OPERATION AND SERVICE MANUAL

for

MOYER 18 INCH CRUSH/DOWNFEED GRINDER MODEL 5-18-2VCD

February 1996 Revised February 2003

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READ SAFETY INSTRUCTIONS PRIOR TO SET UP AND OPERATING THE GRINDER

IMPORTANT OPERATIONAL NOTES

TURN OFF THE COMPUTER WHEN IT IS IN THE MAIN MENU. IF IT IS TURNED OFF IN ANY OTHER MENU, THE POSITION OF THE GRINDING WHEELS WILL BE LOST AND WILL HAVE TO BE RESET.

When adjusting the carrier height using the jackscrew, back off the jack screw via the hand wheel after the carrier is locked in place with the setscrew. Failure to lower the jackscrew will cause an early failure of the jack. **The jack is not affixed to the shaft; hence it will always raise the carrier. It never lowers the hub. Gravity lowers the carrier as the jack is backed away from the carrier shaft hub. Turn the hand wheel clockwise to raise the carrier. If the carrier does not go down when the hand wheel is backed away from the shaft of the carrier plate-mounting hub, tap on the carrier to move it down. DO NOT POUND THE CARRIER DOWN. IF IT MOVES SO HARD THAT A TAP WILL NOT MAKE IT DROP, THE BORE OF THE CONE DRIVE AND THE SHAFT MUST BE CLEANED. THE SHAFT WILL PULL UP AND OUT OF THE BORE FOR CLEANING.**

INDEX FOR MOYER 18" CRUSH GRINDER MODEL 5-18- 2VCD

I. Receiving

A. Damage

Check the crates and machine for any signs of damage. If damaged, advise the driver immediately that you suspect damage to the machine and note this fact on the bill of lading. Call the shipper for instructions before unloading and uncrating.

II. Uncrating and Locating The Machine

A. Uncrating

Remove one of the plywood sides. Remove the top piece of plywood. The remaining sides and the 2x4's can be removed together. Remove the four screws holding the grinder to the skid. Two of the screws are on the front lip of the grinder under the carrier. The other two screws are inside the base weldment. Remove the two back access plates to remove the screws. The machine weighs approximately 2,700 pounds. Hence size the forklift accordingly.

B. Installation of Leveling Pads (Figures1 and 2 on page 3)

After the machine is moved to its final location and before setting it down, the 4 round leveling pads will need to be put under the machine. The leveling pads are shipped in a box with other accessories. The pads are installed under the holes from which the screws were removed in the step above. Holding the pads under the weldment, push the machine screws with the jam nuts on top through the hole and screw into the pads approximately 1". BLOCK THE MACHINE UP PRIOR TO HOLDING THE PADS UNDER THE WELDMENT. DO NOT DEPEND UPON THE FORK LIFT HOLDING THE MACHINE DURING THIS PROCEDURE.

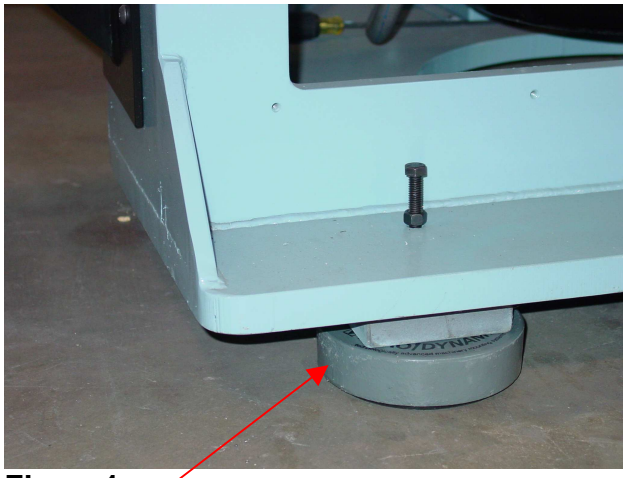


Figure1
Leveling Pad At Front of Machine

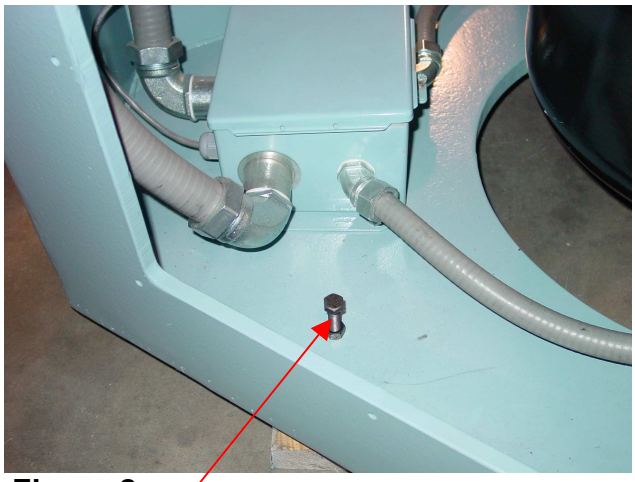


Figure 2
Leveling Screw At Back Of Machine

C. **Unblocking the Grinding Heads** (Figures 3,4 and 5 on page 4)

The top and bottom motor spindles are blocked for shipment. Remove the wood blocks from beneath the bottom motor plate and between the top and bottom 18" grinding wheel mounting plates. The spindle motors are moved via stepper motors thru gearboxes. The gearboxes have clutches that should be loosened to move the motor spindles. The clutch for the top spindle is located on the top of the machine in the back. The clutch for the bottom can be accessed thru the panel on the computer side of the machine. Raise the top spindle by turning the top hand wheel clockwise to remove the wood blocks. After the wood blocks are removed between the grinding wheel mounting plates, raise the bottom spindle by turning the lower hand wheel clockwise.

