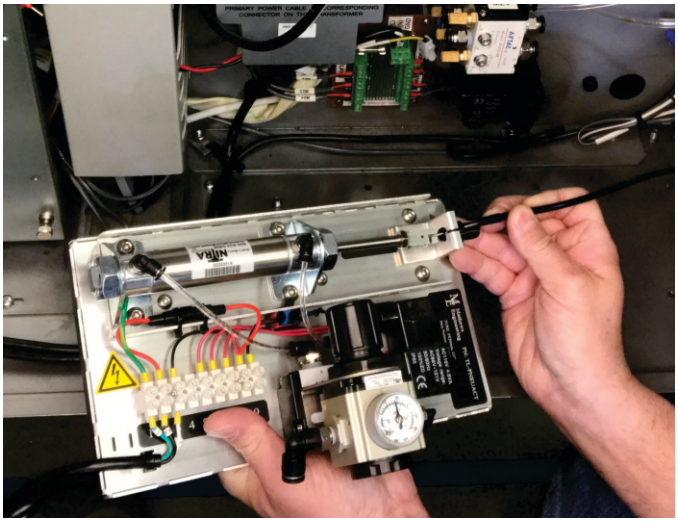


Step A13:

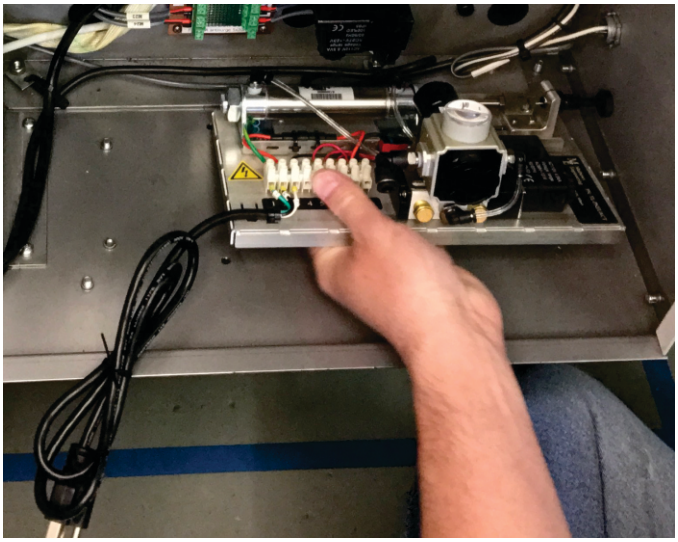
Orient the clevis fork then slide the barrel end of the cable in from the side.



Step A14:

Gently pulling on the brake cable housing will expose additional inner wire. Lift the inner wire up and into the slots in the adjustment barrel.

(To let the cable trough, you'll have to align the slots on the adjustment barrel and barrel nut)



Step A15:

Gently push the cable jacket back through the cable gland and move the pneumatic actuator into place.

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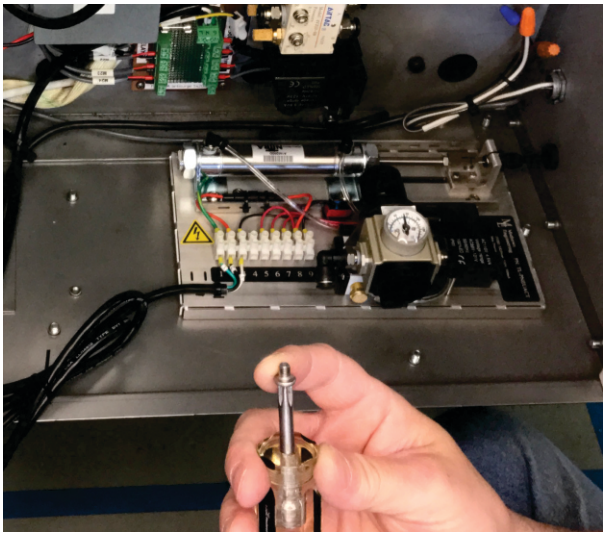
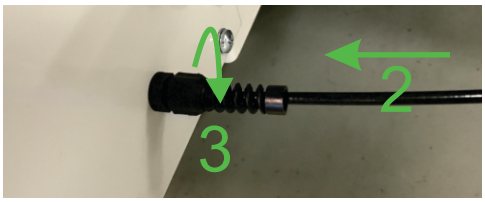
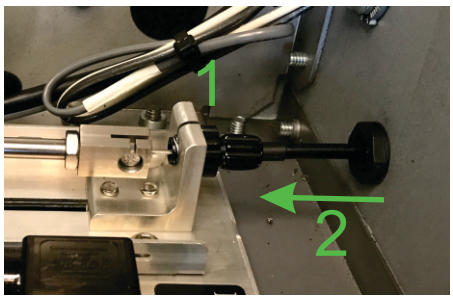


Step A16:

Screw the pneumatic actuator into place using the four (4) 10-32 x 1/4" Phillips machine screws that are provided with the kit.



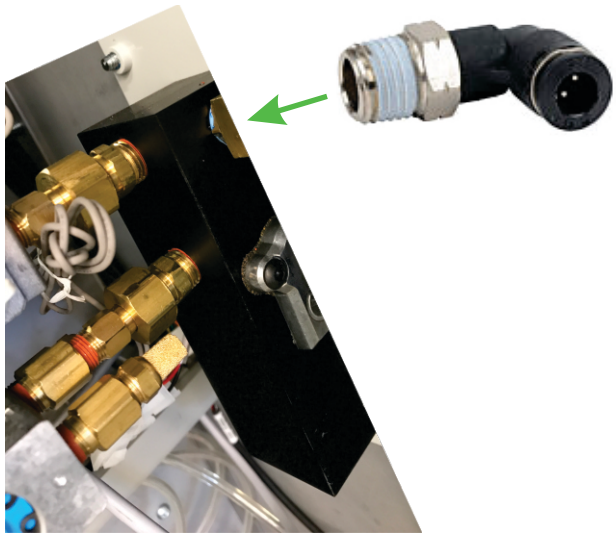


Step A17:

1) With the adjusting barrel screwed all the way in

2) push the cable jacket in until it fully seats in the adjusting barrel

3) With the cable end fully seated, tighten the gripping collar on the cable gland.



Step A18:

Find an open port on the TL air manifold. Install the 1/4 NPT to 1/4" hose push-connector (supplied with the kit).

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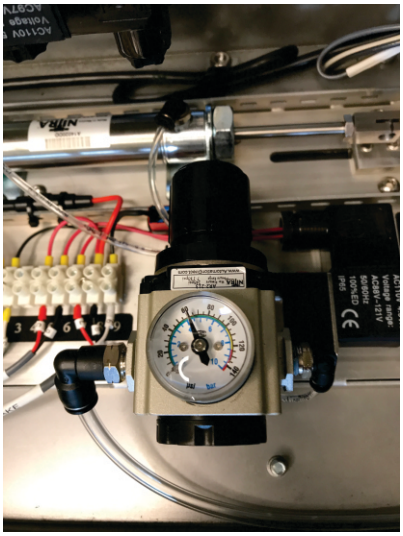

Step A19:

Cut and route the supplied 1/4” air hose from the compressed air manifold to the input side of the pneumatic actuator’s regulator.

Typical regulator setting is 60 psi.

Regulator max setting <= 100 psi.

