Welcome to Trident Machine Tools

Haas Control Overview

Haas Control Overview

- This overview is designed to provide the user with a familiarity of Haas mill and lathe controller. During this half day class participants will be exposed to the control keys, features and basic control operation.

Schedule

- Introductions
- Control Layout
  - Control simulator demo
- Break
- Control Layout (Continued)
  - Control simulator demo

What is the "control"?

- The machine control is the interface used to interact with each Haas machine. This tutorial will explain how to use a Haas controller for both mill and lathe.

- The controllers for mills and lathes are almost identical. This presentation will go over a mill control. Any differences between the mill and lathe will be clarified, and examples of how lathes vary from mills will be given.

Powering Up

- To power the machine up, first turn the breaker located on the back of the machine to the on position, then press the green POWER ON button.

Powering Up

- Before shutting machines off the emergency stop should be activated. Therefore, the emergency stop should still be active from the last shut down.

- Release the emergency stop by rotating it clockwise and allowing it to pop out.

Powering Up

- Press Power up after the machine has started to zero all the axis. All axis have to be returned home before using the machine.

- Turn on the lights with the light switch on the right side of the panel.

Front Panel Keys

- The front panel keys are the ones used to interface with the machine.

- These keys are split up into a few categories:
  1. Function
  2. Cursor
  3. Display
  4. Mode
  5. Numeric
  6. Alpha
  7. Jog
  8. Overrides

- This tutorial will go more in depth with each of these.
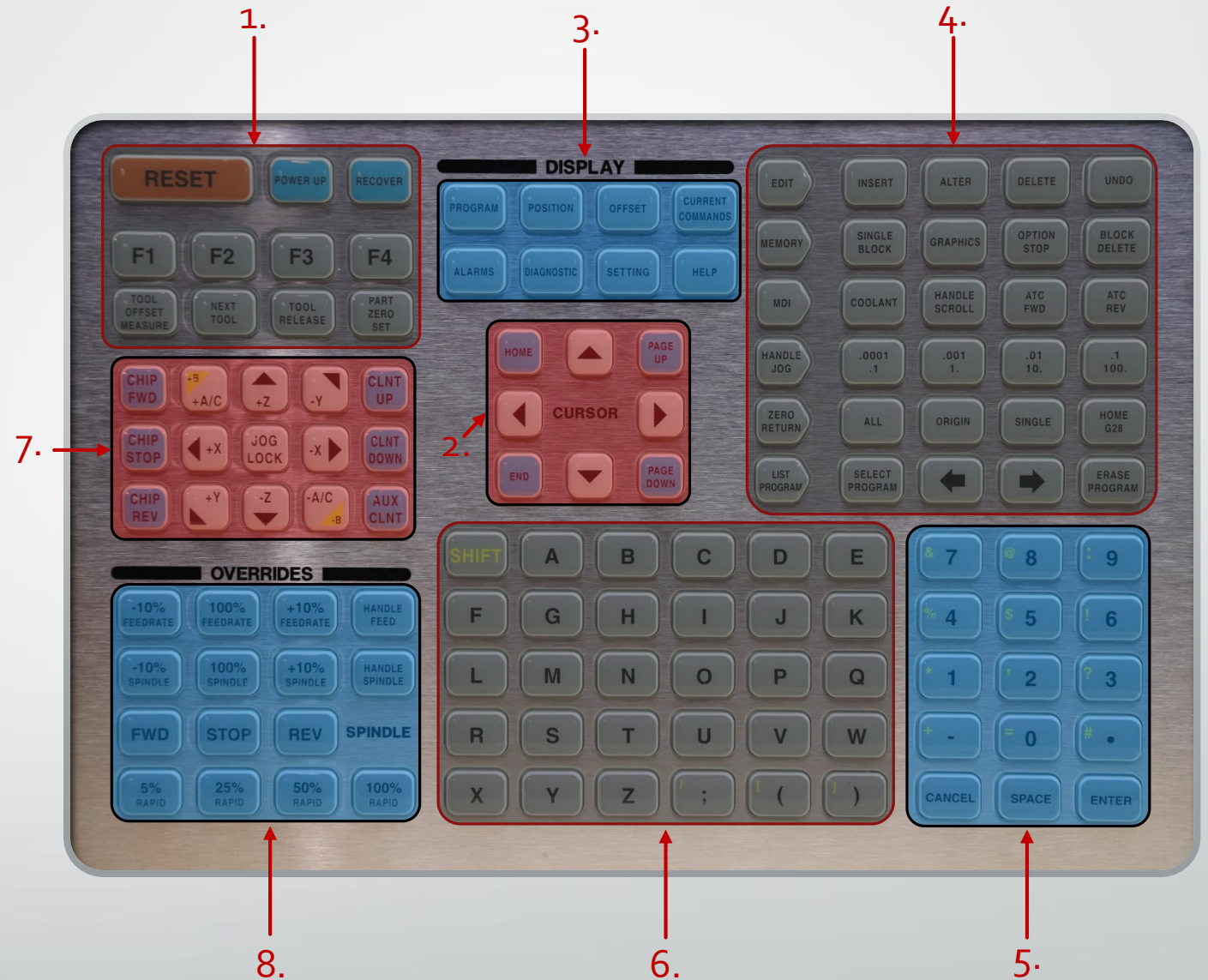
Function Keys

There are a few keys in the top left corner that have a variety of uses.

- Reset – Stops active programs and clears alarms.

- Powerup – is used after the machine has started to zero all the axis. All axis have to be returned home before using the machine.

Function Keys

- Recovery is used to recover from an alarm or to prevent an inevitable error. A couple common uses are to recover from a bad tool change or from an incomplete tapping cycle.

- F1-F4 – Has multiple uses depending on the application. There will be a prompt when they are needed.

Recovery Example

- Each scenario that requires a Recovery is different. However, the machine will prompt the operator with the steps needed to rectify each instance.

Function Keys

- There are some subtle differences in the offset keys in lathe. While a mill has Tool Offset Measure and Part Zero Set, lathes have X Diameter Measure and Z Face Measure.

  - Z face Measure records the current tool position.

  - X Diameter Measure Records the tool position in relation to the lathe centerline. The tool is touched off a diameter of known size, this records that position, then the operator inputs the distance to the lathe centerline (the known radius).

Function Keys

- "Next Tool" is used to select the next tool from the turret.

- X/Z – Toggles between the X & Z axis while in jog mode.

Function Keys

- Tool Offset Measure – Uses the current Z position to automatically determine the tool length offset.

- Next tool – Selects the next tool in the catalog. This is normally used during setups.

- Tool Release – releases the tool from the spindle.

- Part Zero Set – Will insert the current X&Y position into whatever work offset is highlighted.

Cursor Keys

- Cursor keys are used to navigate menus.

- Aside from the 4 directions there are four other functions:

  - Home goes to the top of the page.

  - End goes to the bottom of the page

  - Page up and page down move up or down respectively the distance of one page.

Display Keys

- The display Keys switch the display over to different screens.