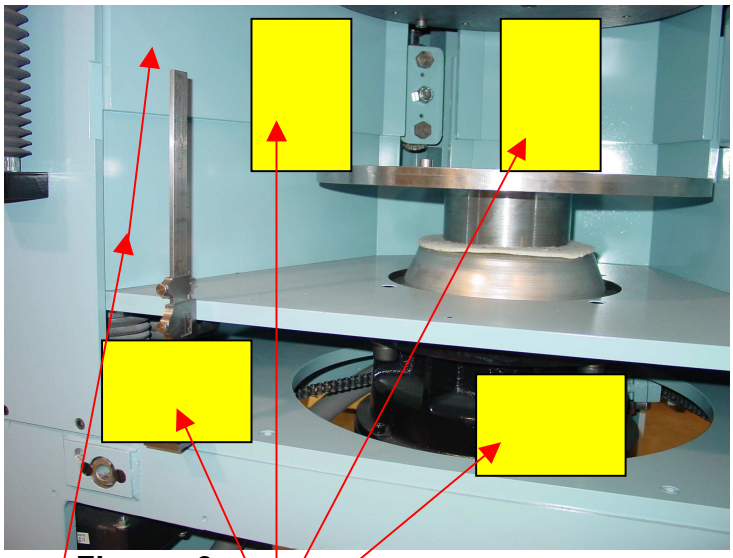


Figure 3

Inner Guards
NEVER REMOVE

Wood Blocks

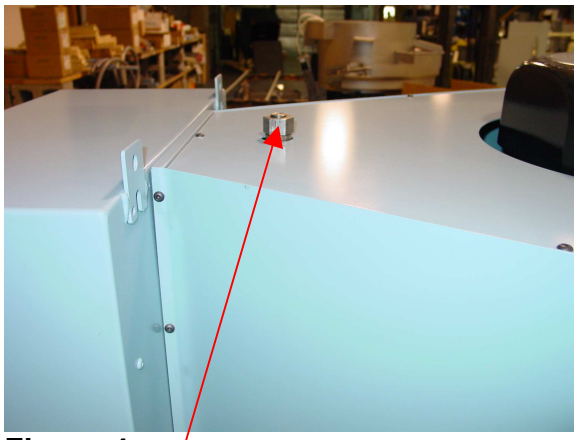


Figure 4
Clutch Shaft Top Spindle Motor

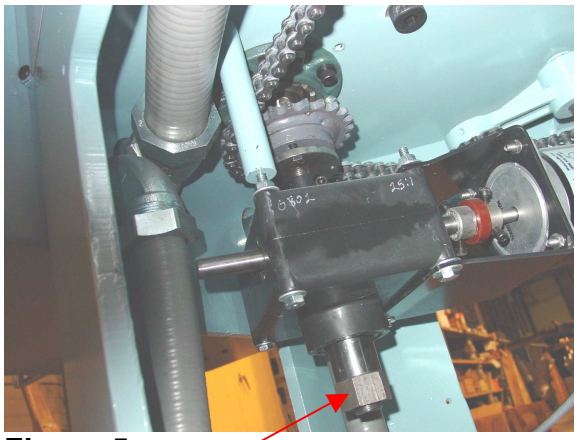


Figure 5
Clutch Shaft For Bottom Spindle Motor

III. Electrical, Air and Dust Collector Hookup

A. Electrical

Have a qualified electrician run electrical power to the disconnect making sure that their is an earth ground and that wiring is in conformance with all local and national codes. The machine requires 40 amps at 240 volts and 25 amps at 480 volts. Electrical schematics are located in the enclosure.

B. Compressed Air

The air regulator located on the right side of the machine as one faces the carrier drive system must be connected to a minimum of 60 PSI air source. The air is for opening and closing the spring drop out chute and operating the ground length-measuring device if this option is purchased. This initial setting may have to be modified after set up. Adjust the Moyer Exit Mounted Probe pressure depending up on observed performance. The probe should move smoothly to measure the parts with a low-pressure setting. It must have enough pressure to get to the measuring point but should not come down with a lot of force.

C. Dust Collector

For optimum dust collection and cooling, the unit should have at least 1020 CFM. The dust collector outlet on the machine has a O.D. dimension of 8 inches.

IV. Safety Considerations

A. When The Grinder Arrives

Prior to operating the machine, please review the safety information with all operators, setup personnel, and maintenance crew.

B. Hazardous Voltages

1. When installing the grinder, have a qualified electrician wire the power according to all local and national codes, and you must be sure to provide a secure GROUND TO EARTH, such as using a 4-wire hookup.

2. Caution operators and maintenance personnel that hazardous voltages exist inside the disconnect enclosure, the motors, the junction box in the base weldment, Operator Console and motor terminals. The places containing electrical components must not be uncover or serviced without DISCONNECTING ALL POWER first using Company LOCK OUT PROCEEDURES.

