WELDON FLATS MACHINE 2002

OPERATOR'S MANUAL

By

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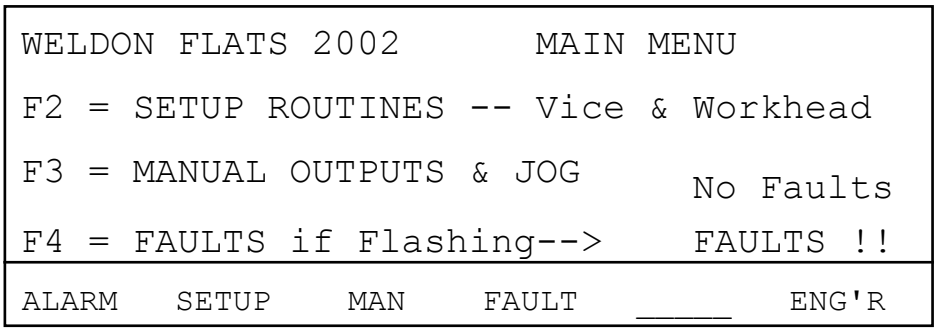
GP #1, Main Menu



This is the **Main Menu** Screen for the **WELDON FLATS** Machine. When the machine is powered up either by choice or power failure, the **"FAULTS!"** prompt will be flashing. The Operator then needs to press the **'FAULT' Button** (F3) and follow the prompts from the FAULT Screen. When ALL Faults have been solved, the Operator will return back to this Screen. The "FAULTS!" prompt will be gone and **"No Faults"** prompt will be seen.

Next the Operator will be able to select:

F1 ALARM - Press this key to clear any Input Over-Limits Value made by Operator.

F2 SETUP – Press this key for SETUP ROUTINES – Vice & Indexing. (Seepage 2-2)

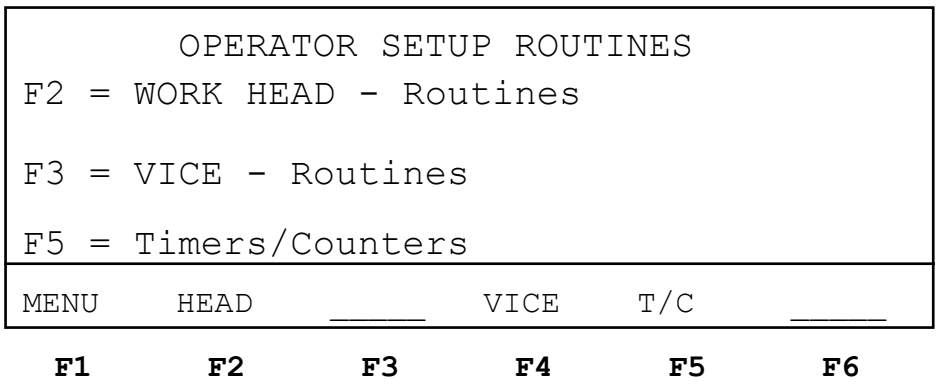
F3 MAN – Press this key for MANUAL OUTPUTS & JOG. (Seepage 2-70)

F3 FAULT - Press this key to view and clear any FAULTS if the red pilot lamp is flashing. (Seepage 2-78)

F5 Key not used.

F6 ENG'R - Press this key for the Special Engineering Setup section. (Seepage 3-1)

GP #2, Operator Setup Routines



F1 MENU - Press this key to return to the Main Menu. (Seepage 2-1)

F2 HEAD - Press this key to select the Work Head routines. These routines are for Weldon flat tools using auto loading or hand loading procedures. (Seepage 2-3)

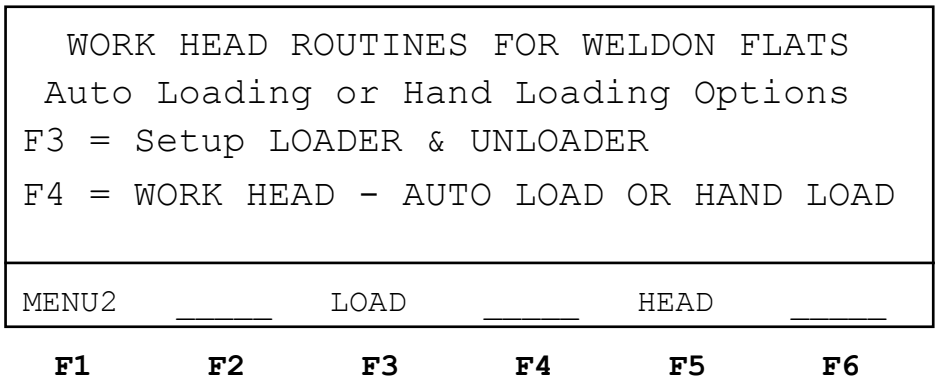
F3 Not used.

F4 VICE - Press this key to select the vice routines for Weldon flats or Whistle Stops. (Seepage 2-41)

F5 Key not used.

F6 T/C - Press this key to select the Timers and Counters section. (Seepage 2-68)

GP #3, Work Head Routines



F1 MENU2 - Press this key to return to the Operator Setup Routines menu. (Seepage 2-2)

F2 Key not used.

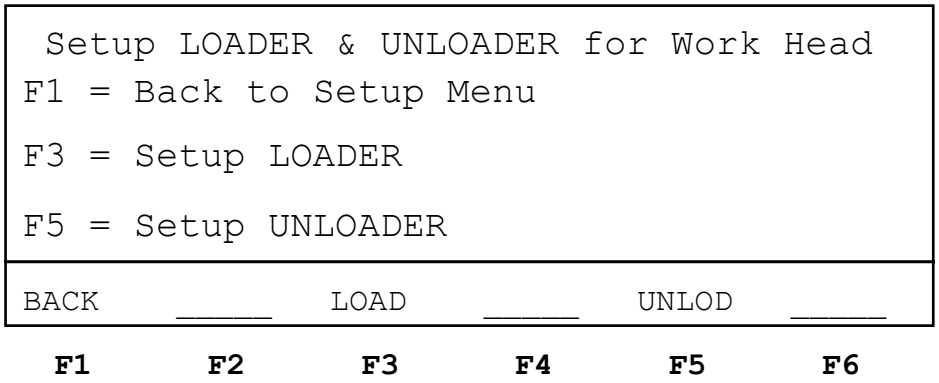
F3 LOAD -- Press this key for the screens to setup the *Loader and Unloader* positions. This is used to align the X and Y-axis to the Loader and Unloader assembly. Also, use this to set the length of the tool extending from the collet. (Seepage 2-4)

F4 Key not used.

F5 HEAD - Press this key for the screens to setup the Work Head Routines. This includes the auto loading or the hand loading option. (Seepage 2-13)

F6 Key not used.

GP #4, Setup Loader & Unloader for Work Head



F1 BACK - Press this key to return to the Work Head Routines for Weldon flats. (Seepage 2-3)

F2 Key not used.

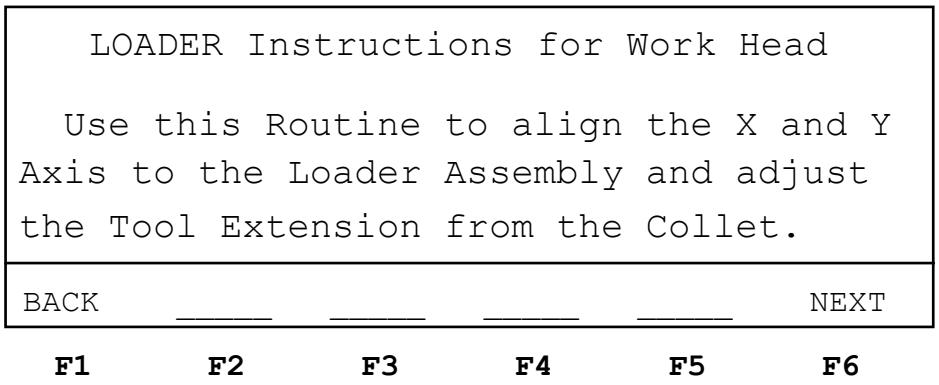
F3 LOAD -- Press this key for the screen to setup the *Loader* positions. This is used to set the length of the tool from the collet and for the proper alignment to the loader assembly. (Seepage 2-5)

F4 Not used.

F5 UNLOD - Press this key for the screen to setup the *Unloader* positions. This is used to set the proper alignment to the Unloader assembly. (Seepage 2-9)

F6 Key not used.

GP #5, Loader Instructions for Work Head



F1 BACK - Press this key to return to the Setup Loader and Unloader menu. (Seepage 2-4)

F2 Not used.

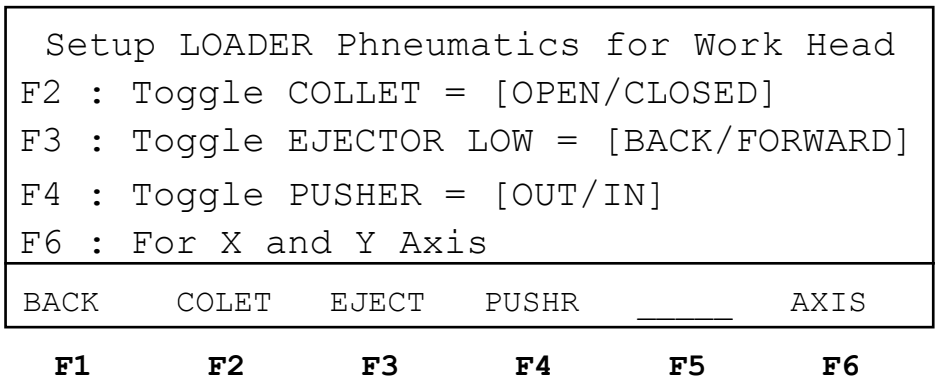
F3 Not used.

F4 Not used.

F5 Not used.

F6 NEXT - Press this key for the next screen to setup the Loader Pneumatics. (Seepage 2-6)

GP #6, Setup Loader Pneumatics for Work Head



F1 BACK - Press this key to go back to the Setup Loader Instructions screen. (Seepage 2-5)

F2 COLET – Press this key to toggle the *Collet* either Open or Closed. The *Collet* needs to be OPEN to load the tool. The status will show the state of the pneumatic valve of either "Open or Closed".

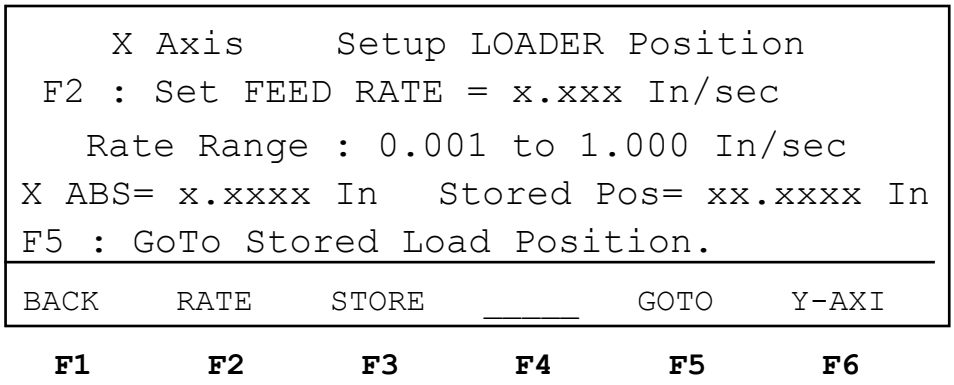
F3 EJECT - Press this key to toggle the *Ejector Low Pressure* either "Back or Forward". The *Ejector Low Pressure* needs to be forward to load the tool. The status will show the state of the pneumatic valve of either "Back or Forward".

F4 PUSHR - Press this key to toggle the *Pusher* either back or forward. First, the *Pusher* needs to be in its Back position to align the X and Y-axis. Then check the alignment by toggling the Pusher to its IN position. The status will show the state of the pneumatic valve of either "Back or Forward".

F5 Not used.

F6 AXIS – Press this key to go to the next screen to setup the Loader's X and Y-axis positions. (Seepage 2-7)

GP #7, Setup Loader X Axis for Work Head



F1 BACK - Press this key to go back to Setup Loader Pneumatic screen. (Seepage 2-6)

F2 RATE – Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F3 STORE - Press this key to access the Stored Loader Position value. Then enter the value displayed by the ABS (absolute value) position or a modified value.

F4 Key not used.

F5 GOTO – Press this key to send the axis the stored loading position.

F6 Y-AXI – Go to the next screen to setup the Loader's Y-axis position. (Seepage 2-8)

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #8, Setup Loader Y Axis for Work Head

```
    Y Axis    Setup LOADER Position
 F2 : Set FEED RATE = x.xxx In/sec
   Rate Range : 0.001 to 1.000 In/sec
Y ABS= x.xxxx In   Stored Pos= x.xxxx In
F5 : GoTo Stored Position.
BACK    RATE    STORE   _____   GOTO    _____
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK -- Back to Setup Loader X-Axis screen. (See page 2-7)

F2 RATE – Press this key to access the *Y-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F3 STORE - Press this key to access the Stored Loader Position value. Then enter the value displayed by the ABS (absolute value) position or a modified value.

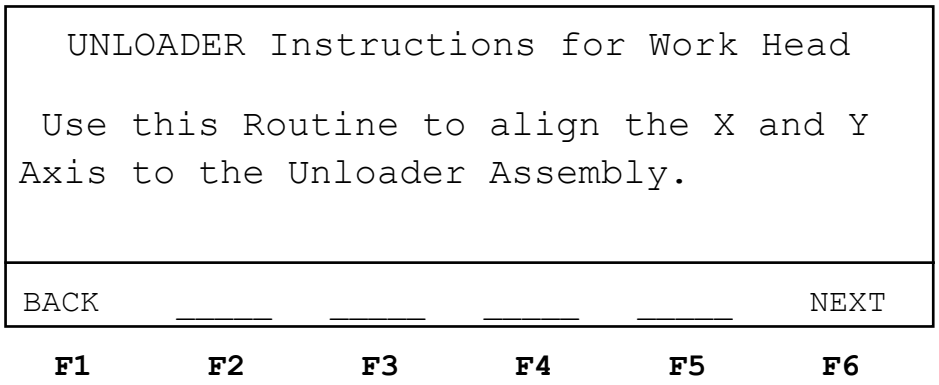
F4 Key not used.

F5 GOTO – Press this key to send the axis the stored loading position.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #9, Unloader Instructions for Work Head



F1 BACK - Press this key to go back to Setup Loader and Unloader screen. (Seepage 2-4)

F2 Key not used.

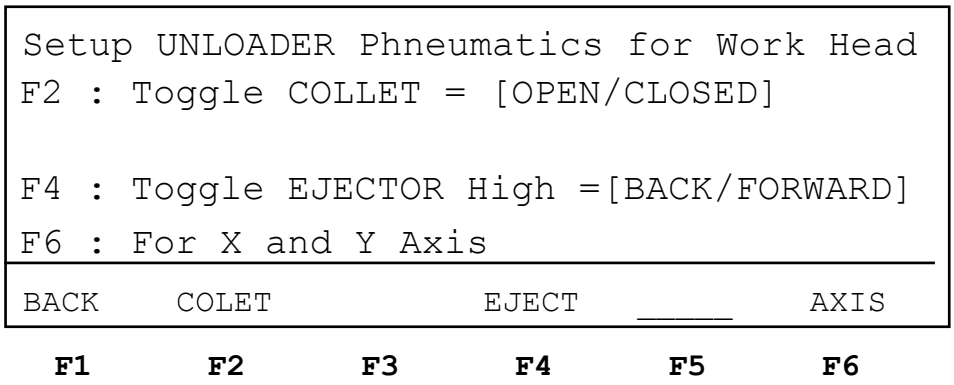
F3 Key not used.

F4 Key not used.

F5 Key not used.

F6 NEXT - Press this key to go to the next screen to setup the Unloader Pneumatics. (Seepage 2-10)

GP #10, Setup Unloader Pneumatics for Work Head



F1 BACK - Press this key to go back to Setup Unloader Instructions screen. (Seepage 2-9)

F2 COLET – Press this key to toggle the *Collet* either Open or Closed. First, the *Collet* needs to be open to load the tool if one is not in place. Then, the Collet will need to be closed with the tool in place. Next, after the X and Y-axis are aligned the collet can be opened to release the tool. The status will show the state of the pneumatic valve of either "Open or Closed".

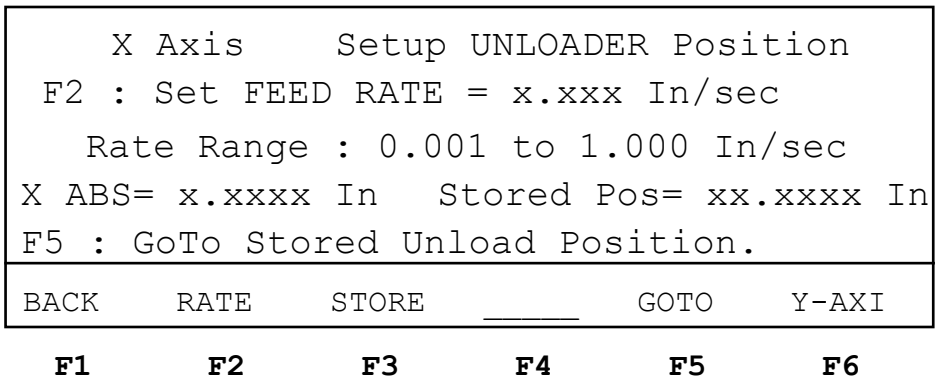
F3 Not used.

F4 EJECT - Press this key to toggle the *Ejector High Pressure* either back or forward. After the Shuttle is IN and the X and Y-axis are aligned and the collet is opened. Then, the *Ejector High Pressure* will need to be forward to unload the tool. The status will show the state of the pneumatic valve of either "Back or Forward".

F5 Key not used.

F6 AXIS – Go to the next screen to setup the Unloader X and Y-axis. (Seepage 2-11)

GP #11, Setup Unloader X Axis for Work Head



F1 BACK -- Press this key to go back to Setup Unloader Pneumatic screen. (Seepage 2-10)

F2 RATE – Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F3 STORE - Press this key to access the Stored Loader Position value. Then enter the value displayed by the ABS (absolute value) position or a modified value.

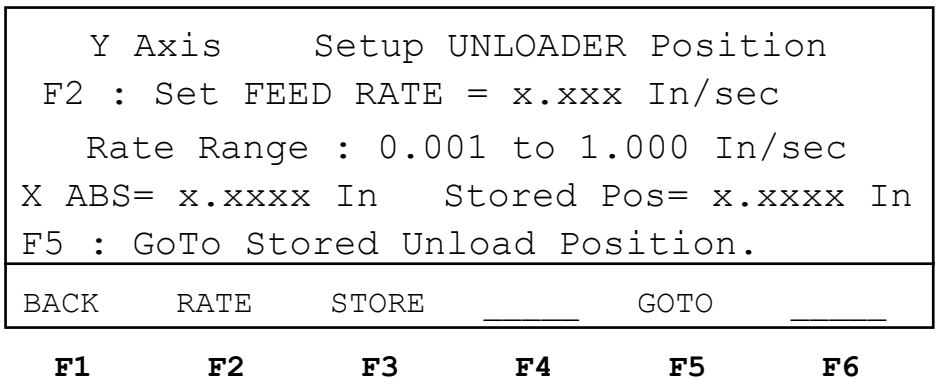
F4 Key not used.

F5 GOTO – Press this key to send the axis the stored unloading position.

F6 Y-AXI – Press this key to go to the next screen to setup the Unloader Y-axis. (Seepage 2-12)

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #12, Setup Unloader Y Axis for Work Head



F1 BACK -- Press this key to go back to Setup Unloader X-Axis screen. (Seepage 2-11)

F2 RATE – Press this key to access the *Y-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F3 STORE - Press this key to access the Stored Loader Position value. Then enter the value displayed by the ABS (absolute value) position or a modified value.

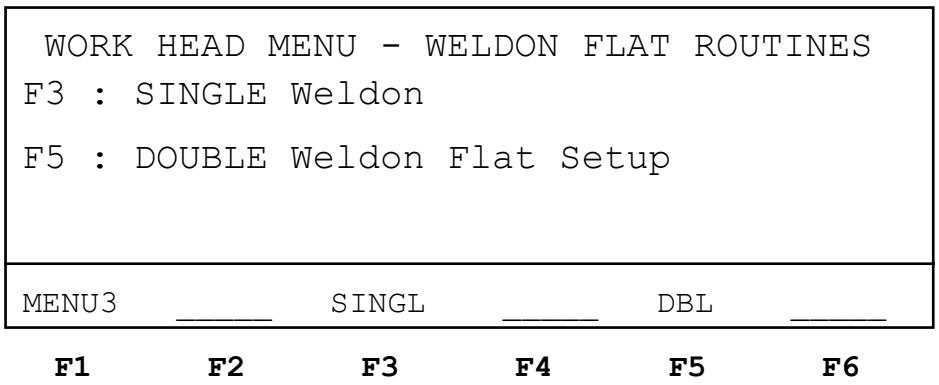
F4 Key not used.

F5 GOTO – Press this key to send the axis the stored unloading position.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #13, WORK HEAD MENU - Weldon Flats Routines



F1 MENU3 - Press this key to return to Operator Setup Routines. (See page 2-3)

F2 Key not used.

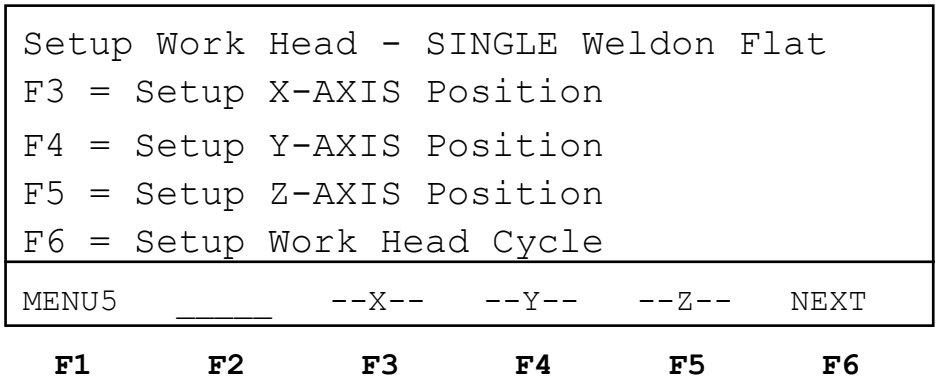
F3 SINGL - Press this key for the screen to setup the Work Head for a Single *Weldon Flat* on the tool. (Seepage 2-14)

F4 Not used.

F5 DBL --- Press this key for the screen to setup two *Weldon Flats* that requires one wheel width to form a center flat and an end flat on the tool. (Seepage 2-27)

F6 Not used.

GP #14, Work Head - Setup Single Weldon Flat



F1 MENU4 - Press this key to go back to Work Head Weldon Flats Routines' menu. (Seepage 2-13)

F2 Key not used.

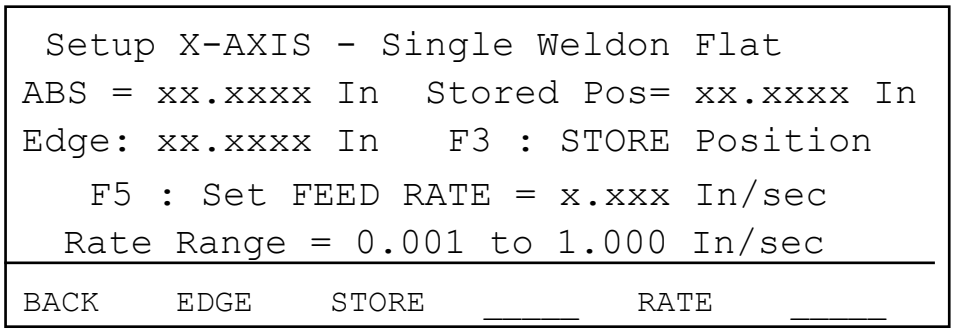
F3 --X-- - Press this key for the screen to setup the X-AXIS position to grind the single Weldon Flat. (Seepage 2-15)

F4 --Y-- - Press this key for the screen to setup the Y-AXIS starting and finish positions. (Seepage 2-16)

F5 --Z-- - Press this key for the screen to setup the Z-AXIS touch off position and finish depth. (Seepage 2-17)

F6 NEXT – Press this key to go to the next screen to setup the Single Weldon Flat tool cycle. (Seepage 2-18)

GP #15, Setup X—Axis Work Head Single Weldon Flat



F1 BACK - Press this key to go back to Setup Work Head Single Weldon Flat menu. (Seepage 2-14)

F2 EDGE - Press this key to access the operator's Edge reference position value. This reference value can be used to represent the distance from the Collet to the back edge of the wheel face. The program's calculations do not use the operator's Edge reference value.

F3 STORE -- Press this key to access the X-axis stored position value. Jog the X-axis to the proper grind position and then enter the ABS value to the stored position value. This value can also be revised without axis in setup position.

F4 Key not used.

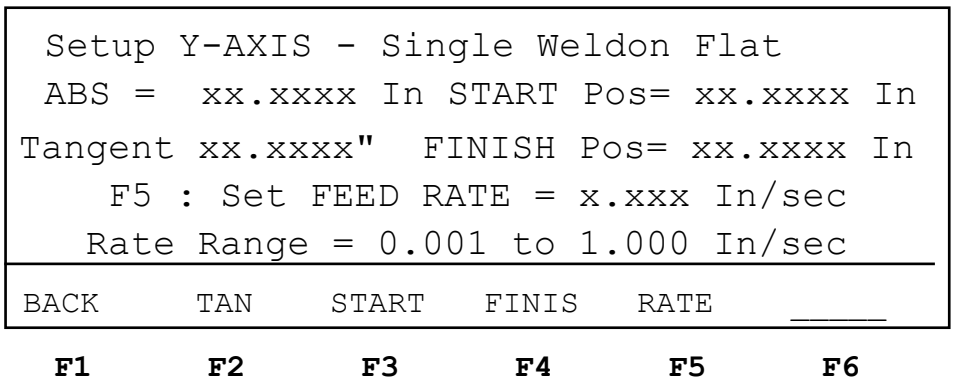
F5 RATE - Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

Additional, the operator may want to move the Z-axis down to close proximity of contact to the top surface of the tool to be more accurate with the X-axis position. To do this, back up to the menu and select the Z-axis and then return this screen.

GP #16, Setup Y—Axis Work Head Single Weldon Flat



F1 BACK - Press this key to go back to Setup Work Head Single Weldon Flat menu. (Seepage 2-14)

F2 TAN - Press this key to access the operator's Tangent reference position value. This reference value can be used to represent the Wheel and Collet vertical centers position. The program's calculations do not use the operator's Tangent reference value.

F3 START - Press this key to copy the Y-axis ABS position to the Y-axis starting position. The starting position is the value that the auto cycle uses.

Important: this position should be on the far side of the wheel.

F4 FINIS - Press this key to copy the Y-axis ABS position to the Y-axis finish position. The finish position is the value that the auto cycle uses.

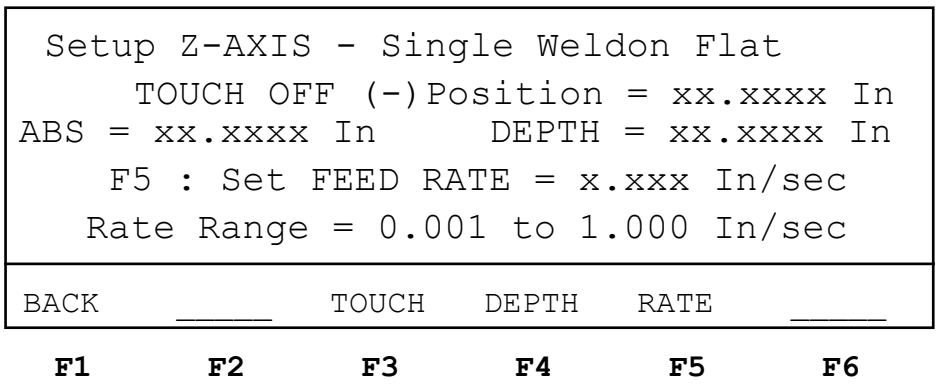
Important: this position should be on the operator side of the wheel.

F5 RATE – Press this key to access the *Y-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #17, Setup Z—Axis Work Head Single Weldon Flat



F1 BACK - Press this key to go back to Setup Work Head Single Weldon Flat menu. (Seepage 2-14)

F2 Key not used.

F3 TOUCH – Press this key to access the Z-axis "Negative touch off position" value and enter a value from the numeric keys. Jog axis down slow until the wheel touches the tool outside diameter. Then use this function to enter the correct value to the "Negative touch off position". Use the ABS position to determine the correct value to place in the "Negative touch off position".

F4 DEPTH - Press this key to access the Z-axis "Finish DEPTH Value" and enter a value from the numeric keys. Calculate this "depth value" from the information given by the tool print. This will be the distance from the outside diameter of the tool the flat portion to be formed.

F5 RATE – Press this key to access the *Z-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #18, Setup Cycle Counters - Work Head Single Weldon Flat

