Parker Automation

p/n YPM03301

AcroMILL Cutting Control User's Guide

Effective: October 7, 2002

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Using This Manual

The purpose of the AcroMill *User's Guide* is to provide an easy to use supplement to the AcroMill software. It is recommended the user take a few minutes reading this section before installing AcroMill.

AcroMill software is composed of up to six layers of menu commands. The software provides a powerful data base of commands to fit your specific requirements. The *User's Guide* defines two basic types of F-key commands. These are F-key *menu* commands and F-key *parameter* commands. Menu commands simply activate the next menu. The *User's Guide* designates menu commands with a RUN PROG → RUN PROG MENU (F5) type format. Parameter commands activate tables which are set by the machine operator. In these tables, the arrow(↓) key and Carriage Return (Enter Key) are used in conjunction with selecting specific parameter lines.

As you familiarize yourself with the software, use the *User's Guide* manual and the software HELP screens for assistance. The manual has been structured by the *level* or layer of menu commands. For instance, the FAST JOG menu is located on the second level of the program hierarchy. Information about the FAST JOG menu is detailed in the Level 2 section of the *User's Guide*. Additional information for individual commands is provided on the next level (Level 3). Use the flow diagrams provided at the start of each level section as a map to locate where specific menu commands are located. As an alternative, F-key commands are provided in this manual for quick referencing to specific menus and commands. These F-key paths are provided from the MAIN (Top Level) menu. Use the ESCAPE key to return to the top level whenever required. An example of an F-key path for the FAST JOG menu (located on Level 2) is F6→F1. The F6→F1 format implies pressing F6 followed by F1. Note, the F-key path starts from the MAIN menu. For the example above, the F6 key is the MANUAL menu key located in the MAIN menu. In addition, use the index in the back of the *User's Guide* for quick directory assistance for individual commands and parameters.

The AcroMill *User's Guide* provides command descriptions by the *level*. For instance, the header: JOG→JOG MENU connotes the JOG command (F1) located on Level 2. Here, the menu is described and a brief overview of its menu commands are stated. The detailed descriptions of each command under the JOG MENU will be found on the next level (Level 3). The *User's Guide* is formatted to emulate the displays as you see them. Whenever the heading such as JOG→JOG MENU is stated, go to the next level for details of the menu commands. In each menu references are made to assist you in finding command information.

If you have questions about AcroMill commands, or would like to make suggestions on improving the *User's Guide*, please call or e-mail AMCS at:

Phone: (612)448-9800 Fax: 612-448-9321
Web site: www.acroloop.com
Technical Support: techsupport@acroloop.com

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1. AcroMill Overview

AcroMill is a universal software package designed for its flexibility and ease of use for controlling 2-8 axis of motion in CNC milling operations. It features a built-in EIA-RS-274D interface and RS-274D communication protocol. AcroMill comes equipped with on-board DXF Interfaces, build-in Part Libraries, Kerf Compensation, and a user "*set-able"* Alarm Screen. A high speed multitasking PLC can be set up to be used in conjunction with AcroMill and it runs simultaneously in the background with virtually no sacrifice to performance. AcroMill also allows you to program most I/O functions by simply selecting or specifying the I/O.

AcroMill software pushes the technological envelope and allows you to change system parameters as your requirements dictate. For example, the software can be used to set the parameters of a servo loop such as integral and proportional gains to tune the motors. A handy four channel oscilloscope is built-in the AcroMill software to allow *on-the-fly* diagnostics of the parameters.

WARNING: This software must not be used in conjunction with SMARTDRV.EXE program. This can cause loss of data. Before running AcroMill, make sure the call to smartdrive is *REMM-ed* out in AUTOEXEC.BAT file and the system rebooted.

Installing AcroMill

System requirement:
DOS 6.22 System.
386SX-25 or better CPU. (Preferably 486-33 or faster).
At least 2 Meg of RAM (Preferable 4 Meg).
At least 80 Meg Harddrive.
At least 620k of free memory in the lower memory (for Real Mode only)
ACR8000 Controller plugged into the PC bus and addressed as Card 0 with Version 1.13 or later.
PC Interrupt Int5 Jumper set on the ACR8000.
Color or monochrome VGA or SVGA graphics.(Prefer fast graphics with PCI buss)

AcroMill software (version 1.13.03) comes on one 1.44 MB disk. To install AcroMill

1. Make a directory called AcroMill on your harddisk. For example, you can type

   c:\ **mkdir AcroMill**

2. Change the current directory to the directory created in step 1. For example, you can type

   c:**cd AcroMill**

3. Install the AcroMill software (version 1.13.03) disk from your floppy drive by typing: **a:cinstall**

4. AcroMill is now installed.

Upgrading AcroMill

Upgrades are provided for new features and improvements which may be added to the AcroMill software. It is recommended to read through this section in its entirety before proceeding.