C. Setup, Stone Change, and Dressing Safety Issues

1. Guards

Surrounding the stones are thick top and bottom inner guards. NEVER remove these inner guards. (Reference Figure 3 on page 4)

2. Grinding Stones

Insist that employees changing grinding stones: Inspect stones for ANY cracks or defects before mounting. Be sure the stone is sitting flush onto its mounting plate. Dowels MUST be used to ensure proper centering. Bolts MUST NOT stick into the stone more than 3/8", but must have enough thread contact for proper mounting. Do not force the bolts. They should be tight, but over tightening can crack the stone. Refer to Grinding Wheel Supplier for proper torque.Please read the entire section "Changing and mounting stones" in the "Setup and Tooling " chapter VIII. on page 19 to all employees performing this function.

3. **Dresser** (Figures 4,5,6 and 7 on page 7)

Caution operators that before dressing the stones, they need to inspect the dresser to make sure the stars are tight on the cutter bushing . The BB10 bearing assembly with the stars should be tight to the dresser head but spin freely when rotated. The BB10 bearing assembly is assembled to the dresser head by the hex bushing screws and hex locking nuts. The dresser head must be tight on the dresser shaft. The dresser unit must be held securely in the dresser mounting support. Stars should be staggered. If the sharp points line up on stars, turn the stars over and put back on the bearing assembly.

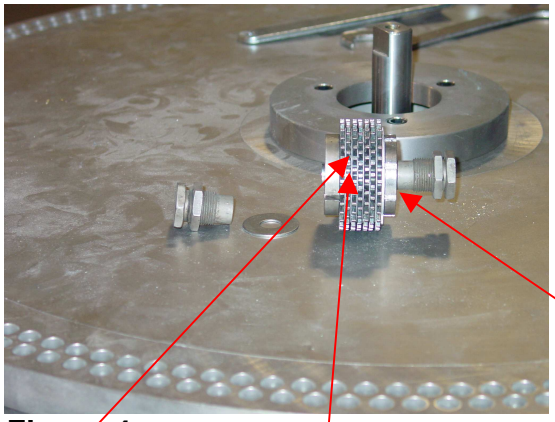


Figure 4

BB10 Bearing Assembly
Stars are tight on cutter bushing with cutter spacer washers between stars.

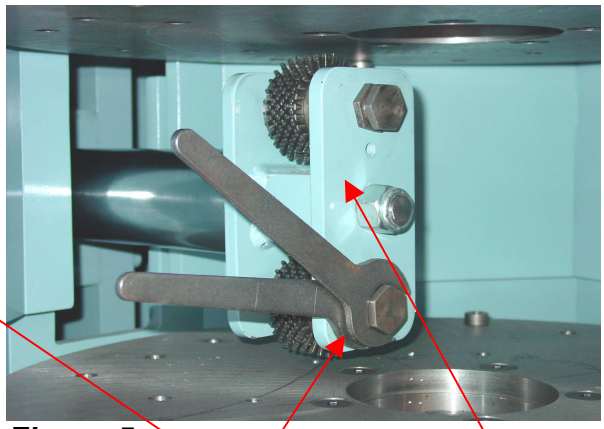


Figure 5

Dresser Head
Hex Bushing Screws And Locking Nuts are tightened to the dresser head using the BB wrenches.

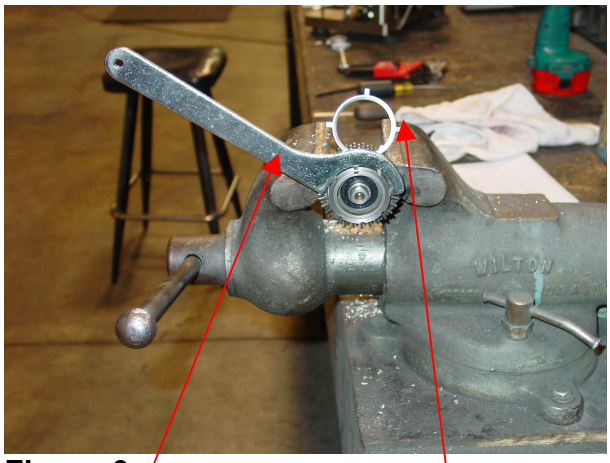


Figure 6

Spanner Wrench
For Tightening Bushing Nut Mounting

Cutter Lock Washer
After Stars Are Tight On Cutter Bushing, Bend A Tab On Cutter Lock Washer

