

Figure 28 Computer Console

B.

VIII. Computer Console Controls (Figure 28 on page 20)

This part of the manual is to familiarize the operator with the computer controls. A more detailed explanation on the usage of the controls will be covered later in the manual when set ups and production running is reviewed.

 "TOP HEAD, UP/DOWN" and "BOTTOM HEAD, UP/DOWN": These spring return selector switches are for up and down movement of the heads. In portions of the software, these switches will move the heads either up or down as long as the switch is held. This is called a **continuous** move. In other parts of the menu, a selected amount of movement like .005" is made up or down when the switches are moved. The amount of stone travel per activation is menu-adjustable from 0.001" to 0.250" per step. This is called a **fixed button move**.

- 2. "TOP SPINDLE START", "BOTTOM SPINDLE START", "TOP SPINDLE STOP", and "BOTTOM SPINDLE STOP": These momentary contact switches are color coded and labeled for start and stop.
- 3. "DIAL JOG, REV/FWD" This spring return selector switch lets you take control of the carrier if it gets jammed during operation or for set-up. Turning it to "REV" makes the carrier move at half speed in the reverse (or CW) direction. Turning it to "FWD" moves the carrier in the forward (or CW) direction. After using the switch, the carrier must be restarted again by selecting "Dial Run" from the "Crush Menu" or "Load" from the "Down feed Menu." This switch is useful if something jams the carrier from moving, like a spring getting caught against the Entrance hold down.
- 4. "DIAL SPEED": This knob adjusts the speed of the carrier for crush grinding (from 0 to 1 RPM) or for Slow Mode in down feed grinding for loading/unloading springs (0 to 2 RPM). The carrier's Fast Mode speed in down feed grinding is determined by the software and is not adjustable.
- 5. "CPU ON/OFF": This selector switch supplies power to the "brains" and CNC drives of the CNC grinder.
- 6. EMERGENCY STOP: Pushing in this red mushroom pushbutton stops the carrier and removes spindle power, allowing the stones to coast to a stop. In down feed mode, the top head moves back up to its initial 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 computer console.
- 7. KEYPAD: The keypad on the upper right of the console allows you to select items from the software menus and enter numerical values when needed. The key functions are summarized below:
 - <u>Arrow Keys</u>: moves the screen highlight to a different menu choice, in preparation for activating the choice such as selecting crush grind or dressing. The highlight of an action to be taken will be flashing and a different color than other items on the screen. Even though a particular action may be highlighted, the action highlighted will not take place until the enter button is pressed.
 - <u>Enter key</u>: activates the current highlighted menu selection, or allows editing of a displayed number value, or ends the editing of a value. In some menus, for safety reasons the enter button may have to be pressed twice to activate the choice. The screen will advise the operator to press the enter button again. The enter button is also used to switch an action. The manual refers to changing action as changing toggles. For instance, the computer console does not have a carrier run switch although it has a carrier jog switch. This switch is toggled between run and jog. The

carrier is put into run when in the crush grind menu by having "dial" highlighted and pressing the enter button. In the set up portion of the manual, the plate that holds the springs was referred to as a carrier. Dial is the same as carrier.

Escape key: exits from the currently displayed menu and brings up the one that came before it.

<u>Number keys</u>: allows editing of displayed numerical values. To change a number, use the arrow key to move the highlight to the action to be taken such as changing the amount of adjustment to the grinding wheel. If the amount of adjustment was set at .001", move the highlighted to adjustment. Press the enter key. A little box will appear next to .001" This box tells the operator that a number can be changed by typing over the number. If .001" was not enough adjustment, the operator will type .0015". To enter certain numbers, the appropriate amount of zeroes will have to be entered. If the adjustment was being changed to .0001", an additional zero has to be typed. If the operator got into a number by accident and did not want to change the number, he or she will press the enter key to get out of this area in the program.

8. <u>Main Menu</u>: is the screen that comes up when the CPU is turned on. It is made up of six **sub menus** which are: (Reference figure 28 on page 20)

Down Feed Grind - is done by setting an opening between the two opposed grinding wheels that is the same as an unground spring. The carrier (dial) is loaded with unground springs. The operator enters the time and maximum amperage to be used to grind the springs. When the cycle is started, the carrier rotates between the grinding wheels at 12 to 15 revolutions per minute. As the carrier is rotating, the top head travels down to a finished grind length

Crush Grind – is done by setting an opening between the two opposed grinding wheels that is the same as a ground spring. The carrier is run at a slow speed and loaded continuously. The springs enter between the grinding stones unground and exit the stones ground to the finished length.