- Each screen has its own unique use.
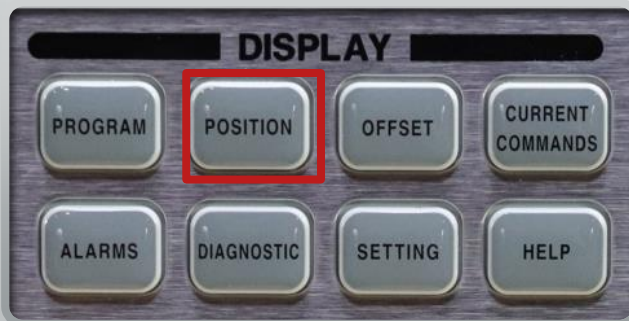
Display Keys

- Program:
  - The program key displays the current program.
  - This includes programs whether it be in memory mode or MDI.

MDI   N100
(Tool Probe Manual Mode);
(**AUTO PROBE MANUAL TOOL MEASUREMENT**);
#2317= 7 (SET TOOL TIP DIRECTION);
;
;
(**PROCEED WITH CAUTION WHEN TOOL AND OFFSET
NUMBERS DO NOT MATCH**);
;
;
G211 T1717 H07;
M30;

Display Keys

- Position:
  - Position is where the operator can view the position of the machine tool.
  - The active display tab will be the one that shows up in the active screen on the control.

There are multiple applications:

- Work - relative distance from PRZ
- Distance to go - distance left in a move
- Machine - Distance from machine home
- Operator - which allows the operator to zero the current position.

Display Keys

- Offset:

  - Offsets is where the machine work and tool offsets are stored.

Display Keys

- Current Commands:
  - Current commands shows timers, active codes, a tool table, and much more.
  - Here are all the timers for the machine.

Display Keys

- Current Commands:
  - Tab over to the right to see all the active codes. For example, no canned cycle is active (G80).
  - Feeds and speeds also show up here.

Display Keys

- Current Commands:
  - Tool table shows where all the tools are. Since the tools aren't sequential, tools are often passed between different tool holder pods for efficiency sake. However when the machine calls up a tool, it knows where it left that tool number last.
  - Simply put, this table here explains which tool is in what pocket.

Display Keys

- Current Commands:
  - There are even calculators within current commands.
  - There is a standard calculator, as well as one specific to milling, and one for tapping.
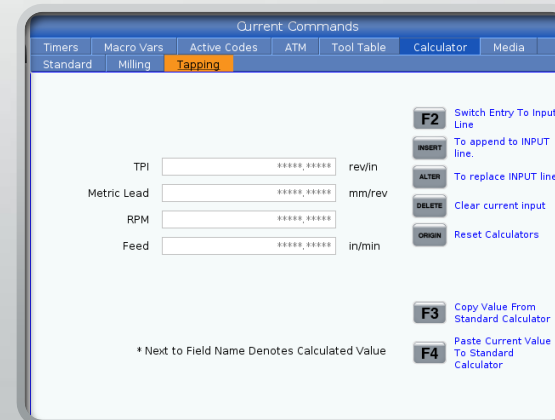
Display Keys

- Alarms:

  - The alarms screen displays any alarms that are active, and includes a description of the issue.
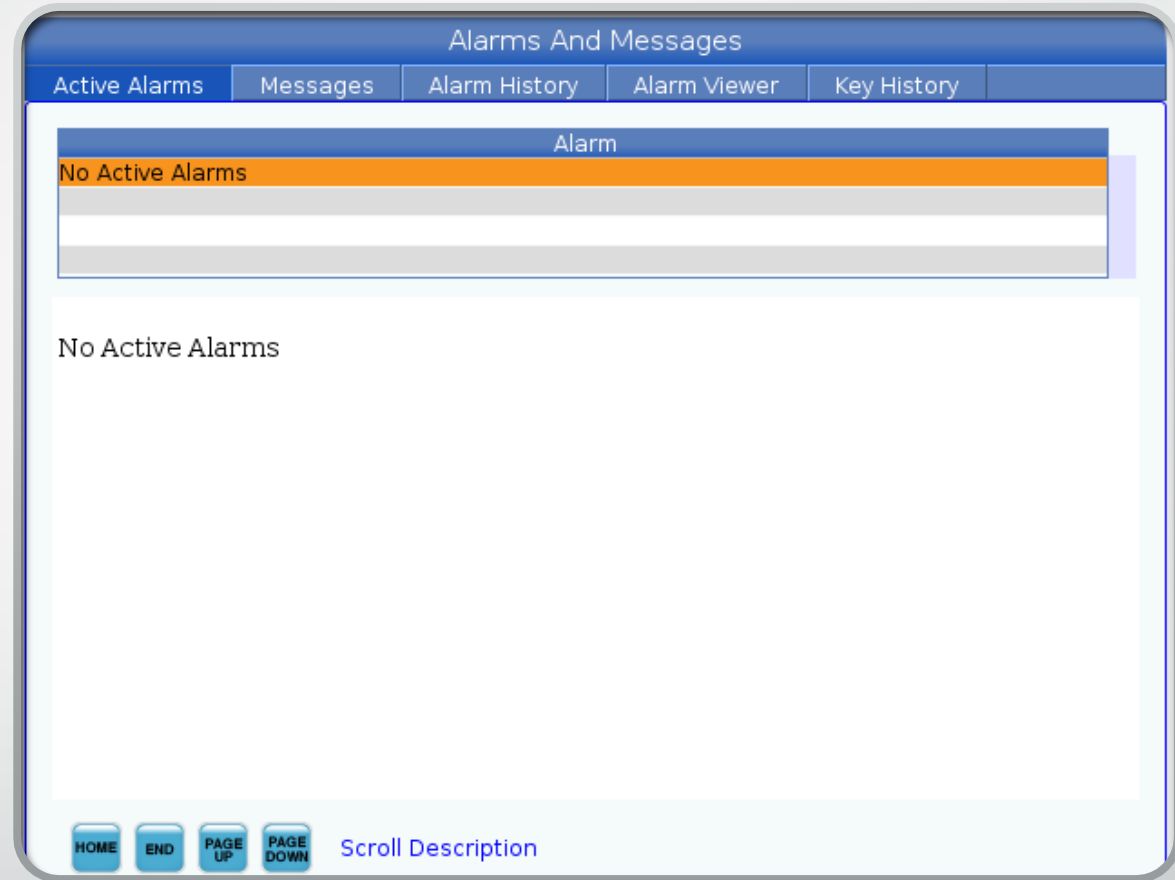
Display Keys