Typical Spindle Holding Torque vs. Pressure Setting:

@100 psi: 106 ft. lbs. (0.69 MPa: 122 Nm)
@80 psi: 69 ft. lbs. (0.55 MPa: 93.7 Nm)
@60 psi: 49 ft. lbs. (0.41 MPa: 66.8 Nm)
@40 psi: 32 ft. lbs. (0.28 MPa: 43.4 Nm)
@20 psi: 17 ft. lbs. (0.14 MPa: 23.0 Nm)

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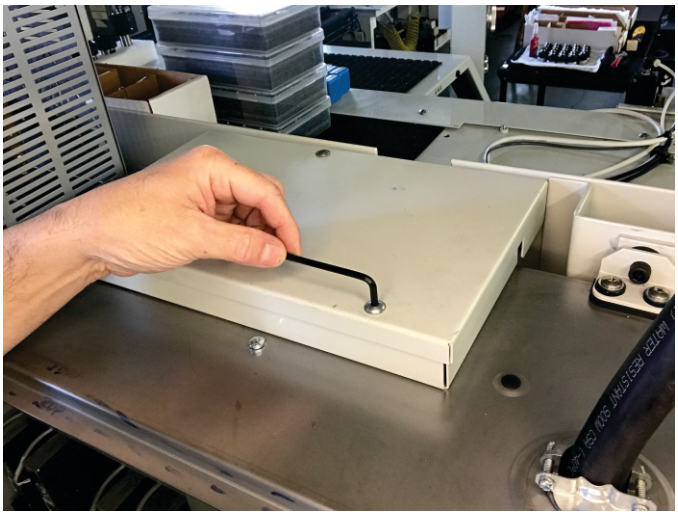
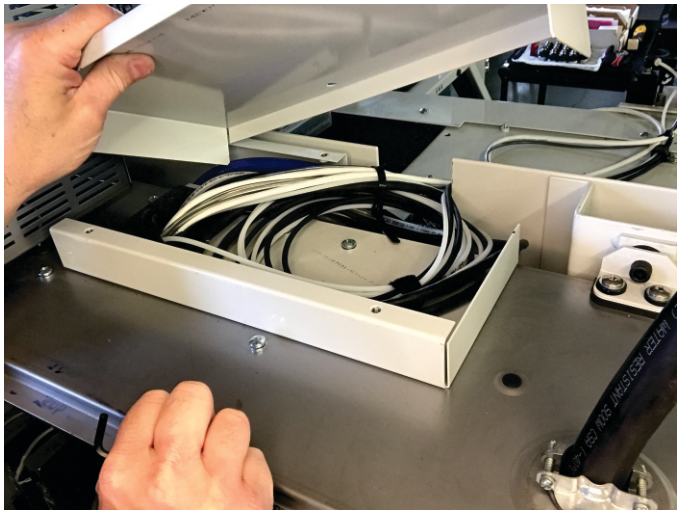


Part B: Install Wiring

Step B1:

Use a 5/32” Allen wrench to remove the three (3) wiring access panel screws on top of the control cabinet.



Step B2:

Remove the wiring access cover.

Electric shock hazzard if power is not properly disconnected.

Step B3:

Remove the plastic cover from the vertical wiring duct.

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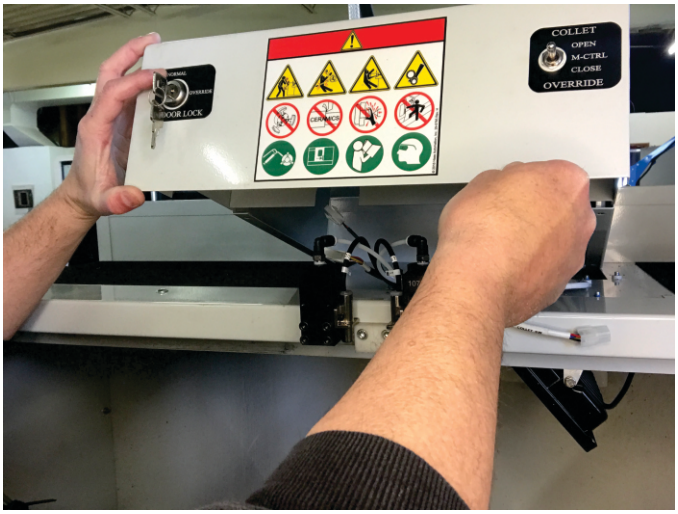
Step B4:

Use a 5/32” Allen wrench to remove the four (4) screws holding the top-front access cover.



Step B5:

Remove the top-front access cover.

Step B6:

A good location for the push-button is 1.65” from the left edge and 1.65” (or more) up from the bottom edge of the cover. On some lathes the back side of the switch body may interfere when the cover is replaced--check to see how much room there is behind the cover and center punch for the push-switch location accordingly.

Step drill, or punch the hole to 7/8” (or use an electrician’s 1/2” panel punch which will make a perfect 0.885” diameter hole)

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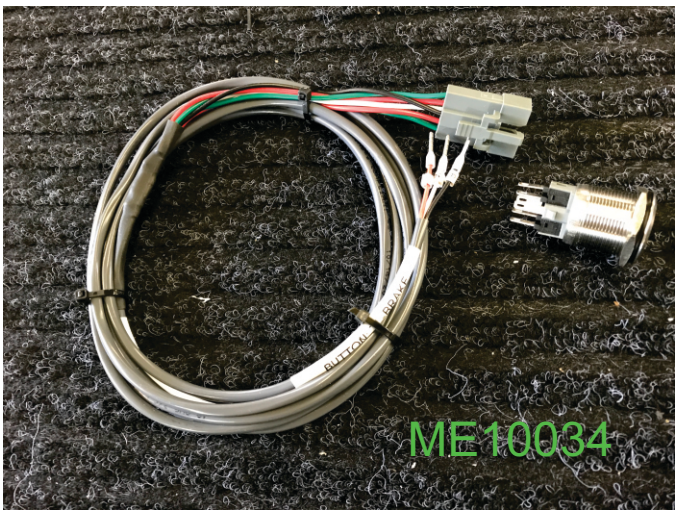
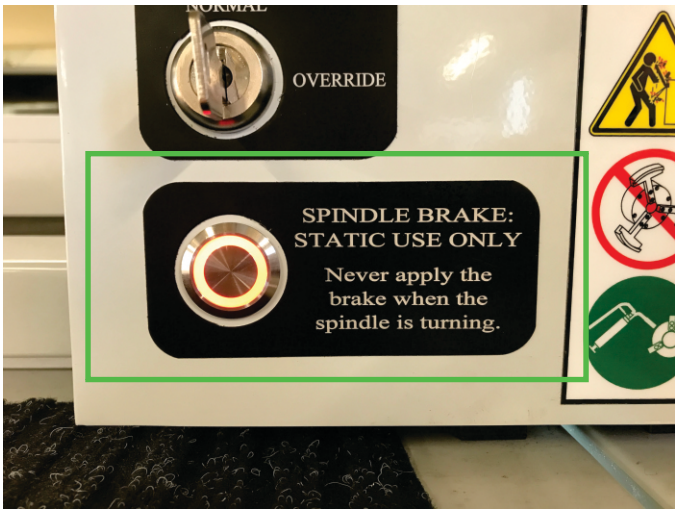


Step B7:

For easy installation and maintenance note that the push-button switch disconnects from the push-button wiring assembly.

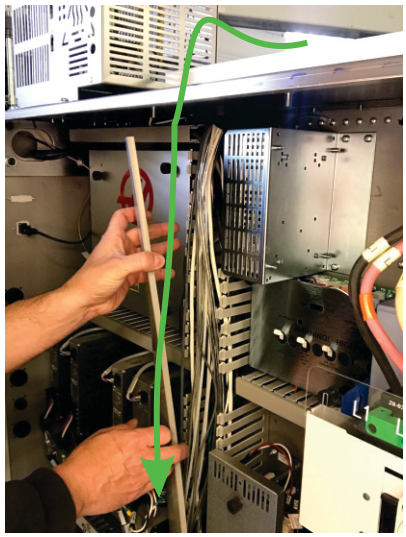
(NOTE: This connector's wiring is symmetric so it may be mated either way and is good as long is it clicks in and latches.)



Step B8:

Install the push-button switch. The o-ring should remain on the front of the panel. Gently tighten the 25mm retaining nut.

Apply TL-BRAKE push button identification and warning sticker P/N ME10032.



Step B9:

Route the pushbutton wiring over the top and down through the wiring duct.