```
COUNTERS,  Work Head Single Weldon Flat
F2 : Cycle Count Down =[?]   Value = xxx
     F3 : Cycle Count Down PRESET =  xxx
F5 : ADJUST PARTS Counter? = xxxxx

BACK    TOGGL   -PRE-   _____   PARTS   NEXT
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back to Setup Work Head Single Weldon Flat menu. (Seepage 2-14)

F2 TOGGL – Press this key to toggle the state of the Count Down Counter to either "NO and RESET" or "YES".

This function will allow the machine to complete the number of desired tool cycles, determined by the preset value, and then do a cycle stop. This can be used to allow the machine to run after an operator shift is complete or for extended time periods without an operator.

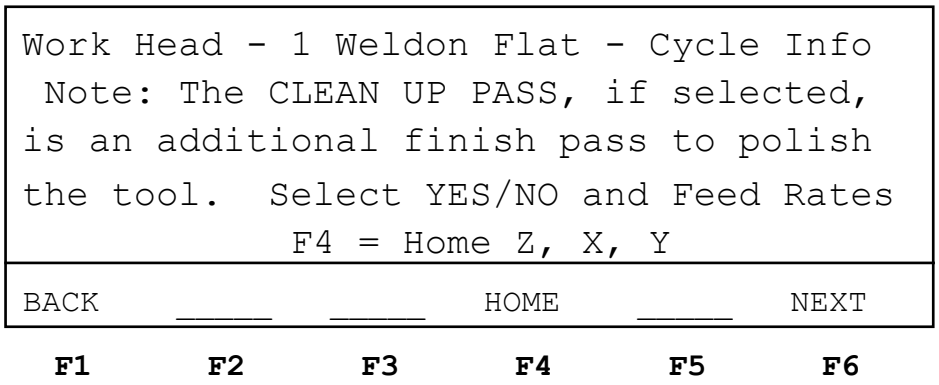
F3 -PRE- - Press this key to enter a "Preset value" for the count down counter to use. This value must be a positive number, for example (1 to 100).

F4 Key not used.

F5 PARTS – Press this key to adjust the inventory Parts Counter to a value of (0) zero or to a corrected good part value. This part counter is designed for the operator to keep track of his/her inventory for each shift or long time run of a job.

F6 NEXT – Go to the next screen for more Work Head cycle setup screens. (Seepage 2-19)

GP #19, Cycle Information Work Head Single Weldon Flat



This screen has on board information about the Clean Up Pass.

F1 BACK -- Press this key to go back to setup cycle counters for the Work Head Single Weldon Flat. (Seepage 2-18)

F2 Key not used.

F3 Key not used.

F4 HOME - Press this key to command the entire Axis to find home or go home, which ever is needed.

F5 Key not used.

F6 NEXT – Press this key to Go to the next screen for more Work Head cycle setup screens. (Seepage 2-20)

GP #20, Setup Cycle for Work Head Single Weldon Flat

```
Setup CYCLE - Work Head - 1 Weldon Flat
F2 : Number of Grind PASSES = xx Passes
F3 "Y" GRIND Feed Rate =   x.xxxx In/sec
F4 "Y" CLEAN UP Pass Rate= x.xxxx In/sec
F5 : Do Clean Up Pass ? = [NO/YES]
BACK    PASS    GRIND   CLEAN    N/Y    NEXT
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back 1 screen to Setup Work Head Single Weldon Flats. (Seepage 2-19)

F2 PASS - Press this key to access the value for the number of grind passes to be done on each side. The total plunge depth of the Z-axis will be equally divided by the value in the "Grind Passes".

Example: [(-Z-axis touch off – Z-axis finish depth) / Grind Passes] = Z-axis depth increments.

F3 GRIND - Press this key to access the value for the Y-axis Grind feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 In/sec maximum.

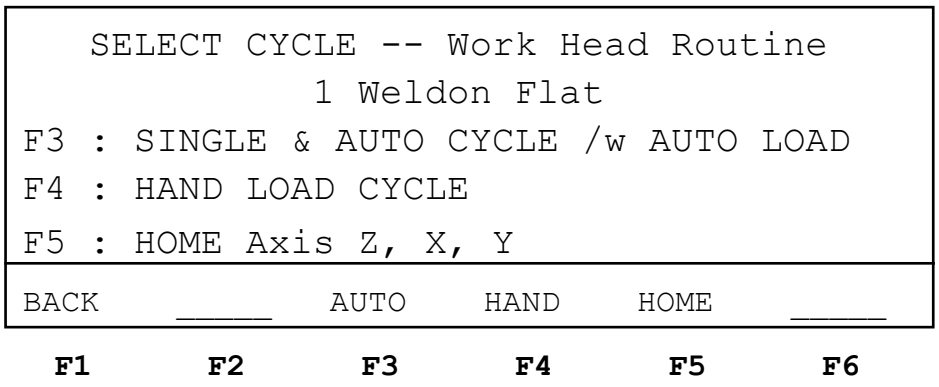
F4 CLEAN - Press this key to access the value for the Y-axis Clean Up Pass feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 In/sec maximum.

F5 N/Y - Press this key to select a clean up pass of Yes or No.

F6 NEXT - Press this key to go to the next Cycle setup screen. (Seepage 2-21)

GP #21, Work Head, Select Cycle for Single Weldon Flat



F1 BACK - Press this key to go back to Setup Cycle for the Work Head Single Weldon Flats. (Seepage 2-20)

F2 Key not used.

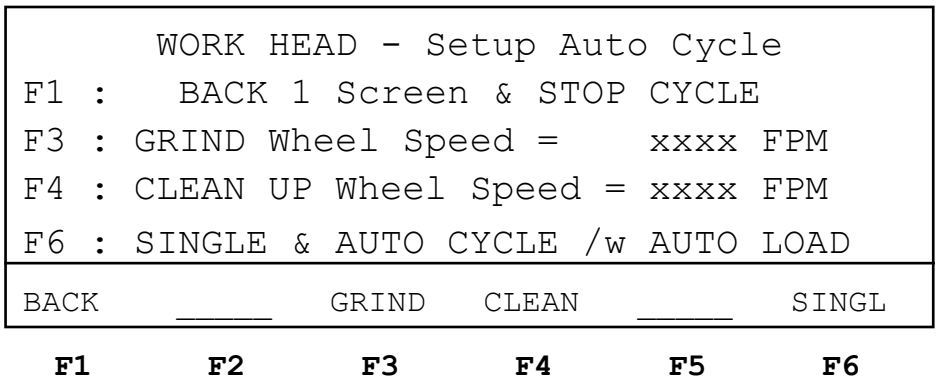
F3 AUTO - Press this key to go to the Single Cycle mode screen and the Auto Cycle mode screen with automatic loading. (Seepage 2-22)

F4 HAND - Press this key to go to the Hand Load cycle for the Work Head Single Weldon Flat. (Seepage 2-25)

F5 HOME - Press this key to command the entire Axis to find home or go home, which ever is needed.

F6 Key not used.

GP #22, Work Head- Setup Auto Cycle Weldon Flat



F1 BACK - Press this key to go back 1 screen to Setup Cycle for the Work Head Single Weldon Flats and also do a "Cycle Stop". (Seepage 2-21)

F2 Key not used.

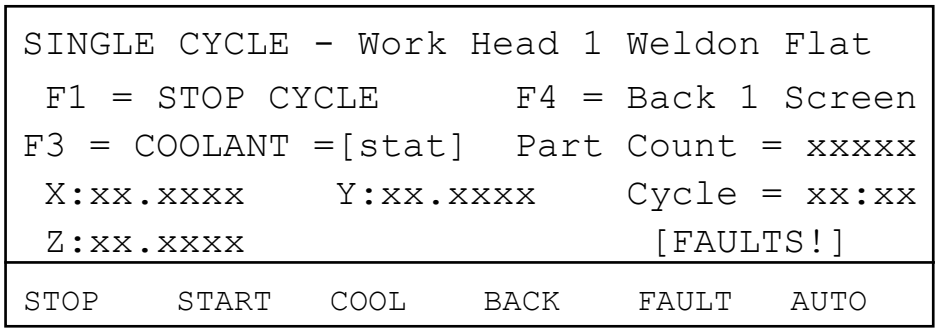
F3 GRIND - Press this key to access the value for the Grinding Wheel Head Speed in feet per minute.

F4 CLEAN - Press this key to access the value for the Clean Up Wheel Head Speed in feet per minute.

F5 Key not used

F6 SINGL – Press this key to go to the Single Cycle mode screen and the Auto Cycle mode screen with automatic loading. (Seepage 2-23)

GP #23, Single Cycle Work Head Single Weldon Flat



F1 STOP – Press this key to Stop Cycle.

F2 START - Press this key to start the Single Cycle mode.

F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 BACK - Press this key to go back one screen to Setup Work Head Single Weldon Flats. (Seepage 2-22)

F5 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F6 AUTO -- Press this key to advance to the Work Head Auto Cycle with auto loading screen. (Seepage 2-24)

GP #24, Auto Cycle Work Head Single Weldon Flat

```
AUTO CYCLE - Work Head - 1 Weldon Flat
 F1 = STOP CYCLE      WHEEL = xxxx FPM
F3 : COOLANT =[stat] Part Count = xxxxx
 X:xx.xxxx    Y:xx.xxxx   Cycle = xx:xx
 Z:xx.xxxx                 [FAULTS!]
STOP    START   COOL    _____   FAULT   SINGL
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 STOP – Press this key to Stop Auto Cycle mode.

F2 START - Press this key to start the Auto Cycle mode.

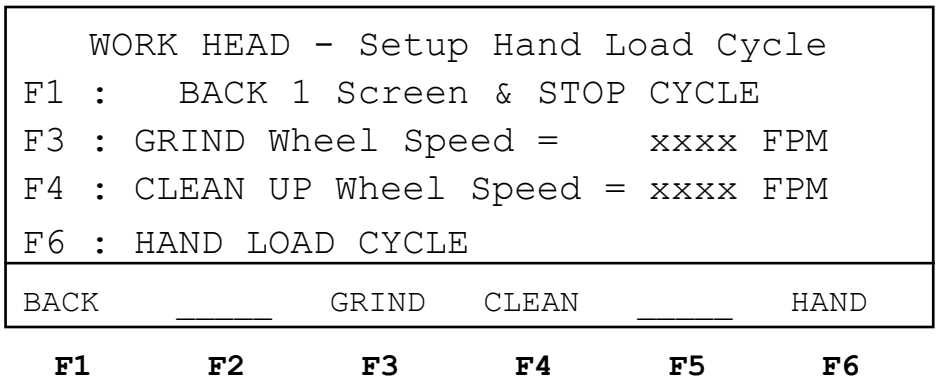
F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 Key not used.

F5 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F6 SINGL - Press this key to return to the Single Cycle mode. (Seepage 2-23)

GP #25, Work Head- Setup Hand Cycle Weldon Flat



F1 BACK - Press this key to go back 1 screen to Setup Cycle for the Work Head Single Weldon Flats and also do a "Cycle Stop". (Seepage 2-21)

F2 Key not used.

F3 GRIND - Press this key to access the value for the Grinding Wheel Head Speed in feet per minute.

F4 CLEAN - Press this key to access the value for the Clean Up Wheel Head Speed in feet per minute.

F5 Key not used.