- Diagnostic:
  - This page displays machine info such as it's power-on time, air pressure, voltage, and much more.
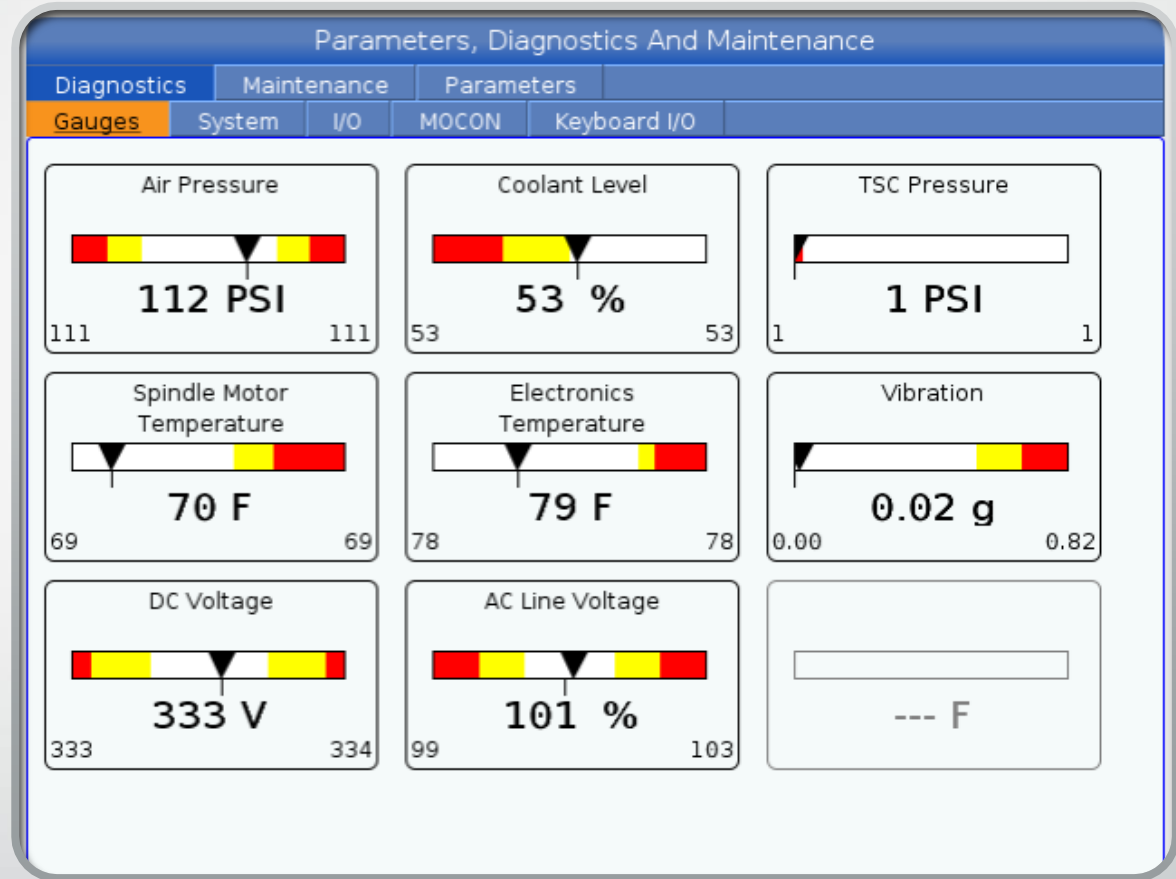
Display Keys

- Setting:
  - Settings is where all the machine settings are located.
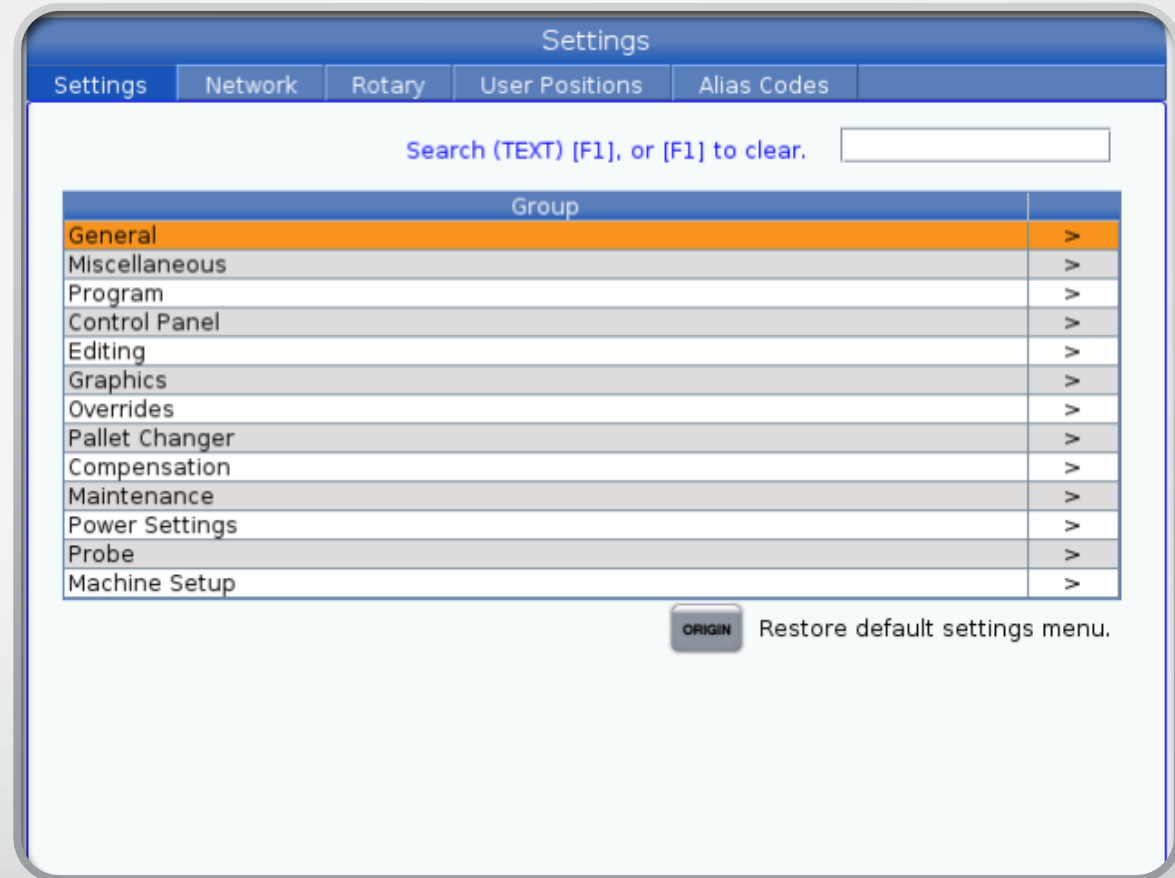
Display Keys

- Help:

  - The help screen will give assistance and resources regarding the operators specific needs.

Mode Keys

- Mode Keys toggle the machine between different functions. In other words, the operator switches between modes based on their needs.

  - One example is moving into handle jog mode to manually move the spindle.

Mode: Edit

- Edit keys are used to edit programs. With them text can be:
  - Inserted into the space after the curser.
  - Altered. The written text will replace the current text.
  - Deleted
  - Undo the previous change(s)

Mode: Memory

- Memory keys take the operator to the machine memory, which is where the program is. The memory keys adjust how the program will act:
  - Single Block makes the machine cycle through the program one line at a time.
  - Graphics will show the machine movement virtually. This is viewable in edit mode and is often used to verify programs.

Mode: Memory

- Memory keys take the operator to the machine memory, which is where the program is. The memory keys adjust how the program will act:

  - Option stop will stop the program at all M01 optional stop commands in the program. With this turned off the program will run through the entire program until it finds the M30 End of Program/Reset, or an M00 Force Stop.