Typically, it is a simple matter of copying the RUN.EXE file over the old one. Before proceeding, we recommend backing up the old version of RUN.EXE first. It should also be noted that the system parameters may change and/or new ones may have been added. Back up of your syspar.fil file before proceeding.

The following is an example of such a copy command when upgrading your AcroMill software.

C:\>**copy a:\run.exe c:\acromill**

The program path may vary for your system. Check the program path AcroMill resides and then copy RUN.EXE to the appropriate directory.

After the RUN.EXE file is copied, the menu structure requires updating from the old version. At the AcroMill directory type:

c:\acromill>**run xyz m**

This will update the menu structure to the correct version.

It was noted that the System Parameters may change and/or new ones may have been added. A list of System Parameters between versions AcroMill 1.13.03 and 1.14.06 are provided below. These are found under the CONTROL (F8→F8→F3) menu.

Angular Acc. Threshold = 10
Root Epsilon = -5.0
Corner Arc Threshold = 90
Mode Incr/Abs = 0
Path Color = 10
Marker Speed = 50.0
Default Lead Radius = 1.0
IgnoreCycleStart = 0

Note, if the kerf compensation is reversed, change the Root Epsilon to a negative value as shown above. This will reverse the kerf to the correct orientation.

Before Starting AcroMill

This section is a preview of the display screens when AcroMill is running. Each status window and dialog box are explained in detail. Become familiarized with the status windows and dialog prompts before running AcroMill. You will find this section is a handy reference for understanding and locating the status information when running programs.

What's on the Screen

Figure 1 shows a typical screen of AcroMill.

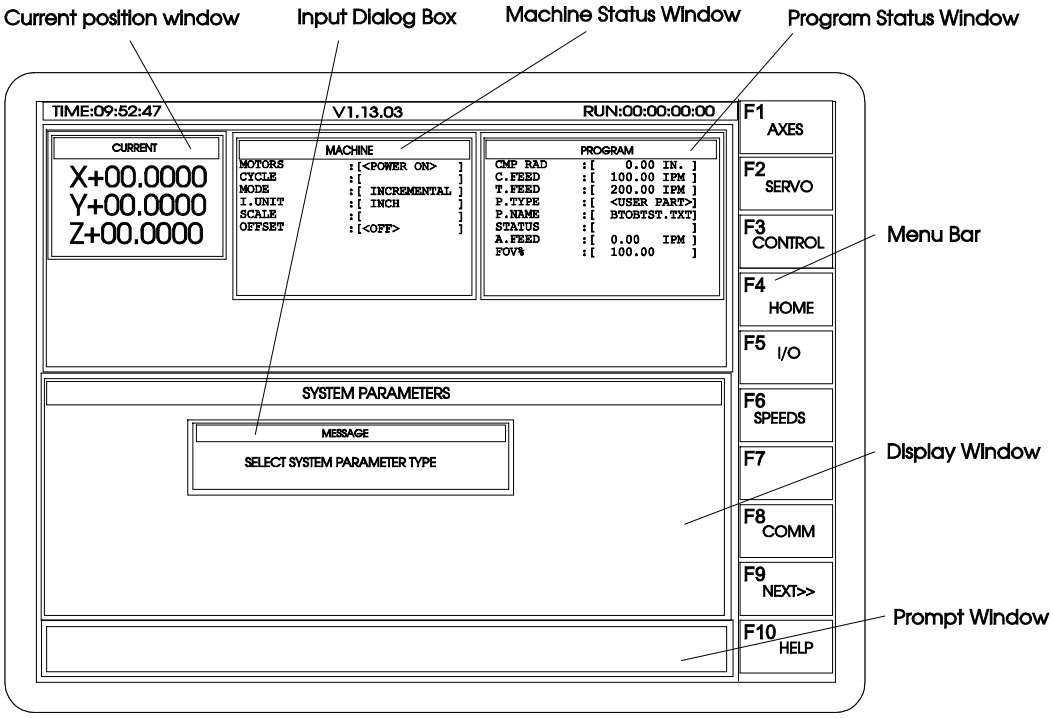


Figure 1. A Typical Screen of AcroMill

Current Position Window shows you the real-time display of the current position of each of the attached axes.

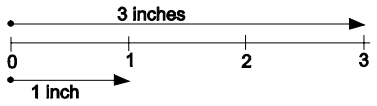
Input Dialog Box is used by AcroMill to prompt you for values of various parameters.

Machine Status Window provides pertinent information on the status of machine parameters such as motors status condition, cycle, unit of measurement, scale, and offset condition. The following explains how to interpret these status conditions and how to set them to your specific requirements.

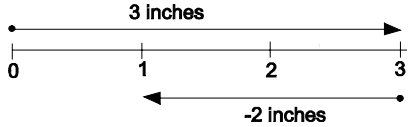
MOTORS Status
- will simply indicate a Power On or an E-Stop input condition.