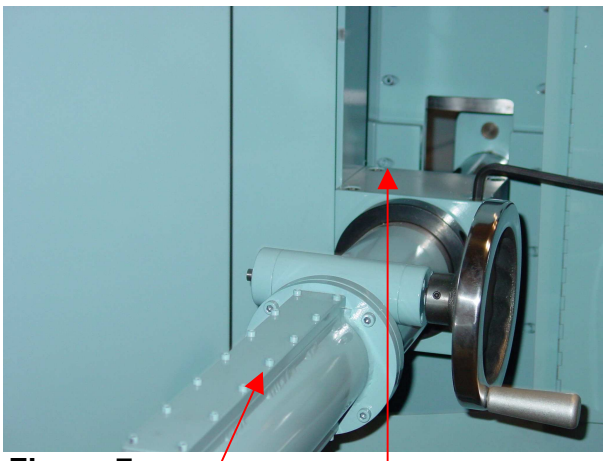


Figure 7

Dresser Unit

Dresser Support

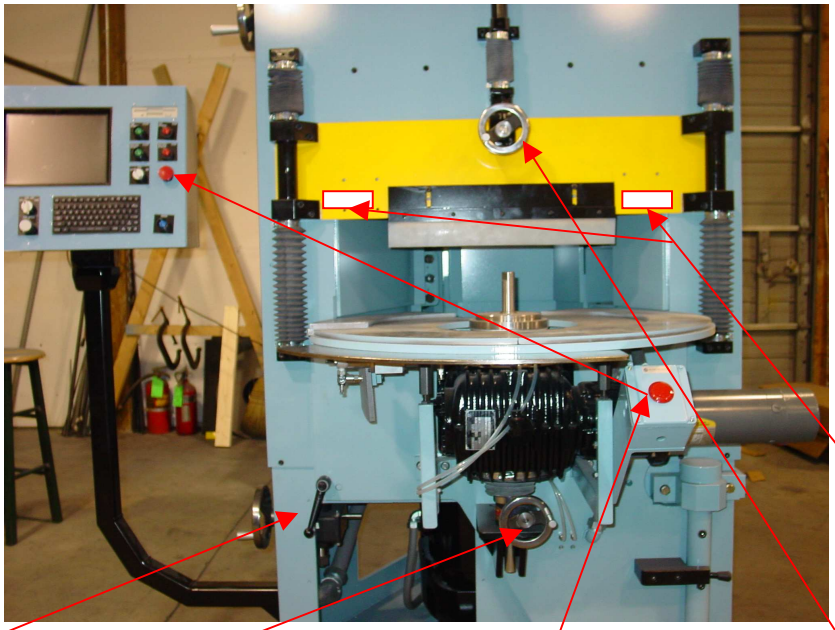


Figure 8

D. General Safety Instructions (Figure 8 on page 8)

1. **Front Guards**

   Prior to operating the grinder, insist that all guards are in place and bolted to the machine. Ensure that the black lock handle that locks the front carrier swing plate is always SCREWED IN TIGHT as this plate is part of the guard system. Insist that the front top guard is moved down in front of the top wheel prior to running machine.

2. **Safety Glasses**

   Insist that safety glasses be worn by all employees operating and loading the grinder.

3. **Instructions to the Operator**

   Review the operation of the machine and make sure that employees know the location and operation of the panic-stop buttons (on the console face and under the sub plate).

   Do not allow operators to load springs too close TO THE ENTRANCE HOLD DOWN AREA, as their hand could be caught between the hold-down and carrier plate.

   Insist that operators keep their fingers AWAY FROM THE DROPOUT AREA, as

they may be injured, or pinched between the carrier and side of the dropout.

Caution operators that while setting up and operating the Moyer Automatic Loading equipment that they should not stick their fingers in between the nozzles and carrier, near the positive stop or indexing pin.

Insist that operators do not stick anything into the grinding stones while the stones are operating, do not lay tools on the carrier plate to be dragged inside the grinder, and do not work on the machine until the stones have completely stopped.

Do not allow operators to load springs or work on the machine while wearing loose clothing, very long hair, necklaces, bracelets, or rings as springs can catch on these items and pull the operator into the grinding wheel area.

Warn operators and setup personnel that when adjusting the carrier in the vertical position that the Jackscrew must be moved against the carrier drive hub. The jackscrew is adjusted by rotating the jackscrew hand wheel clockwise. When the set screw in the collar around the carrier drive hub is loosened the carrier can drop immediately to the subplate unless the jack screw is against the carrier drive hub.

Figure 9

V. Power Test

A. Console (Figures 9 on Page 9)

When the power hookup is completed, test it by turning on console power, using the selector switch marked “CPU” at the center right of the console face. The screen should “come alive” and present you with the “Main Menu” of the CNC system. Use the keypad’s down-arrow key to highlight “Crush grind” and press the ENTER key. The “Crush” menu will appear, from which you then select “dial jog” or “dial run” appearing on the bottom of the window. Confirm that this menu selection turns the carrier hub motion on and off, and that the “dial speed” knob on the lower center of the console regulates the speed. Also confirm that the “dial jog” knob above it allows you to run the carrier backwards and forwards at half speed.

B. Rotation

Caution - Prior to making this check, make sure that nothing is laying loose on either of the grinding wheel mounting plates and that all protective guards are in place.

Using the start and stop button for the top and bottom spindles, jog each motor to check rotation. The spindles and carrier should rotate counter-clockwise when looking down from the top of the machine. As the drive rotation was set at the factory, if the rotation is incorrect reverse two of the incoming power lines to the disconnect switch.

C. EMERGENCY STOP:

Pushing in this red mushroom push button stops the carrier and removes spindle power, allowing the stones to coast to a stop position. To return the machine’s functions, pull the button back out. There is a second emergency stop button mounted to the front of the sub plate which works the same as the emergency stop button on the console.

VI. Run outs and Leveling

The next step is to check alignments and run outs of the major moving parts of this machine. These checks require a machinist's level, felt marker, and a good dial indicator graduated in the thousandths of inch.

A. Leveling the Machine Frame (Figure 10 and 11 on page 11)

Unlock and swing out the carrier assembly to gain access to the top plate of the base weldment. Position a machine level on this frame plate. Adjust the four bolts in the leveling pads until the machine is level in the side-to-side and front to back directions. Tighten the jam nuts on the levelers to keep this setting. It may be necessary to go thru this procedure several times to get the machine level in both planes. It is necessary to verify that the machine is still level after the nuts are tightened. The level of the machine may change when the nuts are tightened.