Change/Set Up Wheels – opens the heads so that new grinding wheels can be put on the machine. It has several sub menus for training the grinder as to the correct dress height and correct grind length.

Dress Wheels – moves the grinding wheels to the correct height for dressing after the first time grinder is set up

Utilities – used for updating software and trouble shooting

Jobs Menu – saves set up information by the job number

Inverter Option : If this option is purchased, you have soft start, breaking and the ability to change the grinding wheel speed. The controls for the inverter are located in a separate enclosure. Note the start and stop for the spindle motors will not be on the computer console. Each inverter control has an up and down arrow. By pressing on the up and down arrow, you can increase or decrease the speed on the spindle motors. The speed is controlled by the hertz. If the hertz increase, the speed increases. If the hertz decreases, the speed decreases. The maximum speed that the grinding wheels can run is 60 hertz or 5,200 surface feed per minute. The inverters have been programmed so that you cannot exceed 60 hertz. If one goes into the program this can be changed. NEVER EXCEED 60 HERTZ. The lowest speed that can be set is 40 hertz. Never go below 40 hertz, as the spindle motors will overheat. This also has been programmed as a minimum. To get into the program, one has to have the log on number. Call Moyer to obtain this number. The idea of being able to vary the speed is to obtain the best grinding results from a particular wheel. If the wheel acts hard, slow the spindle motors. If the wheel acts soft, increase the spindle motors.

IX. Changing Grinding Wheels And Dressing First Time (Computer Not Trained)

A. Moving Grinding Heads To Home Position

From the console's Main Menu, select "Change/Set Up Wheels." A small window will then ask you to confirm this action. When you select "start" another window informs you that the stones are moving apart to the fully open position to a set of limit switches. This erases previous set up information for the dress position and grind positions. (Figure 29 and 30 on page 24)



Figure 29 Using Arrows Move Cursor to Start and Push Enter



Figure 30 Move Cursor To Start And Hit Enter



Figure 31

A "CONTINUOUS button moves" menu will then appear, allowing you to use the console "Top Head", "Bottom Head" rotary switches to raise and lower the stones to assist you in changing them. The top and bottom spindles move as long as the switch is held. **Do not exit "CONTINUOUS button moves" until you are ready to dress**. (Figure 31 on page 25).

B. Mounting Grinding Stones (Read safety instruction IV. C. 2 & 3 on page 6)

- 1. Loosen the black handle under the sub plate and swing the carrier out to have access to the stone mounting plates. Using the hand wheel, raise the front guard plate. Holding the "Bottom Down" rotary switch, lower the bottom stone mounting plate to a position that the grinding wheel can be put on the bottom grinding wheel mounting plate.
- 2. Clean the bottom stone mounting plate by wiping it off with your bare hand until all the grit is removed. Rotate the bottom stone mounting plate so that one of the dowels is in an area that can be easily seen. Mark the outside of the bottom stone mounting plate for the dowel location.
- 3. Clean the mounting surface of the grinding wheel making sure that the aligning holes are free of any foreign material. Mark the outside of the grinding wheel showing the dowel hole location. Slide the grinding wheel across the stone mounting plate so that the aligning holes in the grinding wheel and the dowels in the stone mounting plate line up. Use a screwdriver to raise the wheel up so that it rests on the dowels. When the dowels and the holes in the stone mounting plate line up, the grinding wheel will drop onto the stone mounting plate. Bolt the wheel into place.