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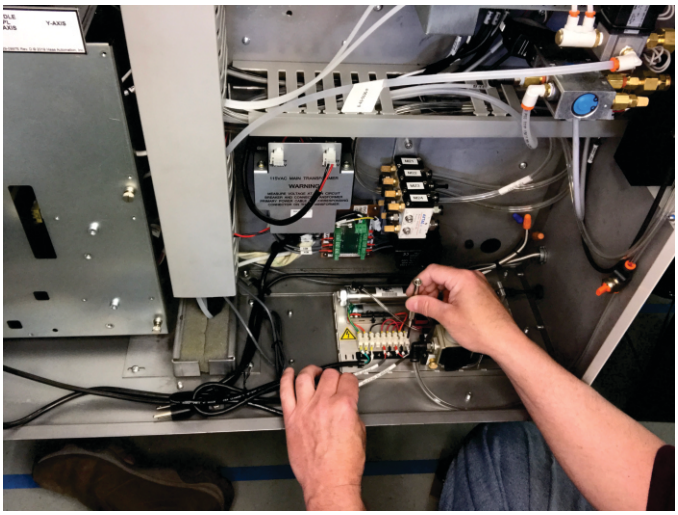
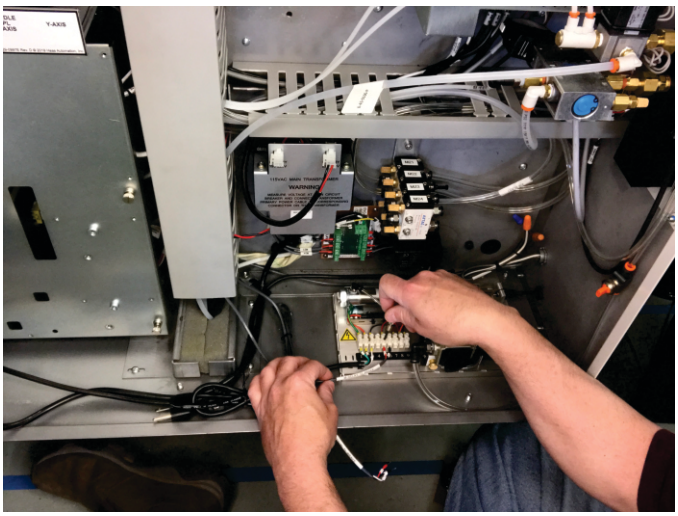


Step B10:

Connect the ends of the push button wiring to pins 7,8, and 9 on the pneumatic actuator. The wire ends of the push button cable assembly are labeled. The numeric labels on the wire ends match the terminal numbers. Tighten the wire connections with a small flat blade screw driver.

Step B11:

Install M-Code wiring assembly.



Step B12:

The M-Code wiring assembly connects to pins 5 and 6 on the pneumatic actuator terminal block. The numeric labels on the wire ends match the associated terminal numbers. Tighten the wire connections with a small flat blade screw driver.

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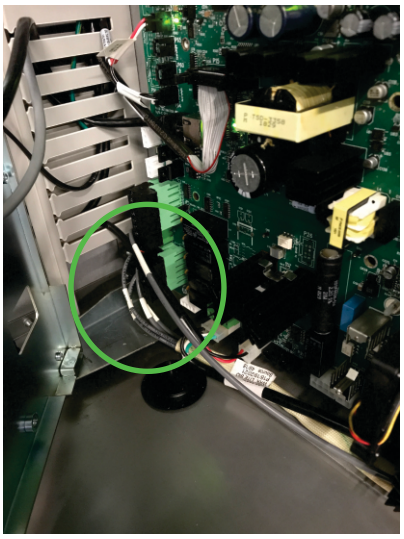
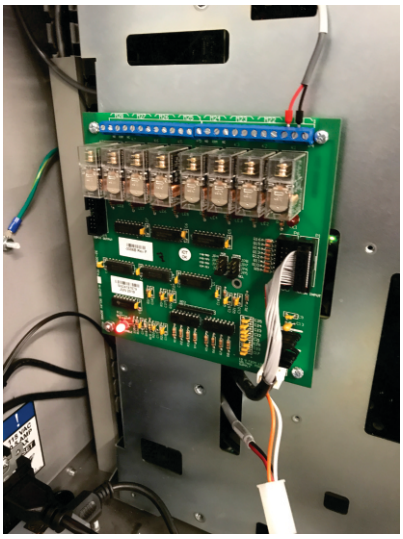


Step B13 (or step B14):
Factory standard m-code relays M21 through M25 are located behind the swing-open metal door. Select an open relay to use for the brake. Wire the brake to a normally open (**NO**) terminal so it is active when the relay is activated.

(For more information consult your machines documentation or the Haas web site.)



Step B14 (optional 8M board) :

Some machines (like shown in this photo) may have Haas "Optional 8M-code Relays". In this case, and if standard relays M21 through M25 are already used, then wire to the 8M-Code relay board as shown here. Wire the brake to a normally open (**NO**) terminal so it is active when the relay is activated.

Standard M-CODES commands:

Rly#	ON	OFF
M21	M51	M61
M22	M52	M62
M23	M53	M63
M24	M54	M64
M25	M55	M65

Optional 8M-Code Commands:

Rly#	ON	OFF
M21	M59 P90	M69 P90
M22	M59 P91	M69 P91
M23	M59 P92	M69 P92
M24	M59 P93	M69 P93
M25	M59 P94	M69 P94
M26	M59 P95	M69 P95
M27	M59 P96	M69 P96
M28	M59 P97	M69 P97

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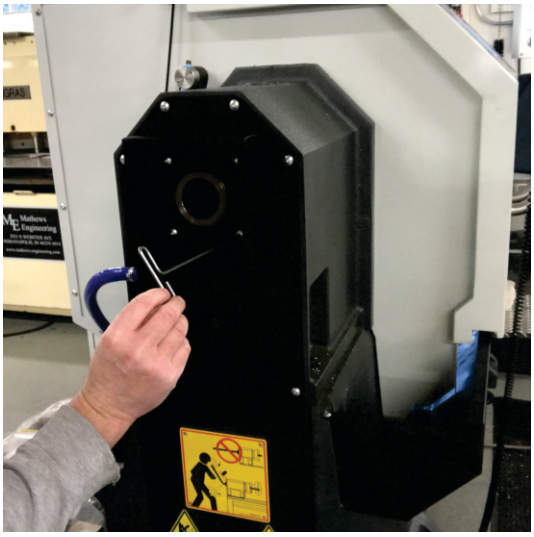


Step C1:

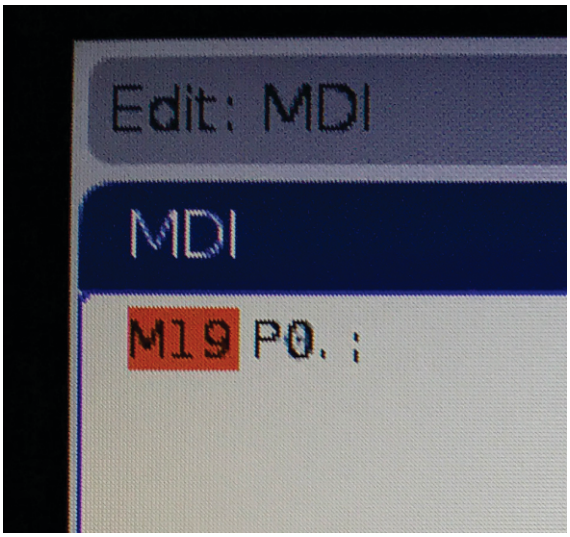
Use a 5/32” Allen wrench to remove the four screws that hold the spindle “Drip Catch” box.

Remove the “Drip Catch” box.

Step C2:

Use a 5/32” Allen wrench to remove the seven (7) screws that hold the spindle motor cover.

Remove the spindle motor cover.



Step C3:

On machines that have SPINDLE ORIENTATION, immobilize the spindle using MDI “M19 P0.” and skip to Step 5.

If your machines does not have SPINDLE ORIENTATION, use the method shown in step 4 instead.