F6 HAND - Press this key to go to the Hand Load cycle for the Work Head Single Weldon Flat. (Seepage 2-26)

GP #26, Hand Load Cycle Work Head Single Weldon Flat

```
HAND LOAD CYCLE Work Head 1 Weldon Flat
 F1 = STOP CYCLE    F5: COLLET =[status]
F3 : COOLANT =[stat] Part Count = xxxxx
 X:xx.xxxx    Y:xx.xxxx    Cycle = xx:xx
 Z:xx.xxxx                  [FAULTS!]
STOP    START   COOL    FAULT   COLET   BACK
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 STOP – Press this key to Stop Cycle.

F2 START - Press this key to start the Single Cycle mode.

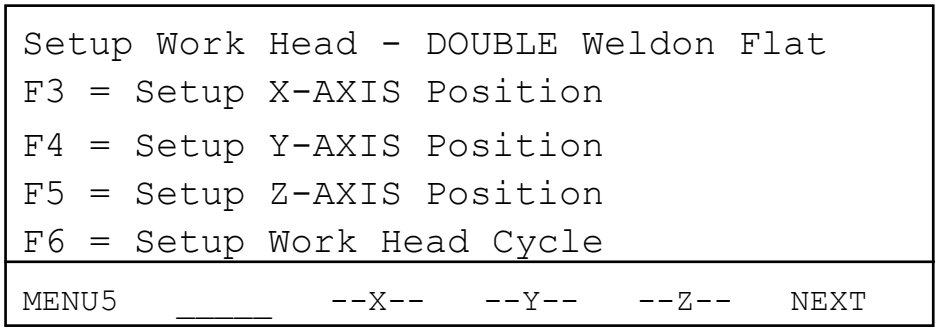
F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F5 COLET - Press this key to "Open" or "Close" the collet to hand load the Index Head.

F6 BACK - Press this key to go back one screen to Setup Hand Load Index Head. (Seepage 2-25)

GP #27, Work Head - Setup Double Weldon Flats



F1 MENU4 - Press this key to go back to Work Head Weldon Flats Routines' menu. (Seepage 2-13)

F2 Key not used.

F3 --X-- - Press this key for the screen to setup the X-AXIS position to grind the single Weldon Flat. (Seepage 2-28)

F4 --Y-- - Press this key for the screen to setup the Y-AXIS starting and finish positions. (Seepage 2-30)

F5 --Z-- - Press this key for the screen to setup the Z-AXIS touch off position and finish depth. (Seepage 2-31)

F6 NEXT – Press this key to go to the next screen to setup the Double Weldon Flats tool cycle. (Seepage 2-32)

GP #28, Setup X—Axis Work Head Double Weldon Flat

```
  Setup X-AXIS - Double Weldon Flats
ABS = xx.xxxx In  Has 2 Stored Positions
Edge: xx.xxxx      F3 : Goto Store PAGE
   F5 : Set FEED RATE = x.xxx In/Sec
  Rate Range = 0.001 to 1.000 In/sec
```

BACK	EDGE	PAGE	_____	RATE	_____
F1	**F2**	**F3**	**F4**	**F5**	**F6**

F1 BACK - Press this key to go back to Setup Work Head Double Weldon Flats menu screen. (Seepage 2-27)

F2 EDGE - Press this key to access the operator's Edge reference position value. This reference value can be used to represent the distance from the Collet to the back edge of the wheel face. The program's calculations do not use the operator's Edge reference value.

F3 PAGE - Press this key to access the screen to store the desired positions for the flats. (Seepage 2-29)

F4 Key not used.

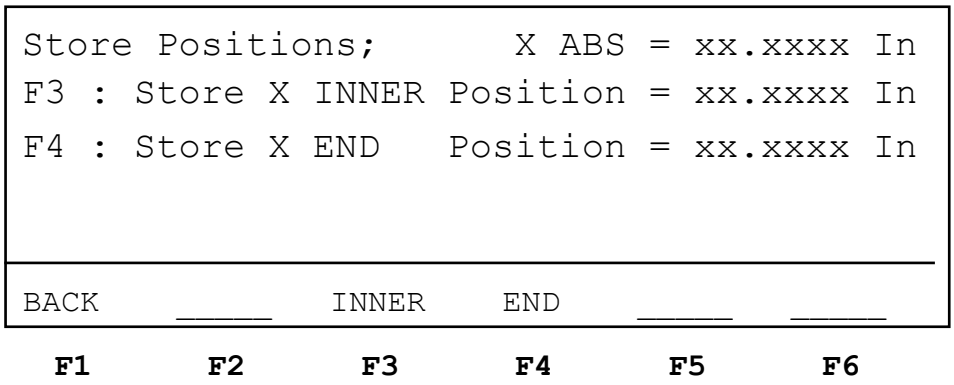
F5 RATE - Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

Additional, the operator may want to move the Z-axis down to close proximity of contact to the top surface of the tool to be more accurate with the X-axis position. To do this, back up to the menu and select the Z-axis and then return this screen.

GP #29, X-axis Store positions, Work Head Double Weldon Flat



F1 BACK - Press this key to go back 1 screen to setup Double Weldon Flat X Axis. (Seepage 2-28)

F2 Key not used.

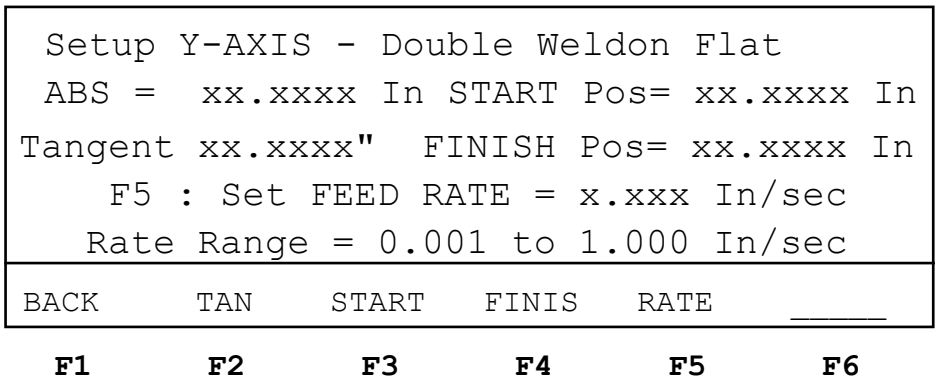
F3 INNER - Press this key to access the inner flat value and then enter the desired position.

F4 END --- Press this key to access the end flat value and then enter the desired position.

F5 Key not used.

F6 Key not used.

GP #30, Setup Y—Axis Work Head Double Weldon Flat



F1 BACK - Press this key to go back to Setup Work Head Double Weldon Flats menu screen. (Seepage 2-27)

F2 TAN - Press this key to access the operator's Tangent reference position value. This reference value can be used to represent the Wheel and Collet vertical centers position. The program's calculations do not use the operator's Tangent reference value.

F3 START - Press this key to copy the Y-axis ABS position to the Y-axis starting position. The starting position is the value that the auto cycle uses.

Important: this position should be on the far side of the wheel.

F4 FINIS - Press this key to copy the Y-axis ABS position to the Y-axis finish position. The finish position is the value that the auto cycle uses.

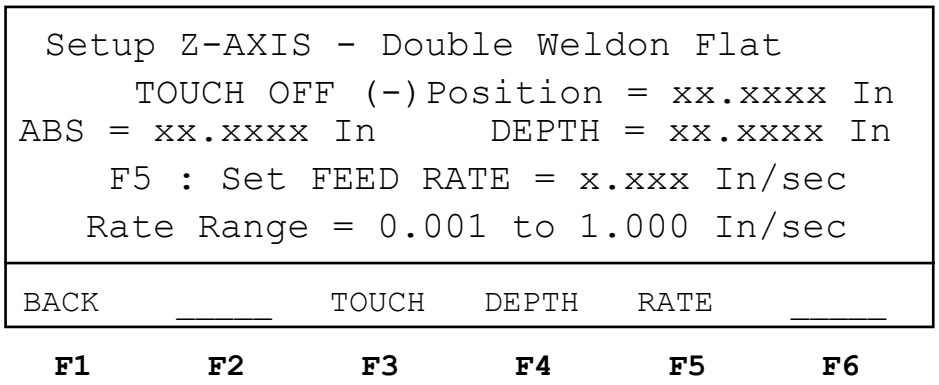
Important: this position should be on the operator side of the wheel.

F5 RATE – Press this key to access the *Y-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #31, Setup Z—Axis Work Head Double Weldon Flat



F1 BACK - Press this key to go back to Setup Work Head Double Weldon Flats menu screen. (Seepage 2-27)

F2 Key not used.

F3 TOUCH – Press this key to access the Z-axis "Negative touch off position" value and enter a value from the numeric keys. Jog axis down slow until the wheel touches the tool outside diameter. Then use this function to enter the correct value to the "Negative touch off position". Use the ABS position to determine the correct value to place in the "Negative touch off position".

F4 DEPTH - Press this key to access the Z-axis "Finish DEPTH Value" and enter a value from the numeric keys. Calculate this "depth value" from the information given by the tool print. This will be the distance from the outside diameter of the tool the flat portion to be formed.

F5 RATE – Press this key to access the *Z-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #32, Setup Cycle Counters - Work Head Double Weldon Flat

```
COUNTERS,  Work Head Double Weldon Flat
F2 : Cycle Count Down =[?]   Value = xxx
     F3 : Cycle Count Down PRESET =  xxx
F5 : ADJUST PARTS Counter? = xxxxx

BACK    TOGGL   -PRE-   _____   PARTS   NEXT
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back to Setup Work Head Double Weldon Flats menu screen. (Seepage 2-27)

F2 TOGGL – Press this key to toggle the state of the Count Down Counter to either "NO and RESET or YES".

This function will allow the machine to complete the number of desired tool cycles, determined by the preset value, and then do a cycle stop. This can be used to allow the machine to run after an operator shift is complete or for extended time periods without an operator.

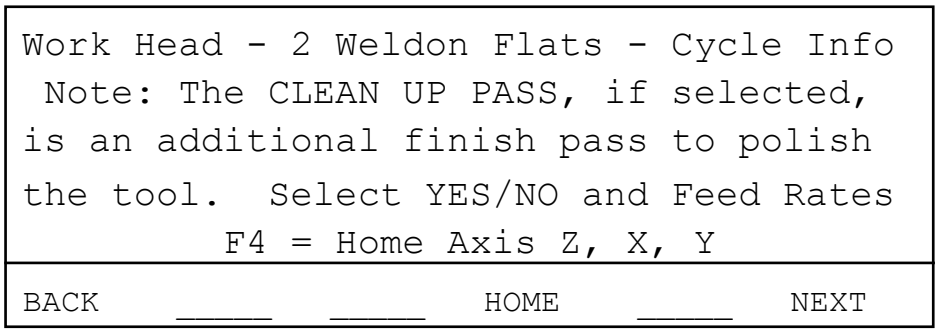
F3 -PRE- - Press this key to enter a "Preset value" for the count down counter to use. This value must be a positive number, for example (1 to 100).

F4 Key not used.

F5 PARTS – Press this key to adjust the inventory Parts Counter to a value of (0) zero or to a corrected good part value. This part counter is designed for the operator to keep track of his/her inventory for each shift or long time run of a job.

F6 NEXT – Go to the next screen for more Work Head cycle setup screens. (Seepage 2-33)

GP #33, Cycle Information Work Head Double Weldon Flat



This screen has on board information about the Clean Up Pass.

F1 BACK - Press this key to go back to setup counters for the Work Head Double Weldon Flats. (Seepage 2-32)

F2 Not used.

F3 Not used.

F4 HOME - Press this key to command the entire Axis to find home or go home, which ever is needed.

F5 Not used.

F6 NEXT – Press this key to Go to the next screen for more Work Head cycle setup screens. (Seepage 2-34)

GP #34, Setup Cycle for Work Head Double Weldon Flats

```
Setup CYCLE - Work Head - 2 Weldon Flats
F2 : Number of Grind PASSES = [xx]
F3 "Y" GRIND Feed Rate =   x.xxxx In/sec
F4 "Y" CLEAN UP Pass Rate= x.xxxx In/sec
F5 : Do Clean Up Pass ? = [NO/YES]
BACK    PASS    GRIND   CLEAN    N/Y    NEXT
  F1      F2      F3      F4      F5      F6
```

F1 BACK - Press this key to go back 1 screen to setup the Work Head Double Weldon Flats. (Seepage 2-33)

F2 PASS - Press this key to access the value for the number of grind passes to be done on each side. The total plunge depth of the Z-axis will be equally divided by the value in the "Grind Passes".

Example: [(-Z-axis touch off – Z-axis finish depth) / Grind Passes] = Z-axis depth increments.

F3 GRIND - Press this key to access the value for the Y-axis Grind feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 In/sec maximum.

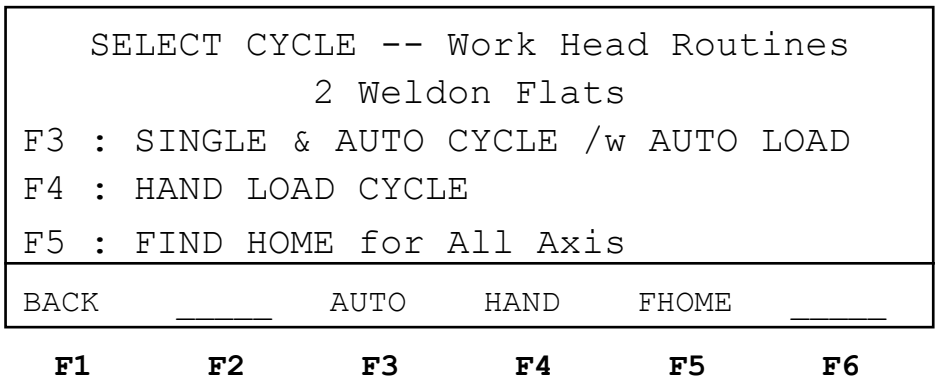
F4 CLEAN - Press this key to access the value for the Y-axis Clean Up Pass feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 In/sec maximum.

F5 N/Y - Press this key to select a clean up pass of Yes or No.

F6 NEXT – Press this key to go to the next Work Head cycle setup screen. (Seepage 2-35)

GP #35, Work Head, Select Cycle for Double Weldon Flats



F1 BACK - Press this key to go back to Setup Cycle for the Work Head Double Weldon Flats. (Seepage 2-34)

F2 Key not used.

F3 AUTO - Press this key to go to the Work Head Single Cycle mode and view screen. (Seepage 2-36)

F4 HAND - Press this key to go to the Hand Load cycle for the Work Head Double Weldon Flats. (Seepage 2-39)

F5 FHOME - Press this key to command the entire Axis to find home.

F6 Not used.

GP #36, Work Head- Setup Auto Cycle Weldon Flat

```
      WORK HEAD - Setup Auto Cycle
F1 :   BACK 1 Screen & STOP CYCLE
F3 : GRIND Wheel Speed =    xxxx FPM
F4 : CLEAN UP Wheel Speed = xxxx FPM
F6 : SINGLE & AUTO CYCLE /w AUTO LOAD
BACK    _____   GRIND   CLEAN   _____   SINGL
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back 1 screen to Setup Cycle for the Work Head Double Weldon Flats and also do a "Cycle Stop". (Seepage 2-35)

F2 Key not used.

F3 GRIND - Press this key to access the value for the Grinding Wheel Head Speed in feet per minute.

F4 CLEAN - Press this key to access the value for the Clean Up Wheel Head Speed in feet per minute.

F5 Key not used

F6 SINGL – Press this key to go to the Single Cycle mode screen and the Auto Cycle mode screen with automatic loading. (Seepage 2-37)

GP #37, Single Cycle - Work Head Double Weldon Flats

```
SINGLE CYCLE - Work Head 2 Weldon Flats
 F1 = STOP CYCLE       F4 = Back 1 Screen
F3 = COOLANT =[stat]   Part Count = xxxxx
 X:xx.xxxx     Y:xx.xxxx     Cycle = xx:xx
 Z:xx.xxxx                    [FAULTS!]
STOP    START   COOL    BACK    FAULT   AUTO
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 STOP – Press this key to Stop Cycle.

F2 START - Press this key to start the Single Cycle mode.

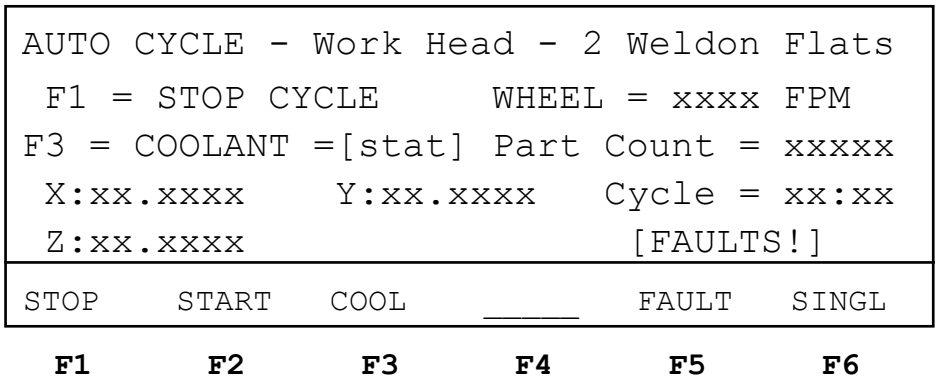
F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 BACK - Press this key to go back one screen to the Work Head Double Weldon Flats. (Seepage 2-36)

F5 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F6 AUTO -- Press this key to advance to the Work Head Auto Cycle mode and view screen. (Seepage 2-38)

GP #38, Auto Cycle - Work Head Double Weldon Flats



F1 STOP – Press this key to Stop Auto Cycle mode.

F2 START - Press this key to start the Auto Cycle mode.

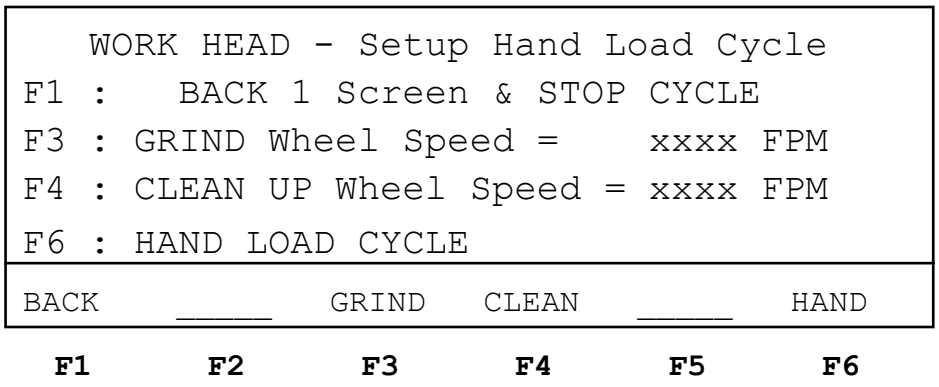
F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 Key not used.

F5 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F6 SINGL - Press this key to return to the Work Head Single Cycle mode. (Seepage 2-37)

GP #39, Work Head- Setup Hand Cycle Weldon Flat



F1 BACK - Press this key to go back 1 screen to Setup Cycle for the Work Head Double Weldon Flats and also do a "Cycle Stop". (Seepage 2-35)

F2 Key not used.

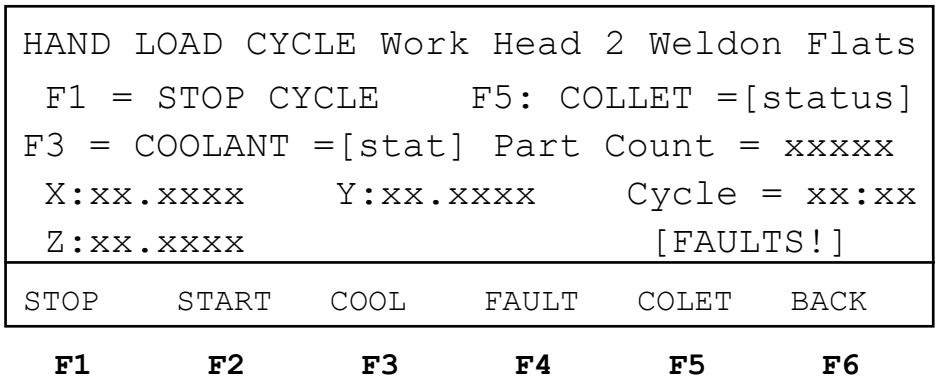
F3 GRIND - Press this key to access the value for the Grinding Wheel Head Speed in feet per minute.

F4 CLEAN - Press this key to access the value for the Clean Up Wheel Head Speed in feet per minute.

F5 Key not used.

F6 HAND - Press this key to go to the Hand Load cycle for the Work Head Single Weldon Flat. (Seepage 2-40)

GP #100, Hand Load Cycle Work Head Double Weldon Flat



F1 STOP – Press this key to Stop Cycle.

F2 START - Press this key to start the Single Cycle mode.

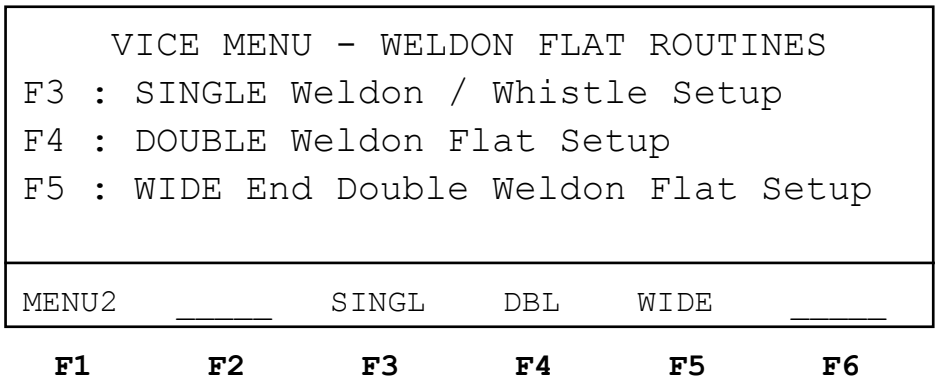
F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F5 COLET - Press this key to open or close the collet to hand load the Index Head.

F6 BACK - Press this key to go back one screen to Setup Hand Load Index Head. (Seepage 2-39)

GP #40, VICE MENU for Weldon Flat Routines



F1 MENU2 - Press this key to return to Operator Setup Routines. (See page 2-2)

F2 Key not used.

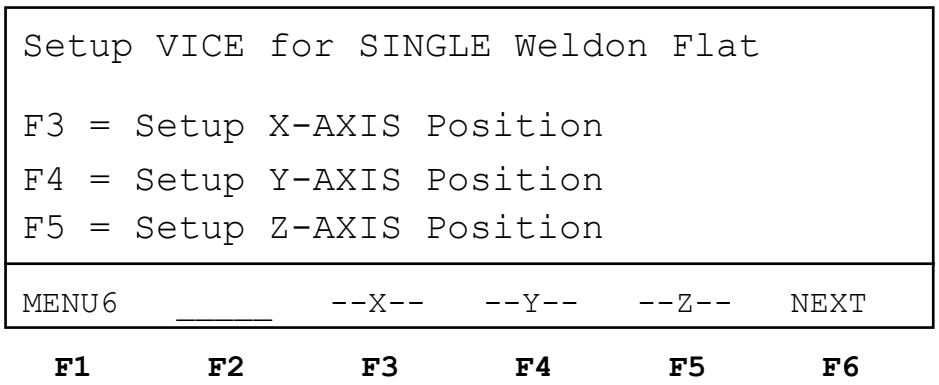
F3 SINGL - Press this key for the screen to setup a Single *Weldon Flat or Whistle Stop* on the tool. This is a vice routine and uses a single cycle operation. (Seepage 2-42)

F4 DBL --- Press this key for the screen to setup two *Weldon Flats* that requires one wheel width to form a center flat and an end flat on the tool. This is a vice routine and uses a single cycle operation. (Seepage 2-50)

F5 WIDE -- Press this key for the screen to setup two *Weldon Flats* that requires one wheel width to form a center flat and more than one wheel width to form the end flat on a large tool. This is a vice routine and uses a single cycle operation. (Seepage 2-59)

F6 Not used.

GP #41, Vice - Setup XYZ, Single Weldon Flat



F1 MENU6 - Press this key to go back to Weldon / Whistle Stop Routine menu. (Seepage 2-41)

F2 Key not used.

