



INSTALLATION AND OPERATING INSTRUCTIONS

MATE PILOT™ TURRET CALIBRATION SYSTEM

VERIFICATION MODE

Mate Pilot™ Turret Calibration System

These instructions show the operation of the Mate Pilot Calibration System in two modes.

- Verification Mode**—Used to confirm the precise concentric and angular alignment of your turret to maintain high quality piece parts, extend tool life and increase productivity.
- Alignment Mode**—Used to restore the concentric and angular alignment of each station with the same or better precision as the initial machine installation. Achieving precise alignment improves piece part quality, extends tool life, and increases productivity.

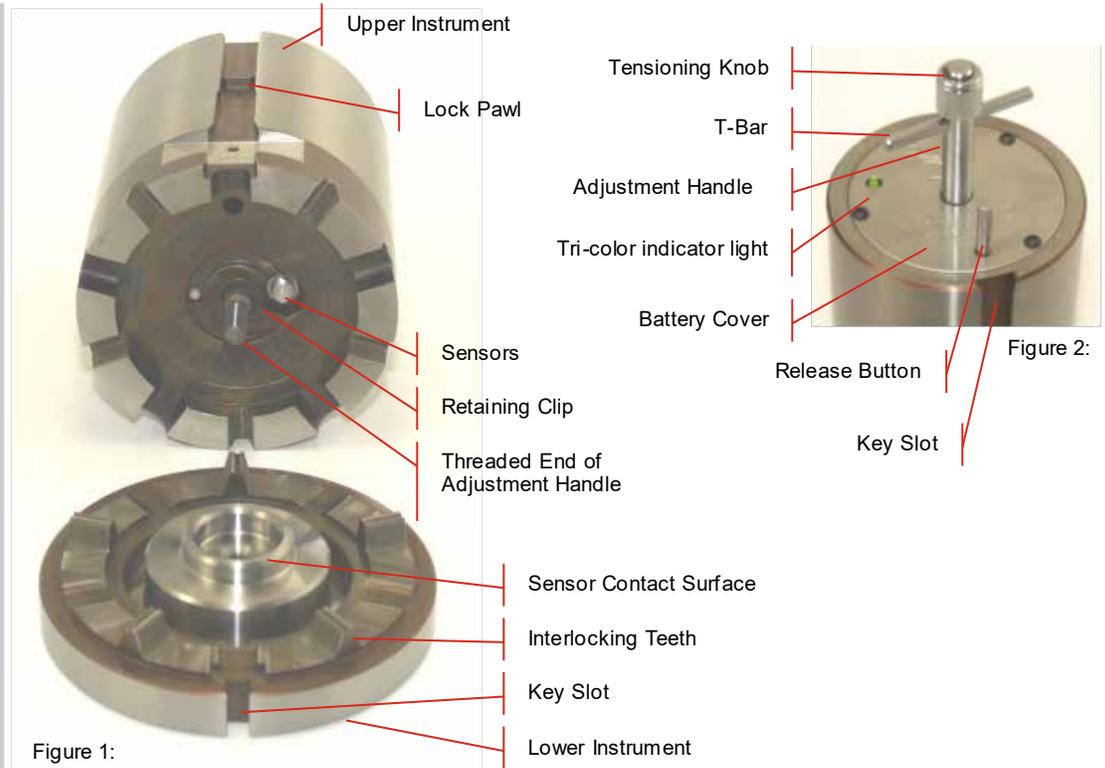


Figure 1:

Figure 2:

