

## BN-01: Repair and Align Turret

### SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Always lockout /tagout the machine before working on it.
- Ask a Machine Operator to operate the machine for you. Be aware of moving and rotating shafts during operation.

### EQUIPMENT

- lockout/tagout equipment
- dial indicators
- precision square and level
- Allen head wrenches
- shims

### RESOURCES

- manufacturer's manual

### Repair and Align Turret

**Note: Ask a Machine Operator to assist with machine operation.**

#### 1. Determine the cause of misalignment.

**Note: The typical cause of turret misalignment is a “wreck” in the fixture.**

- Perform a corrective action to return the process to normal operating condition.

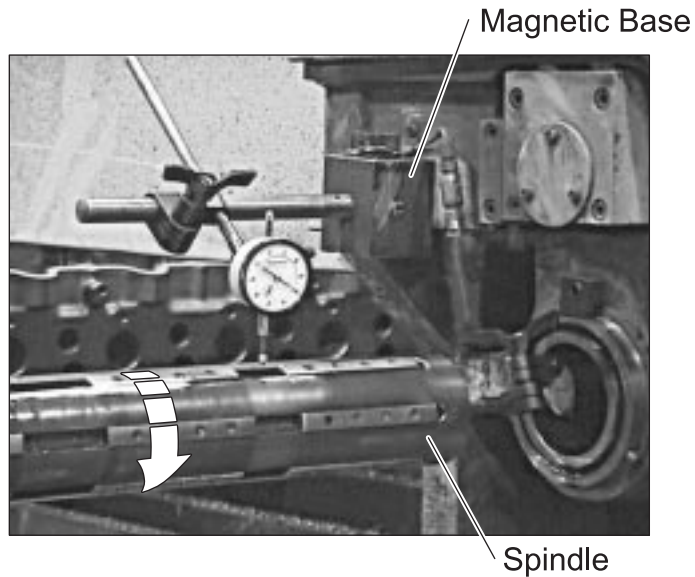
#### 2. Check the turret for damage.

- Inspect the turret, work head, spindle, and fixture for damage.
- Perform a corrective action to repair the turret.

#### 3. Check the spindle for runout.

- Verify that the shot pin is engaged.
- Verify that the turret clamps are in place.

- Mount a dial indicator to the fixture, as shown below.

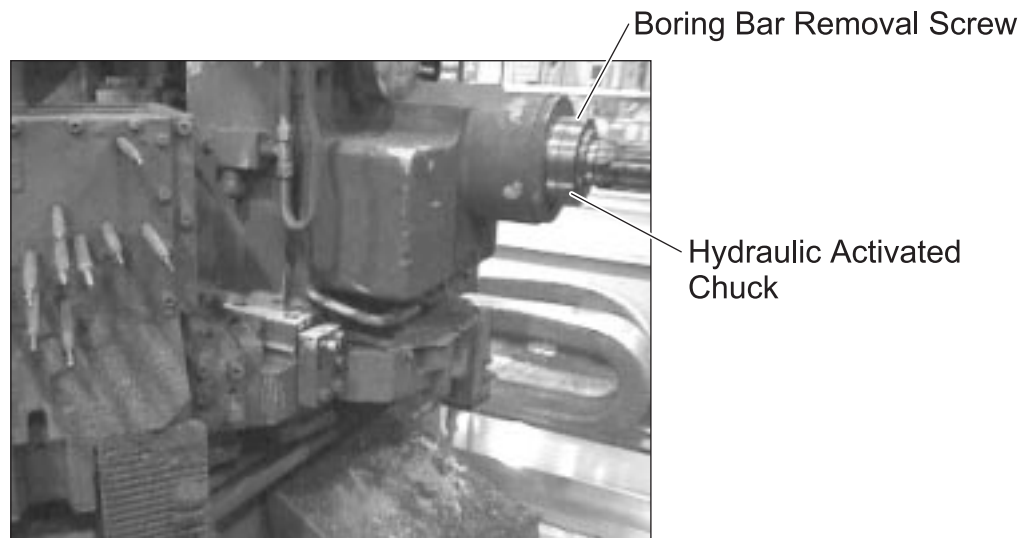


#### **Dial Indicator Mounted on the Fixture**

- Manually rotate the spindle while observing the dial indicator.
- Runout exists on the spindle if the dial indicator jumps from the manufacturer's specifications as you rotate the spindle.