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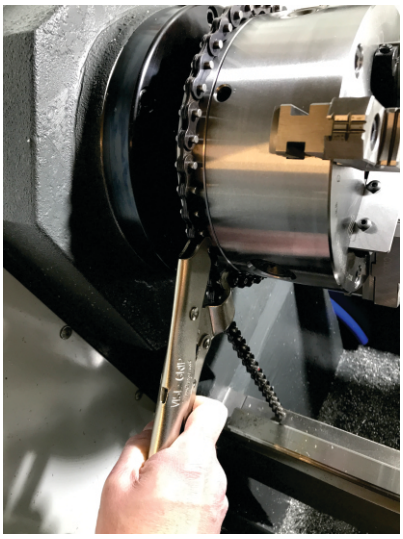
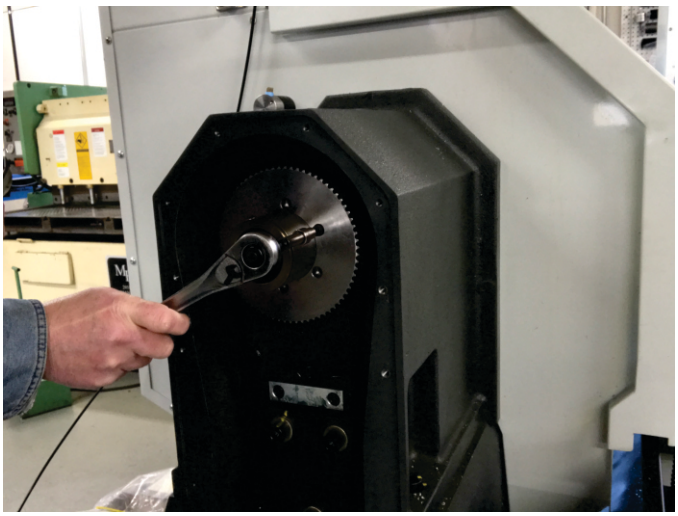


Step C4:

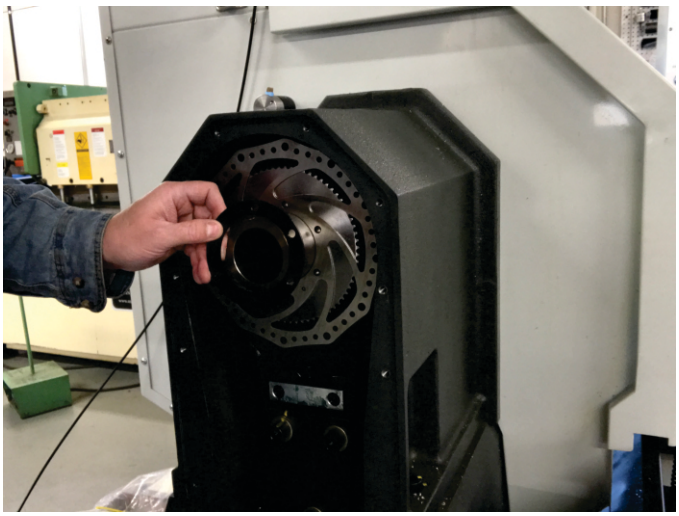
As an alternative to SPINDLE ORIENTATION you may use an assistant to hold the spindle still with a strap wrench, chain wrench, or similar tool.



Step C5: ROTOR INSTALLATION

Use a socket wrench with an Allen bit and a 3” extension to remove the six (6) spindle hub screws.

NOTE: *These screws are too short and will no longer be needed so set them aside.*



Step C6:
Loosely install the ROTOR, ROTOR BOLSTER PLATE, six (6) THICK ROTOR WASHERS, and six (6) SOCKET HEAD SCREWS (*).

(*) Use the longer screws supplied with the kit. The screws removed in step C5 are too short and will not engage enough thread.

A2-5 Spindle uses 5/16-18 screws
A2-6 Spindle uses 3/8-16 screws

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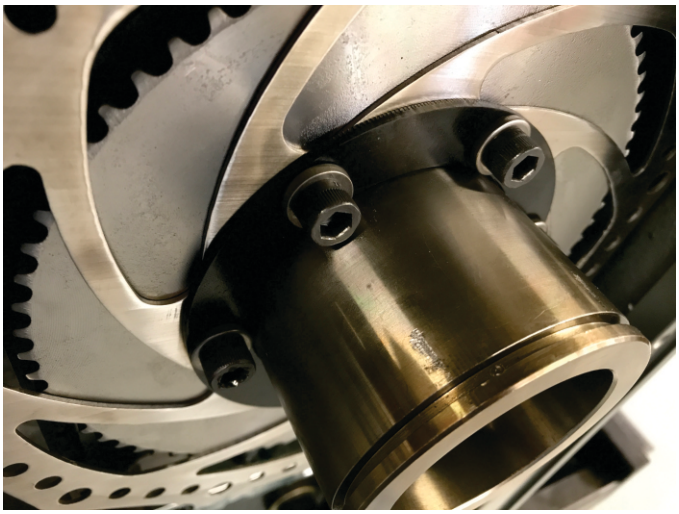
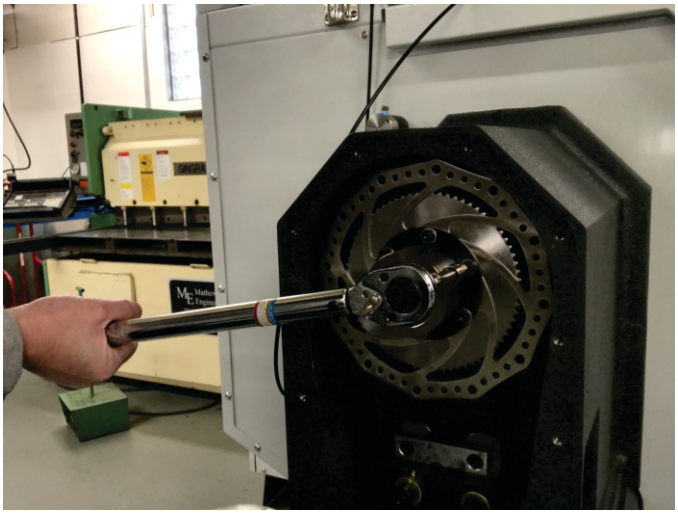


Step C7:

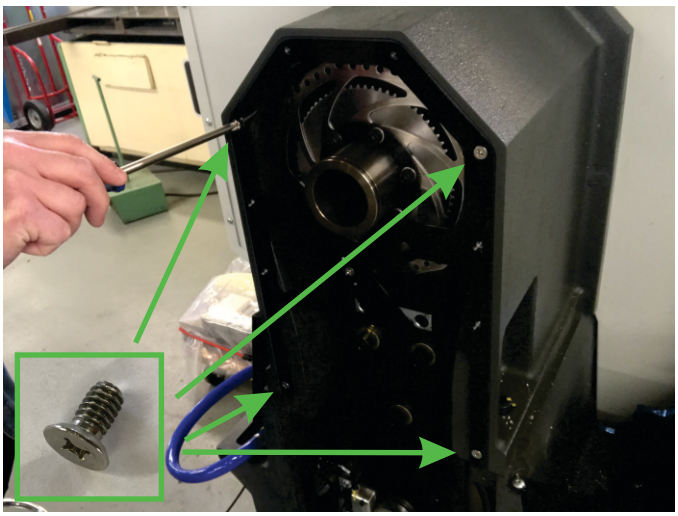
Confirm the ROTOR, ROTOR BOLSTER PLATE, six (6) THICK ROTOR WASHERS, and six (6) SOCKET HEAD SCREWS are installed as shown in this photo.



Step C8:

Torque the six (6) SOCKET HEAD SCREWS using an Allen bit on a 3” extension at the end of a socket extension.