Verification Mode

- Rotate the turret until the station to be verified is in the tool change position and remove punch guide and/or die.
- Install the lower calibration instrument into the die holder and tighten the clamp screw(s) as you would for a die.
- Install the upper calibration instrument into upper holder, gently lowering the instrument until the lock pawl (see Figure 1) rests on the top of the turret key in the machine. **Caution:** Do not allow the upper instrument to drop onto the turret key or through the turret bore as this may damage the instrument and/or the turret bore.
- Look into the turret gap to ensure the threaded end of the length adjustment handle is not engaged with the lower calibration instrument.
- Rotate the turret until the station to be verified is positioned under the ram. Note: The turret must be locked in place. For auto-index stations, the auto-index must be engaged.
- Lower the upper instrument gently, by depressing the release button and lowering the instrument using the adjustment handle, until the threaded end of the adjustment handle rests on the top of the lower instrument. **Caution:** Do not allow the upper instrument to drop onto the turret key or through the turret bore as this may damage the instrument and/or the turret bore.
- Reach into the machine and rotate the T-bar on the adjustment handle until the red light just turns on, then continue rotating with the tensioning knob (see Photo 2) until the interlocking teeth of the upper and lower instruments are engaged and the tensioning knob starts to click. Do not use the T-bar when any of the lights are on as this may result in a false verification.
- View the color of the indicator light. If the light is obscured, then view the reflection of the light on the handle.
 - Red: angularity and concentricity is not confirmed. Perform an alignment as described on pages 2 and 3.
 - Yellow: angularity and concentricity is within 0.0012(0.030)
 - Green: angularity and concentricity is within 0.0003(0.008) - ideal for 0.048(1.20) material or less.
- Loosen the adjustment handle until the threaded end of the adjustment handle is fully disengaged from the lower instrument.
- Lift the upper instrument gently, using the length adjustment handle, until the lock pawl rests on the top surface of the turret key.
- Look into turret gap to ensure the threaded end of the length adjustment handle is not engaged with the lower instrument.
- Rotate the turret until the station that has been verified is in the tool change position.
- Note: If you did not previously use the alignment mode, then skip this step. Tighten any screws that were previously loosened during alignment in accordance to the punch press manufacturer's torque specifications.
- Repeat steps 5 to 11 above to ensure the tool holder did not move during tightening.
- Remove the upper and lower instruments.



Photo 1: Install upper and lower instruments. Rotate station under machine ram.



Photo 2: Tighten tensioning knob on adjustment handle until knob starts to click.



Photo 3: View Light Color

Note: Angularity and concentricity within 0.0003(0.008) - Green Indicator Light - is recommended when punching materials with a thicknesses of 0.048(1.20) or less.

- Engaged, but not aligned
- Angularity and concentricity within 0.0012(0.030)
- Angularity and concentricity within 0.0003(0.008)



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Alignment Mode—For thick turret punch press with fixed upper holder and moveable lower holder.

Used to restore the concentric and angular alignment of each station with the same or better precision as the initial machine installation. Achieving precise alignment improves piece part quality, extends tool life, and increases productivity.

Install the Instruments into the Punch Press

1. Rotate the turret until the station to be aligned is in the tool change position, and remove punch holder and/or die as applicable. (Tip: Tooling in adjacent stations should also be removed to provide an adequate work space.)
2. Inspect the upper turret bore for damage. Pay particular attention to the turret bore keys. The upper calibration instrument should slide freely in the upper turret bore. Repair as required, prior to alignment.
3. Loosen the screw(s) that hold die holder in place. See photo 1. (Tip: Any thread-retaining compound used in previous installations should be removed.)
4. Tighten the screw(s) mentioned above until just snug. The die holder will need to slide during the alignment process.
5. Install the lower calibration instrument into the die holder and tighten the clamp screw(s) as you would for a die. See photo 2
6. Install the upper calibration instrument into upper holder, gently lowering the instrument until the lock pawl (see figure 1 on page 1) rests on the top of the turret key in the turret bore. **Caution:** Do not allow the upper instrument to drop onto the turret key or through the turret as this may damage the instrument and/or the turret bore. See photo 3.
7. Look into the turret gap to ensure the threaded end of the length adjustment handle is not engaged with the lower calibration instrument. See photo 4.

Align Lower Holder

1. Rotate the turret until the station to be aligned is under the ram. Note: The turret must be locked in place. For auto-index stations, the auto-index must be engaged.
2. Lower the upper instrument gently by depressing the release button and lowering the instrument using the adjustment handle, until the threaded end of the adjustment handle rests on the top of the lower instrument. **Caution:** Do not allow the upper instrument to drop through the turret bore as this may damage the instrument and/or the turret bore.
3. Reach into the machine and tighten the adjustment handle, using the T-bar, until the interlocking teeth of the upper and lower instruments are fully engaged. The indicator light will change color from red, to yellow, and then to green. See photo 5. During this process the lower tool holder will be adjusted into precise concentric and angular alignment with the upper tool holder. **Caution:** Do not use any device other than the T-bar to tighten the adjustment handle. Excessive torque may damage the machine and/or the calibration instrument.
4. Loosen the adjustment handle until the threaded end of the adjustment handle is fully disengaged from the lower instrument.
5. Lift the upper instrument gently, using the length adjustment handle, until the lock pawl rests on the top surface of the turret key.
6. Look into turret gap to ensure the threaded end of the length adjustment handle is not engaged with the lower calibration instrument. See photo 4.
7. Rotate the turret until the station that has been aligned is in the tool change position. **Caution:** Do not rotate the turret with the two halves of the calibration instrument tightened together.
8. Tighten the die holder retaining screws until snug.
9. Proceed to step 5 of the Verification Mode Procedure on the previous page.