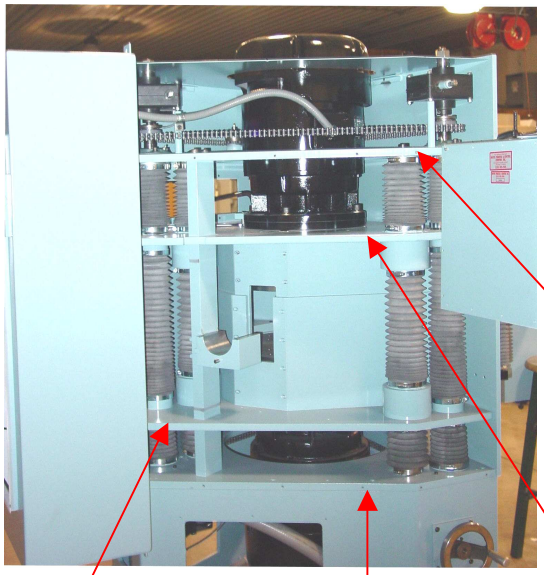
Figure 10

Figure 11

B. Parallelism between Top And Bottom Frame Plates And Top And Bottom Motor Plates (Figure 12,13 and 14on page 12)

With the swing out carrier open and with the outer guards removed, use a height gage or calipers to check the parallelism between the bottom frame plate and the bottom (moveable) motor plate at the three ball screw locations. If the readings at the ball screws differ by more than 0.010" remove the master link of the bottom chain connecting the three screws and adjust them independently to achieve a parallelism of 0.010" or less. Repeat this process between the top frame plate and the top motor plate. Do not reassemble the chain until later in the process of leveling the machine. Hints: Adjust one ball screw at a time then check for results. If you move more than one ball screw at a time, it is difficult figuring out which ball screw must be moved to get the heads parallel with the frame plates. Prior to removing the chain rotate the ball screws such that the connectors for the chains are on the sprockets. Check to see if each of the screws can be rotated a slight amount with the same amount of resistance. If one or more screws are tighter than others, it means that one of the screws was moved an excessive amount one-way or the other. Correct this condition prior to going to the next step. Set the parallelism as close as possible without binding the ball screws.

Figure 13 Outer Guard Removed



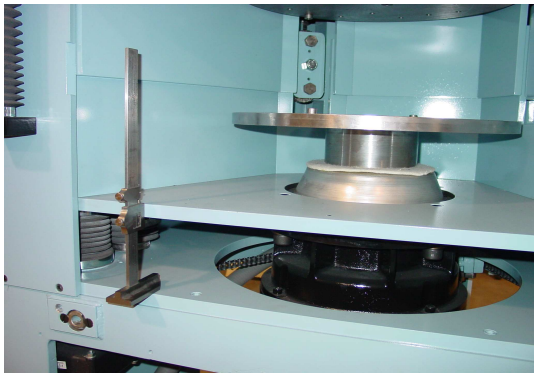


Figure 14 Using Height Gage

Figure 15 Chain and Sprocket For Bottom Spindle

C. Dresser Alignment (Figure 16 on Page 13)

Mount the base of the dial indicator to the dresser head with the tip onto the bottom stone mounting plate. Set the dial to zero, and move the dresser in and out across the bottom stone mounting plate. These readings should be within 0.006". If the reading is more than 0.006", the bottom motor plate must be adjusted. Adjust the three bottom ball screws until the reading is .006" or less. Prior to putting the chain back onto the ball screw sprockets make sure that each of the screws turn freely. Reinstall the chain and make a final check with the chain installed. When reinstalling the chains, make sure that each of the chains have the excess slack removed but are not so tight that the screws are put on a bind. The tension on the chain connecting the three screws is set using a chain tightener. **Check to see if each of the screws can be rotated a slight amount with the same amount of resistance. If one or more ball screws are tighter than others, it means that one of the ball screws was moved an excessive amount one-way or the other.**

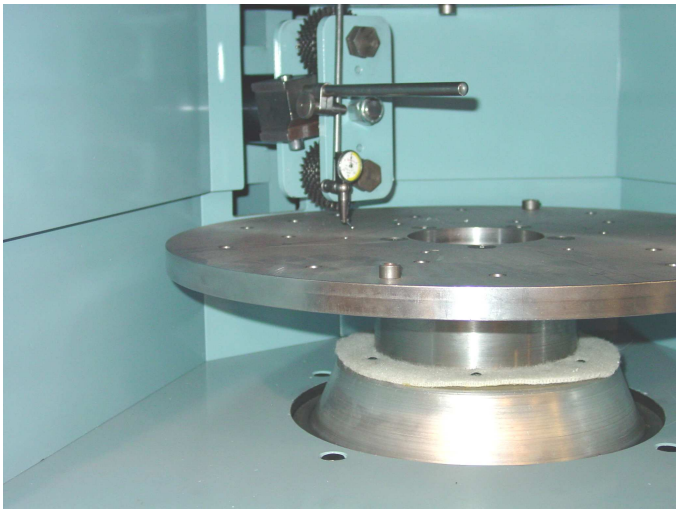
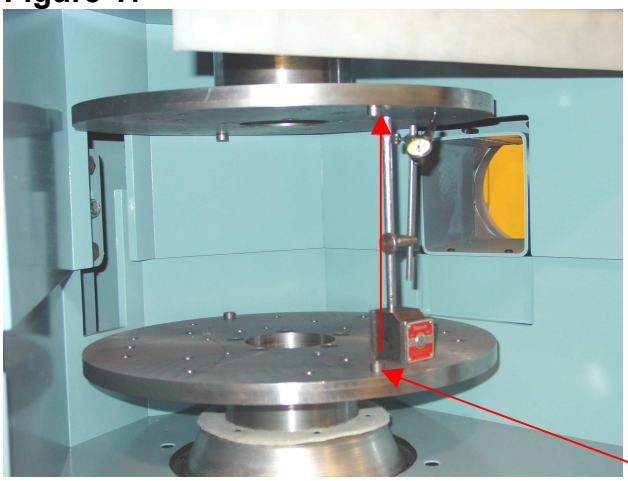