CYCLE Status
- provides a Running input status when the motors are running.

MODE Status
- indicates the move status to be *absolute* or *incremental*. An absolute move is a move from the defined Home position. The move is always referenced from this position. For example, an absolute move of 3 inches and then an opposite move of 2 inches is illustrated below.



An incremental move is a move defined from a floating reference point. For example, an incremental move of 3 inches and then an opposite move of 2 inches is illustrated below.



To change the Mode Status from Incremental Mode to Absolute Mode, enter the M.D.I. menu (F6-F4). Type G90 for the Absolute Mode or G91 for Incremental Mode. Note the Mode Status changes in the Machine Status Window. Hit ESCAPE to save and exit the M.D.I. menu.

Input Unit (I. UNIT, or Unit of measurement)
- provides the unit of measurement in inches or metric (mm) units. To set these units, access the Manual Data Input (MDI) menu under Level 2 (see the AcroMill flow diagram for easy tier viewing, p.4-1). Next, from the prompt window enter the G70 command to change to inch units, or G71 for metric (mm) units (see the table for Setup G-Codes on p. 3-2). Note, how *only* the I. Unit status changes units. These are designated as Input Units. The Control Units in the Program Status and Current Position Windows are changed at the DISPLAY command under the NEXT>>menu (see the AcroMill flow diagram). This will be explained below under Program Status Window.

SCALE Status
- indicates the scale for any chosen axis. The scale can be set under Scale Commands. See Scale Commands on page 3-5 for additional information.

WARNING:

Independent scaling of an axis is allowed for non-Kerf radius compensated programs. If Kerf compensation is required, then *all* axes in the Kerf compensation plane must be scaled the same. A final note, do not confuse the Scale status under Scale commands with SCALE/ROT under the RUN menu (Level 3). Changing the Scale parameters under the SCALE/ROT changes the scaling of the part drawing to be created.

Program Status Window shows you status of the current program including a real-time display of feedrate parameters. The following explains how to interpret these status conditions and how to set them to your specific requirements.

CMP RAD Program status
- displays the kerf width in inches or metric (mm) units. Kerf width is set under CMP RAD (F1) prior to running a program. Note, a negative number will cause erroneous machine movement.

C.FEED Program Status (Cut Feed status)

- displays the parameter set in the SPEEDS menu (F6) under Level 3. The default is set to 50 units per minute (UPM) and can be changed to the specific requirements of the cutting operation.

T.FEED Program Status (Trial Feed status)

- displays the parameter set in the SPEEDS menu (F6) under Level 3. The default is set to 50 UPM and can be changed to the specific requirements of the trial feed operation.

P.TYPE Program Status (Program Type status)

- displays the current source of the loaded program. This can be a program from the LIBRARY or a **.txt** file from the USER FILE. The P.Type Program status line displays USER PART for a program from the USER FILE.

P.NAME Program Status

- displays the name of the program currently being run.

STATUS

- indicates the status of the program. Do not confuse the Status display in the Program Status Window with the STATUS key (F6) under Level 5, the SCREEN menu bar. This sets up the window sizes of the graphics. Another STATUS (F9) found under both the MAIN MENU (Level 1) and RUN PROG (Level 2) menu bars is used as a quick access to view I/O, the Gain/Lag screen, Tool Information status, and Program Parameters.
The Status display line will indicate <Pause> if the program is stopped. The STOP key (F1) under the RUN PROG menu bar will create a <Pause> condition. RESUME key (F8) will cause a <Resume> condition to be displayed on the Status display line. To resume running the program, hit the RUN key (F3) or DRY RUN (F4) to resume running the program. The RESET key (F1) will reset the program back to the home position. To initiate the program again hit the RUN or DRY RUN key. The Status display line will indicate a Program End <Prog End> when initializing a program or resetting one. Just hit Carriage Return to start the new program. Then hit the Carriage Return key to start the program. The Block Wait <Blk Wait> display will be displayed on the Status display line when the BLOCK key (F7) is activated. The BLOCK key allows stepping through each block of code and is used in conjunction with the START key (F2).

The units of measurement are the Control units and can be set to inches or metric (mm) under DISPLAY in the NEXT>>menu bar. The path from the MAIN menu is F8-F8-F9-F5. Change the Input Dialog Box to SETUP DISPLAY GRAPHICS by hitting Carriage Return twice. Use the arrow (↓) keys to position the cursor under the "Control Mode" parameter. Type "1" for metric or "0" for inches. Exit AcroMill to complete the Control unit changes. Start AcroMill by typing: **run xy** to get back in the program. Note, *all* units of measurement change in the Program Status Window and the Current Position Window.