A2-5 Spindle:
5/16-18 bolts: 18 ft·lbs (24 N·m)
A2-6 Spindle:
3/8-16 bolts: 20 ft·lbs (27 N·m)



Step C9: HOLE PREPARATION
Using the four (4) 1/4-20 82 degree countersunk screws to hold the CALIPER SUPPORT FRAME in place (for use as a template). It may be necessary to “jiggle” the CALIPER SUPPORT FRAME while gently tightening the countersunk screws. This action will get the frame to center on the oversize clearance holes.

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Static Spindle Brake for Haas TL-1 Lathes

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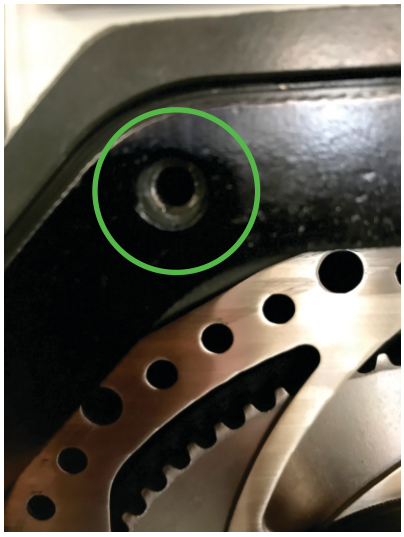
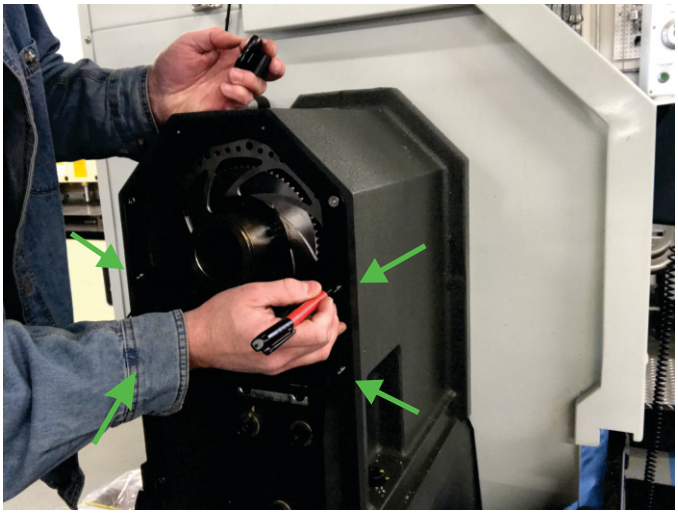


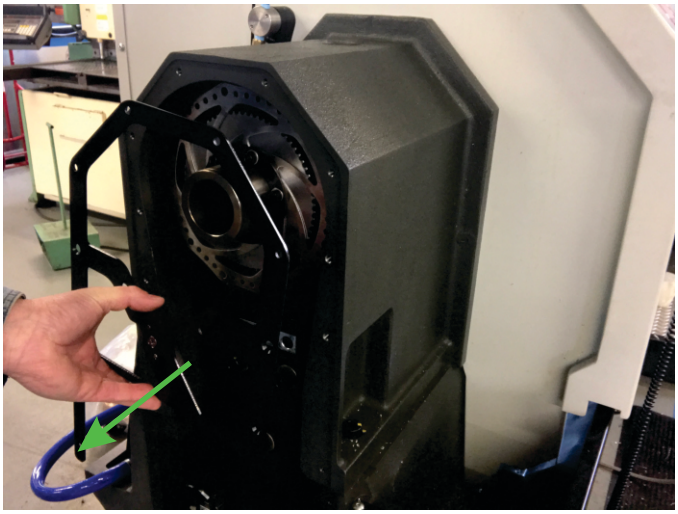
Step C10:

Confirm that the CALIPER SUPPORT FRAME is properly centered on the chamfers of the 82 degree chamfer screws. When the frame is aligned, the threaded holes of the top two, unused holes, will be centered in the CALIPER SUPPORT FRAME as shown in this image.



Step C11:

Once confident that the CALIPER SUPPORT FRAME is accurately located, use a SHARPIE® marker to mark drill locations inside the four (4) countersunk holes on the CALIPER SUPPORT FRAME.



Step C12:

Remove the CALIPER SUPPORT FRAME

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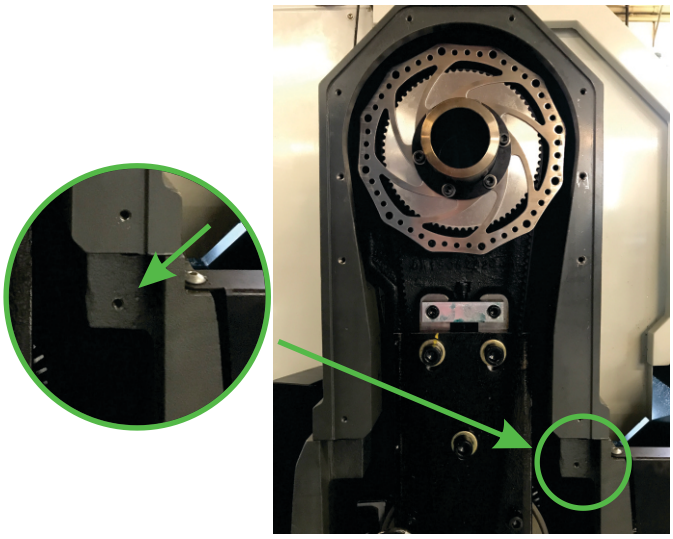
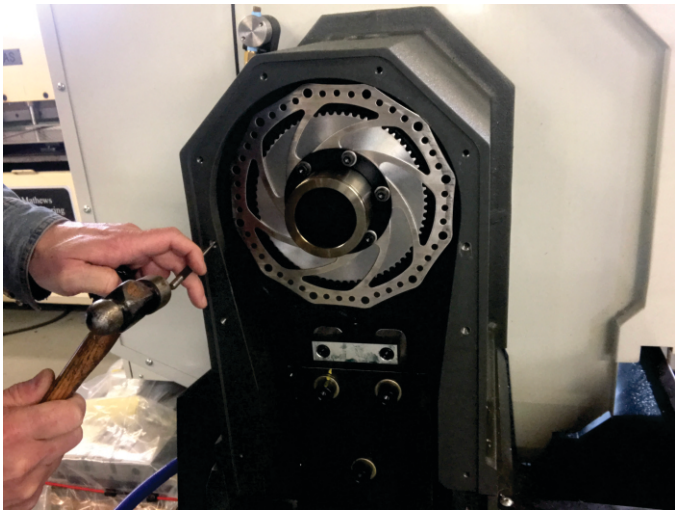


Step C13:

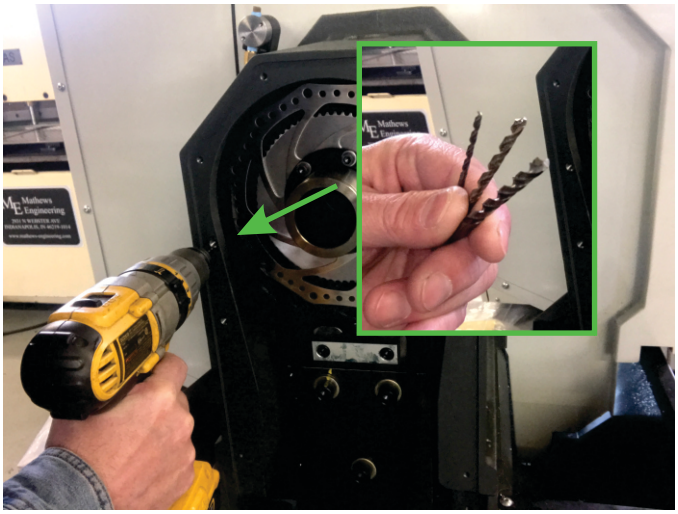
Mark the location for a fifth hole.

This will be used for a wire tie anchor.