  - Block Delete ignores all program lines with a "/" in front of it.

Mode: MDI

- MDI is where temporary code is written and executed without messing with the main program.

- MDI functions allow for manual control over:

  - Toggling coolant on or off.

  - Handle Scroll which allows for scrolling using the handle in specific situations.

  - Switching between adjacent tools (ATC FWD & ATC REV).

Mode: MDI

- MDI on a lathe is the same as on a mill, however the tool changer is now a turret. So:
  - Switching between adjacent tools is now TURRET FWD & TURRET REV.
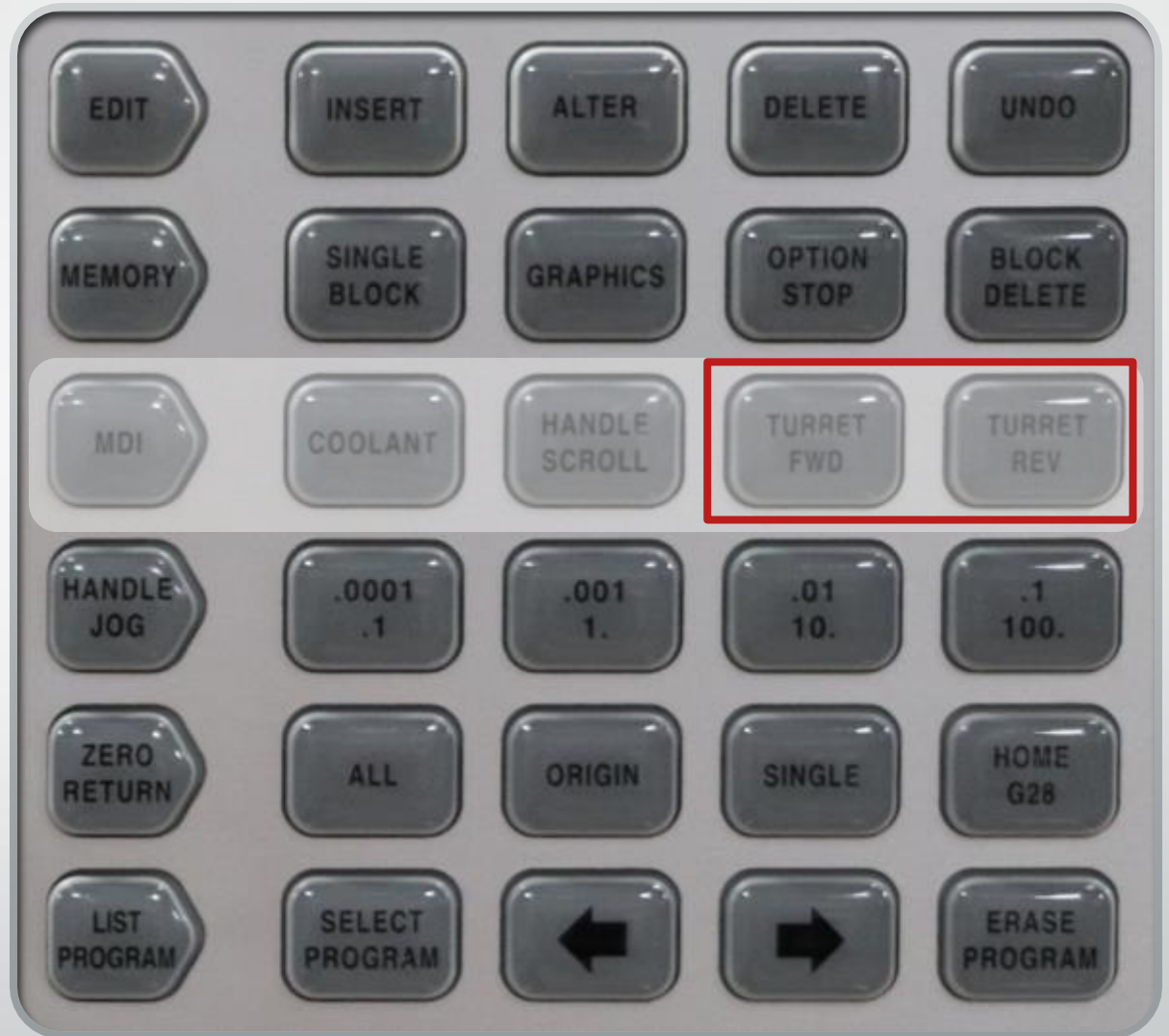
Mode: Handle Jog

- Handle Jog mode allows the operator to manually move the spindle with directional keys or the scroll wheel.

- The keys to the right change the jog speed in magnitudes of 10X

- Note: Be extra careful with the highest speeds, as accidents are more common the higher the feed. The highest feed can even be disabled under settings.

Mode: Zero Return

- Zero Return keys all send the machine home in one way or another, however, the Origin key can also be used to zero the operator position.

Mode: Zero Return

- All axis can be sent home, but there are multiple ways to do so.
  - To send home and zero all axis select "Power up" as mentioned earlier. Pressing "Zero Return", "All", and then "Origin" will do the same thing.
  - To send home and zero a single axis – Press "Zero Return", the axis of choice, then "Single".

Mode: Zero Return

- Once the machine has been sent home and zeroed, subsequent returns to home can be done using "Home G28"

- Just select "Zero Return", "All" then "Home G28". Alternatively, to return a single axis select "Zero Return", the axis of choice, then "home G28".

  - Once the machine is Zero Return mode, single axis can be sent home without pressing Zero Return.

Mode: List Program

- "List Program" keys are used when selecting a program. Once active, all the programs in memory will be displayed on the screen, as well as any USBs that are plugged in.

  - Select Program will make the highlighted program active in machine memory.

  - The directional keys switch between screen tabs, such as listing programs in memory to programs in USB.

  - Erase Program will erase any selected program. The active program can't be deleted.

Numeric Keys

- The numeric keys are where the numbers, cancel (backspace), space, and enter are located.
  - Cancel backspaces text.
  - Space is not needed when writing G-code, but it is inserted with the space key.
  - Enter places text. It is also the selection key in menus.

Alpha Keys

- The alpha keys are where the alphabetic keys are located.

- There are also a few common symbols in this section.

  - ";" defines the end of a line of code

  - "()" surrounds notes, and is only for operator reference.

Shift Key

- Special characters can be inserted by pressing the yellow shift key, then the key that has the desired yellow character.