Photo 1: Loosen Die holder



Photo 2: Install Lower Instrument



Photo 3: Install Upper Instrument

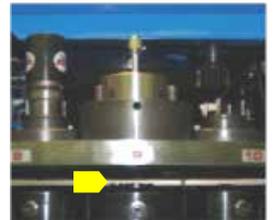


Photo 4: Check disengagement



Photo 5: Align the station, using the T-bar to tighten the adjustment handle until the light goes green.



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Alignment Mode—For thick turret punch press with removable upper and lower holders.

Used to restore the concentric and angular alignment of each station with the same or better precision as the initial machine installation. Achieving precise alignment improves piece part quality, extends tool life, and increases productivity.

Install the Instruments into the Punch Press

1. Rotate the turret until the station to be aligned is in the tool change position, then remove punch holder and/or die as applicable. (Tip: Tooling in adjacent stations should also be removed to provide more work space.)
2. Inspect the upper tool holder for damage. Pay particular attention to the tool holder alignment keys. The upper calibration instrument should slide freely in the upper tool holder. Repair as required, prior to alignment.
3. Loosen the screw(s) that hold the upper and lower tool holders in place. See photo 1. (Tip: Any thread retaining compound used in previous installations should be removed.)
4. Tighten the screw(s) mentioned above until just snug. The upper and lower tool holders will need to slide during the alignment process.
5. Install the lower calibration instrument into the die holder and tighten the clamp screw(s) as you would for a die.
6. Install the upper calibration instrument into upper holder, gently lowering the instrument until the lock pawl (see Figure 1 on page 1) rests on the top of the turret key in the turret bore. **Caution:** Do not allow the upper instrument to drop onto the turret key or through the turret bore as this may damage the instrument and/or the machine. See photo 2.
7. Look into the turret gap to ensure the threaded end of the length adjustment handle is not engaged with the lower calibration instrument. See photo 3.



Photo 1: Loosen upper and lower tool holder retaining screws



Photo 2: Install upper and lower instruments

Align Upper and Lower Holder

1. Rotate the turret until the station to be aligned is under the ram. Note: The turret must be locked in place. For auto-index stations, the auto-index pins must be engaged.
2. Lower the upper instrument gently by depressing the release button and lowering the instrument using the adjustment handle, until the threaded end of the adjustment handle rests on the top of the lower instrument. **Caution:** Do not allow the upper instrument to drop through the turret bore as this may damage the instrument and/or the turret bore.
3. Reach into the machine and tighten the adjustment handle using the T-bar, until the interlocking teeth of the upper and lower instruments are fully engaged. The indicator light will change color from red, to yellow, and then to green (see photo 4). During this process the upper and lower tool holders will be adjusted into precise concentric and angular alignment. **Caution:** Do not use any device, other than the T-bar, to tighten the adjustment handle. Excessive torque may damage the machine and/or the calibration instruments.



Photo 3: Check disengagement

Align the Station to the Punch Press:

1. Attach the alignment bar to the upper calibration instrument using the M4 screw provided.
2. Clamp an approximately 24"(600mm) x 48"(1200mm) piece of mild steel 0.100(2.50) thick or thicker into the punch press work holder clamps. See photo 5.
3. Mount a dial-test-indicator (DTI) with a magnetic base in a suitable position so the probe can be moved along the length of the alignment bar. See photo 5.
4. Use the manual jog mode on the machine control to move the sheet metal with the DTI attached, so that the probe of the DTI can move along the full length of the alignment bar. The total indicator reading (TIR) should be <math><0.001(0.02)</math> when the tool holder is correctly aligned. See photo 5.
5. Use the adjustment bar to rotate the calibration instruments (and the upper and lower tool holders) until the total indicator reading (TIR) of <math><0.001(0.02)</math> is achieved. You may need to move the sheet with the DTI back and forth several times until the desired reading is achieved. **TIP:** If it is difficult to rotate the calibration instruments, slightly loosen one or more of the retaining screws.
6. Tighten all the accessible retaining screws. See photo 6.
7. Recheck the alignment (repeat steps 4 to 6) to confirm the tool holders did not move during tightening. If the TIR of <math><0.001(0.02)</math> is achieved, then proceed to the next step. If not, repeat steps 4 to 6.
8. Remove the alignment bar.
9. Lift the upper instrument gently, using the length adjustment handle, until the lock pawl rests on the top surface of the turret key.
10. Look into turret gap to ensure the threaded end of the length adjustment handle is not engaged with the lower calibration instrument.
11. Rotate the turret until the station that has been aligned is returned to the tool change position. **Caution:** Do not rotate the turret with the two halves of the calibration instrument tightened together.
12. Tighten any retaining screws not previously tightened in step 6 above.
13. Proceed to step 5 of the Verification Mode Procedure.