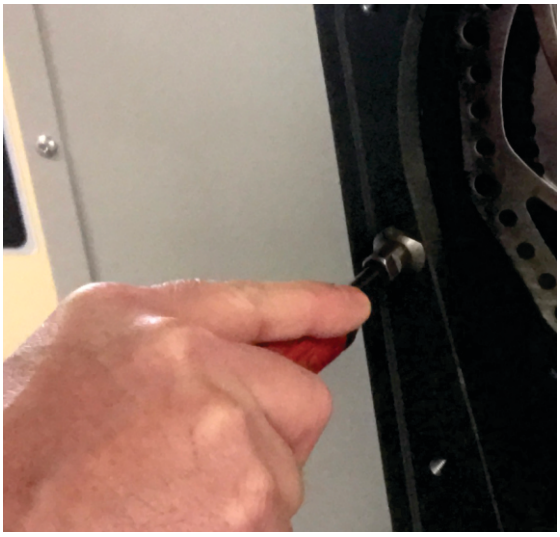
Step C14:

Carefully and accurately center-punch the locations for the five (5) holes.



Step C15:
Starting with the smallest bit, use three (3) progressively larger drill bits (#40, #22, then #6 (0.204")) to "step drill" the five (5) hole locations. Drill to 1" depth or, where possible, drill through.

(Step drilling is tedious but this is the best way to ensure that hand drilled holes stay "on center")



Step C16:

Chamfer the five (5) hole locations.

Step C17:

Tap the five (5) hole locations with a 1/4-20 tap. Use tap-oil and be careful to assure the tap enters perpendicular to the surface and does not break inside the hole. If, at any time, the tapping force feels too high, back the tap out, clean, re-oil, and resume the tapping.

Step C18:

Use compressed air to clean the tapping debris from the five (5) tapped holes.

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Static Spindle Brake for Haas TL-1 Lathes

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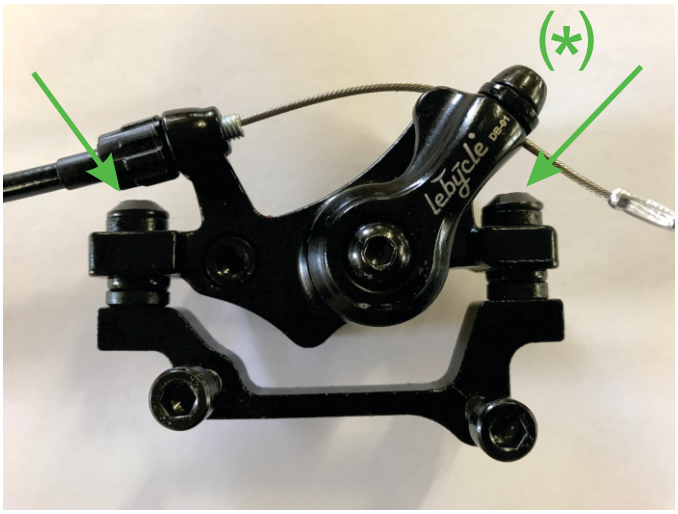
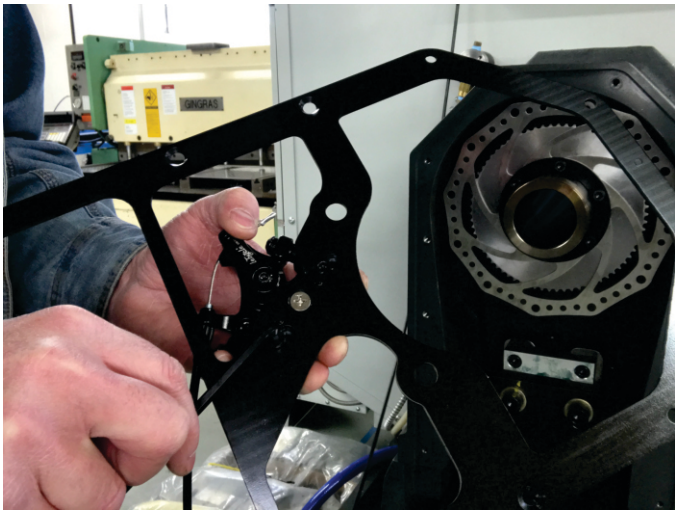
Step C19:

Feed the brake cable caliper end (caliper and all) through the hole in the back side of the lathe casting.



Step C20:
Use the 5 mm Allen wrench to slightly loosen the caliper floating screws identified by the arrows in this image.

(*) *Do not loosen the cable pinch bolt. The cable pinch bolt comes factory pre-adjusted and torqued. If a cable pinch bolt adjustment is needed, re-torque this bolt to 62 in·lbs (7 N·m)*

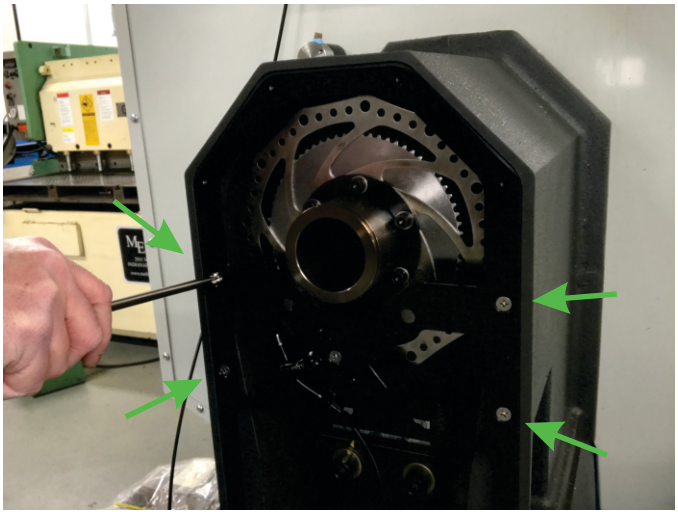


Step C21:
Caliper Support Frame Install

Use a 5mm Allen wrench to loosely install the BRAKE CALIPER to the CALIPER SUPPORT FRAME

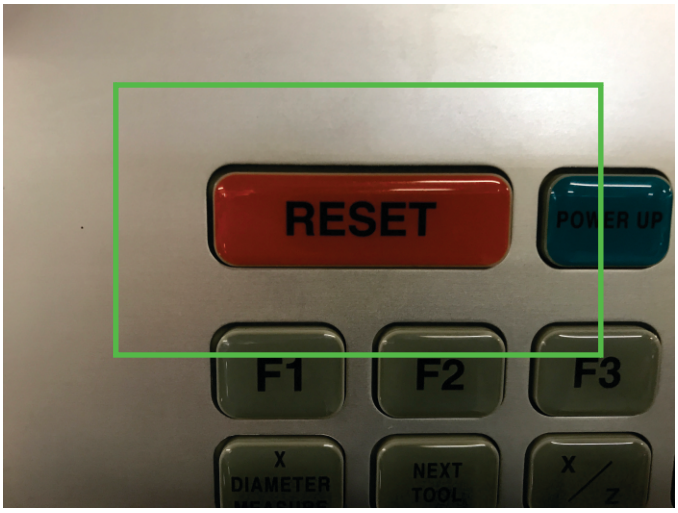
Step C22:

Sliding it up from the bottom, and guiding the brake caliper onto the rotor, gently feed the CALIPER SUPPORT FRAME up and onto the lathe's motor housing.



Step C23:

Use a #3 Phillips screwdriver to fasten the CALIPER SUPPORT FRAME with the four (4) 1/4-20 x 1/2" countersunk screws.



Step C24:

Caliper UP/DOWN adjustment

If MDI "M19 P0." is still active, press "RESET" to release the spindle from spindle orientation.