Figure 16

D. Checking Parallelism of Bottom Stone Mounting Plate To Top Stone Mounting Plate (Figure 17 on page 14)

Set the dial indicator between the two stone mounting plates (base on bottom, tip on top) and rotate the two plates together to see if the stone mounting plates are parallel. Orient the plates so their locating pins are in line then turn the plates so that the locating pins remain in line. If the top stone plate is not parallel with the bottom stone mounting plate, remove the chain from the top sprockets and adjust the three screws independently so that the stone plates are slightly closer together at the spring exit point than they are at the spring entrance. Try to keep the cant between 0.003" to .008"

Figure 17



E. Setting the Carrier Drive In The Same Plane As The Bottom Stone Mounting Plate

1. **Marking Run Out of Bottom Grinding Stone Mounting Plate**
(Figure 18 on page 14)

   Place a dial indicator with its base on the bottom motor plate and its tip near the outside edge of the bottom stone mounting plate. On the plate mark the run out (plus or minus from zero) every 3" around its circumference. The run outs should not exceed 0.008". If the run out exceeds the .008" contact Moyer Manufacturing Company, Inc.

2. **Run Out of Carrier Hub** (Figure 19 on page 14)

   Put the indicator base on the sub plate and the tip onto the shoulder of the carrier hub. Rotate the hub using the "Dial Jog" and mark the run out of the hub, which should not exceed 0.002". If this is not within +/- .002" contact Moyer Manufacturing Company, Inc. for assistance.

Figure 18

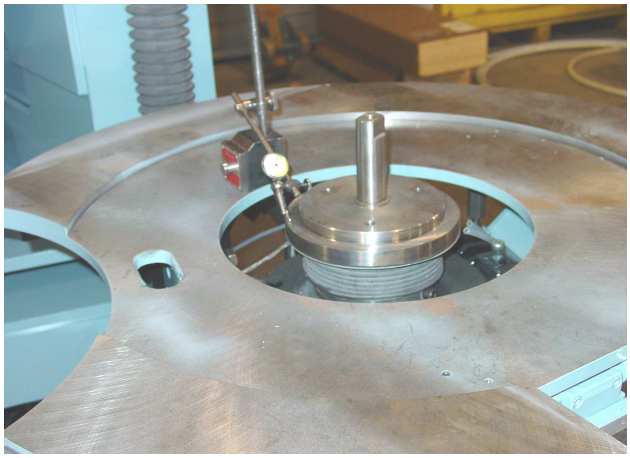


Figure 19

3. **Checking The Carrier Drive** (Figures 20 & 21 on page 15)

Rotate the bottom stone mounting plate so that its previously marked run out readings have the same value at the spring entrance and exit points. Set the indicator base onto the carrier hub and the tip of the indicator onto the spring entrance point on the bottom stone mounting plate. Rotate the carrier hub using the "Dial Jog" to sweep the indicator across the stone mounting plate in the path that the springs will go thru the grinder. The reading should not vary more than 0.006" progressively thru the path. To check the parallelism toward the back of the machine, use a precision straight edge with precision blocks. This is a two-man operation. One person holds the straight edge tight against the carrier hub shaft while the 2nd person checks the back position using shims. If the readings vary more than .006", the cone drive must be shimmed.

Figure 20

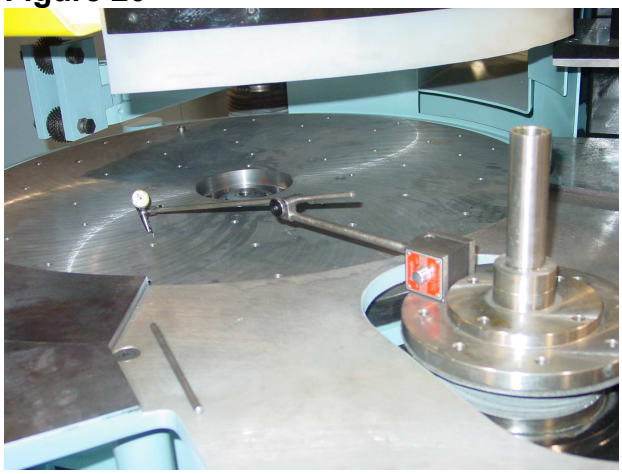
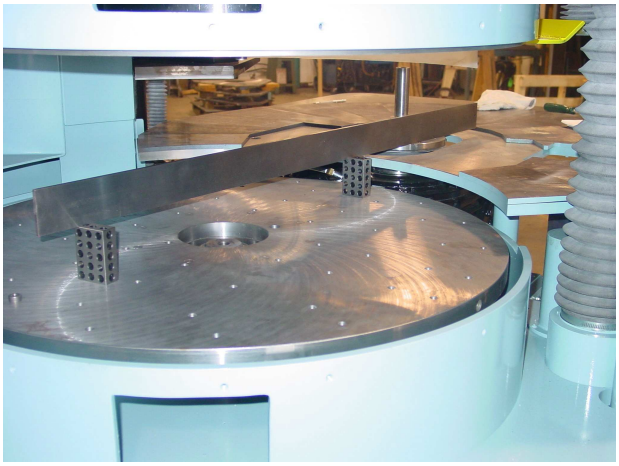