Note

Control units should be set at the initial start up of your machine. Contact your machine builder if you want to change the unit of measure. Changing the Control units require changing all the units for the system parameters. For example:
+Soft Travel Limit :[10.00000] inches. Changing the Control units to metric changes only the units of measurement, not the variables: +Soft Travel Limit :[10.00000] millimeters.

The table below shows the relationship between the Control units and Input units.

Control Units / Input Units	Inch	Metric
Inch		
Metric		

A.FEED Program Status - displays the actual feedrate of the machine.

FOV% Program Status - displays the Feedrate Override increment in percentage setup in FPOSITION (I/O menu) under Level 5.

Menu Bar shows you the current active menus. A menu can be selected by hitting a function key (for example, F1) attached to it. Hitting the ESCAPE key will take you back to the previous menu.

Display Window is used by AcroMill to display text or graphics.

Prompt Display is used by AcroMill to display errors or to occasionally ask for an input.

Selecting Commands

The most common way of selecting a command in AcroMill is to use the menu bar. You can select a command by simply hitting the function key attached to a menu of the menu bar. Also, a mouse can be used to select the Run commands by clicking on the command. Performing this will either take you to the next menu or execute the command attached to the menu.

Entering Numbers

You enter numbers in AcroMill using three types of dialog boxes.

Static Dialog Box

A typical **Static Dialog Box** is shown in Figure 2.

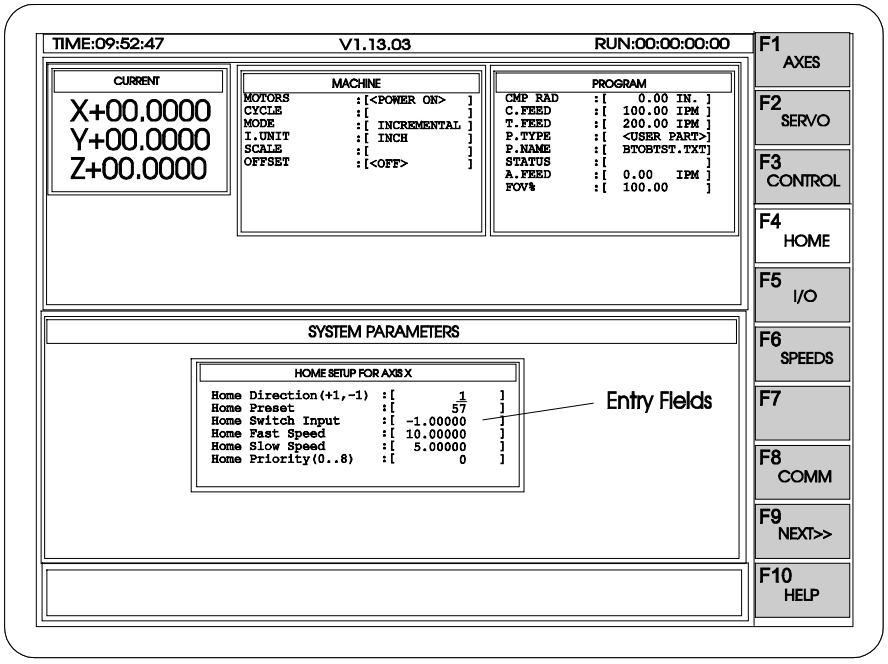


Figure 2. A Typical Static Dialog Box

When AcroMill brings up a static dialog box, you can change the values shown in the dialog box by simply typing them in the entry fields. Use the down arrow (↓) key to go to the next entry and the up arrow (↑) key to go the previous entry in a static dialog box. You can also use the TAB key to cycle through the entries. When you are done entering the values, hitting Carriage Return will make the static dialog box disappear.

List Dialog Box

A second type of dialog box called a **List Dialog Box** is shown in Figure 3.