- 4. Inspect stones for ANY Cracks or Defects before mounting. Be sure the stone is sitting flush onto its plate. Dowels MUST be used to ensure proper centering. Using the 3/8-16 SHCS bolts provided for the machine, bolt the grinding wheels to the grinding wheel mounting plate. BOLTS MUST NOT STICK INTO THE GRINDING WHEELS MORE THAN 3/8" BUT HAVE ENOUGH THREAD CONTACT TO HOLD THE WHEELS ONTO THE STEEL MOUNTING PLATES. Do not force the bolts. They should be tight, but over tightening will crack the stone. Reference the grinding wheel supplier for the correct torque.
- 5. Lay the grinding stone for the top grinding wheel mounting plate on top of the bottom grinding wheel. Using the "Top Stone" rotary switch lower the top stone mounting plate making sure that the alignment holes in the grinding wheel line up with the dowels in the stone mounting plate. Don't bring the top head down so that the dowels completely enter the grinding wheel alignment holes. Use a small pry bar and lift the top wheel up and start several of the grinding wheel mounting bolts that are next to the dowel. Rotate the wheels so that another set of bolts can be started into the grinding wheel next to the dowel located 180 degrees away from the first dowel. Insert the remaining bolts and tighten.
- 6. When the stones are installed, be sure all tools, wood, and other foreign objects are removed from the grinder interior. Move the grinding wheel so they are close, but do not touch the dressing stars. CAUTION- WITH THE FRONT PLATE UP FOR CHANGING STONES, THE ENTRANCE AND THE EXIT HOLD DOWNS ARE CLOSE TO HITTING THE STONE MOUNTING PLATE. THE JACK THAT MOVES THE HOLD DOWNS CAN BE DAMAGED IF THE HOLD DOWNS HIT THE STONE MOUNT PLATE. Move the hold downs down prior to bringing the top head down. Using the "Continuous Button Moves" bring both grinding wheels close to the stars on the dresser. Then exit the "Continuous Button Moves" screen.

- B. C. Changing Star Cutters (Figures 32,33,34,35 and 36) Reference page 6 and 7 under Section IV. Safety
 - 1. The stars can be changed inside the machine as shown in figure 28 or the dresser shaft can be removed from the dresser block as shown in figures 29 and 30. The dresser is heavy use caution when handling.



Figure 32 Changing stars inside machine Figure 33 Dresser shaft removed



Figure 34 Removing dresser

2. Loosen the two hex locking nuts and back off the bushing screw. After the outside bushing screw is removed from the dresser head, the cutter assembly BB10 can be removed for replacing stars. We recommend Desmond Sharp Tooth Cutters 17-A.



Figure 35

BB10 Bearing Assembly

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

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



Spanner Wrench ForTightening Bushing Nut **Figure 36 Cutter Lock Washer** After Stars Are Tight On Cutter Bushing Bend A Tab On Cutter

3. To take the worn stars off and replace with new ones, bend the tab back out of the slot in the bushing nut. Using the spanner wrench, remove the bushing nut from the assembly. Take off all the worn stars but save the worn stars. Put on a new star then put on a worn star until the bushing is full. If no worn stars are available, use the spacers supplied with the cutter assembly. To align the teeth so that they are staggered, flip the stars over so that the tooth of the star being put on is in the middle of the two sharp points of the star just put on. Reverse the process of putting the cutter assembly back on the dresser head. The bushing screw should be tight enough to feel a small resistance when the stars are rotated. Reinstall the two jam nuts to hold the bushing screw in place.

D. Dressing The Stones After A Grinding Wheel Change (Dress Position Not Stored): Swivel the console so the controls are available from the dressing area on the left side of the machine. When the "CONTINUOUS BUTTOM MOVES " is exited a "FIXED BUTTON MOVE" screen pops up for dressing. (Figure 37 and 38 on page 29)



Figure 38 Exit Dress & Store Dress Position

The screen will display "FIXED button moves and "Dress the stones. Using the arrows move so that .002" is highlighted and press enter. Now when the selector switches for top and bottom head up or down is held, the grinding head selected will move .002" each time the selector switch is held.0.002" is the recommended amount for dressing. Using the top and bottom selector switches move the grinding wheels

closer to the teeth of the dresser by swinging the dresser into the grinding area until contact is made. Start the motors and dress both heads at the same time or individually. After dressing, select "Exit" from the menu. A warning will appear to ensure that the dresser arm is removed from between the grinding stones. If the dresser is retracted, push the enter button. The dress position is stored. The wheels will move to this dress position when the wheels are dressed the second time.

E. Setting Grinding Stones For Grind Height (Grinding Height Not Stored In Memory): Using the fixed button moves again and selecting a large incremental move like .250" move the heads to the grind position. As your wheels get close to the proper grind height, be sure not to smash the wheels into the carrier dial. Select a smaller increment of movement to move the wheels to their final grind position. (Figure 39 on page 30)



Figure 39 Moving To Grind Position

By following this procedure, the dress position and the grind position have been stored in the computer's memory. The computer can now move the heads between these two positions and remember all grinding wheel adjustments for wheel wear.