Figure 21



Note: These two pictures are from a different machine. However the procedure is the same.

4. **Adjusting The Carrier Drive**

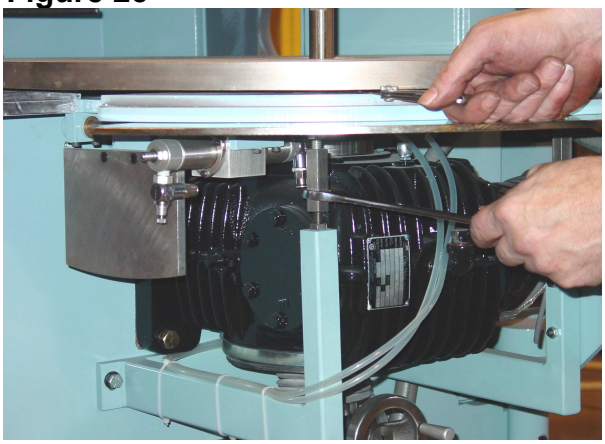
If the check performed in Figure 21 is off, the gearbox must be shimmed to set the the front to back position. Loosen the bolts holding the large carrier gearbox to the swing plate. Adjust the gearbox using shims under the feet of the gearbox and retighten. Repeat this procedure until the 0.006" is achieved. If the check performed in Figure 20 is off, there is enough room around the bolts holding the gearbox to twist the gearbox so that the entrance and exit side of the grinding plate are within .006" with the cone drive.

F. Sub plate Alignment (Figures 22 &23 on page 16)

Mount a carrier onto the carrier hub. Using shim stock check the space between the carrier and the sub plate at several places around the carrier. Adjust the sub plate to get an equal distance between the carrier and the sub plate. The sub plate is adjusted by the turnbuckles under the front of the sub plate and the slotted angle blocks supporting the sub plate behind the carrier swing plate.

Figure 22

Figure 23



G. Further Setup

The chapter,"Setup and Tooling For A New Job", provides the instructions for safely mounting and dressing stones, mounting the carrier plate and other topics in setting up a new job.

VII. Manual Controls

A. Manual Adjustments Available

1. **Carrier Adjustment Vertically** (Figure 24 on page 17)

To adjust the carrier up and down, the setscrew in the collar on the cone drive is loosened using the long T-handle provided. Use the console's dial jog switch to rotate the carrier until the setscrew can be reached using the long T-handle. Note turn the speed pot all the way counter-clockwise so that the dial will not move fast. Turn the speed pot up slowly or clockwise until the carrier starts to move slowly. After the setscrew is loosened, the adjusting hand wheel located at the front of the machine under the carrier plate is used to raise the carrier plate. This hand wheel is connected to a jack under the shaft of the carrier plate mounting hub. The jack is not affixed to the shaft; hence it will always raise the carrier. It never lowers the shaft. Gravity lowers the carrier as the jack is backed away from the carrier shaft hub. Turn the hand wheel clockwise to raise the carrier. If the carrier does not go down when the hand wheel is backed away from the shaft of the carrier plate mounting hub, tap on the carrier to move it down. DO NOT POUND THE CARRIER DOWN. IF IT MOVES SO HARD THAT A TAP WILL NOT MAKE IT DROP, THE BORE OF THE CONE DRIVE AND THE SHAFT MUST BE CLEANED. THE SHAFT WILL PULL UP AND OUT OF THE BORE FOR CLEANING.

Warn operators and setup personnel not to have their hands under the carrier when adjusting the height. When the setscrew in the collar around the carrier drive hub is loosened, the carrier can drop immediately to the sub plate. To prevent this from happening, adjust the jackscrew so that there is pressure on the screw. When lowering the carrier, slowly back down the screw so that the carrier slowly drops toward the sub plate. When the carrier is at the correct height, use the long T-handle and tighten the setscrew to lock the carrier in position. **To prevent damage to the jack, back off the jack so that it is not touching the shaft of the carrier plate mounting hub prior to running production. This adjustment is required to equalize the amount of spring length sticking above and below the carrier's thickness.**

Figure 24

2. **Entry and Exit Hold Downs** (Figure 8 on page 9 and Figure 25 on page 18)

The entry and exit hold-downs are fastened to the front plate. The heights of both hold-downs are adjusted together using the 4" hand wheel on the front of the plate. Set the entry hold down so that the bottom of the hold down is flush with the top grinding wheel. The exit hold-down is set at the factory slightly higher than the entry hold-down. The hold-downs can be moved relative to the front plate by adjusting the mounting screws.