- These symbols are less common.
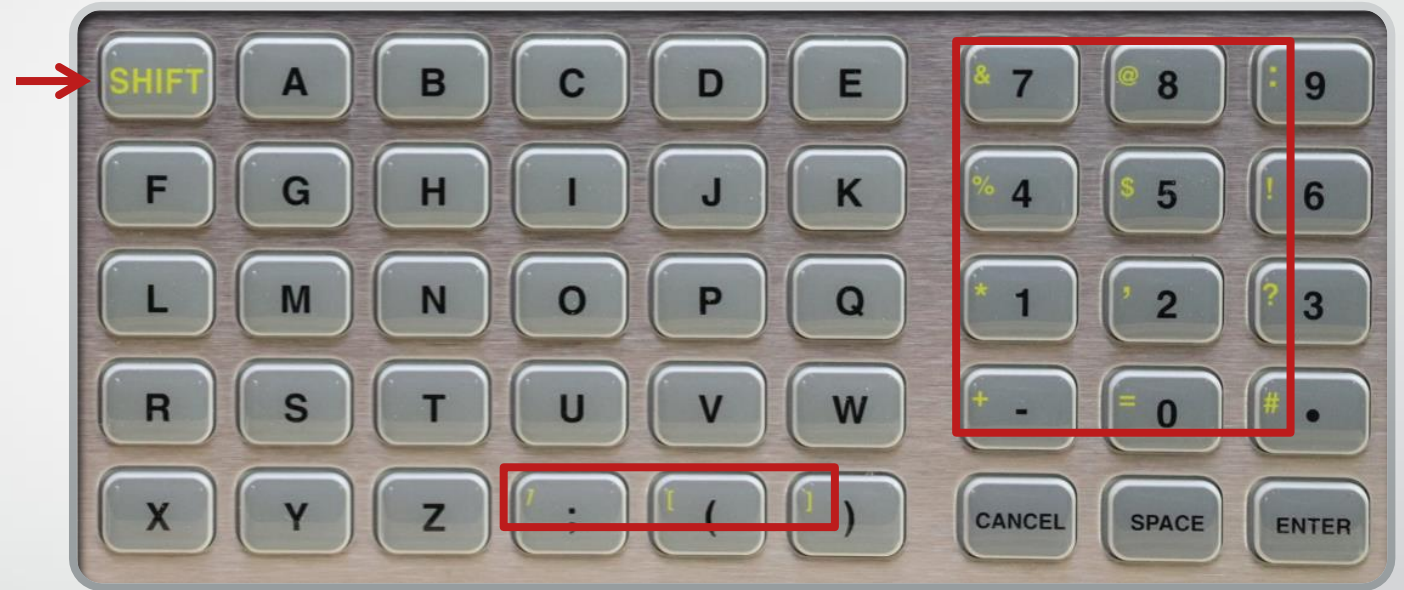
Overrides

- The overrides change the machine feedrate, spindle speed, and rapid by whatever amount selected by the operator.

    - For example: A speed and feed of 1,000-RPM 5-IPM toggled up to 200% would then be 2,000-RPM 10IPM.
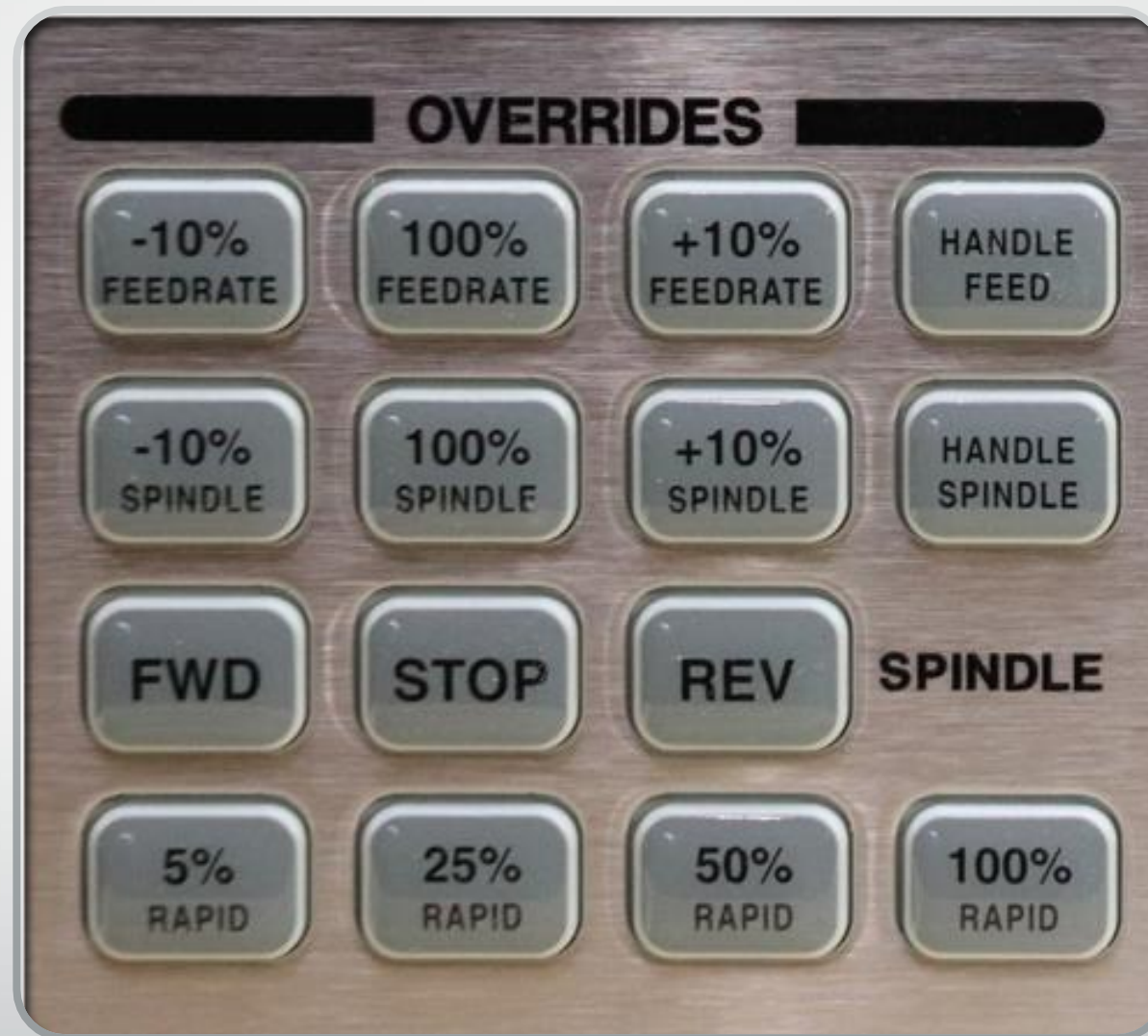
Overrides

- Handle Feed and Handle Spindle allow for both to be adjusted by the hand wheel in increments of 1.