F3 --X-- - Press this key for the screen to setup the X-AXIS position to grind the Weldon Flat. (Seepage 2-43)

F4 --Y-- - Press this key for the screen to setup the Y-AXIS starting and finish positions. (Seepage 2-44)

F5 --Z-- - Press this key for the screen to setup the Z-AXIS touch off position and finish depth. (Seepage 2-45)

F6 NEXT – Press this key to go to the next screen to setup the Single Weldon / Whistle Stop tool cycle. (Seepage 2-46)

GP #42, Vice Setup X-axis, Single Weldon Flat

```
Setup VICE  X-AXIS  Single Weldon Flat
ABS = xx.xxxx In  Stored Pos= xx.xxxx In
Edge: xx.xxxx      F3 : STORE Position
   F5 : Set FEED RATE = x.xxx In/Sec
  Rate Range = 0.001 to 1.000 In/sec
BACK    EDGE    STORE    _____    RATE    _____
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back to setup Single Weldon Flat / Whistle Stop menu. (Seepage 2-42)

F2 EDGE - Press this key to access the operator's Edge reference position value. This reference value can be used to represent the distance from the Vice side to the back edge of the wheel face. The program's calculations do not use the operator's Edge reference value.

F3 STORE - Press this key to access the X-axis stored position value. Jog the X-axis to the proper grind position and then enter the ABS value to the stored position value. This value can also be revised without axis in setup position.

F4 Key not used.

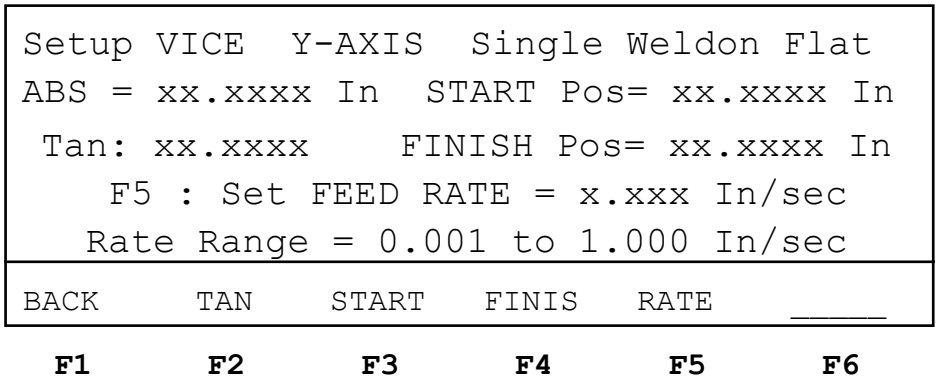
F5 RATE – Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

Additional, the operator may want to move the Z-axis down to close proximity of contact to the top surface of the tool to be more accurate with the X-axis position. To do this, back up to the menu and select the Z-axis and then return this screen.

GP #43, Vice Setup Y-axis, Single Weldon / Whistle



F1 BACK - Press this key to go back to setup Single Weldon Flat / Whistle Stop menu. (Seepage 2-42)

F2 TAN - Press this key to access the operator's Tangent reference position value. This reference value can be used to represent the Wheel and Vice tool vertical centers position. The program's calculations do not use the operator's Tangent reference value.

F3 START - Press this key to copy the Y-axis ABS position to the Y-axis starting position. The starting position is the value that the auto cycle uses.

Important: this position should be on the far side of the wheel.

F4 FINIS - Press this key to copy the Y-axis ABS position to the Y-axis finish position. The finish position is the value that the auto cycle uses.

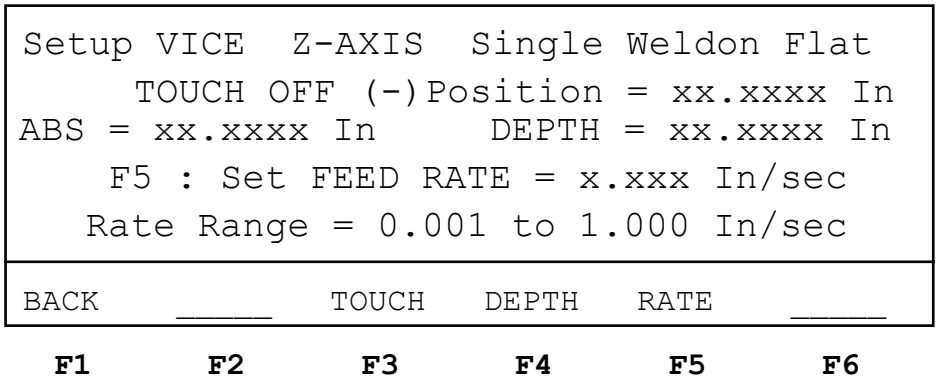
Important: this position should be on the operator side of the wheel.

F5 RATE – Press this key to access the *Y-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #44, Vice Setup Z-axis, Single Weldon / Whistle



F1 BACK - Press this key to go back to setup Single Weldon Flat / Whistle Stop menu. (Seepage 2-42)

F2 Key not used.

F3 TOUCH – Press this key to access the Z-axis "Negative touch off position" value and enter a value from the numeric keys. Jog axis down slow until the wheel touches the tool outside diameter. Then use this function to enter the correct value to the "Negative touch off position". Use the ABS position to determine the correct value to place in the "Negative touch off position".

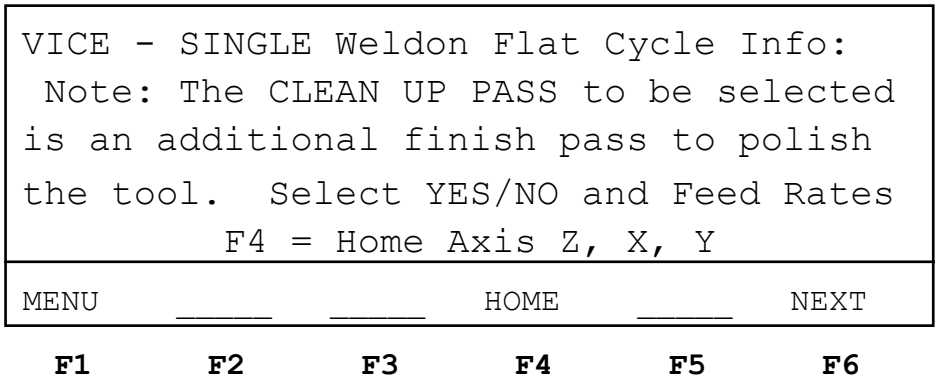
F4 DEPTH - Press this key to access the Z-axis "Finish DEPTH Value" and enter a value from the numeric keys. Calculate this "depth value" from the information given by the tool print. This will be the distance from the outside diameter of the tool the flat portion to be formed.

F5 RATE – Press this key to access the *Z-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #45, Vice Setup Single Weldon Flat Information



This screen has on board information about the Clean Up Pass.

F1 MENU - Press this key to go back to setup Single Weldon Flat / Whistle Stop menu. (Seepage 2-42)

F2 Key not used.

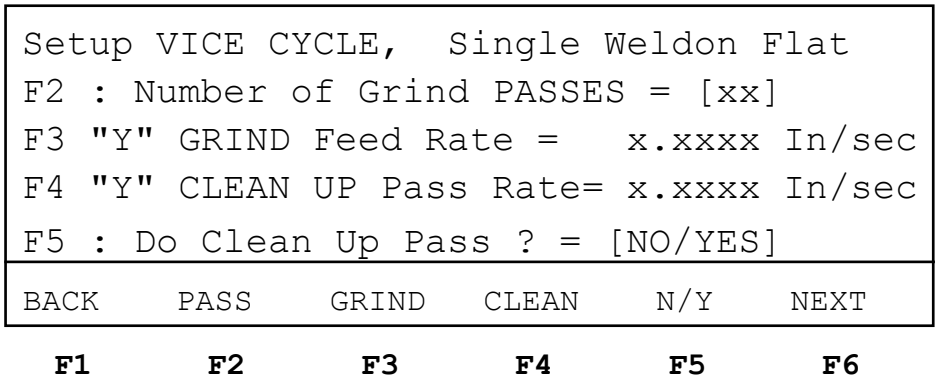
F3 Key not used.

F4 HOME - Press this key to command the entire Axis to find home or go home, which ever is needed.

F5 Key not used.

F6 NEXT - Press this key to go to the next screen for more setup information for the Single Weldon Flat / Whistle Stop tool. (Seepage 2-47)

GP #46, Vice Setup Cycle for Single Weldon / Whistle



F1 BACK - Press this key to go back to Single Weldon Flat / Whistle Stop information. (Seepage 2-46)

F2 PASS -- Press this key to access the value for the number of grind passes to be done on each side. The total plunge depth of the Z-axis will be equally divided by the value in the "Grind Passes".

Example: [(-Z-axis touch off – Z-axis finish depth) / Grind Passes] = Z-axis depth increments.

F3 GRIND - Press this key to access the value for the Y-axis Grind feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 in/sec maximum.

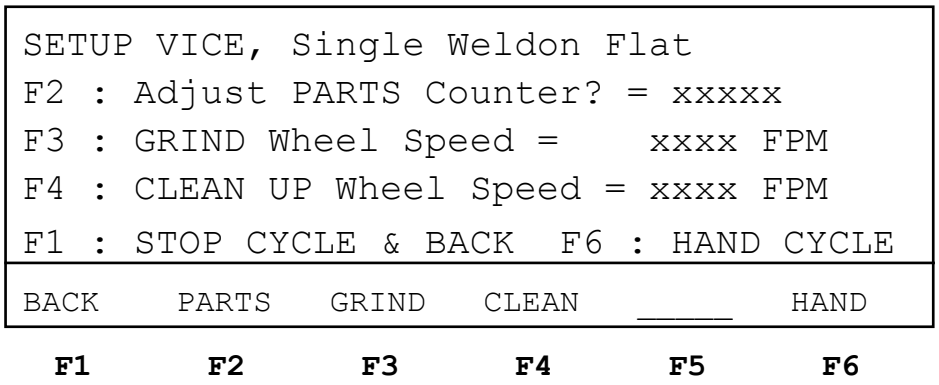
F4 CLEAN - Press this key to access the value for the Y-axis Clean Pass feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 in/sec maximum.

F5 N/Y --- Press this key to select a clean up pass of Yes or No.

F6 NEXT – Press this key to go to the next Cycle setup screen. (Seepage 2-48)

GP #47, Vice Setup, Single Weldon Flat



F1 BACK - Press this key to go back to Setup Cycle for the Single Weldon Flat and also do a "Cycle Stop". (Seepage 2-47)

F2 PARTS - Press this key to adjust the inventory Parts Counter to a value of (0) zero or to a corrected good part value. This part counter is designed for the operator to keep track of his/her inventory for each shift or long time run of a job.

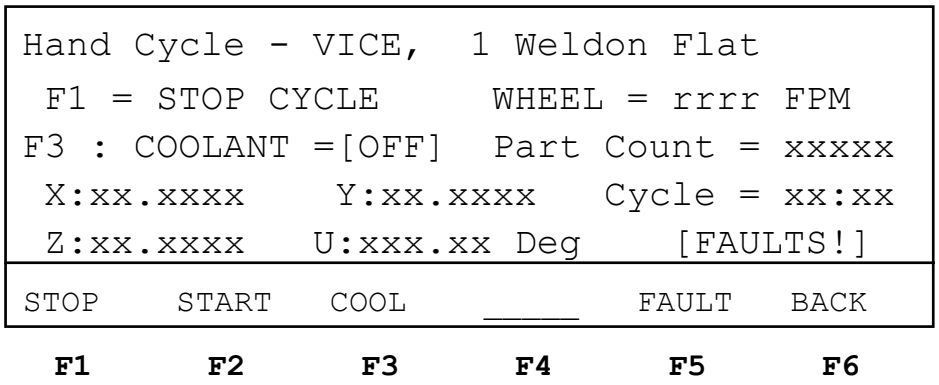
F3 GRIND - Press this key to access the value for the Grinding Wheel Head Speed in feet per minute.

F4 CLEAN - Press this key to access the value for the Clean Up Wheel Head Speed in feet per minute.

F5 Key not used.

F6 HAND - Press this key for the Vice Single Cycle mode screen. (Seepage 2-49)

GP #48, Vice Cycle, Single Weldon Flat



F1 STOP – Press this key to stop the Single Cycle mode.

F2 START - Press this key to start the Single Cycle mode.

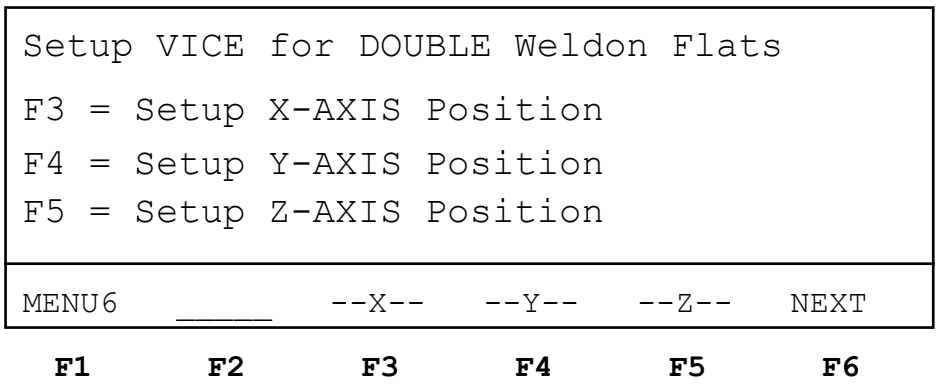
F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 Key not used.

F5 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F6 BACK - Press this key to and go back one screen to Set up Single Weldon Flat / Whistle Stop. (Seepage 2-48)

GP #49, Vice - Setup XYZ, Double Weldon Flat



F1 MENU6 - Press this key to go back to Weldon Flats Routine menu. (Seepage 2-41)

F2 Key not used.

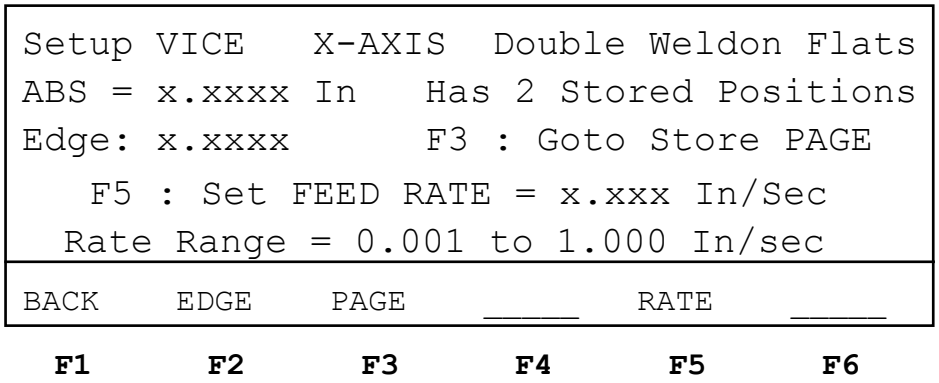
F3 --X-- - Press this key for the screen to setup the X-AXIS position to grind two positions of the Weldon Flats. (Seepage 2-51)

F4 --Y-- - Press this key for the screen to setup the Y-AXIS starting and finish sweep positions. (Seepage 2-53)

F5 --Z-- - Press this key for the screen to setup the Z-AXIS touch off position and finish depth. (Seepage 2-54)

F6 NEXT – Go to the next screen to setup the Double Weldon Flat tool cycle. (Seepage 2-55)

GP #50, Vice Setup X-axis, Double Weldon Flat



F1 BACK - Press this key to go back to setup Double Weldon Flat menu. (Seepage 2-50)

F2 EDGE - Press this key to access the operator's Edge reference position value. This reference value can be used to represent the distance from the Vice side to the back edge of the wheel face. The program's calculations do not use the operator's Edge reference value.

F3 PAGE - Press this key to access the screen to store the desired positions for the flats. (Seepage 2-52)

F4 Key not used.

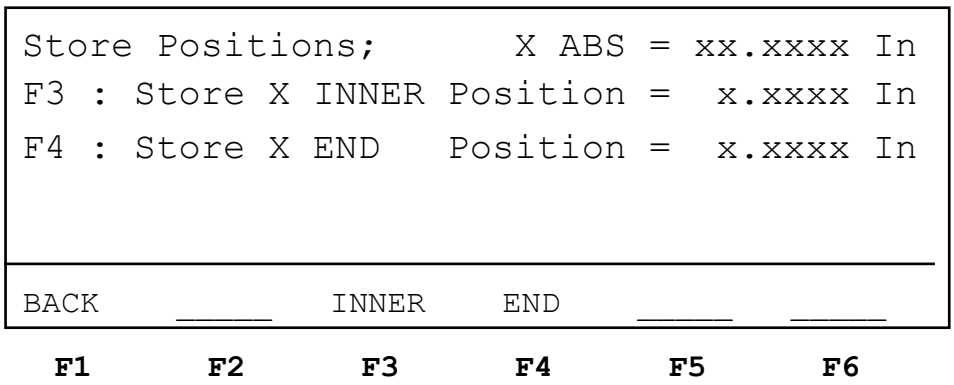
F5 RATE - Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

Additional, the operator may want to move the Z-axis down to close proximity of contact to the top surface of the tool to be more accurate with the X-axis position. To do this, back up to the menu and select the Z-axis and then return this screen.

GP #51, Vice X-axis Store positions, Double Weldon Flat



F1 BACK - Press this key to go back 1 screen to setup Double Weldon Flat X Axis. (Seepage 2-51)

F2 Key not used.

F3 INNER - Press this key to access the inner flat value and then enter the desired position.

F4 END --- Press this key to access the end flat value and then enter the desired position.

F5 Key not used.

F6 Key not used.

GP #52, Vice Setup Y-axis, Double Weldon Flat

```
Setup VICE   Y-AXIS  Double Weldon Flat
ABS = xx.xxxx        START Pos= xx.xxxx In
 Tan: xx.xxxx       FINISH Pos= xx.xxxx In
    F5 : Set FEED RATE = x.xxx In/sec
   Rate Range = 0.001 to 1.000 In/sec
-------------------------------------------
BACK     TAN    START   FINIS   RATE    _____
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back to setup Double Weldon Flat menu. (Seepage 2-50)

F2 TAN - Press this key to access the operator's Tangent reference position value. This reference value can be used to represent the Wheel and Vice tool vertical centers position. The program's calculations do not use the operator's Tangent reference value.

F3 START - Press this key to copy the Y-axis ABS position to the Y-axis starting position. The starting position is the value that the auto cycle uses.

Important: this position should be on the far side of the wheel.

F4 FINIS - Press this key to copy the Y-axis ABS position to the Y-axis finish position. The finish position is the value that the auto cycle uses.

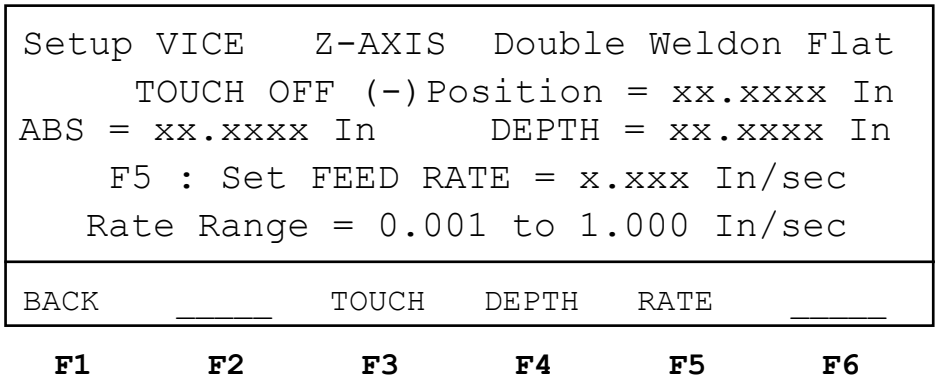
Important: this position should be on the operator side of the wheel.

F5 RATE – Press this key to access the *Y-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #53, Vice Setup Z-axis, Double Weldon Flat



F1 BACK - Press this key to go back to setup Double Weldon Flat menu. (Seepage 2-50)

F2 Key not used.

F3 TOUCH – Press this key to access the Z-axis "Negative touch off position" value and enter a value from the numeric keys. Jog axis down slow until the wheel touches the tool outside diameter. Then use this function to enter the correct value to the "Negative touch off position". Use the ABS position to determine the correct value to place in the "Negative touch off position".

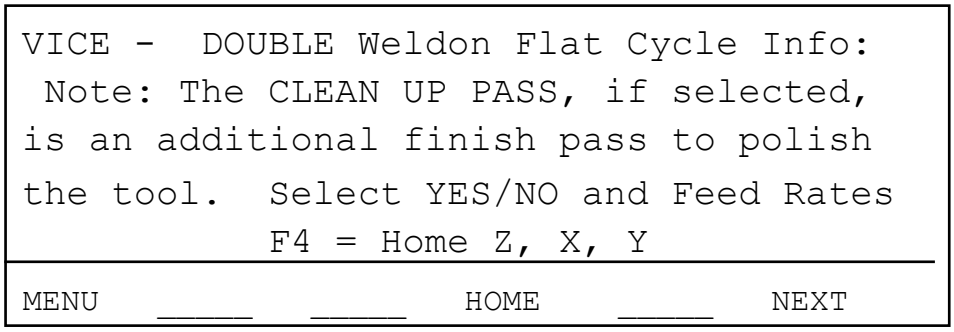
F4 DEPTH - Press this key to access the Z-axis "Finish DEPTH Value" and enter a value from the numeric keys. Calculate this "depth value" from the information given by the tool print. This will be the distance from the outside diameter of the tool the flat portion to be formed.