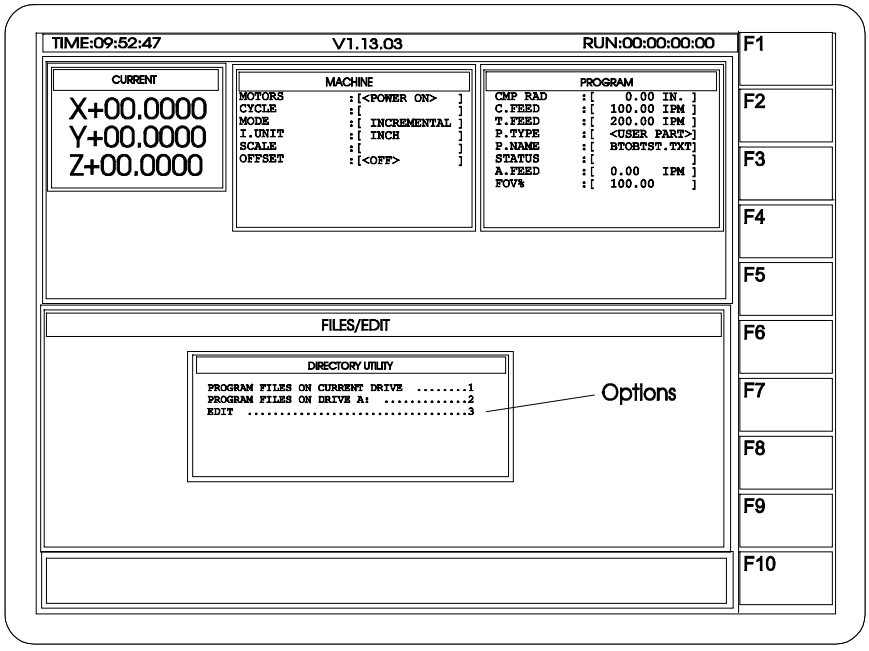


Figure 3. A Typical List Dialog Box

A list dialog box shows you a number of options to select from. You can select an option by typing the number corresponding to the option. In addition to the usual exit option provided, an ESCAPE key will always get you out of a list box dialog box.

Dynamic Dialog Box

A third type of dialog box used in AcroMill is the dynamic dialog box as shown in Figure 4.

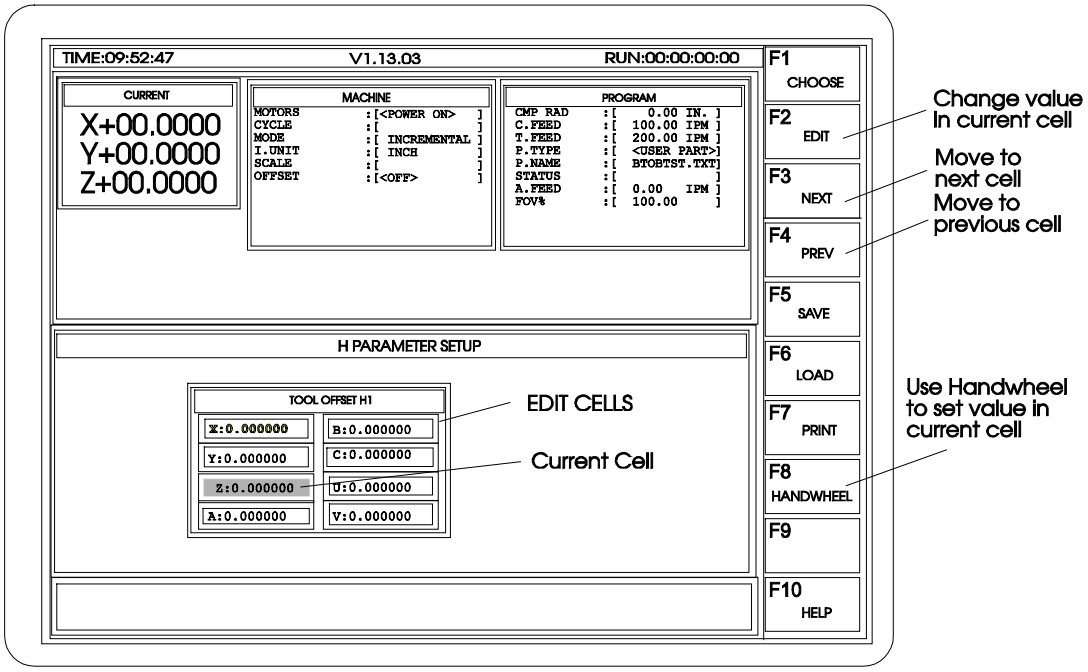


Figure 4. A Typical Dynamic Dialog Box

A **Dynamic Dialog Box** shows Edit cells. Each cell typically contains a parameter value. The highlighted cell is the currently selected cell. You can move from cell to cell by selecting NEXT and PREV menu keys. You can change the value of the parameter shown in the currently selected cell by using the EDIT menu key. Some dynamic dialog boxes also allow you to enter a value in a cell by using the handwheel. You can use the handwheel in this manner by selecting the HANDWHEEL menu.