- The rapid can be set to 5%, 25%, 50%, or 100%.
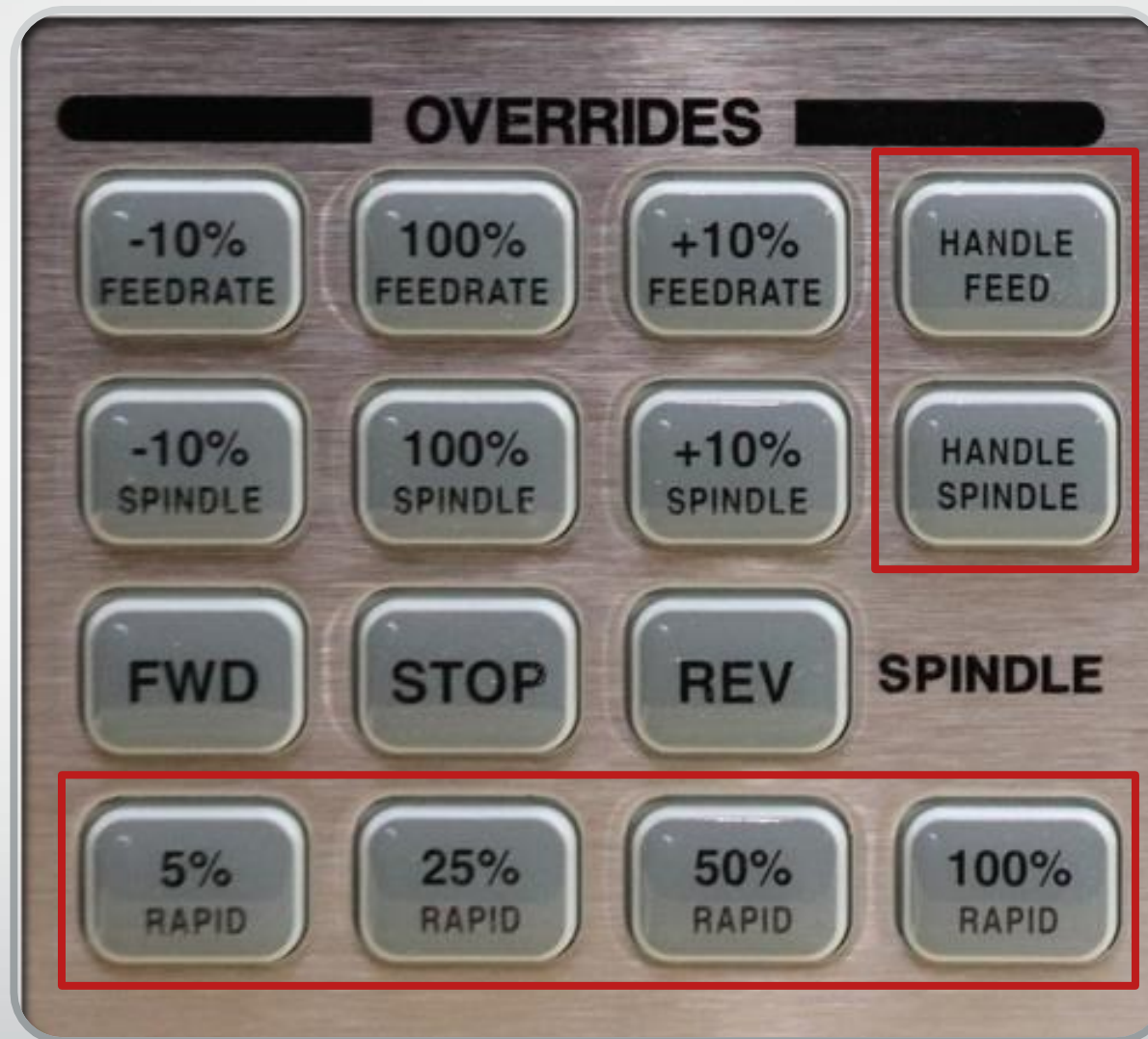
Overrides

- FWD turns the spindle on to the previous RPM with a CW rotation.
  - This will activate with the last commanded spindle speed that was programmed.
  - In "Jog" mode typing a spindle speed and pressing forward will also activate the spindle.
- Stop turns the spindle off
- REV turns the spindle on to the previous RPM with a CCW rotation.
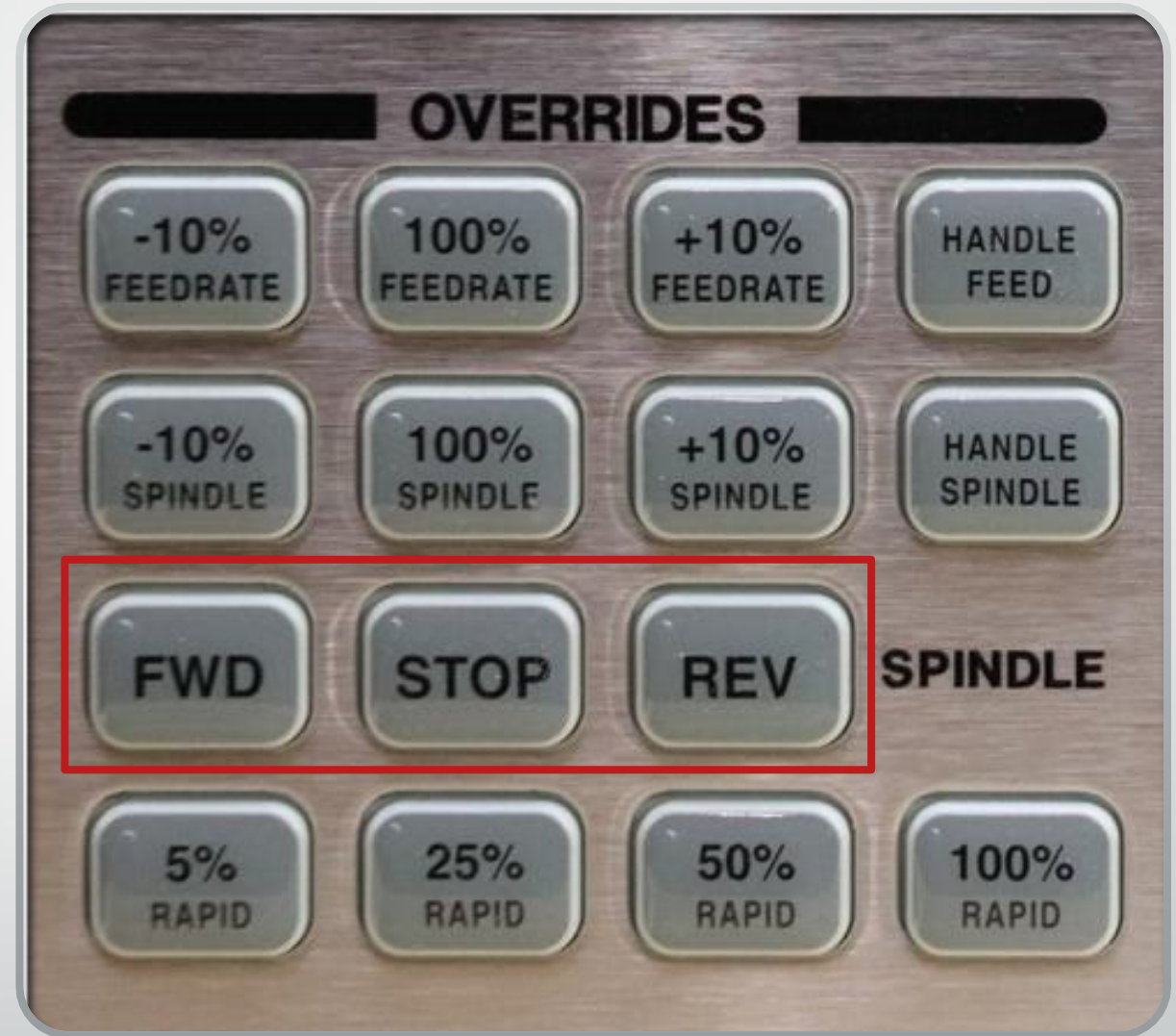
Jog Keys

- Jog keys are used to move the machine at a constant feed.