F5 RATE – Press this key to access the *Z-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #54, Vice Double Weldon Flat Information



This screen has on board information about the Clean Up Pass.

F1: MENU - Press this key to go back to Double Weldon Flat setup menu. (Seepage 2-50)

F2: Not used.

F3: Not used.

F4: HOME - Press this key to command the entire Axis to find home.

F5: Not used.

F6: NEXT - Press this key to go to the next screen for more setup information for the Double Weldon Flat tool. (Seepage 2-56)

GP #55, Vice Setup Cycle, Double Weldon Flat

```
Setup VICE CYCLE,  Double Weldon Flats
F2 : Number of Grind PASSES = xx Passes
F3 "Y" GRIND Feed Rate =   x.xxxx In/sec
F4 "Y" CLEAN UP Pass Rate= x.xxxx In/sec
F5 : Do Clean Up Pass ? = [NO/YES]
BACK    PASS    GRIND   CLEAN    N/Y    NEXT
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back 1 screen to Double Weldon Flat information. (Seepage 2-55)

F2 PASS -- Press this key to access the value for the number of grind passes to be done on each side. The total plunge depth of the Z-axis will be equally divided by the value in the "Grind Passes".

Example: [(-Z-axis touch off – Z-axis finish depth) / Grind Passes] = Z-axis depth increments.

F3 GRIND - Press this key to access the value for the Y-axis Grind feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 in/sec maximum.

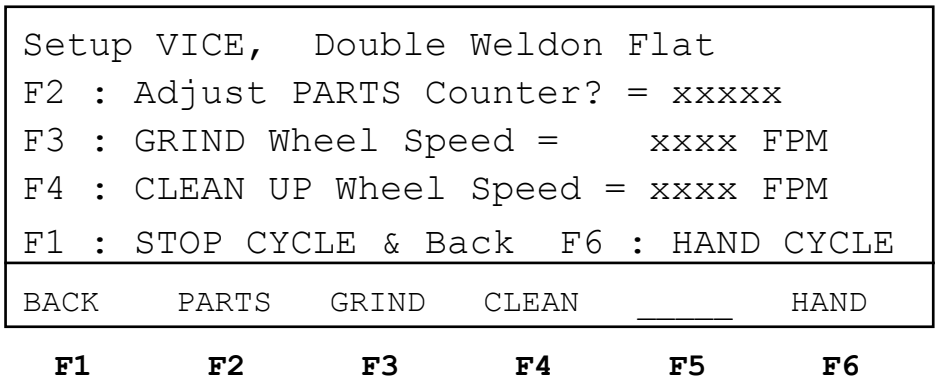
F4 CLEAN - Press this key to access the value for the Y-axis Clean Pass feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 in/sec maximum.

F5 N/Y --- Press this key to select a clean up pass of Yes or No.

F6 NEXT – Press this key to go to the next Cycle setup screen. (Seepage 2-57)

GP #56, Vice Setup, Double Weldon Flats



F1 BACK - Press this key to go back to Setup Cycle for the Double Weldon Flat and also do a "Cycle Stop". (Seepage 2-56)

F2 PARTS - Press this key to adjust the inventory Parts Counter to a value of (0) zero or to a corrected good part value. This part counter is designed for the operator to keep track of his/her inventory for each shift or long time run of a job.

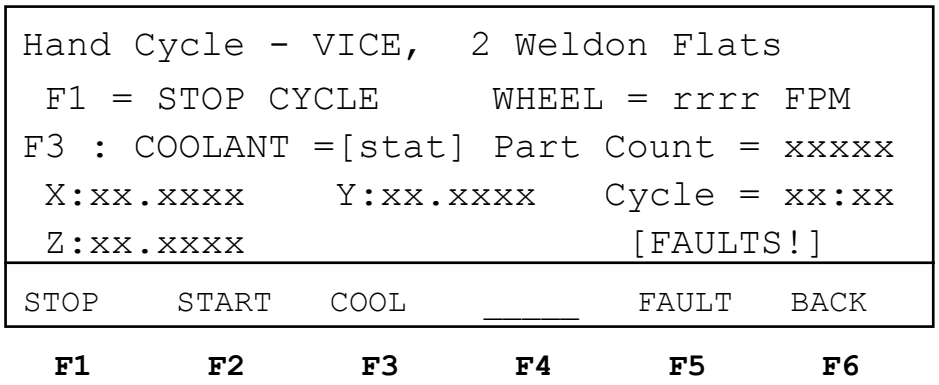
F3 GRIND - Press this key to access the value for the Grinding Wheel Head Speed in feet per minute.

F4 CLEAN - Press this key to access the value for the Clean Up Wheel Head Speed in feet per minute.

F5 Key not used.

F6 VICE - Press this key for the Vice Single Cycle mode screen. (Seepage 2-58)

GP #57, Vice Cycle Double Weldon Flats



F1 STOP – Press this key to stop the Single Cycle mode.

F2 START - Press this key to start the Single Cycle mode.

F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 Key not used.

F5 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F6 BACK - Press this key to and go back one screen for Set up Double Weldon Flat. (Seepage 2-57)

GP #58, Vice - Setup XYZ, Wide Double Weldon Flat

```
Setup VICE for WIDE DOUBLE Weldon Flats
  Double Weldon Flat with Wide End
F3 = Setup X-AXIS Position
F4 = Setup Y-AXIS Position
F5 = Setup Z-AXIS Position
MENU6    _____    --X--    --Y--    --Z--    NEXT
```

F1 F2 F3 F4 F5 F6

F1 MENU6 - Press this key to go back to Weldon / Whistle Stop Routine menu. (Seepage 2-41)

F2: Not used.

F3: --X-- - Press this key for the screen to setup the X-AXIS position to grind three positions of the Weldon Flats. (Seepage 2-60)

F4: --Y-- - Press this key for the screen to setup the Y-AXIS starting and finish sweep positions. (Seepage 2-62)

F5: --Z-- - Press this key for the screen to setup the Z-AXIS touch off position and finish depth. (Seepage 2-63)

F6: NEXT – Go to the next screen to setup the Double Weldon Flat Wide End tool cycle. (Seepage 2-64)

GP #59, Vice Setup X-axis, Wide Double Weldon Flat

```
Setup VICE  X-AXIS  Wide Double Weldon
ABS = xx.xxxx In  Has 3 Stored Positions
Edge: xx.xxxx      F3 : Goto Store PAGE
   F5 : Set FEED RATE = x.xxx In/Sec
  Rate Range = 0.001 to 1.000 In/sec
BACK    EDGE    PAGE    _____   RATE    _____
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back to setup the Wide Double Weldon Flat menu. (Seepage 2-59)

F2 EDGE - Press this key to access the operator's Edge reference position value. This reference value can be used to represent the distance from the Vice side to the back edge of the wheel face. The program's calculations do not use the operator's Edge reference value.

F3 PAGE - Press this key to access the screen to store the desired positions for the flats. (Seepage 2-61)

F4 Key not used.

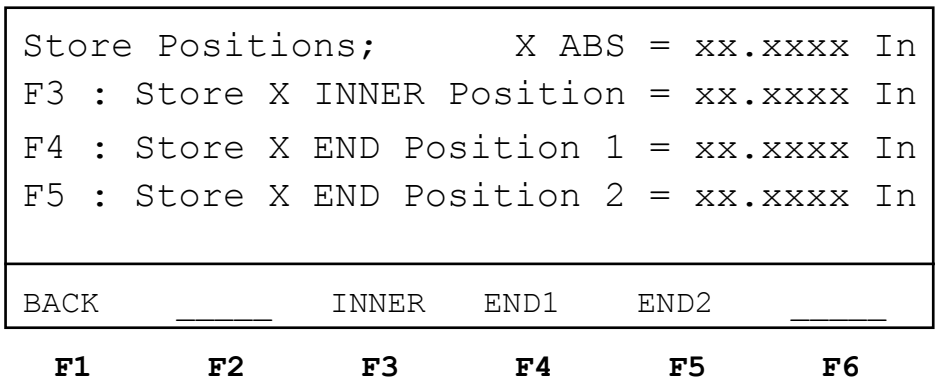
F5 RATE – Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

Additional, the operator may want to move the Z-axis down to close proximity of contact to the top surface of the tool to be more accurate with the X-axis position. To do this, back up to the menu and select the Z-axis and then return this screen.

GP #60, Vice, X-axis Store Positions Wide Double Weldon Flat



F1 BACK - Press this key to go back 1 screen to setup the Wide Double Weldon Flat X Axis. (Seepage 2-60)

F2 Key not used.

F3 INNER - Press this key to access the inner flat value and then enter the desired position.

F4 END1 -- Press this key to access the first end flat value and then enter the desired position.

F5 END2 -- Press this key to access the second end flat value and then enter the desired position. This value is used when the end tool surface area is larger than the wheel width.

F6 Key not used.

GP #61, Vice Setup Y-axis, Wide Double Weldon Flat

```
 Setup VICE  Y-AXIS  WIDE Double Weldon
ABS = xx.xxxx In    START Pos= xx.xxxx In
 Tan: xx.xxxx      FINISH Pos= xx.xxxx In
    F5 : Set FEED RATE = x.xxx In/sec
   Rate Range = 0.001 to 1.000 In/sec
-------------------------------------------
BACK     TAN    START   FINIS   RATE    _____
```

F1 **F2** **F3** **F4** **F5** **F6**

F1 BACK - Press this key to go back to setup the Wide Double Weldon Flat menu. (Seepage 2-59)

F2 TAN - Press this key to access the operator's Tangent reference position value. This reference value can be used to represent the Wheel and Vice tool vertical centers position. The program's calculations do not use the operator's Tangent reference value.

F3 START - Press this key to copy the Y-axis ABS position to the Y-axis starting position. The starting position is the value that the auto cycle uses.

Important: this position should be on the far side of the wheel.

F4 FINIS - Press this key to copy the Y-axis ABS position to the Y-axis finish position. The finish position is the value that the auto cycle uses.

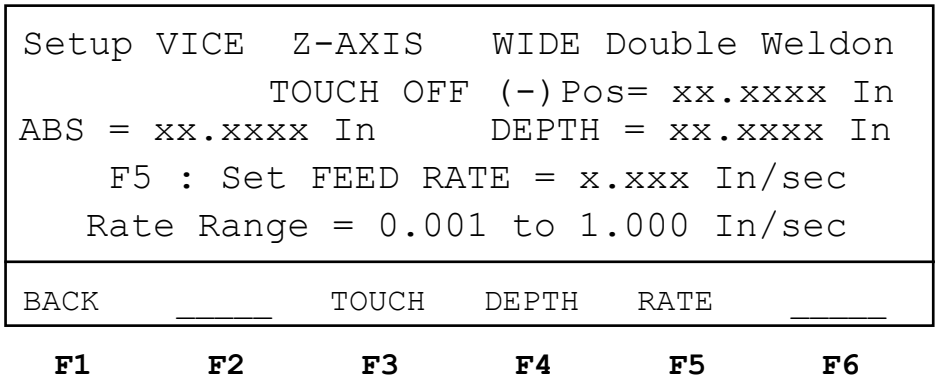
Important: this position should be on the operator side of the wheel.

F5 RATE – Press this key to access the *Y-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #62, Vice Setup Z-axis, Wide Double Weldon



F1 BACK - Press this key to go back to setup the Wide Double Weldon Flat menu. (Seepage 2-59)

F2 Key not used.

F3: TOUCH – Press this key to access the Z-axis "touch off position" value and enter a value from the numeric keys. Jog axis down slow until the wheel touches the tool outside diameter. Then use this function to enter the correct value to the "touch off position". Use the ABS position to determine the correct value to place in the "touch off position".

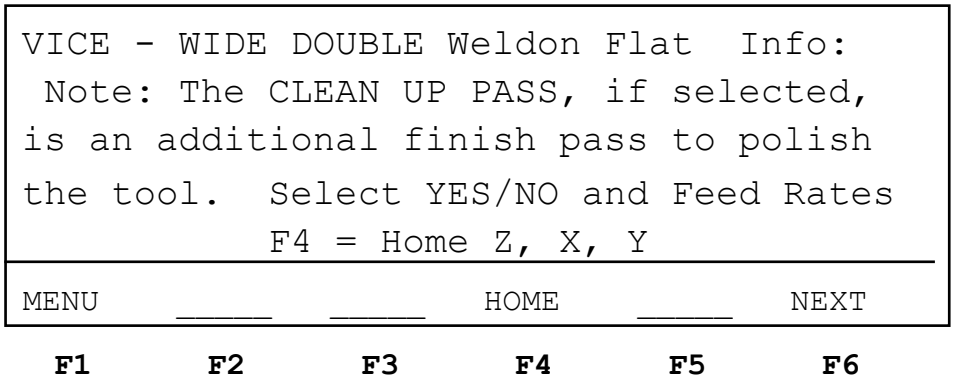
F4 DEPTH - Press this key to access the Z-axis "Finish DEPTH Value" and enter a value from the numeric keys. Calculate this "depth value" from the information given by the tool print. This will be the distance from the outside diameter of the tool the flat portion to be formed.

F5 RATE – Press this key to access the *Z-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F6 Key not used.

Note: Then use the **JOG IN** or **JOG OUT** push buttons to control the axis.

GP #63, Vice Wide Double Weldon Flat Information



This screen has on board information about the Clean Up Pass.

F1: MENU - Press this key to go back to Double Weldon Flat setup menu. (Seepage 2-59)

F2: Not used.

F3: Not used.

F4: HOME - Press this key to command the entire Axis to find home or go home, which ever is needed.

F5: Not used.

F6: NEXT – Press this key to go to the next screen for more setup information for the Double Weldon Flat tool. (Seepage 2-65)

GP #64, Vice Setup Cycle, Wide Double Weldon Flat

```
Setup VICE CYCLE,   WIDE Double Weldon
F2 : Number of Grind PASSES = xx Passes
F3 "Y" GRIND Feed Rate =   x.xxxx In/sec
F4 "Y" CLEAN UP Pass Rate= x.xxxx In/sec
F5 : Do Clean Up Pass ? = [NO/YES]
BACK    PASS    GRIND   CLEAN    N/Y    NEXT
  F1      F2      F3      F4      F5      F6
```

F1 BACK - Press this key to go back 1 screen to the Wide Double Weldon Flat information. (Seepage 2-64)

F2 PASS -- Press this key to access the value for the number of grind passes to be done on each side. The total plunge depth of the Z-axis will be equally divided by the value in the "Grind Passes".

Example: [(-Z-axis touch off – Z-axis finish depth) / Grind Passes] = Z-axis depth increments.

F3 GRIND - Press this key to access the value for the Y-axis Grind feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 in/sec maximum.

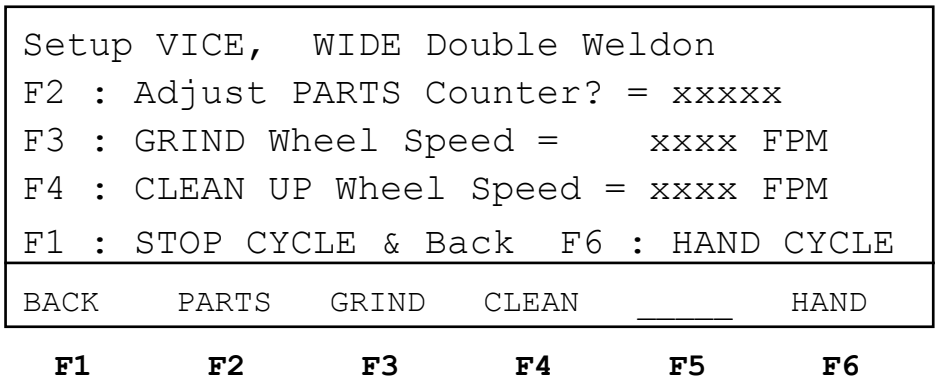
F4 CLEAN - Press this key to access the value for the Y-axis Clean Pass feed rate in Inches per second.

The valid values are 0.0001 In/sec to 0.1250 in/sec maximum.

F5 N/Y --- Press this key to select a clean up pass of Yes or No.

F6: NEXT – Press this key to go to the next Cycle setup screen. (Seepage 2-66)

GP #65, Vice Setup Wide Double Weldon Flat



F1 BACK - Press this key to go back to Setup Cycle for the Wide Double Weldon Flat and also do a "Cycle Stop". (Seepage 2-65)

F2 PARTS - Press this key to adjust the inventory Parts Counter to a value of (0) zero or to a corrected good part value. This part counter is designed for the operator to keep track of his/her inventory for each shift or long time run of a job.

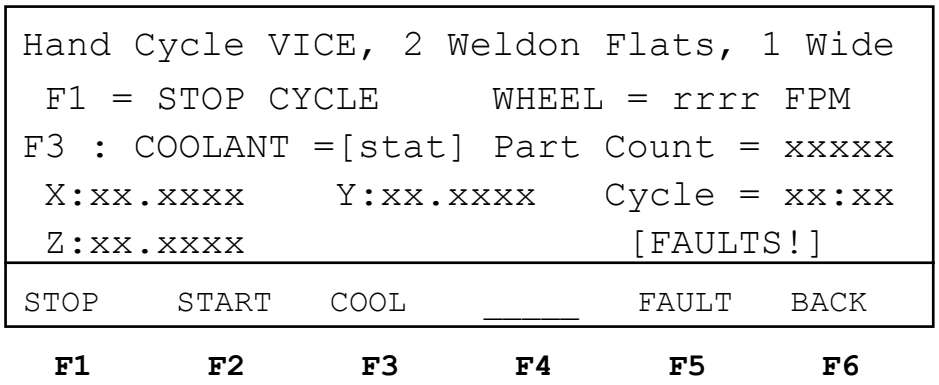
F3 GRIND - Press this key to access the value for the Grinding Wheel Head Speed in feet per minute.

F4 CLEAN - Press this key to access the value for the Clean Up Wheel Head Speed in feet per minute.

F5 Key not used.

F6 HAND - Press this key for the Vice Single Cycle mode screen. (Seepage 2-67)

GP #66, Vice Cycle, Wide Double Weldon Flat



F1 STOP – Press this key to stop the Single Cycle mode.

F2 START - Press this key to start the Single Cycle mode.

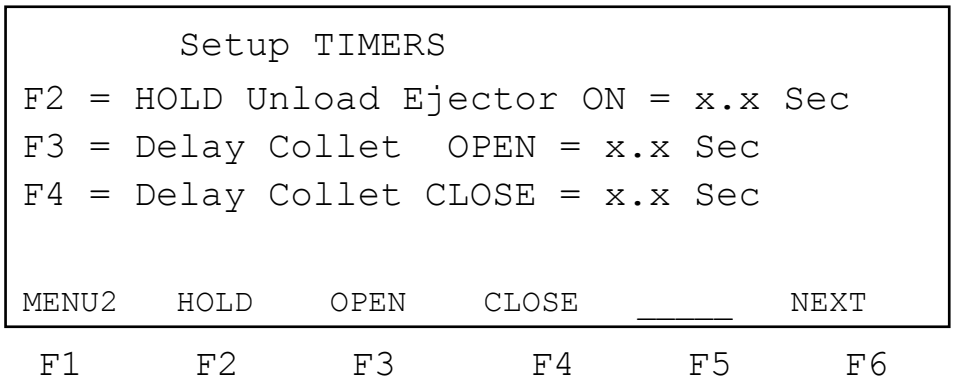
F3 COOL – Press this key to toggle the coolant solenoid between auto and off.

F4 Key not used.

F5 FAULT – Press this key if the word "FAULTS!" is flashing to view the fault section.

F6 BACK - Press this key to and go back one screen for Set up Double Weldon Flat. (Seepage 2-66)

GP #68, Timers



F1 MENU2 - Press this key to return to the Setup Menu. (See page 2-2)

F2 HOLD -- Press this key to adjust the time delay for after the Ejector has moved out. This will allow time for the part to be ejected.

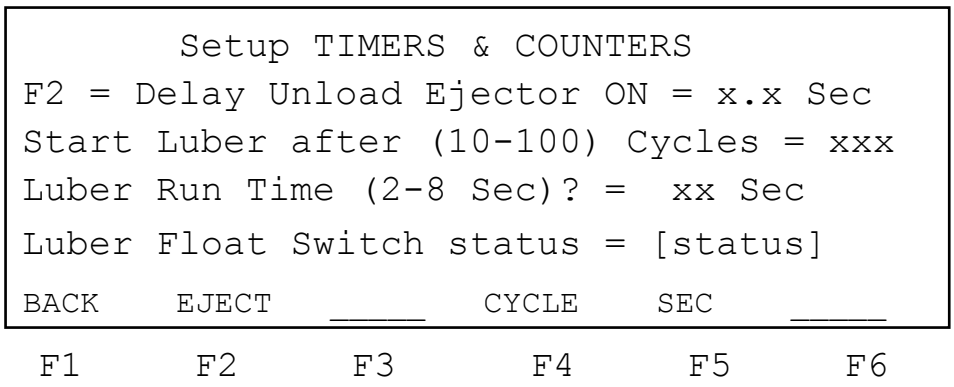
F3 OPEN - Press this key to adjust the time delay for the Collet to open. This will create a time delay to insure that the axes unload and load positions are valid before the collet opens to release the part or except a part.

F4 CLOSE - Press this key to adjust the time delay for the Collet to close. This will insure that the tool is fully in place after the pusher has loaded the part.

F5 Key not used.

F6 NEXT - Press this key for the next timer screen. (Seepage 2-69)

GP #69, Timers Continued



F1 BACK - Press this key to go back to the previous timer screen. (Seepage 2-68)

F2 EJECT -- Press this key to adjust the time delay for the Ejector to turn on to eject the part. This will create a time delay to insure that the collet opened fully to unload or load the part.