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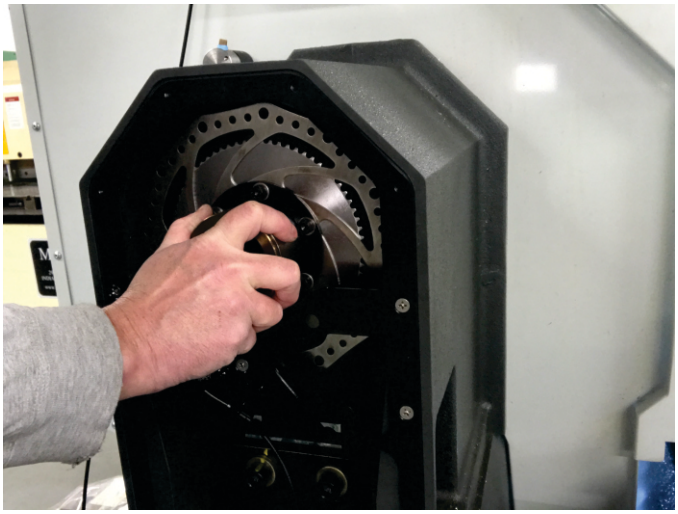
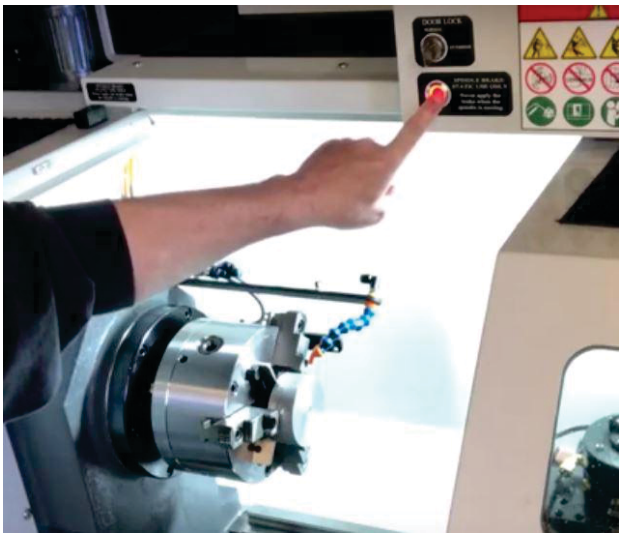


Step C25:
Adjust the UP/DOWN location of the caliper by gently turning the spindle and moving the caliper UP until it contacts a high point on the rotor's perimeter. Lower the caliper about 0.1" from this point and tighten the two (2) UP/DOWN adjust screws with a 5mm Allen wrench. Check that the rotor spins freely without touching at its edge.

Step C26:

Caliper "Float" Adjustment

Slide the CALIPER PAD ADJUSTING TOOL between the rotor and the pads.



Step C27:

With the float screws loose, and the pneumatic actuator pressure at 60 psi, activate the brake.

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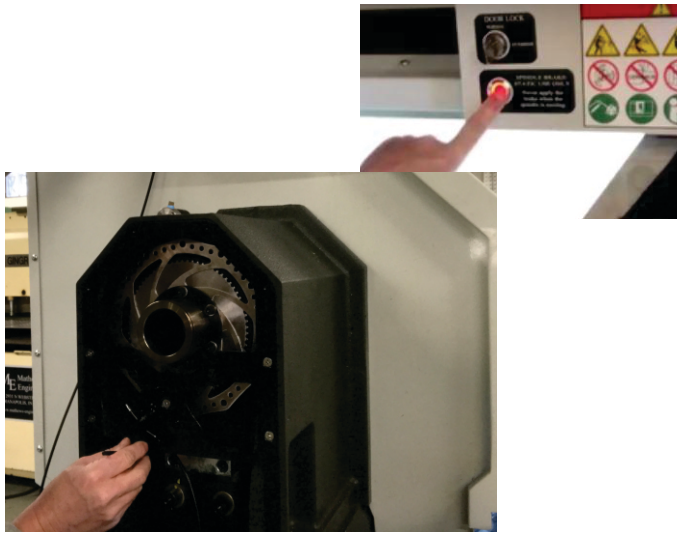


Step C28:

While holding the brake switch, use a 5mm Allen wrench to tighten the two float screws. (An assistant may be required for this step.)

Step C29:

Remove the CALIPER ADJUSTING TOOL.

Step C30:

By hand, spin the rotor and check for rubbing. A trace amount of rubbing is normal however rubbing noise should be audible only when the covers are off. Properly adjusted calipers should make no noise that is so loud that it is audible when all the covers and the spindle drip-catch is installed.

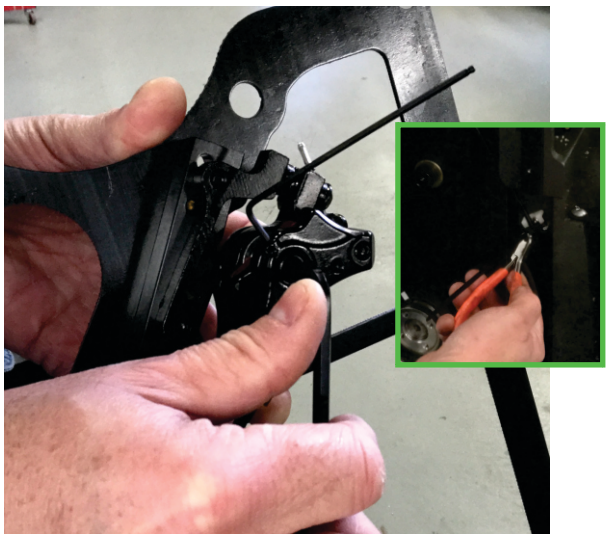
M03 S100.
....then
M03 S500.
....then
M03 S1000.
....then
M03 S1800.
....then (if available):
M03 S3000.

Step C31:
Staying clear of the uncovered motor area, carefully test the rotor with progressively faster speeds.

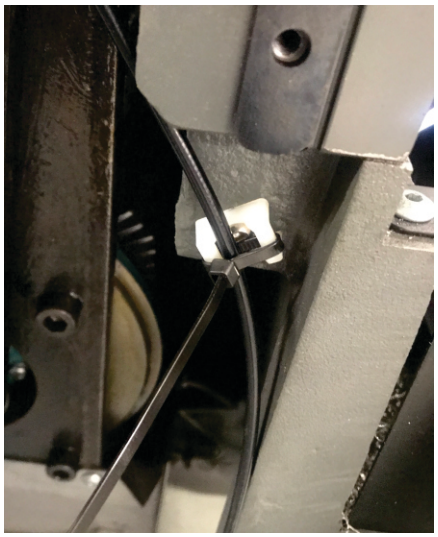
If there is too much rubbing, repeat the float screw adjustment or try Step 40.

.

Never use the brake when the spindle is turning.



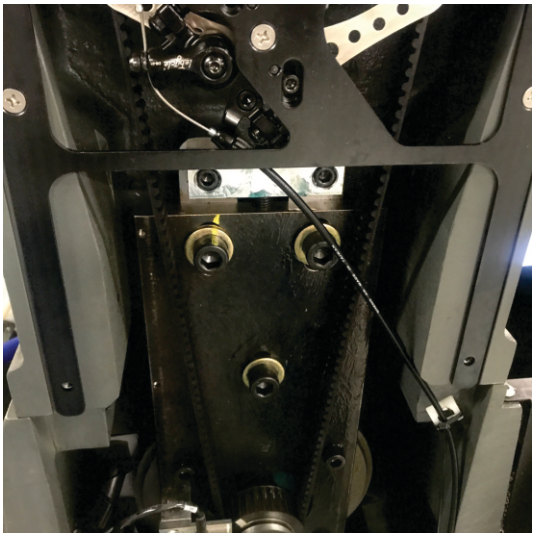
Step C32: OPTIONAL STEP
If the back-side pad continues to rub, 1st retry float screw adjustment Steps C26-C29. If it continues to rub the back pad can be moved by loosening the locking set screw (2 mm Allen) and adjusting the 5 mm Allen adjusting screw. After this adjustment, the 2mm Allen screw should be re-tightened to lock the larger screw.