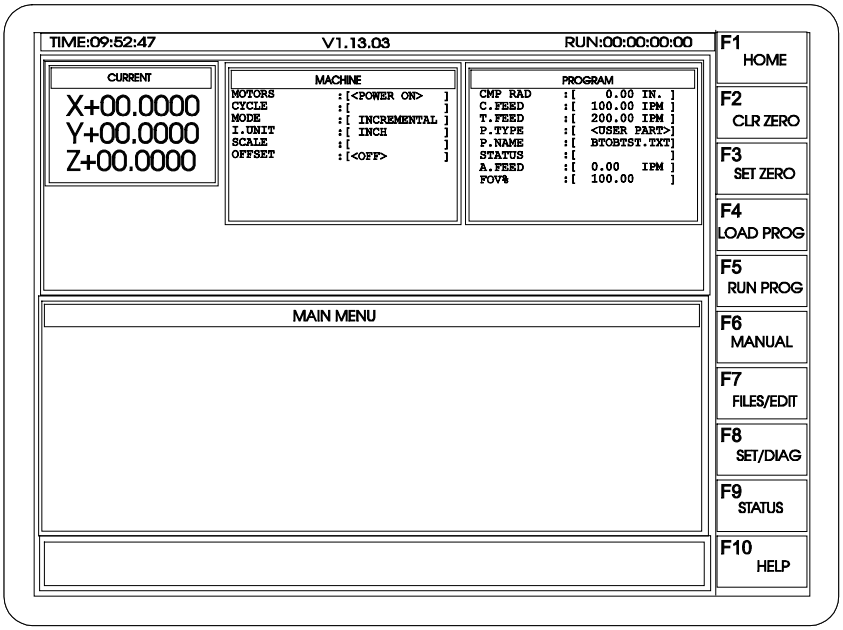
Starting AcroMill

Typically, AcroMill will activate as you power up the machine. In case this does not happen, AcroMill can be started by using the following sequence of commands.

c:\ **cd AcroMill**

c:\AcroMill **run xyz**

The argument **xyz** specifies the number of axes (two in this case) to be attached in the program. The illustration below is the HOME menu screen.



2. A Sample Session With AcroMill

The chapter takes you through a “test drive” of AcroMill. It assumes you have already installed the AcroMill software on your machine (page 1-3 shows you how to install AcroMill software on your machine).

Running Diagnostics

In order to ensure AcroMill on a host computer is correctly connected to an ACR2000/ACR8000 card, you should run the following diagnostics.

Note

If you are initializing AcroMill for the first time, make sure that your servo loops are not active. Default settings for parameters used by AcroMill may cause motors to runaway.

☞**To make sure that the ACR8000 card is properly installed**

1. Initialize AcroMill (See **Starting AcroMill** on page 1-12.)
2. Select **SET/DIAG** menu by pressing F8.
3. Select **DIAGNOSTICS** menu by pressing F9.
4. Enter the supplied password (default 1).
5. Select **ACR8000** menu by pressing F8.

AcroMill should respond by bringing up a dialog box indicating the version number of the card and a "SYSTEM O.K." prompt. See Toubleshooting section for what to do in case the test fails.

☞**To make sure that host computer is appropriately setup**

1. Initialize AcroMill (See **Starting AcroMill** on page 1-12).
2. Select **SET/DIAG** menu by pressing F8.
3. Select **DIAGNOSTICS** menu by pressing F9.
4. Enter the supplied password (default 1).
5. Select the **COMPUTER** command by pressing F7 (path is F8-F9-F7 from MAIN menu).

AcroMill should respond by the message 'Testing Interrupt . . . Check O.K.' See Troubleshooting section page 10-1 for what to do in case the test fails.

Tuning Servos

Before running a program on AcroMill, make sure the servos are appropriately tuned. This section describes the steps required to tune a motor.

Note

Before attempting to use the tuning features make sure each axes being tuned is a closed loop system with good encoder and Digital to Analog Conversion (DAC) signals. In addition, the servo amplifier must be fully operational and tuned if it is to be controlled in the velocity mode. See AXES menu described on page 6-23, and SERVO menu on page 6-24 for some of the parameters that need to be set for each servo loop.

The TUNE (F9) menu under level 3 allows setting up a four channel oscilloscope. Each scope channel can be programmed to look at data in the range of following error, current position (command position), actual position, actual velocity, and voltage output.

Tuning a motor consists of the following steps.