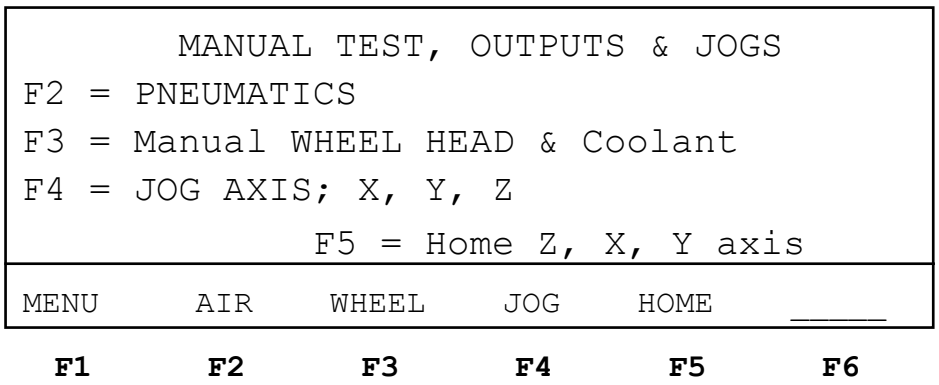
F3 Key not used.

F4 CYCLE - Press this to enter the number of machine cycles needed before starting the Machine lubrication system.

F5 SEC - Press this to give the Machine Oiler the amount of seconds needed to charge the oil lines. The required amount of seconds can be from 3 to 10 seconds.

F6 Key not used.

GP #70, Manual Test, Operator Routines



F1 MENU – Press this key to return to the Main Menu. (Seepage 2-1)

F2 AIR --- Press this key for the screen to select manual control of the pneumatics. (Seepage 2-71)

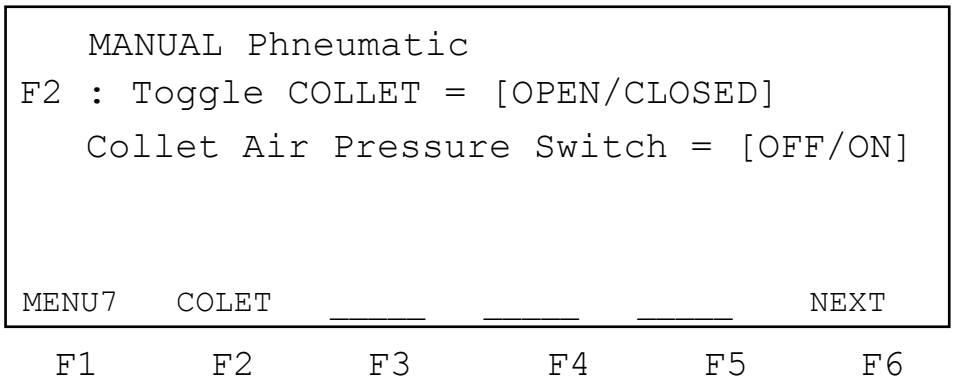
F3 WHEEL - Press this key for the screen to select manual control of the wheel head and coolant solenoid. (Seepage 2-73)

F4 JOG --- Press this key for the screen to select manual jog of the servo axis. (Seepage 2-74)

F5 HOME – Press this key to command the entire Axis to find home or go home, which ever is needed.

F6 Key not used.

GP #71, Manual Pneumatics



F1 MENU7 – Press this key to return to the Manual menu screen. (Seepage 2-70)

F2 COLET – Press this key to toggle the *Collet* either Open or Closed. The *Collet* needs to be OPEN to load the tool. The status will show the state of the pneumatic valve of either "Open or Closed".

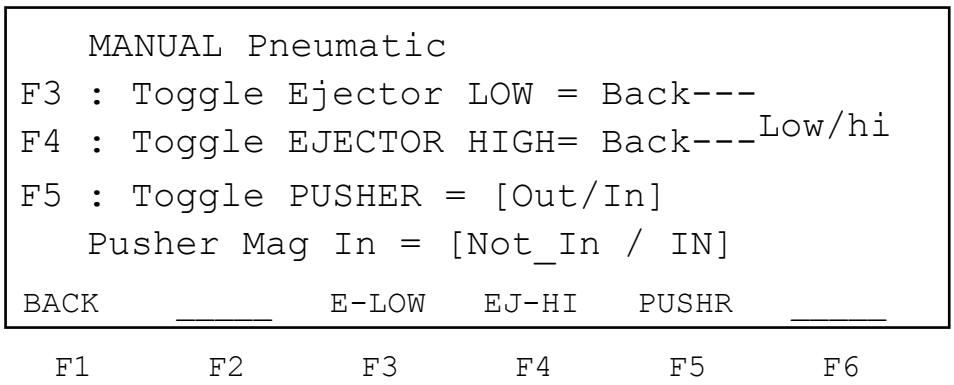
F3 Key not used.

F4 Not used.

F5 Not used.

F6 NEXT – Press this key for the next pneumatic screen. (Seepage 2-72)

GP #72, Manual Pneumatics



F1 BACK – Press this key to go back one Manual pneumatic screen.

(Seepage 2-71)

F2 Not used.

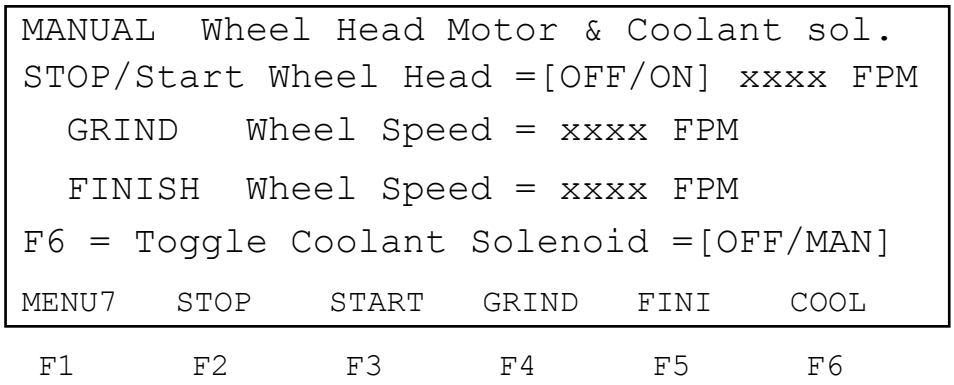
F3 E-LOW - Press this key to toggle the *Ejector* either back or forward at low pressure. The status will show the state of the pneumatic valve to be either "Back Low or Forward Low".

F4 EJ-HI - Press this key to toggle the *Ejector* either back or forward at high pressure. The status will show the state of the pneumatic valve to be either "Back High or Forward High".

F5 PUSHR - Press this key to toggle the *Pusher* either back or forward. First, the *Pusher* needs to be in its Back position to align the X and Y-axis. Then check the alignment by toggling the Pusher to its IN position. The status will show the state of the pneumatic valve to be either "Back or Forward".

F6 Not used.

GP #73, Manual Wheel Head & Coolant



F1 MENU7 – Press this key to return to the Manual menu screen. (Seepage 2-70)

F2 STOP – Press this key to Stop Wheel Head.

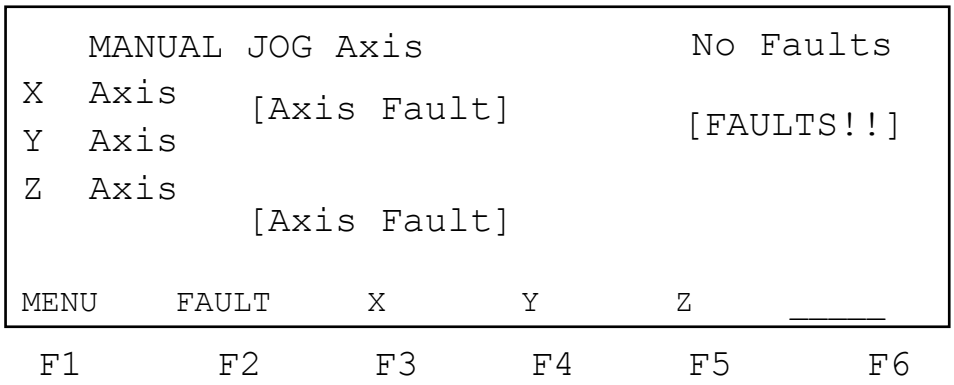
F3 START – Press this key to Start Wheel Head: [Status Wheel Head, OFF or ON]. The "Manual Wheel Head Speed" will be the "Grind Wheel Speed" in fpm.

F4 GRIND - Select to enter Hog Wheel Speed "Feet Per Minute"

F5 FINI -- Select to enter Finish Wheel Speed "Feet Per Minute"

F6 COOL – Press this key to manually toggle the coolant solenoid from "Off" to "On" state and back.

GP #74, Manual Jog Select Axis



F1 MENU7 – Press this key to return to the Manual menu screen. (Seepage 2-70)

F2 FAULT - Select if "FAULTS!" or "Axis Fault" prompt is flashing.

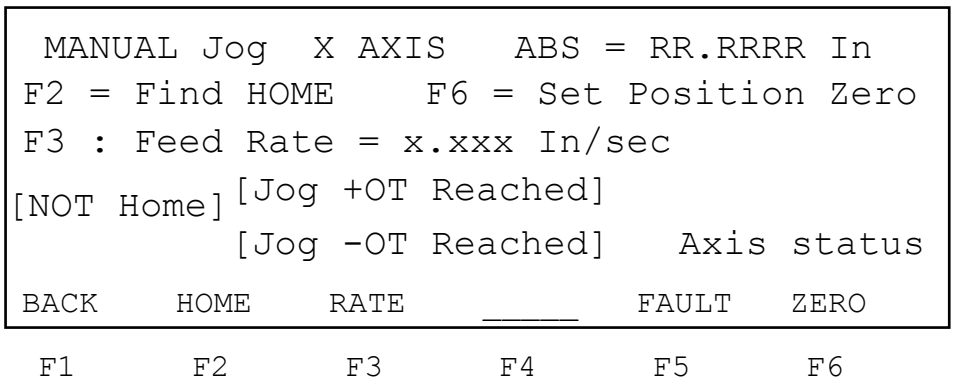
F3 X – Press this key to select Manual Jog X-axis. (Seepage 2-75)

F4 Y - Press this key to select Manual Jog Y-axis. (Seepage 2-76)

F5 Z - Press this key to select Manual Jog Z-axis. (Seepage 2-77)

F6 Key not used. Reserved for other axis.

GP #75, Manual Jog X-axis



F1 BACK – Press this key to return to the Manual Jog Axis menu. (Seepage 2-74)

F2 HOME – Press this key for the axis to find home the limit.

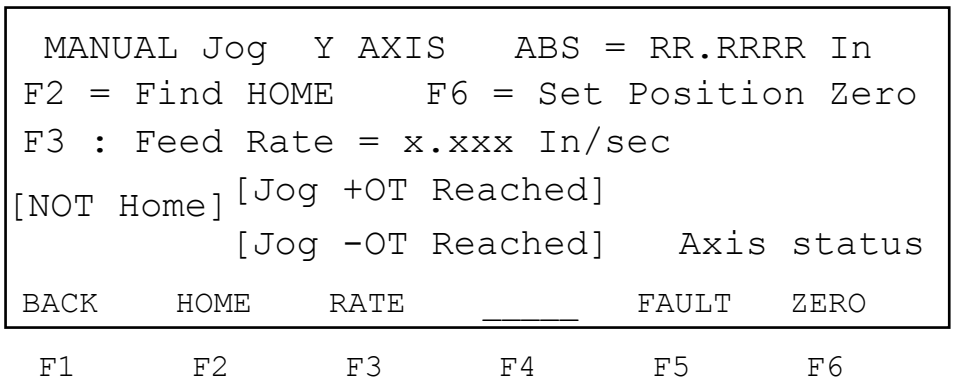
F3 RATE - Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F4 This key not used.

F5 FAULT – Press this key if the "Axis status" displays a fault.

F6 ZERO – Press this key if axis cannot jog out or find home. This will set the axis position to 0.0000" and is not in relation to the home limit.

GP #76, Manual Jog Y-axis



F1 BACK – Press this key to return to the Manual Jog Axis menu. (Seepage 2-74)

F2 HOME – Press this key for the axis to find home the limit.

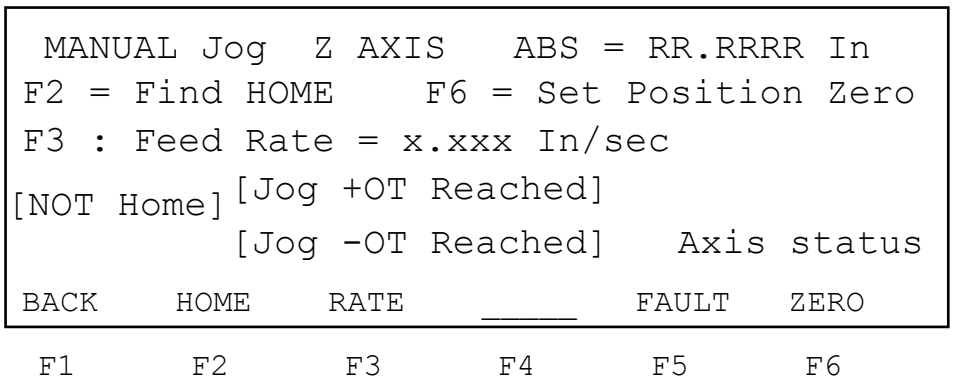
F3 RATE - Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F4 This key not used.

F5 FAULT – Press this key if the "Axis status" displays a fault.

F6 ZERO – Press this key if axis cannot jog out or find home. This will set the axis position to 0.0000" and is not in relation to the home limit.

GP #77, Manual Jog – Z-axis



F1 BACK – Press this key to return to the Manual Jog Axis menu. (Seepage 2-74)

F2 HOME – Press this key for the axis to find home the limit.

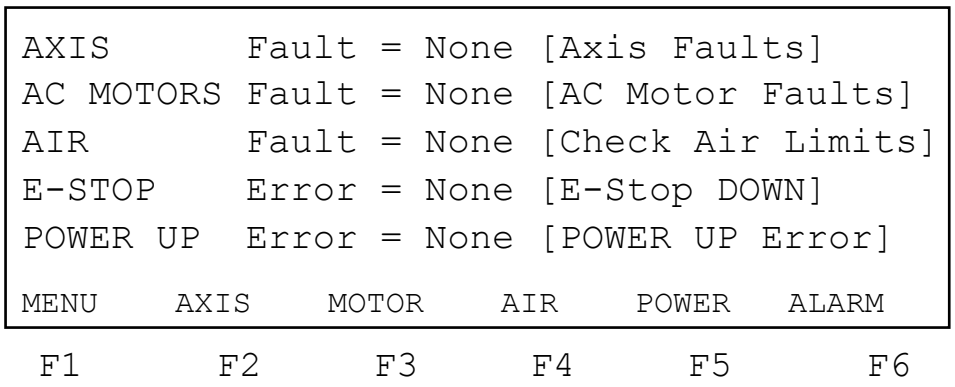
F3 RATE - Press this key to access the *X-axis Feed Rate* and then enter the desired value. The rate range is 0.001 to 1.000 In/Sec.

F4 This key not used.

F5 FAULT – Press this key if the "Axis status" displays a fault.

F6 ZERO – Press this key if axis cannot jog out or find home. This will set the axis position to 0.0000" and is not in relation to the home limit.

GP #79, FAULT Section - MAIN MENU for Fault screens



F1 MENU - Press this key to return to the Main Menu. (Seepage 2-1)

Fault status: [None] = No faults, take no action.

[Fault Type Flashing] = Fault active, select proper Key.

Fault status is in order of priority.

F2 AXIS --- Select this Key when "Axis Faults" if flashing to view the type of fault. (Seepage 2-79)

F3 MOTOR -- Select this Key when "AC Motor Faults" is flashing.

(Seepage 2-83)

F4 AIR ---- Select this Key when "Check Air Limits" is flashing.

(Seepage 2-84)

F5 POWER -- Select this Key when "POWER UP ERROR" is flashing.

F6 ALARM -- Select this Key if Alarm Tag is flashing in upper screen area.

TURN or PULL the E-STOP operator when the "E-Stop DOWN" is flashing.

GP #80, Faults Any Axis

```
 AXIS FAULTS:  Select if fault
X  Axis Fault = X Axis Ok/Fault
Y  Axis Fault = Y Axis Ok/Fault
Z  Axis Fault = Z Axis Ok/Fault


MENU8   _____     X       Y       Z     _____
```

F1 F2 F3 F4 F5 F6

F1 MENU8 – Press this key to return to the Main Fault Screen menu. (Seepage 2-78)

F2 Not Used.

Status: None - No Fault, check Axis only if "Faults!" flashing will not clear. Then check each Axis for Fault code number present.

[ACTIVE] - Select proper Key

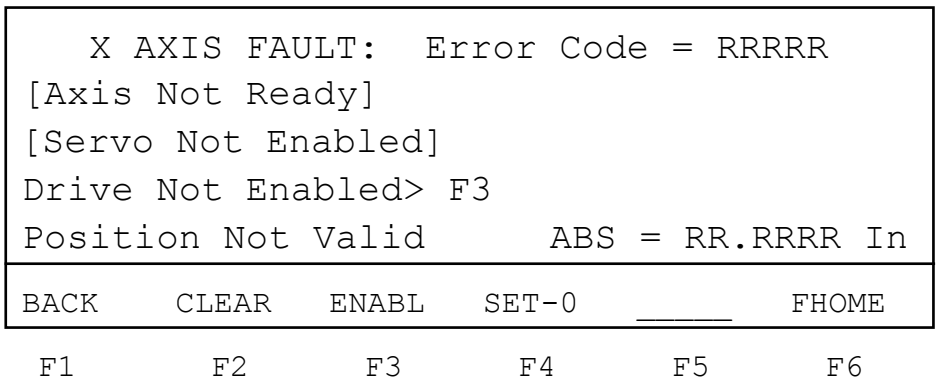
F3 X - Select this Key if "Fault" is flashing. (Seepage 2-80)

F4 Y - Select this Key if "Fault" is flashing. (Seepage 2-81)

F5 Z - Select this Key if "Fault" is flashing. (Seepage 2-82)

F6 Key not used.

GP #81, Fault X-axis



F1 BACK – Press this key to return to the Axis Fault menu screen. (Seepage 2-79)

F2 CLEAR - If number is not 0000, this clears any Error for this Axis.

Note: The "Error Code Number" on the display is "Decimal Base". Convert the Number to a "HEX value" and then see Error Codes Section.

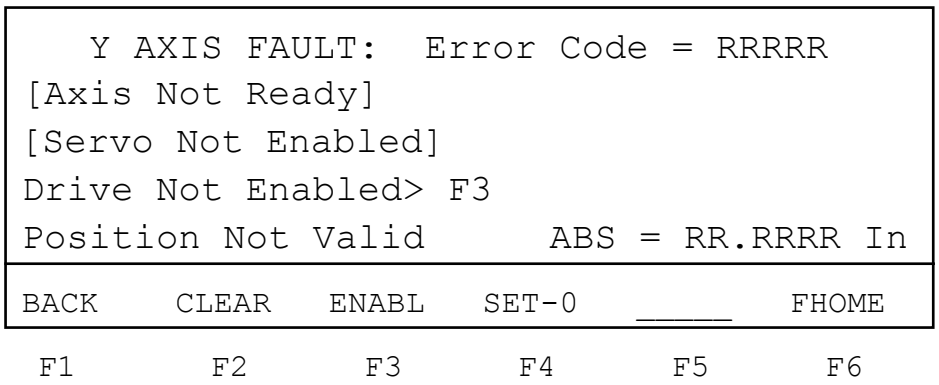
F3 ENABL - Select this Key if "Drive Not Enabled> F3" is flashing. The "Drive Not Enabled> F3" changes to "OK" when Key is accepted.

F4 SET-0 - Select this Key if "LOST POSITION> F4" is flashing. This will set this Axis position to Zero (0.0000). This is used instead of "Find Home", so the axis can be jogged plus and minus to verify it's proper direction. "LOST POSITION> F4" changes to "OK" when Key is accepted.

F5 Not Used.

F6 FHOME – Press this key to command this Axis only to find it's home limit and then set it's position to Zero.

GP #82, Fault Y-axis



F1 BACK – Press this key to return to the Axis Fault menu screen. (Seepage 2-79)

F2 CLEAR - If number is not 0000, this clears any Error for this Axis.

Note: The "Error Code Number" on the display is "Decimal Base". Convert the Number to a "HEX value" and then see Error Codes Section.

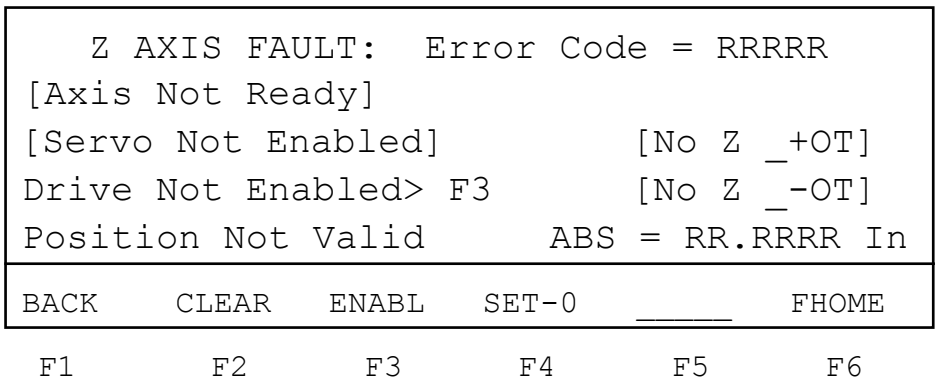
F3 ENABL - Select this Key if "Drive Not Enabled> F3" is flashing. The "Drive Not Enabled> F3" changes to "OK" when Key is accepted.