Photo 4: Align the station, using the T-bar to tighten the adjustment handle until the light goes green.



Photo 5: Draw the probe of the dial-test-indicator along the length of the alignment bar.



Photo 6: Tighten the upper and lower tool holder retaining screws.



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Preparation for Use

1. Separate the upper from the lower by unscrewing the adjustment handle.
2. Ensure that the serial number of both the upper and lower instruments are identical.
3. Wipe off any lubrication/preservative oil from the unit with a soft cloth paying close attention to the interlocking teeth. Compressed air may be used; care should be taken not to blow air in the sensor area. Always blow from the inside to the outside.
4. Install the batteries (if applicable). See Battery Removal and Installation.
5. Re-assemble the upper and lower by tightening with the tensioning knob.
6. Check the color of the tri-color indicator light.
 - No light—check battery installation. Replace battery if required. See section below.
 - Red or Yellow—interlocking teeth may be dirty. Clean interlocking teeth and recheck.
 - Green—calibration system is operational and ready for immediate use.

Note: If you cannot get the light to turn green by using the tension knob only and the parts are clean, the unit may be out of adjustment. Contact Mate Precision Tooling for immediate assistance.



Battery Removal and Installation

1. Separate the upper from the lower by unscrewing the adjustment handle.
2. Remove the clip which secures the adjustment handle to the upper with a screwdriver. Be careful not to damage the sensors.
3. Remove handle from the upper assembly.
4. Unscrew the button head screws on the cover. Use 2mm hex wrench for 1-1/4" B station. Use 2.5mm hex wrench for 2" C, 3-1/2" D, and 4-1/2" E Stations. Remove the cover and set aside.
5. Remove old batteries.
6. Install new batteries paying attention to polarity.—Locate the negative (-) of the battery against the spring in the battery pack first. Then compress the spring with the battery, and slide battery into the battery pack until the positive (+) end of the battery touches the end contact.
7. Test the operation of the batteries. Gently lower the upper instrument on to the lower instrument until the interlocking teeth are fully engaged. If the light fails to activate, repeat steps 5 and 6.
8. Reinstall the cover, using the button head screws and wrench used in step 4.
9. Reinstall the adjustment handle. Install the handle through the upper instrument until the tip protrudes through the underside. Replace the clip into the groove on the adjustment handle. Use needle nose pliers to guide the ears of the clip into the slot until it snaps into position.

Removal and Reinstallation of Adjustment Handle.

- Remove the dip using a flat bladed screw driver to pry out the retaining clip. Take care not to damage the sensors located around the handle
- Replace the dip using needle nose pliers to guide the ears of the dip into the slot on the handle until it snaps into position.



Battery Removal 2" C, 3-1/2" D and 4-1/2" E Stations

- Pry the first battery out by placing the tip of a flat bladed screwdriver under the top lip of the battery holder and on top of the flat of the battery.
- Pry the second battery out by placing the tip of a flat bladed screwdriver behind the body of the battery.



Storage Instructions

1. Separate the upper from the lower by unscrewing the adjustment handle.
2. Remove the batteries if storage for longer than three (3) months is expected. See battery installation instructions.
3. Coat the lower with a spray lubricant/preservative or light machine oil. Examples: LPS 1, WD-40.
4. Wipe off any excess lubricant/preservative from the sensor contact surface.
5. Re-assemble the lower and upper aligning the external orientation slots, and tighten the handle until the light glows green.
6. Coat the outside surface of the upper instrument with the lubricant/preservative.
7. Loosen the handle and position the upper and lower with the interlocking teeth disengaged to prevent inadvertent activation of the indicator light during storage. See photo at right.
8. Tighten the handle using the tensioning knob until a click is felt.