☞ **Choose a channel**

1. Bring up AcroMill (See **Starting AcroMill** on 1-11).
2. Select **SET/DIAG** menu by pressing F8.
3. Select **DIAGNOSTICS** menu by pressing F9.
4. Enter the supplied password (default 1).
5. Select the **TUNE** menu by pressing F9.
6. Select **SETUP** (F3)
7. Select **CHANNEL** (F1). CHANNEL is the scope channel setup menu and allows for use of up to four different channels.
8. **ON/OFF** (F2) is used to activate/deactivate the four individual channels.
9. Setup **VSCALE** (F3) for each channel. VERTICAL SCALE allows to set up and change the vertical units per division for each channel. Enter the units and hit the Carriage Return.
10. Determine **VOFFSET** (F4) for each channel. VERTICAL OFFSET allows to set up and change the vertical offset in units for each channel. Enter the units and hit the Carriage Return.
11. Setup **PROFILE** (F5). This brings up the PROFILE menu for setting and changing individual motor excitation parameters. These parameters are DISTANCE (F3) in units, VELOCITY (F3) in units per minutes, and ACCeleration/DECeleration (F5) in units/sec/sec. Up to four individual scope channels can be activated, ON/OFF key (F2), for viewing of these parameters. The information can be stored by utilizing STORE (F10) key. Press ESCAPE to go back.
12. Select **HSCALE** (F6). HORIZONTAL SCALE sets the horizontal scale in units per division. Enter the units and hit the Carriage Return.
13. Choose **DRAWCOLOR** (F7). DRAW COLORS uses standard ANSI terminal emulation to determine the channel draw colors (ISO 6429). Sixteen colors can be chosen (0-15). **0**=black, **1**=blue, **2**=green, **3**=cyan, **4**=red, **5**=magenta, **6**=brown, **7**=light gray, **8**=dark gray, **9**=light blue, **10**=light green, **11**=light cyan, **12**=light red, **13**=light magenta, **14**=yellow, **15**=white. Hit the Carriage Return key after selection. A color bar of the sixteen colors can be viewed under the NEXT>> menu (Level 4) under T.COLOR (F3).
14. Select **AXIS** (F8). AXIS changes the source axis and is setup when AcroMill is initialized. For example, C:\ACROMILL>**run *xyz*** *or* **run *xy***.
15. Determine **SOURCE** (F9). This selects the parameters to be viewed on any of the 4 channels. The following is a list of the parameters available for diagnosis: Cur Pos (current position or command position), Act Pos (actual position), Inst Vel (instantaneous velocity), Vout (voltage out), and Foll Err (following error). Typically, the source data should be following error for tuning. As a note, all four channels can be used for providing information about one axis. For example, Ch1 can show following error, Ch2 can show actual position, Ch3 can show actual velocity, and Ch4 can show Voltage out. All of these parameters will provide information about one axis. Where multiple channels show the same axes, only the *first* motion profile for a given axis is used. The rest are ignored.

16. Any channels not required should be turned OFF.
17. **STORE** (F10) stores the parameter setup to disk. After all the parameters are setup, use the STORE key to save to diskette.
18. Leave the channel selected via F1 to the axis that requires tuning first and hit escape to go back to the previous menu. As an example, if Channel 1 is setup to show X axis following error, and X axis gain is being setup, then leave Channel 1 selected.

☞ **Choose a servo parameter to change**

19. On the selected channel the source axis parameters can now be changed from the TUNE menu bar (Level 4). Press **PARAM** (F2) until the servo parameter desired is highlighted in green. Choose the parameter **P** for this example (For definitions of parameters see index). Hit the Carriage Return key on the keyboard.

    AcroMill will prompt you to enter a value for **P**.

20. Type in the value for the parameter (Type in **0.003** for this example), followed by a Carriage Return. AcroMill will display the updated value in the top window.

☞ **Trigger motion profile for all selected motors and record**

21. Selecting **RUN/SAMP** (F8) from the TUNE menu will cause all the stored profiles in Channels 1 through 4 to be sent to the corresponding motor. Each channel can be programmed to excite a motor with distance and velocity profiles. Gain settings can be easily changed and the response of the motors stored onto the disk.

Note

If only one motor is setup, Channel 1 should be setup for that individual motor. All remaining channels should be turned off *or* not setup for other motors.

☞ **Store the actual response in an array**

22. AcroMill will respond by taking 128 samples based on the input profile (see Level 5 for PROFILE (F5)) and storing the programmed data for each turned on channel source into an array. AcroMill will also display the actual values of this data on the screen. Selecting **SETUP** (F3) and then **STORE** (F10) will store this data along with the channel setup parameters on to the disk. Hit ESCAPE to return to previous menu.

☞ **Display the response on the screen**

Note

Sometimes the response captured when **RUN/SAMP** (F8) is activated may be out of bounds for the display. To correct this go to SETUP (see steps 6 through 17).

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23. Select **CLEAR** (F9) under the TUNE menu (Level 4) to clear the screen, and **REDRAW** (F10) to redraw the response.

24. Based on the response, repeat steps 6-20 for changing the servo parameters. Again, utilize steps 21-23 to observe the display response.

Notes

1. Too much P-gain will cause oscillations.
2. Not enough gain will cause large swings in the Foll Err (following error).
3. Choose a velocity that is close to the maximum RPM of the motor.
4. Choose a **SLOPE** (ACC) of ZERO to simulate a **STEP** response.
   In doing so choose a velocity that is attainable by the motor.

Homing the Machine

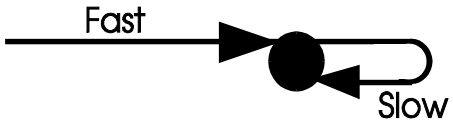
The first step in running a machine is the Home. The HOME command is a reference point and may be the position the cutting tool resides when the machine is not running a program or when disabled. Home is typically defined by a physical input such as a limit switch. The sequence of commands shown below assumes home switches for each axis are already installed and tested. Also, all the parameters for the servo loops have been properly set (See AXES menu described on 6-23 and SERVO menu described on page 6-24).