F4 SET-0 - Select this Key if "LOST POSITION> F4" is flashing. This will set this Axis position to Zero (0.0000). This is used instead of "Find Home", so the axis can be jogged plus and minus to verify it's proper direction. "LOST POSITION> F4" changes to "OK" when Key is accepted.

F5 Not Used.

F6 FHOME – Press this key to command this Axis only to find it's home limit and then set it's position to Zero.

GP #83, Fault Z-axis



F1 BACK – Press this key to return to the Axis Fault menu screen. (Seepage 2-79)

F2 CLEAR - If number is not 0000, this clears any Error for this Axis.

Note: The "Error Code Number" on the display is "Decimal Base". Convert the Number to a "HEX value" and then see Error Codes Section.

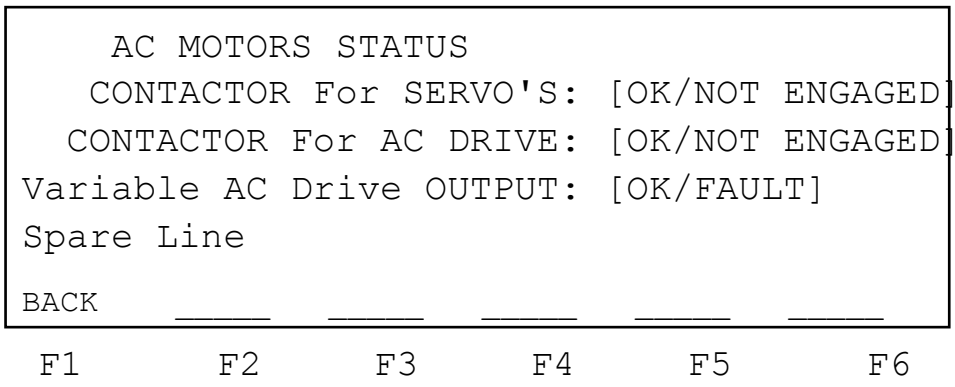
F3 ENABL - Select this Key if "Drive Not Enabled> F3" is flashing. The "Drive Not Enabled> F3" changes to "OK" when Key is accepted.

F4 SET-0 - Select this Key if "LOST POSITION> F4" is flashing. This will set this Axis position to Zero (0.0000). This is used instead of "Find Home", so the axis can be jogged plus and minus to verify it's proper direction. "LOST POSITION> F4" changes to "OK" when Key is accepted.

F5 Not Used.

F6 FHOME – Press this key to command this Axis only to find it's home limit and then set it's position to Zero.

GP #85, Faults AC Motors



F1: BACK -- Back to Main Fault screen. (Seepage 2-78)

This screen displays the status for the AC Motor contactors and the Variable Frequency Drive.

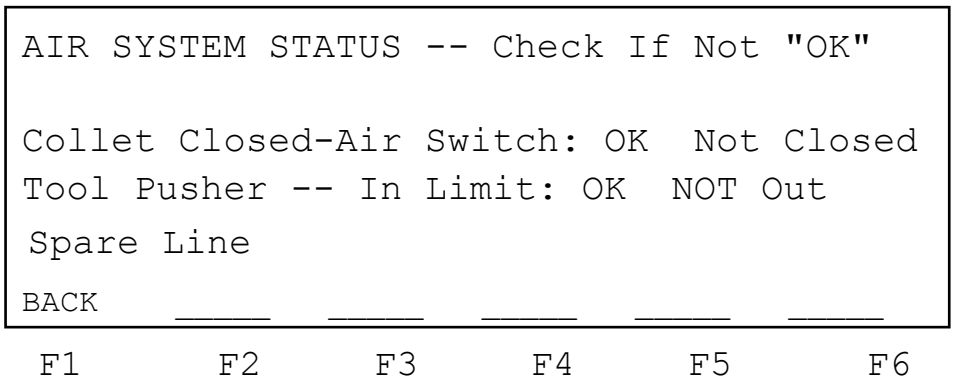
CONTACTOR For SERVO Drives: - This will display "OK" or "NOT ENGAGED". If Not Engaged is displayed, and then check the AC Contactor.

CONTACTOR For AC Motor Variable Speed Drive: - This will display "OK" or "NOT ENGAGED". If Not Engaged is displayed, and then check the AC Contactor.

AC Motor Variable Speed Drive OUTPUT: - This will display "OK" or "NOT ACTIVE". If Not Active, then check the Woods Drive.

Spare Line:

GP #86, Faults Air System



F1: BACK -- Back to Main Fault screen. (Seepage 2-78)

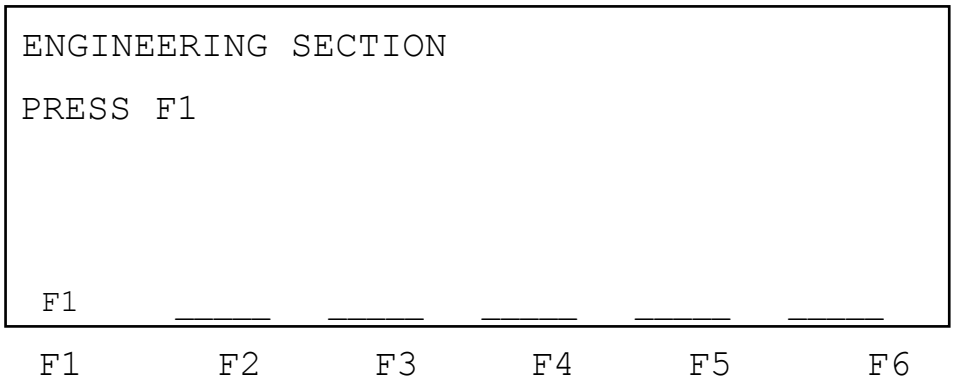
Collet Closed-Air Switch: - If "NOT CLOSED" then check Air Switch.

Tool Pusher --- In Limit: - If "NOT OUT" then check Tool Rest Position

Spare Line:

Chapter 3 : Engineering Section

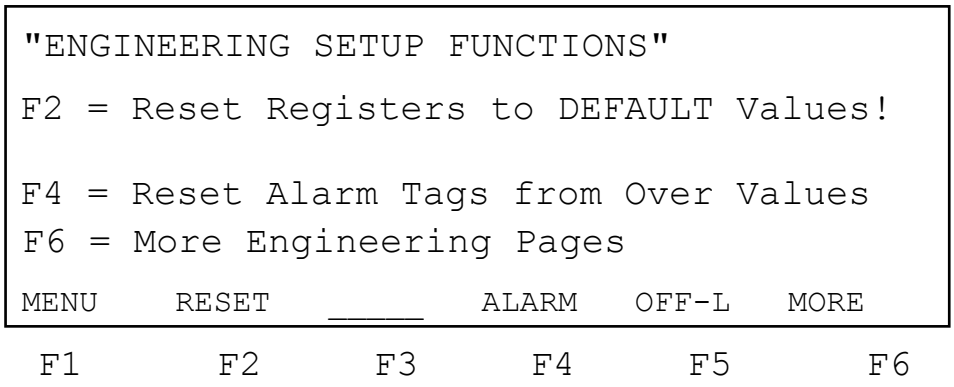
GP #87, Engineering Screen Access



F1: MENU --- Return to the Main Menu Screen. (Seepage 2-1)

F4: MASKED -- To Engineering Main Screen. (Seepage 3-2)

GP #88, Engineering Main Screen



This screen and the following screens are to be accessed by a SUPERVISOR or ENGINEERING ONLY!

F1: MENU --- Return to the Main Menu. (Seepage 2-1)

F2: RESET -- Reset All Register Values to PLC CONSTANT (Default) Values.

F5: Not used.

F4: ALARM -- Reset Any Alarm Tag that Exceeds an Over or Under Value.

F5: OFF-L -- Changes Operator Interface from Run Mode to the Programming Mode.

F6: MORE --- Go to Change Register Values to customize for each Machine. (Seepage 3-3)

GP #89, Engineering Screen #2

```
OVER LOAD RELAY DWELL1 TIMER
Default = 1.0 Sec ; Preset = x.x Sec
SPARE
  ENGINEERING Setup Functions page2
BACK    ENG'R   _____   O-L-R   _____   MORE
 F1      F2      F3      F4      F5      F6
```

F1: BACK --- Back 1 Screen. (Seepage 3-2)

F2: ENG'R -- Back to Engineering Screen. (Seepage 3-2)

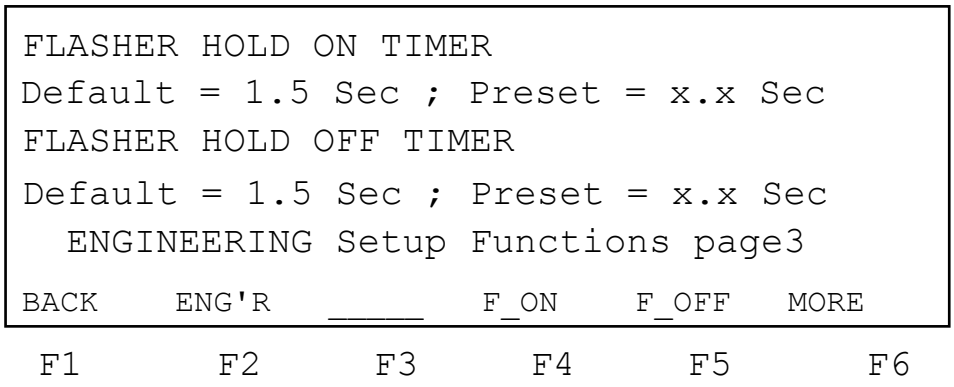
F3: Not Used.

F4: O-L-R -- Select to Write New Value of 1.0 sec to 2.0 sec.

F5: Not Used.

F6: MORE --- Go to Change Register Values to customize for each Machine. (See page 3-4)

GP #90, Engineering Screen #3



F1: BACK --- Back 1 Screen. (Seepage 3-3)

F2: ENG'R -- Back to Engineering Screen. (Seepage 3-2)

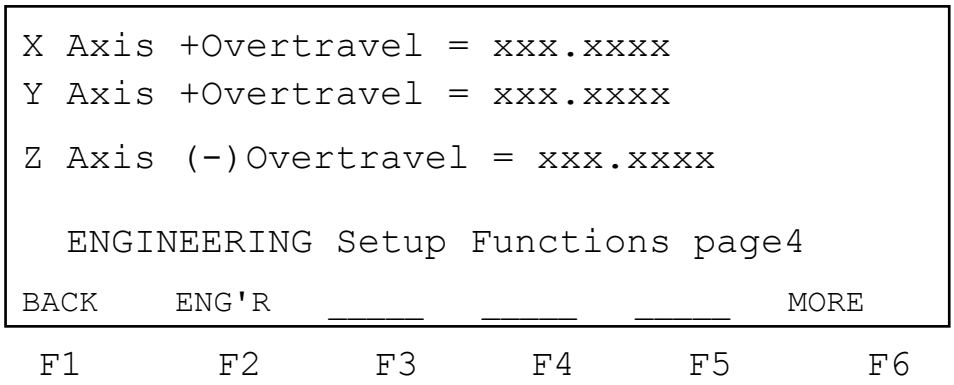
F3: Not Used.

F4: F_ON --- Select to Write New Value.

F5: F_OFF -- Select to Write New Value.

F6: MORE --- Go to Change Register Values to customize for each Machine. (See page 3-5)

GP #91, Engineering Screen #4



This screen is used to view the PLC logic over travel values.

These are fixed values by the programmer.

F1: BACK --- Back 1 Screen. (Seepage 3-4)

F2: ENG'R -- Back to Engineering Screen. (Seepage 3-2)

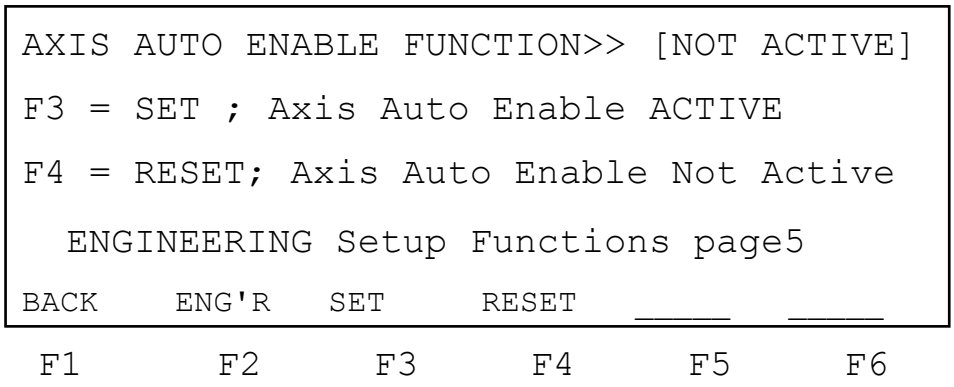
F3: Key not used.

F4: Key not used.

F5: Key not used.

F6: MORE --- Go to Change Register Values to customize for each Machine. (Seepage 3-6)

GP #92, Engineering Screen #5



F1: BACK --- Back 1 Screen. (See page 3-5)

F2: ENG'R -- Back to Engineering Screen. (Seepage 3-2)

F3: SET -- Select to Set the "Servo Auto Enable" Function to Active.

F4: RESET -- Select to Set the "Servo Auto Enable" Function to NOT Active.

F5: Not used.

F6: Not used.

Chapter 4 : AC TECH DRIVE PARAMETERS

Parameter settings changed for this machine.

AC TECH Model SF275

7.5HP @ 240VAC 3 PHASE

Line Voltage Selection; P01 = 1 (for 220-240 VAC)
Line Voltage Selection; P01 = 2 (for 200-208 VAC)

Stop Method; P04 = 3 (Ramp to Stop)
Standard Speed Source; P05 = 3 (External 0-10 VDC from PLC)

TB-14 Open Collector; P06 = 3 (FAULT - Closes if there is no fault)
TB-15 Open Collector; P13 = 6 (At Set Speed)

Acceleration Time; P19 = 3.0 Sec
Deceleration Time; P20 = 3.0 – 5.0 Sec

Minimum Frequency; P23 = 00 Hz
Maximum Frequency; P24 = 60 Hz

Current Limit; P25 = 140% - 150%
[The Electronic Current Limit will time out if percentage has exceeded for 1 minute and trip the drive into an Overload Fault. The report will be from TB-14]

Motor Overload; P26 = 68% [@240 VAC: (MOTOR FLA / 25 Amps) = 68%]
[@208 VAC: (MOTOR FLA / 22 Amps) = 77%]
[P01 must be set to the correct voltage]

Fixed Boost; P28 = 2.7 (from chart in AC Tech manual)

End of parameter settings: to return to page 1-1

Chapter 5 : Program Sequences

FROM PAGE 1-1

Auto Load & Unload Sequencer for Work Head

```
%M0081;   AUTO-01; Auto Load Sequencer, check conditions
%M0082;   AUTO-02; Call Unload Subroutine
%M0083;   AUTO-03; Call Load Subroutine
%M0084;   AUTO-04; Do Grind Sequencer
%M0085;   AUTO-05; Reset if Auto Cycle/ Next if Single Cycle
%M0086;   AUTO-06; Home Z-axis
%M0087;   AUTO-07; Home X & y-axis
%M0088;   AUTO-08; Send U-axis to position Zero
%M0089;   AUTO-09; Open Collet
%M0090;   AUTO-10; Reset Polygon Sequencer
```

Unload Sequencer

```
%M0305;   UNLOAD1; Unload Sequencer, check conditions to start
%M0306;   UNLOAD2; Move X & Y axis to Unload position
%M0307;   UNLOAD3; Move Shuttle in & dwell
%M0308;   UNLOAD4; Dwell to next stage
%M0309;   UNLOAD5; Ejector High pressure & hold (dwell)
%M0310;   UNLOAD6; Return Ejector
%M0311;   UNLOAD7; to next stage
%M0312;   UNLOAD8; Unload Sequencer done
```

Load Sequencer

```
%M0321;   LOAD-S1; Load Rod Sequencer, check condition to start
%M0322;   LOAD-S2; Move X & Y axis to Load position
%M0323;   LOAD-S3; Dwell and to next stage
%M0324;   LOAD-S4; Ejector Low pressure and Open Collet
%M0325;   LOAD-S5; Rod Pusher forward & dwell
%M0326;   LOAD-S6; Close Collet & dwell
%M0327;   LOAD-S7; Return Ejector & X-axis to position Zero
%M0328;   LOAD-S8; Return Rod Pusher & pop new tool from Hopper
%M0329;   LOAD-S9; Load Sequencer done
%M0330;   LOADS10; spare stage
```

Program Sequences continued

Hand-Load Sequencer for Vice and Work Head

```
%M0105;   HAND-S1; Hand Load Sequencer, check conditions to start
          Check if Vice or Collet, if Hand Load Work Head, is closed.
%M0106;   HAND-S2; Do Grind Sequencer
%M0107;   HAND-S3; Home Z-axis
%M0108;   HAND-S4; Home X & Y axis
%M0109;   HAND-S5; Reset Hand Load sequencer
```

Grind Sequencer

```
%M0113;   GRIND01; Grind Sequencer, check conditions to start
%M0114;   GRIND02; Increment Tracking counters
%M0115;   GRIND03; Calculate moves
%M0116;   GRIND04; Move X & Y axis to start positions
%M0117;   GRIND05; Move Z-axis to calculated Depth
%M0118;   GRIND06; Move Y axis to finish position
%M0119;   GRIND07; Move Z axis up clearance distance & check if done
%M0120;   GRIND08; If passes are done, setup U-axis or X-axis moves
%M0121;   GRIND09; Repeat sequence if not done
%M0122;   GRIND10; spare stage
```

Chapter 6 : Appendix B: Servo Axis Error Codes Section

FROM PAGE 1-1

Response Methods

1. **Status Only Errors:** Set the *Module Error Present* %I bit and *Module Status Code* or *Axis Error Code* %AI word, but do not affect motion.

Note

Unless otherwise noted, any command which causes a Status Only Error is ignored.

2. **Stop Normal Errors:** Perform an internal abort of any current motion using current ***Jog Acceleration*** and ***Jog Acceleration Mode*** (LINEAR or S-CURVE). The *Drive Enabled* and *Axis Enabled* %I bits are turned OFF after the configured ***Drive Disable Dela***y.

3. **Stop Fast Errors:** Instantly abort all motion by setting the servo velocity command to zero. The *Drive Enabled* and *Axis Enabled %I* bits are turned OFF after the configured ***Drive Disable Dela***y.