Step C33:

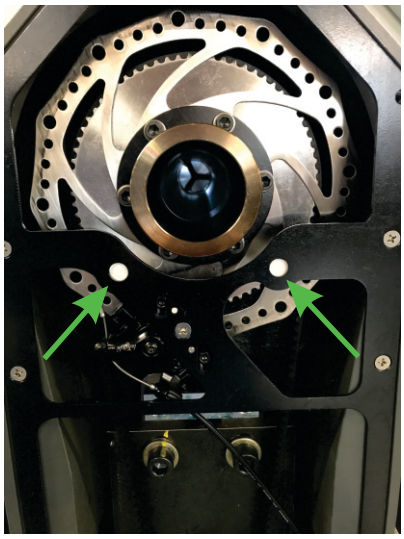
Brake Wire-Tie Anchor

Install the wire tie anchor. Anchor the brake control wire using the wire tie provided in the kit. Cut away the excess portion of the wire tie.



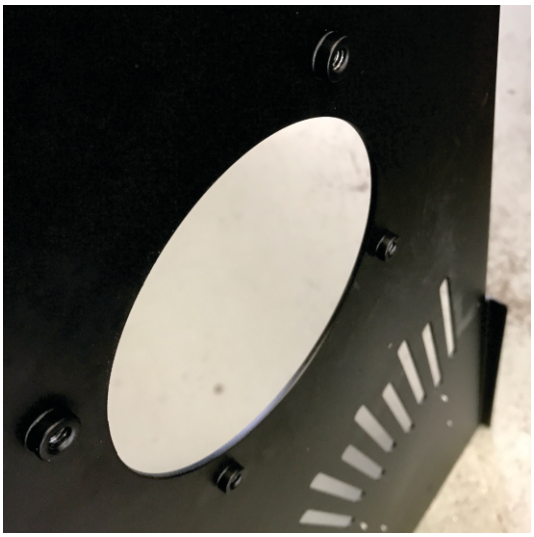
Step C34:

Confirm that there is no chance the brake wire will contact, or interfere with, the spindle drive belt.



Step C35: Reassembly
In the CALIPER SUPPORT FRAME there are two clearance holes as shown in this photo.

These holes provide clearance and prevent the PEMSERTs on the backside of the motor cover from pressing against the CALIPER SUPPORT FRAME (see next photo).



Step C36:

Take note of the PEMSERTS that are on the back side if the motor access cover. These MUST fit inside their associated clearance holes (shown in Step 43).

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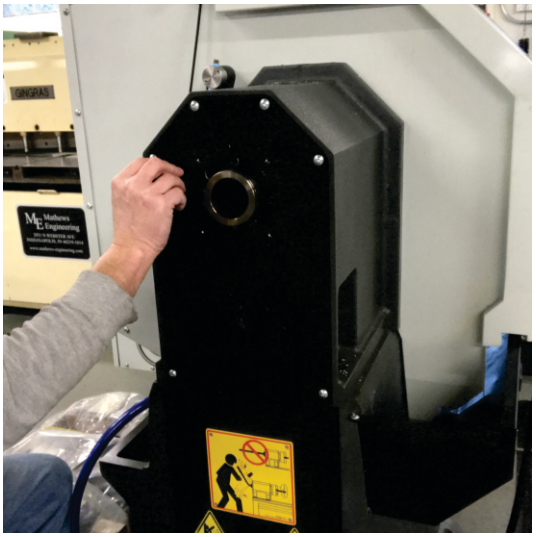
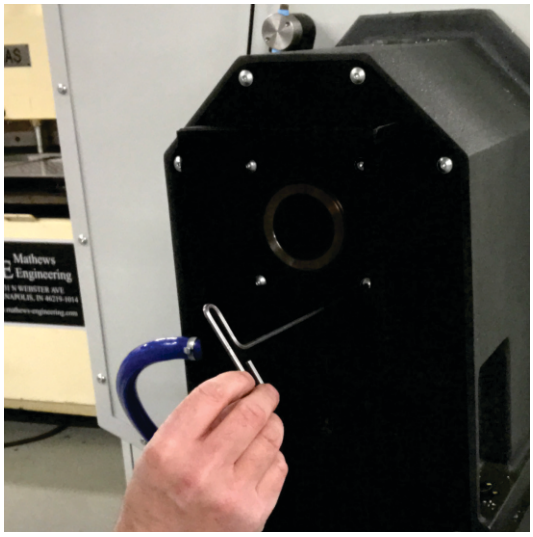


Step C37:

Lift the left side cover onto the caliper support frame again making sure that the PEMSERTs fit into the clearance holes provide in the caliper support frame.

Install the seven (7) 1/4-20 button head truss screws that were original to the machine



Step C38:

Re-install the spindle “drip catch” box.

Re-install all other access panels and associated hardware.

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```
O10100 (EXAMPLE PROGRAM STD M21 RELAY);

(BRAKE RELEASE SAFETY LINES BELOW);
M61        (SPINDLE BRAKE OFF);
G04 P1.;   (1 SECOND DELAY);

(DO STUFF....);

(TL-BRAKE ENGAGE CODE);
M19 P0.    (ORIENT SPINDLE)
M51        (ENGAGE SPINDLE BRAKE);

(DO OTHER STUFF...);

(TL-BRAKE DISENGAGE CODE);
M61        (SPINDLE BRAKE OFF);
G04 P1.;   (1 SECOND DELAY);
```

NOTE 1

Add brake release safety lines to the beginning of all programs.

If a prior program was interrupted before releasing the TL-BRAKE, an operator might accidentally start a program with the TL-BRAKE actuated.

```
O10101 (EXAMPLE PROGRAM OPTIONAL 8M, M21);

(BRAKE RELEASE SAFETY LINES BELOW);
M69 P90        (SPINDLE BRAKE OFF);
G04 P1.        (1 SECOND DELAY);

(DO STUFF....);

(TL-BRAKE ENGAGE CODE);
M19 P0.    (ORIENT SPINDLE);
M59 P90    (ENGAGE SPINDLE BRAKE);

(DO OTHER STUFF...);

(TL-BRAKE DISENGAGE CODE);
M69 P90    (SPINDLE BRAKE OFF);
G04 P1.;   (1 SECOND DELAY);
```

NOTE 2

Always orient the spindle with M19 before applying the TL-BRAKE through G-Code. Orienting the spindle puts the spindle into a known orientation but, M19 also forces the spindle to a known FULL STOP condition and suspends further processing of G-Code until there is a confirmed spindle FULL STOP.

FAQ:

Q: Why can't I just use M05 to stop the spindle instead of M19 P0.?
A: M05 will stop the spindle, but it will not suspend further G-Code processing or wait for the spindle to come to a full stop. The M19 command contains an implied M05 but M19 also forces all G-Code processing to wait until the spindle has come to a FULL STOP.

Q: Can I orient to something other than P0.?
A: Yes, if your machine has spindle orientation, you can use this step to orient to any desired angle.

NOTE 3

After TL-BRAKE release always include a one (1) second delay to allow time for the TL-BRAKE pads to release.

```
O10200 (EXAMPLE G156 BROACHING CODE);
 (BRAKE RELEASE SAFETY LINES);
M61 (SPINDLE BRAKE OFF);
G04 P1.0 (DELAY);

(DO OTHER NORMAL STUFF);

(BROACHING CALLS);
M19 R0.0;
M97 P1000;
M19 R30.0;
M97 P1000;
M19 R60.0;
M97 P1000;
(ETC....)
.
M30;
```

G156 with sub-program:

When using the TL-BRAKE with canned cycles like the G156 broaching command it may not be possible to use G156 using the normal canned cycle coding approach. This is because of the need to apply the brake before each G156 broaching operation and then to always release the brake before any M19 spindle orient.

```
N1000 (SINGLE G156 WITH BRAKE COMMANDS);
M51 (SPINDLE BRAKE ON);
G04 P1.0 (DELAY);
G156 X1.313 Z-1.66 I0.0016 D0.0016 F200.;
G80 (CANNED CYCLE CANCEL);
M61 (SPINDLE BRAKE OFF);
G04 P1.0 (DELAY);
M99;
```

This local sub-program “wraps” a single acting G156 command inside the brake ON and brake OFF commands. Delays are also included to give the brake time to actuate before any subsequent action.