F. Dressing Wheels After The First Dress On A Set Of Wheels (Dress Position Previously Stored): (Figures 40 and 41 on page 31)

After grinding and when the grinding stones need dressing, select "DRESS WHEELS" from the main menu. Another small window will then ask you to confirm this action. When you select "start" another window informs you that the stones are opening up to the position they were in at the end of the last dress. The screen will display "FIXED button moves:", "Dress the stones:". Set the movement to 0.002" as a recommended amount for dressing. Move the grinding wheels closer to the teeth of the dresser by swinging the dresser into the grinding area until contact is made. Start the motors and dress both heads at the same time or individually. After dressing, select "Exit" from the menu. A warning will appear to ensure that the dresser arm is removed from the grinding stones.



Figure 40

Figure 41

G. Setting Grinding Stones For Grind Height (Grinding Position Previously Stored) (Figure 42 on page 31)

After dressing the wheels exit the dress screen by pressing the ENTER key. The grinding head will automatically move to the position that they were in at the last grind height. The computer takes into account the amount dressed off the stones and adds a small amount of extra gap between the stones. A "FIXED button moves:" menu is presented allowing you to refine this position. Select "EXIT" to return to the console Main Menu. From the main menu select crush or down feed screens.



Figure 42 Fixed Button Moves To Set Exact Grind Length

Turn the console to the front, and grind a few springs. They will most likely be a little too long. You can then adjust the heads closer by the amount of extra length and run some more springs.

X. Basic Setup Procedure

Refer to Section VII. "Manual Controls on pages 17 and 18 to set the height and on of the carrier plate and the hold downs.

A. Positioning Stones

- 1. The bottom stone's height should be positioned right at or a slight bit below the entrance edge of the sub plate. The exit side of the sub plate should be slightly lower than the grinding wheel. With this setting the springs will slide easily between the stones, to prevent chamfering the stone or the springs. At the exit, the springs should not get caught against the sub plate upon leaving the stones.
- 2. Bring the top grinding wheel down to the estimated grind length position. A gage block or a ground sample spring may be used to determine this position.

B. Mounting Carrier Plate

Prior to mounting the carrier plate, clean the two mounting surfaces to ensure that the two surfaces are clean. Any dirt on these surfaces can make the spring carrier plate run through the grinder on such a tilt that the springs may not grind square. After this cleaning, set the carrier gently onto the carrier plate mounting hub. If fixtures or tubes are used, make sure that they are set at the same height and that they are set perpendicular to the grinding wheels.

C. Positioning Carrier Plate And Hold Down

 The carrier plate should be moved so that the springs in the holes are equally spaced between the top and bottom grinding wheels. The desired height of the hold down depends upon the position of the top stone and the mode of grinding, crush or downfeed. IN CRUSH GRINDING, SET THE HOLD DOWN SO THE BOTTOM OF THE HOLD DOWN IS LEVEL WITH THE BOTTOM SURFACE OF THE TOP STONE. WHEN DOWNFEED GRINDING, THE HOLD DOWN IS SET JUST ABOVE THE UNGROUND HEIGHT OF THE SPRINGS.

XI. Design of Carrier Plates

The first concern in setting up a new job is to provide a carrier to push the given springs into the grinder, holding them as square as possible.

- *Diameter:* The machine is designed to use up to a 30" diameter carrier. and to have a center hole in the grinding stone. The center hole will have to be adjusted to match the type and size of carrier being used. Contact Moyer for sizing the center hole in the grinding stone based upon the type of carriers that will be used.
- *Bollt Circle*: Using stones with an 8" ID center hole, the 30" carrier would require that the outermost holes be on an approximate bolt circle of 28.5". The actual bolt circle is dependent upon the hole size in the carrier. The distance between the centerline of the carrier and the grinding wheel is 18.25". If the hole is put on a 28.5" bolt circle ½ of the spring O.D. will pass over the center hole. For small diameter springs the bolt circle should be reduced based upon the diameter of the spring.

Hole Spacing: Leave at least 0.125" material between holes.

- Hole Size: Make holes at least 0.006" to 0.015" larger than the spring diameter depending upon size of wire, squareness required and the length to diameter ratio. Longer springs typically can have more clearance.
- *Thickness*: Subtract 1 to 2 wire diameters from the free length of the springs. Lower rate springs require thinner carriers as they compress more during grinding. For springs that are as tall as they are wide, or springs with only ½ active coil, the carrier must be as close to the ground length of the spring as possible without grinding the carrier.
- *Center Hole*: The mounting hub is 5.00 inches. The center hole dimension for the carrier is 5.002" to 5.004".
- *Surfaces*: Blanchard ground flat and parallel to 0.002" TIR. Plated with electroless Nickel and baked for hardness is also recommended.