- One of any axis can be moved at a time, this includes any auxiliary axis if it is hooked up.

- Press Jog Lock before pressing an axis direction to have the machine lock into a feed in that direction.

Jog Keys

- The jog speed keys mentioned previously come into play here in jog mode. When these axis are selected, the feed can be adjusted with the Handle Jog speed keys.

- Remember to be careful when jogging the machine in the highest feeds.

Jog Keys

- The chip conveyer belt controls are just to the left of the jog keys. The belt can be commanded to go forward, reverse, or stop.

- The auxiliary coolant controls are to the right of the jog keys. Here the auxiliary coolant can be turned on and pointed up or down.

Lathe Jog Keys

- On a lathe, the chip conveyer controls are to the right of the jog keys, and tailstock controls are to the left of them.

- Where there was A, B, and C auxiliary mill axis, there is now a C axis for the lathe.

- The center button is Rapid on the lathe. Be careful not to rapid with the intention of feed holding!

MDI Mode

- Manual Data Input (MDI) can be used to execute single lines of code or short programs.

- MDI can be used for tool changes, spindle warm-ups, offset call ups, probing functions, etc.

- Once code is entered in MDI it can be activated with the "Cycle Start" button.

- After it is activated the code will stay in MDI and will need to be erased or altered for the next operation.


```
MDI                                          N100
(Tool Probe Manual Mode);
(**AUTO PROBE MANUAL TOOL MEASUREMENT**);
#2317= 7 (SET TOOL TIP DIRECTION);
;
;
(**PROCEED WITH CAUTION WHEN TOOL AND OFFSET
NUMBERS DO NOT MATCH**);
;
;
G211 T1717 H07;
M30;
```
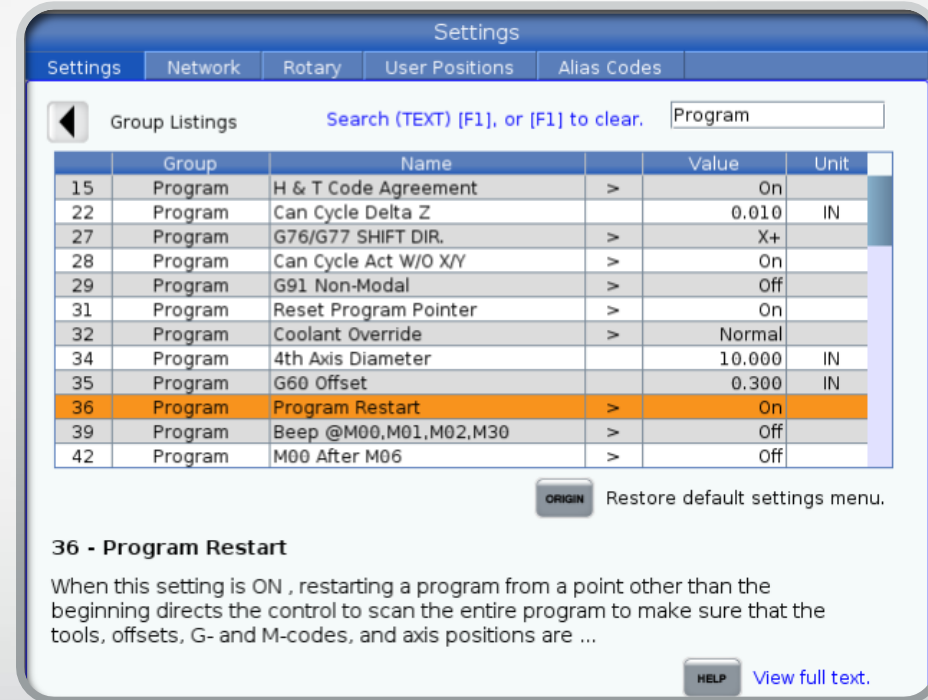
Visual Programming System (VPS)

- VPS is Haas's built in conversational programming. Whole toolpaths can be created using a step by step process, with prompts for directions.

- VPS can also be used to set tool heights, and operate a probe.

- Once all values for a cycle have been inserted, the resulting program can be used within a program, run in MDI, or copied to the clipboard.
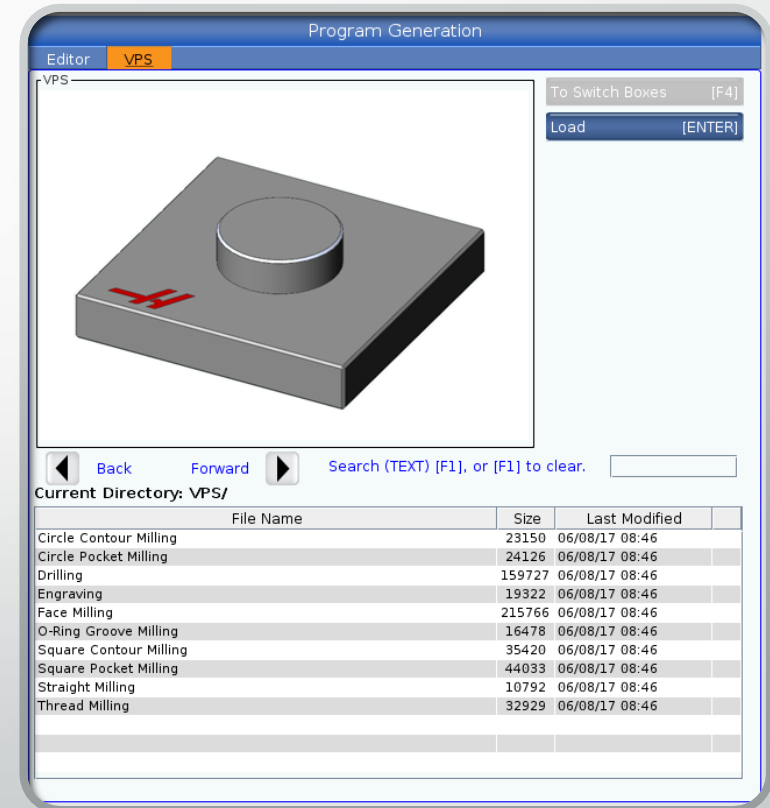
Program Restart

- The control has the ability to start at any point in the program.

- When the program position is set and "Cycle Start" is activated the control will scan for tool number, offsets, G/M codes and tool position.

- Once the program is scanned the tool will start from the selected block.

- Note: Setting 36 must be on for Program restart to work. If setting 36 is off the program will start without any scanning.

  - NGC lathes have no program restart option.

Run/Stop/Jog/Continue

- The Haas control allows for a Run Stop Jog Continue(RSJC) feature. This feature allows the user to stop a program, jog away from the part, then start the program.

- This feature allows for inspection of the part or replacement of a cutting insert.

  - It is important to note that when the program is started again only the current offsets are used.

    - If a new tool height or diameter offset is entered it will not be picked up.