GFK-1464 Appendix B Error Reporting B-3

Table B-1. DSM302 Error Codes

Error Number
(Hexadecimal)
Response Description Error Type
00 None No Error All
Configuration Errors
02 Status Only -- Scaled data too big, maximum value in range used -- Axis
03 Status Only -- Home Position > Positive EOT, Positive EOT used -- Axis
04 Status Only -- Home Position < Negative EOT, Negative EOT used -- Axis
Configuration Parameter Errors
10 Status Only -- Position Loop Time Constant too large, Immediate command ignored -- Axis
11 Status Only -- Position Loop Time Constant too small, Immediate command ignored -- Axis
12 Status Only -- Position Loop Time Constant computation overflow, reduced to non-overflow value -- Axis
1E Status Only -- Immediate command Jog Velocity out of range, command ignored -- Axis
1F Status Only -- Immediate command Jog Acceleration out of range, command ignored -- Axis
Program Errors
20 Status Only -- Program Acceleration over range, defaults to 16.7 million cts/sec/sec -- Axis
21 Status Only -- Program Acceleration too small, defaulted to 32 cts/sec/sec -- Axis
22 Status Only -- Scaled Velocity greater than 1 million cts/sec, 1 million cts/sec is used -- Axis
23 Status Only -- Program Velocity is zero, defaulted to 1 count/sec used -- Axis
24 Stop Normal -- Program Position too large -- Axis
25 Stop Normal -- Unconditional Jump Destination not found -- Axis
26 Stop Normal -- Jump Mask error -- Axis
27 Stop Normal -- Wait Mask error -- Axis
28 Stop Normal -- Parameter Position too large -- Axis
29 Status Only -- Dwell time greater than 60 seconds, 5 seconds used -- Axis
Position Increment Errors
2C Status Only -- Position Increment Over range error, increment ignored -- Axis
Find Home Errors
30 Status Only -- Find Home while Drive Not Enabled error -- Axis
31 Status Only -- Find Home while Program Selected error -- Axis
32 Status Only -- Find Home while Force Digital Servo Velocity error -- Axis

33 Status Only -- Find Home while Jog error -- Axis
34 Status Only -- Find Home while Move at Velocity error -- Axis
36 Status Only -- Find Home while Abort bit set error -- Axis

Move at Velocity Errors

39 Status Only -- Move at Velocity while Drive Not Enabled error -- Axis
3A Status Only -- Move at Velocity while Program Selected error -- Axis
3B Status Only -- Move at Velocity while Home Cycle active error -- Axis
3C Status Only -- Move at Velocity while Jog error -- Axis
3D Status Only -- Move at Velocity while Abort All Moves bit is set error -- Axis
3E Status Only -- Move at Velocity Data greater than 8,388,607 user units/sec -- Axis
3F Status Only -- Move at Velocity Data greater than 1-million cts/sec error -- Axis

Table B-1. - Continued - DSM302 Error Codes

Error Number
(Hexadecimal)
Response Description Error Type

Jog Errors

40 Status Only -- Jog while Find Home error -- Axis
41 Status Only -- Jog while Move at Velocity error -- Axis
42 Status Only -- Jog while Force Digital Servo Velocity error -- Axis
43 Status Only -- Jog while Program Selected and not Feed holding error -- Axis

Force Digital Servo Velocity Errors

47 Status Only -- Force Digital Servo Velocity while Jog error -- Axis
48 Status Only -- Force Digital Servo Velocity while Move at Velocity error -- Axis
49 Status Only -- Force Digital Servo Velocity while Program Selected error -- Axis
4A Status Only -- Force Digital Servo Velocity while Follower Enabled error -- Axis

Set Position Errors

50 Status Only -- Set Position while Program Selected error -- Axis
51 Status Only -- Set Position Data over range error -- Axis
52 Status Only -- Servo Axis 1,2: Set Position while not In Zone error Aux Axis 3: Set Position while ENC3 Velocity > 128 error-- Axis
53 Status Only -- Attempt to initialize position before digital encoder passes reference point. -- Axis
54 Status Only -- Digital encoder position invalid, must use Find Home or Set Position. -- Axis

End of Travel and Count Limit Errors

56 Status Only -- Commanded Position > Positive End of Travel or High Count Limit -- Axis
57 Status Only -- Commanded Position < Negative End of Travel or Low Count Limit -- Axis
58 Status Only -- (Absolute Position + Position offset) > Positive End of Travel or High Count Limit -- Axis
59 Status Only -- (Absolute Position + Position offset) < Negative End of travel or Low Count Limit -- Axis

Drive Disable Errors

5B Stop Normal -- Drive Disabled while Moving -- Axis
5C Stop Normal -- Drive Disabled while Program Active -- Axis

Software Errors

5F Status Only -- Software Error (Call GE Fanuc Field Service) -- Axis

Program and Subroutine Errors

60 Status Only -- Absolute Encoder Rotary Position Computation error -- Axis
61 Stop Normal -- Subroutine not in list -- Axis

62 Stop Normal -- Call Error (subroutine already active) -- Axis
63 Stop Normal -- Subroutine End command found in Program -- Axis
64 Stop Normal -- Program End command found in Subroutine -- Axis
65 Stop Normal -- Sync subroutine encountered by non-sync program -- Axis

Program Execution Errors

71 Status Only -- Too many programs requested in same PLC sweep -- Module
72 Status Only -- Request Program 0-10 with multi-axis program active -- Module
73 Status Only -- Request two programs on same sweep with program active -- Module
74 Status Only -- Request two programs for same axis, lower number program executed -- Module
75 Status Only -- Empty or Invalid Program requested -- Module
76 Status Only -- AQ Move Command Position Out of Range -- Axis

Table B-1. - Continued - DSM302 Error Codes

Error Number
(Hexadecimal)
Response Description Error Type
Program Execution Conditions Errors
80 Status Only -- Execute Program while Home Cycle active -- Axis
81 Status Only -- Execute Program while Jog -- Axis
82 Status Only -- Execute Program while Move at Velocity -- Axis
83 Status Only -- Execute Program while Force Digital Servo Velocity -- Axis
84 Status Only -- Execute Program while Program Selected -- Axis
85 Status Only -- Execute Program while Abort All Moves bit set -- Axis
86 Status Only -- Execute Program while Position Valid not set -- Axis
87 Status Only -- Execute Program while Drive Enabled not set -- Axis
88 Status Only -- Execute Program with active Error Stop (Axis Enabled off) -- Axis
Program Synchronous Block Errors
8C Status Only -- Sync Block Error during CMOVE -- Axis
8D Status Only -- Sync Block Error during Jump -- Axis
EEPROM Errors
90 Status Only -- Flash EEPROM memory programming failure -- Module
Hardware Limit Switch Errors
A0 Stop Fast -- Limit Switch (+) error -- Axis
A1 Stop Fast -- Limit Switch (-) error -- Axis
Hardware Errors
A8 Stop Fast -- Out of Sync error -- Axis
A9 Stop Fast -- Encoder Loss of Quadrature or Linear Feedback Loss of Signal error -- Axis
Digital Servo Alarms
B0 Stop Normal -- Main DC power supply over voltage -- Axis
B1 Stop Normal -- Control power under voltage -- Axis
B2 Stop Normal -- Dynamic brake failure Axis
B3 Stop Normal -- Main DC power supply under voltage -- Axis
B4 Stop Normal -- CNV Overload -- Axis
B5 Stop Normal -- Cooling fan failure -- Axis
B6 Stop Normal -- Over current -- Axis
B7 Stop Normal -- Regenerative discharge energy error; resistor thermal switch open -- Axis
B9 Stop Normal -- Control power under voltage -- Axis
BA Stop Normal -- Error detected by IPM circuit -- Axis
BB Stop Normal -- Main DC power supply under voltage -- Axis
BD Stop Normal -- Cooling fan failure -- Axis
BE Stop Normal -- Over current -- Axis

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Table B-1. - Continued - DSM302 Error Codes (Continued)

Error Number
(Hexadecimal)
Response Description Error Type
Encoder Alarms
C0 Stop Fast Servo not ready when MCON command is on - may be caused by E-STOP input to amplifier. Axis
C1 Status Only -- Serial Encoder Battery Low -- Axis
C2 Stop Normal -- Serial Encoder Battery Failed -- Axis
C3 Stop Normal -- Servo Motor Over Temperature -- Axis
C4 Stop Fast -- Servo Motor Over Current -- Axis
C5 Stop Fast -- Loss of Encoder -- Axis
C6 Stop Fast -- Error in encoder pulse detection -- Axis
C7 Stop Fast -- Encoder counter error -- Axis
C8 Stop Fast -- -- Encoder LED is disconnected -- Axis
C9 Stop Fast -- Encoder CRC checksum failure -- Axis
CA Stop Fast -- Unsupported encoder, linear or Type A -- Axis
CB Stop Fast -- Unsupported encoder, Type C -- Axis
DSP Alarms
D1 Stop Fast -- Over current Detected -- Axis
D2 Stop Fast -- Loss of Analog Feedback -- Axis
D3 Stop Fast -- Over Acceleration Detected -- Axis
D4 Stop Fast -- Over Velocity Detected -- Axis
D5 Status Only -- KpVelFix Too Large -- Axis
D6 Status Only -- IntGainFix Too Large -- Axis
D7 Status Only -- Alpha Calculation Overflow -- Axis
D8 Status Only -- IntGain Calculation Overflow -- Axis
D9 Status Only -- Kp Calculation Overflow -- Axis
DA Stop Fast -- FPGA Error Detected -- Axis
Special Purpose Errors
E0 Status Only Custom Loop Type Mismatch Axis
E2 Stop Fast DSP Interrupt failure Module
Follower Errors
F1 Status Only -- Follower Position Error Limit Encountered -- Axis
F2 Status Only -- Follower Velocity Limit Condition Encountered -- Axis
F3 Status Only -- Follower Ratio B value = 0 -- Axis
F4 Status Only -- Follower Ratio B value < 0 -- Axis
F5 Status Only -- Follower Ratio A/B or B/A > 32 -- Axis
Winder Errors
F6 Status Only -- A/B Change Not Allowed in Winder Mode With Follower Enabled -- Axis
F7 Status Only -- Set Winder Position Immediate Command Out of Zone -- Axis

F8 Status Only -- Zone Length Out of Range or Zone Length Change Exceeded 25% -- Axis
F9 Status Only -- Zone Length Change Not Accepted; Previous Change Still in Effect -- Axis
Internal Errors
FD Stop Fast -- System software error -- Axis
FE Stop Fast -- Unrecognized encoder, not supported -- Axis

GFK-1464 Appendix B Error Reporting B-7

LED Indicators

There are seven LEDs on the DSM302 module, which provide status indications. These LEDs are described below.

STAT Normally ON. FLASHES to provide an indication of operational errors. Flashes *slow* (four times/second) for Status-Only errors. Flashes *fast* (eight times/second) for errors which cause the servo to stop.

ON: When the LED is steady ON, the DSM302 is functioning properly. Normally, this LED should always be ON.

OFF: When the LED is OFF, the DSM302 is not functioning. This is the result of a hardware or software malfunction which will not allow the module to power up.

Flashing: When the LED is FLASHING, an error condition is being signaled.

Constant, CFG LED ON:
The LED flashes slow (four times / second for Status Only errors and fast (eight times / second for errors which cause the servo to stop. The operational error code will be placed in one of the first four %AI status words and the *Module Error Present* %I status bit will be ON.

Constant, CFG LED Flashing:
If the STAT and CFG LEDs both flash **together** at a constant rate, the DSM302 module is in boot mode waiting for a new firmware download. If the STAT and CFG LEDs both flash **alternately** at a constant rate, the DSM302 firmware has detected a software watchdog timeout due to a hardware or software malfunction.

Irregular, CFG LED OFF:
If this occurs immediately at power-up then a hardware or software malfunction has been detected. The module will blink the STAT LED to display two error numbers separated by a brief delay. The numbers are determined by counting the blinks in both sequences. Record the numbers and contact GE Fanuc for information on correcting the problem.

OK The OK LED indicates the current status of the DSM302 module.

ON: When the LED is steady ON, the DSM302 is functioning properly. Normally,

this LED should always be ON.
OFF: When the LED is OFF, the DSM302 is not functioning. This is the result of a hardware or software malfunction which will not allow the module to power up.
CFG This LED is ON when a valid module configuration has been received from the PLC. Flashes *slow* (four times/second) during the Motion Program Store function. Flashes *fast* (eight times/second) during the Write User RAM to EEPROM operation.
EN1 When this LED is ON, the servo drive for Servo Axis 1 is enabled.
EN2 When this LED is ON, the servo drive for Servo Axis 2 is enabled.
EN3 When this LED is ON, the *Force Analog Output* command for Aux Axis 3 is active.
EN4 When this LED is ON, the *Force Analog Output* command for Aux Axis 4 is active.

Appendix B: Servo Axis Error Codes Section

Response Methods

1. **Status Only Errors:** Set the *Module Error Present* %I bit and *Module Status Code* or *Axis Error Code* %AI word, but do not affect motion.

Note

Unless otherwise noted, any command which causes a Status
Only Error is ignored.

2. **Stop Normal Errors:** Perform an internal abort of any current motion using current ***Jog Acceleration*** and ***Jog Acceleration Mode*** (LINEAR or S–CURVE). The *Drive Enabled* and *Axis Enabled* %I bits are turned OFF after the configured ***Drive Disable Dela***y.

3. **Stop Fast Errors:** Instantly abort all motion by setting the servo velocity command to zero. The *Drive Enabled* and *Axis Enabled %I* bits are turned OFF after the configured ***Drive Disable Dela***y.

Table B-1. DSM302 Error Codes

Error Number
(Hexadecimal)
Response Description Error Type
00 None No Error All
Configuration Errors
02 Status Only -- Scaled data too big, maximum value in range used -- Axis
03 Status Only -- Home Position > Positive EOT, Positive EOT used -- Axis
04 Status Only -- Home Position < Negative EOT, Negative EOT used -- Axis
Configuration Parameter Errors
10 Status Only -- Position Loop Time Constant too large, Immediate command ignored -- Axis
11 Status Only -- Position Loop Time Constant too small, Immediate command ignored -- Axis
12 Status Only -- Position Loop Time Constant computation overflow, reduced to non-overflow value -- Axis
1E Status Only -- Immediate command Jog Velocity out of range, command ignored -- Axis
1F Status Only -- Immediate command Jog Acceleration out of range, command ignored -- Axis
Program Errors
20 Status Only -- Program Acceleration overrange, defaults to 16.7 million cts/sec/sec -- Axis
21 Status Only -- Program Acceleration too small, defaulted to 32 cts/sec/sec -- Axis
22 Status Only -- Scaled Velocity greater than 1 million cts/sec, 1 million cts/sec is used -- Axis
23 Status Only -- Program Velocity is zero, defaulted to 1 count/sec used -- Axis
24 Stop Normal -- Program Position too large -- Axis
25 Stop Normal -- Unconditional Jump Destination not found -- Axis
26 Stop Normal -- Jump Mask error -- Axis
27 Stop Normal -- Wait Mask error -- Axis
28 Stop Normal -- Parameter Position too large -- Axis
29 Status Only -- Dwell time greater than 60 seconds, 5 seconds used -- Axis
Position Increment Errors
2C Status Only -- Position Increment Overrange error, increment ignored -- Axis
Find Home Errors
30 Status Only -- Find Home while Drive Not Enabled error -- Axis
31 Status Only -- Find Home while Program Selected error -- Axis
32 Status Only -- Find Home while Force Digital Servo Velocity error -- Axis
33 Status Only -- Find Home while Jog error -- Axis
34 Status Only -- Find Home while Move at Velocity error -- Axis
36 Status Only -- Find Home while Abort bit set error -- Axis
Move at Velocity Errors
39 Status Only -- Move at Velocity while Drive Not Enabled error -- Axis
3A Status Only -- Move at Velocity while Program Selected error -- Axis
3B Status Only -- Move at Velocity while Home Cycle active error -- Axis
3C Status Only -- Move at Velocity while Jog error -- Axis
3D Status Only -- Move at Velocity while Abort All Moves bit is set error -- Axis
3E Status Only -- Move at Velocity Data greater than 8,388,607 user units/sec -- Axis
3F Status Only -- Move at Velocity Data greater than 1 million cts/sec error -- Axis

Table B-1. - Continued - DSM302 Error Codes

Error Number
(Hexadecimal)
Response Description Error Type

Jog Errors

40 Status Only -- Jog while Find Home error -- Axis
41 Status Only -- Jog while Move at Velocity error -- Axis
42 Status Only -- Jog while Force Digital Servo Velocity error -- Axis
43 Status Only -- Jog while Program Selected and not Feedholding error -- Axis

Force Digital Servo Velocity Errors

47 Status Only -- Force Digital Servo Velocity while Jog error -- Axis
48 Status Only -- Force Digital Servo Velocity while Move at Velocity error -- Axis
49 Status Only -- Force Digital Servo Velocity while Program Selected error -- Axis
4A Status Only -- Force Digital Servo Velocity while Follower Enabled error -- Axis

Set Position Errors

50 Status Only -- Set Position while Program Selected error -- Axis
51 Status Only -- Set Position Data overrange error -- Axis
52 Status Only -- Servo Axis 1,2: Set Position while not In Zone error Aux Axis 3: Set Position while ENC3 Velocity > 128 error-- Axis
53 Status Only -- Attempt to initialize position before digital encoder passes reference point. -- Axis
54 Status Only -- Digital encoder position invalid, must use Find Home or Set Position. -- Axis

End of Travel and Count Limit Errors

56 Status Only -- Commanded Position > Positive End of Travel or High Count Limit -- Axis
57 Status Only -- Commanded Position < Negative End of Travel or Low Count Limit -- Axis
58 Status Only -- (Absolute Position + Position offset) > Positive End of Travel or High Count Limit -- Axis
59 Status Only -- (Absolute Position + Position offset) < Negative End of travel or Low Count Limit -- Axis

Drive Disable Errors

5B Stop Normal -- Drive Disabled while Moving -- Axis
5C Stop Normal -- Drive Disabled while Program Active -- Axis

Software Errors

5F Status Only -- Software Error (Call GE Fanuc Field Service) -- Axis

Program and Subroutine Errors

60 Status Only -- Absolute Encoder Rotary Position Computation error -- Axis
61 Stop Normal -- Subroutine not in list -- Axis
62 Stop Normal -- Call Error (subroutine already active) -- Axis
63 Stop Normal -- Subroutine End command found in Program -- Axis
64 Stop Normal -- Program End command found in Subroutine -- Axis
65 Stop Normal -- Sync subroutine encountered by non-sync program -- Axis

Program Execution Errors

71 Status Only -- Too many programs requested in same PLC sweep -- Module
72 Status Only -- Request Program 0-10 with multi-axis program active -- Module
73 Status Only -- Request two programs on same sweep with program active -- Module
74 Status Only -- Request two programs for same axis, lower number program executed -- Module
75 Status Only -- Empty or Invalid Program requested -- Module
76 Status Only -- AQ Move Command Position Out of Range -- Axis

Table B-1. - Continued - DSM302 Error Codes

Error Number
(Hexadecimal)
Response Description Error Type

Program Execution Conditions Errors

80 Status Only -- Execute Program while Home Cycle active -- Axis
81 Status Only -- Execute Program while Jog -- Axis
82 Status Only -- Execute Program while Move at Velocity -- Axis
83 Status Only -- Execute Program while Force Digital Servo Velocity -- Axis
84 Status Only -- Execute Program while Program Selected -- Axis
85 Status Only -- Execute Program while Abort All Moves bit set -- Axis
86 Status Only -- Execute Program while Position Valid not set -- Axis
87 Status Only -- Execute Program while Drive Enabled not set -- Axis
88 Status Only -- Execute Program with active Error Stop (Axis Enabled off) -- Axis

Program Synchronous Block Errors

8C Status Only -- Sync Block Error during CMOVE -- Axis
8D Status Only -- Sync Block Error during Jump -- Axis

EEPROM Errors

90 Status Only -- Flash EEPROM memory programming failure -- Module

Hardware Limit Switch Errors

A0 Stop Fast -- Limit Switch (+) error -- Axis
A1 Stop Fast -- Limit Switch (–) error -- Axis

Hardware Errors

A8 Stop Fast -- Out of Sync error -- Axis
A9 Stop Fast -- Encoder Loss of Quadrature or Linear Feedback Loss of Signal error -- Axis

Digital Servo Alarms

B0 Stop Normal -- Main DC power supply overvoltage -- Axis
B1 Stop Normal -- Control power undervoltage -- Axis
B2 Stop Normal -- Dynamic brake failure Axis
B3 Stop Normal -- Main DC power supply undervoltage -- Axis
B4 Stop Normal -- CNV Overload -- Axis
B5 Stop Normal -- Cooling fan failure -- Axis
B6 Stop Normal -- Over current -- Axis
B7 Stop Normal -- Regenerative discharge energy error; resistor thermal switch open -- Axis
B9 Stop Normal -- Control power undervoltage -- Axis
BA Stop Normal -- Error detected by IPM circuit -- Axis
BB Stop Normal -- Main DC power supply undervoltage -- Axis
BD Stop Normal -- Cooling fan failure -- Axis
BE Stop Normal -- Over current -- Axis

Table B-1. - Continued - DSM302 Error Codes (Continued)

Error Number
(Hexadecimal)
Response Description Error Type
Encoder Alarms
C0 Stop Fast Servo not ready when MCON command is on - may be caused by E-STOP input to amplifier.
Axis
C1 Status Only -- Serial Encoder Battery Low -- Axis
C2 Stop Normal -- Serial Encoder Battery Failed -- Axis
C3 Stop Normal -- Servo Motor Over Temperature -- Axis
C4 Stop Fast -- Servo Motor Over Current -- Axis
C5 Stop Fast -- Loss of Encoder -- Axis
C6 Stop Fast -- Error in encoder pulse detection -- Axis
C7 Stop Fast -- Encoder counter error -- Axis
C8 Stop Fast -- -- Encoder LED is disconnected -- Axis
C9 Stop Fast -- Encoder CRC checksum failure -- Axis
CA Stop Fast -- Unsupported encoder, linear or Type A -- Axis
CB Stop Fast -- Unsupported encoder, Type C -- Axis
DSP Alarms
D1 Stop Fast -- Over current Detected -- Axis
D2 Stop Fast -- Loss of Analog Feedback -- Axis
D3 Stop Fast -- Over Acceleration Detected -- Axis
D4 Stop Fast -- Over Velocity Detected -- Axis
D5 Status Only -- KpVelFix Too Large -- Axis
D6 Status Only -- IntGainFix Too Large -- Axis
D7 Status Only -- Alpha Calculation Overflow -- Axis
D8 Status Only -- IntGain Calculation Overflow -- Axis
D9 Status Only -- Kp Calculation Overflow -- Axis
DA Stop Fast -- FPGA Error Detected -- Axis
Special Purpose Errors
E0 Status Only Custom Loop Type Mismatch Axis
E2 Stop Fast DSP Interrupt failure Module
Follower Errors
F1 Status Only -- Follower Position Error Limit Encountered -- Axis
F2 Status Only -- Follower Velocity Limit Condition Encountered -- Axis
F3 Status Only -- Follower Ratio B value = 0 -- Axis
F4 Status Only -- Follower Ratio B value < 0 -- Axis
F5 Status Only -- Follower Ratio A/B or B/A > 32 -- Axis
Winder Errors
F6 Status Only -- A/B Change Not Allowed in Winder Mode With Follower Enabled -- Axis
F7 Status Only -- Set Winder Position Immediate Command Out of Zone -- Axis
F8 Status Only -- Zone Length Out of Range or Zone Length Change Exceeded 25% -- Axis
F9 Status Only -- Zone Length Change Not Accepted; Previous Change Still in Effect -- Axis
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FD Stop Fast -- System software error -- Axis
FE Stop Fast -- Unrecognized encoder, not supported -- Axis

LED Indicators

There are seven LEDs on the DSM302 module which provide status indications. These LEDs are
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If this occurs immediately at power-up then a hardware or software malfunction has been detected. The module will blink the STAT LED to display two error numbers separated by a brief delay. The numbers are determined by counting the blinks in both sequences. Record the numbers and contact GE Fanuc for information on correcting the problem.

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EN1 When this LED is ON, the servo drive for Servo Axis 1 is enabled.

EN2 When this LED is ON, the servo drive for Servo Axis 2 is enabled.

EN3 When this LED is ON, the *Force Analog Output* command for Aux Axis 3 is active.

EN4 When this LED is ON, the *Force Analog Output* command for Aux Axis 4 is active.