The entry hold-down alignment is critical in the crush mode. The springs should just slide between the two grinding wheels. If the hold-down is too high, the springs will hit the edge of the grinding wheel, which will radius the edge of the wheel. If the hold- down is too low, the springs will compress too much and the end coils opposite the tips will compress too much which will adversely affect squareness, wheel life and time between dresses.

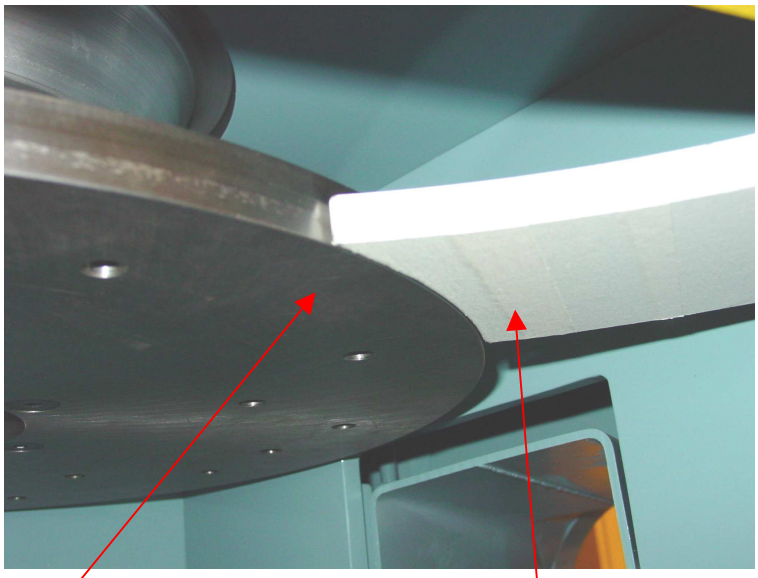


Figure 25

The grinding wheel is not mounted to the steel mounting plate.
The steel plate shows the grinding wheel location in relation to the entry hold-down.

3. **Head Position Hand Wheels** (Figure 8 on page 8)

The two hand wheels on the left side of the grinder are for manually adjusting the grinding spindles. Turning the top hand wheel CLOCKWISE moves the top spindle UP. Turning the bottom hand wheel CLOCKWISE moves the botton spindle down. One rotation of the hand wheels move the spindles .050".

4. **Canting Top Head** (Figures 26 & 27 on page 19)

Remove the two panels, one by the dresser and one by the exhaust pipe to gain access to the top motor spindle. Loosen the four bolts holding the top motor to the top motor plate and lift up the motor using the jack bolt in the mounting flange of the motor. Insert three shims at 90 degrees to the dresser. Refer to the chart on page 18 for shim thickness. Position two shims ½ the thickness of the first shim 90 degrees to the left and right of the first shim. Let the motor down on the motor plate using the jack bolt then tighten the four bolts holding the top motor to the top motor plate. Tighten one bolt then move diagonally across the motor and tighten that bolt. Continue moving from bolt to bolt in this X pattern until all bolts are tight. To go back to a parallel grind reverse this process. If the first shim is positioned 90 degrees to the dresser, the shims do not have to be removed before dressing the wheels. A starting point for canting is one half a wire size.

THICKNESS OF SHIMS

Machine	Desired Amt of Cant	Shim Thickness
18'	.050"	.100" Or Twice The Amount of Cant
30"	.050"	.075" Or A 1 to 1.5 Relationship
36"	.050"	.090" Or A 1 to 1.8 Relationship

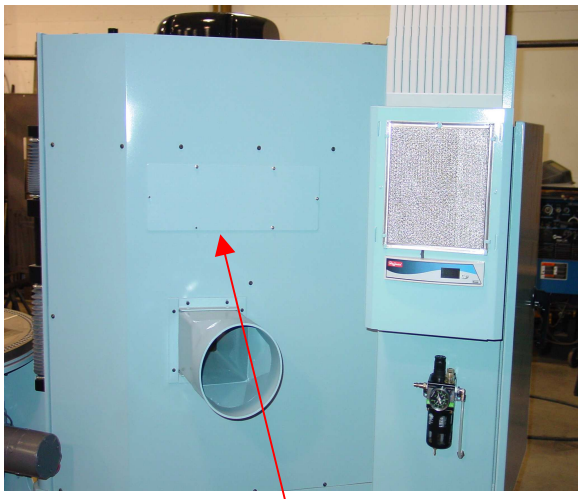


Figure 26

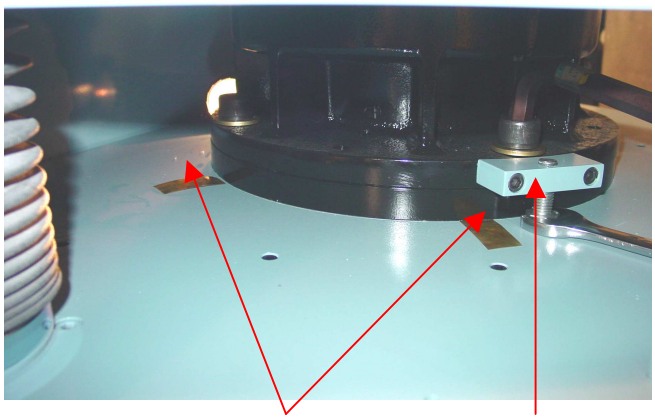


Figure 27