**4. Re-seat the boring bar.**

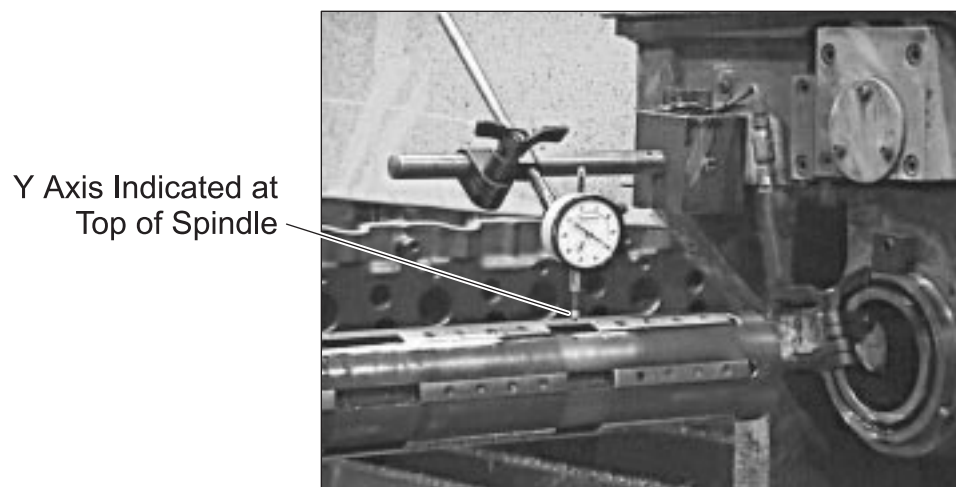
- Loosen the chuck.
- Remove/clean the boring bar.



- Rotate the boring bar 180 degrees in the chuck to check for runout.
- Check again for runout. The readings must be as close to zero as possible.

**5. Check that the Y axis is parallel to the ways.**

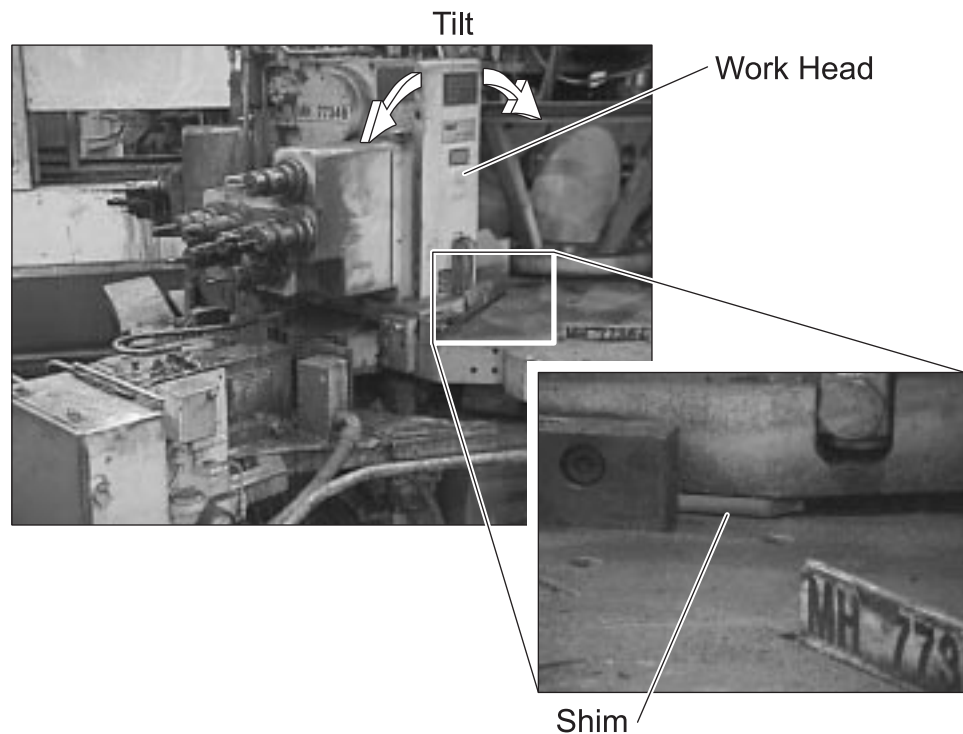
- Mount the dial indicator to the fixture so that it is measuring directly at the top of the spindle.

**Checking for Work Head Tilt**

- Rotate the spindle until the indicator is at the maximum height.
- Leave the spindle resting on the high point of runout.
- Move the head in and out while indicating the top of the spindle.
- A non-parallel work head tells you if the work head is tilted, remember to subtract runout.

## 6. Adjust the Y axis, if not parallel.

- Loosen the work head Allen head bolts and shim the work head to eliminate runout.



### Shimming Work Head Tilt

- Check the Y axis orientation of the work head to the fixture again.

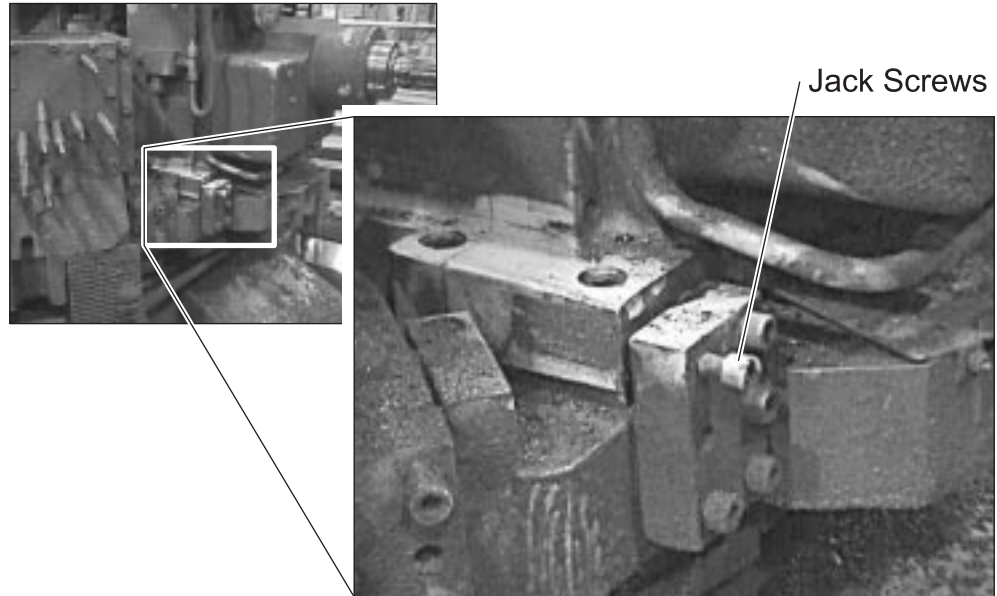
## 7. Check that the X axis is parallel to the ways.