Run/Stop/Jog/Continue

- To use RSJC:
  - Press feed hold at a stopping point in the active program.
  - Select an axis (X,Y,Z) on the keypad and then select hand Jog to activate the axis.
  - "Jog Away" should display on the screen.
  - Any jog feature can now be used to move away from the part.
  - The coolant and spindle can be stopped on the control.
  - The part or tool inspection can now be preformed.
  - Note*- the tool should be in an unobstructed path back to the stored position. If not, jog the tool closer to the original position.
  - Return the control the previous MEM or MDI mode, then press cycle start.
    - The control will display "Jog Return" and return the X and Y axis in rapid at 5% to the feed hold position, then return the Z axis.

Classic vs. NGC Control Differences

- The most obvious change between the Classic Control and the Next Gen. Controller is the display. The graphics have been improved in the NGC to be more clear and concise.
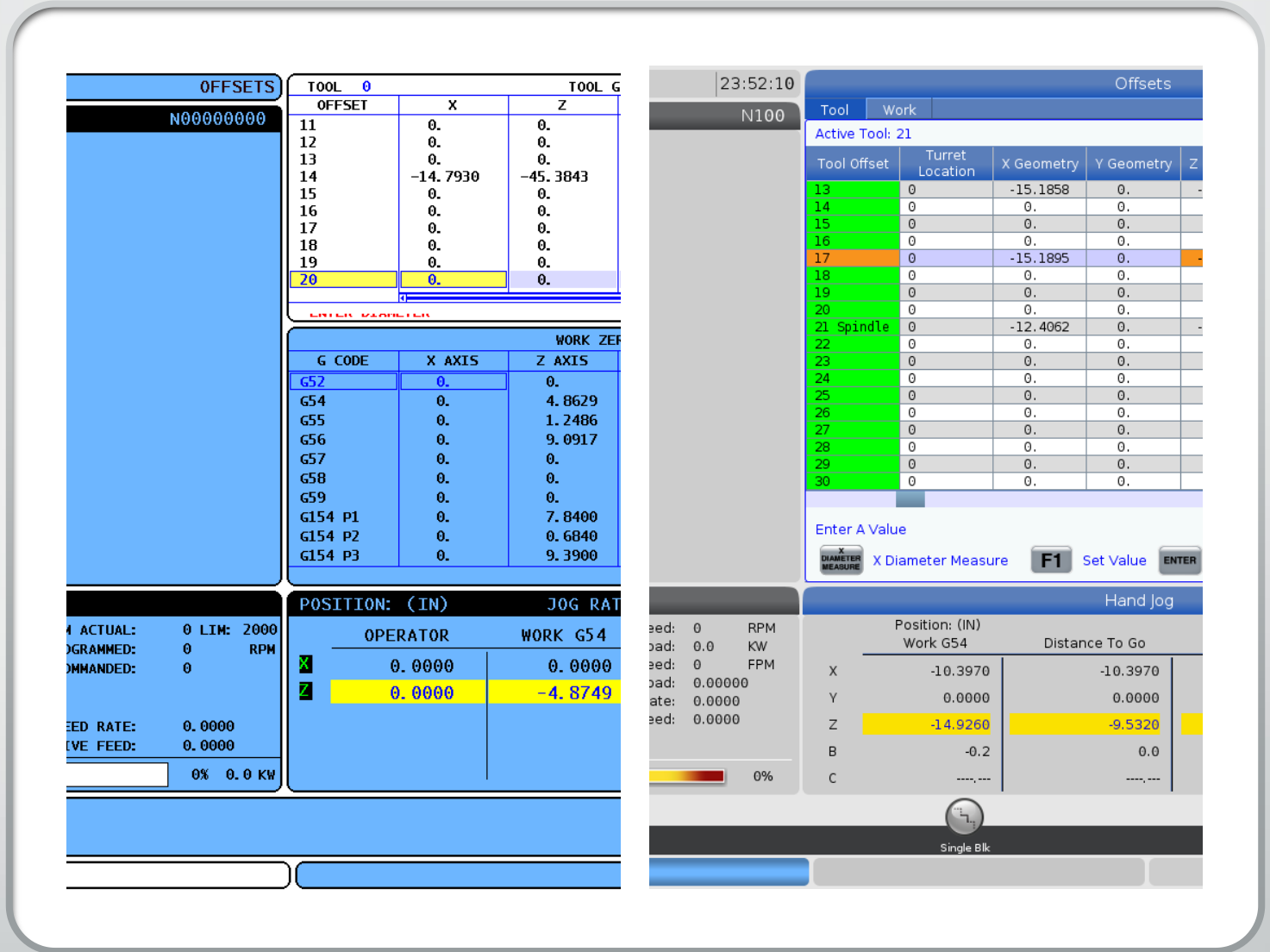
Classic vs. NGC Control Differences

- The features mentioned throughout this presentation are all available with the next gen controller. However, there are differences between the functionality of both controllers.

- Aside from the CC not utilizing some of the newer functionality such as built in calculators, VPS replaced two features in the CC called Visual Quick Code (VQC) and Intuitive Programming System. Both of these are a form of conversational programming, which uses a visual display and prompts to help generate code.

Classic vs. NGC Control Differences

CC

NGC

- There are a few differences between the keys on both controls. This is to make better use of less used keys.

- Graphics is separated into the memory row.

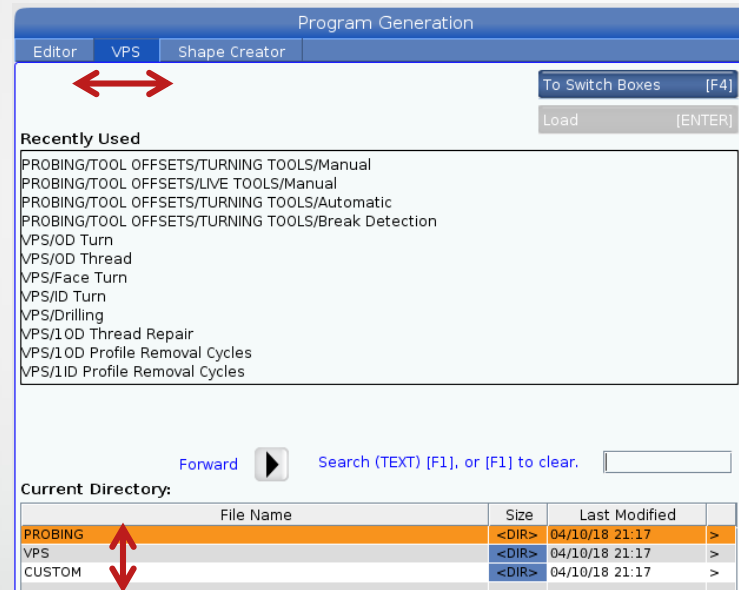- Parameter/Diagnostic is now just Diagnostic, as parameters now have to be adjusted by a service technician.

Classic vs. NGC Control Differences

- On the classic control, the arrow, cancel, and enter keys were used to navigate menus.

- Now the NGC only needs the arrow keys to navigate menus. Up and down scrolls while left and right enters and exits the hierarchy of menus.

CC uses to enter exit.

NGC uses for all navigation.