- Mount the dial indicator to the fixture so that it is measuring directly at the side of the spindle.
- Run the head in and out to determine if the work head is tilted sideways.

- Perform step 8 if the total indicator runout (TIR) exceeds manufacturer's specifications.

**8. Adjust the X axis perpendicularity of the work head, if not perpendicular.**

- Adjust the front work head locators (jack screws) to compensate for alignment. Remove the indicator while shimming.

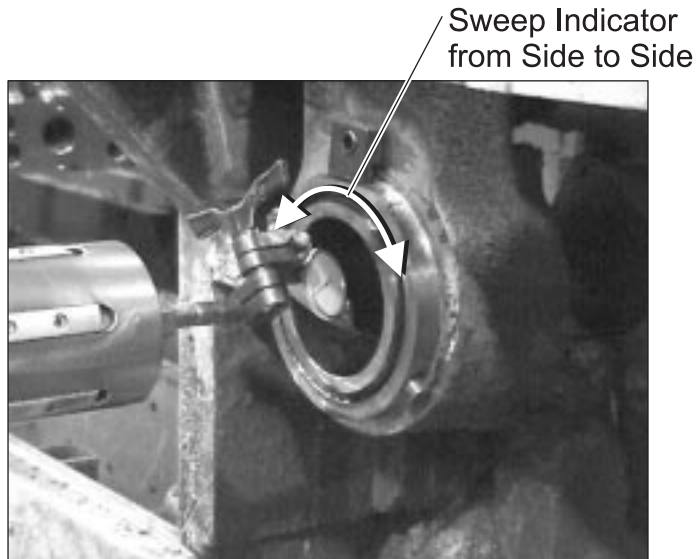


**Jack Screws**

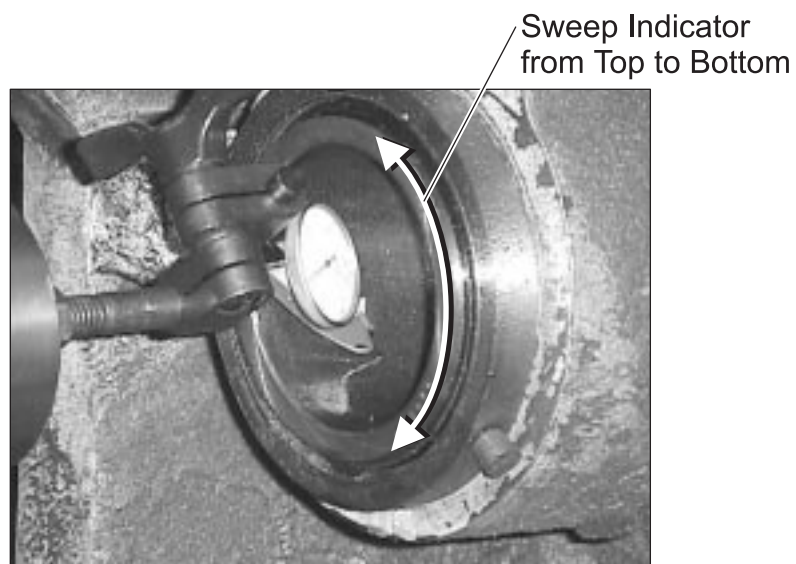
**Note: Alternative methods for adjusting the perpendicularity in the X axis are shown in the manufacturer's manual.**

**9. Align the spindle with the bore of the fixture/master part.**

- Install a dial indicator in the end of the spindle.
- Sweep the indicator from side to side to check the X axis.

**X Axis**

- Shim the side locators to compensate for TIR, verify that the work head stays horizontal to the fixture.
- Sweep the indicator from top to bottom to check the Y axis.
- Shim under the head to compensate for TIR, verify that the work head stays vertical to the fixture.

**Y Axis**

**10. Check the perpendicularity of the spindle to the master machine part.**

**Note: Follow the manufacturer's procedure to move the wing base if the spindle is not perpendicular to the master part.**

Check the wing base to the master machine part.

**11. Run a test piece to determine if the alignment is within tolerance.**

Perform this task again until the turret is aligned.