Note

The sequence of commands shown here will home all axes **simultaneously**. If you want to home the axes sequentially, you must assign different home priorities (in step 11 below) to each axis. See Home Setup menu on page 6-35.

☞ **Setup Home Parameters**

1. Select **SET/DIAG** (F8) from the MAIN menu to access the SETUP/DIAGNOSTICS menu.
2. Select **SYS PARAM** (F8) under Level 2 to access the SYSTEM PARAMETERS menu.
3. Enter the supplied password (default 1) followed by Carriage Return.
4. Select **HOME** (F4) to bring up a static menu showing the HOME SETUP FOR AXIS X.
5. Enter the Home Direction as 1. Use the (↓) key to go to Home Preset entry field.
6. Enter the Home Preset as 0. Use the arrow (↓) key to go to HomeSwitch Input field.
7. Enter the Home Switch Input number (for example, 33) for Axis 0 (Axis X). Use the arrow (↓) key to go to Home Fast Speed entry field.
8. Enter the faster speed (for example, 30 units/min) at which home switch on Axis 0 will be approached as Home Fast Speed entry speed. Use the arrow (↓) key to go to Home Slow Speed entry field.
9. Enter the slower speed (for example, 5 units/min) at which home switch on Axis 0 will be re-approached as HomeSlow Speed entry field. Below, is a representation of a Home cycle using the Home Fast and Home Slow speeds.



Use the (↓) key to go to Home Priority entry field.

10. Enter the Home Priority as 1 for Axis 0.
11. Hit Carriage Return to enter the static menu showing the Home parameters for the next axis. If you missed changing a home parameter for Axis 0, hitting Carriage Return successively will cycle you back to the Home parameters for Axis 0.
12. Repeat Steps 6-10 for each axis.
13. Hit ESCAPE three times to get back to the **MAIN** menu**.**

☞ **Execute the Home Cycle**

After the Home parameters have been set, you can start the Home cycle.

1. From MAIN menu select **HOME** (F1) to select the Home cycle.
2. Hit Carriage Return to start the Home cycle.

AcroMill will start the home cycle and display "CYCLE IN PROGRESS . . . HIT ESCAPE TO ABORT."

Jogging the Machine

Once the Home cycle has been run, you may want to jog the machine to a particular position before starting execution of a program.

☞ **Setup JOG Parameters**

1. Select **SET/DIAG** (F8) from the MAIN menu to access the SETUP/DIAGNOSTICS menu.
2. Select **SYS PARAM** (F8) under Level 2 to access the SYSTEM PARAMETERS menu.
3. Enter the supplied password (default 1) followed by Carriage Return.
4. Select **NEXT>>** (F9) to go to the second set of menus for SYSTEM PARAMETERS (Level 4).
5. Select **JOG** (F1) menu to bring up static dialog box for AXIS X JOG PARAMETERS .
6. Enter the Jog Feedrate (for example, 15 units per minute). Use the arrow (↓) key to go to Jog Rapid entry field.
7. Enter a fast speed (for example, 50 units per minute) for the Jog Rapid parameter for Axis 0. Use the (↓) key to go to Jog ACC and DEC entry field.
8. Enter the acceleration and deceleration parameters for the jog as Jog ACC and DEC (for example, 10 UPM). Use the (↓) key to go to Jog Direction entry field.
9. Enter the Jog Direction indicating whether you want the axis to move in the same direction or opposite to that specified. Use a value of zero for the same direction.
10. Hit Carriage Return to go to the Home parameters for the next axis. If you missed changing a jog parameter for Axis 0, hitting Carriage Return will cycle you back to the Home parameters for Axis 0.
11. Repeat Steps 6-9 for each axis.
12. Hit ESCAPE four times to get back to the **MAIN** menu**.**

☞ **Jogging Axes**

14. From the MAIN menu, access the MANUAL menu (F6). Select **FAST JOG** (F1) or **SLOW JOG** (F2) to bring up the Jog Mode dialog box.

15. The **INC** (F1) key provides incremental moves based on the F3-F7 keys. The increment moves range from 1.00000 to 0.00010 units (inches or metric).

16. The **CONT** (F2) key allows continuous jogging. The Jog Mode dialog box is used to jog the axes in the desired direction. Use the number keys on the keyboard for jogging the axes (i.e., the PgUp (↑) key jogs the motor in the +Z direction. While the PgDn (↓) key jogs the motor in the -Z direction). Stop the jog by releasing the key.

17. The jog moves can be reset to zero by using the **SET ZERO** (F8) key.

Using the Manual Data Input (MDI) Mode

AcroMill supports a set of the EIA-274D interface command set. The MDI menu extends a non-ASCII key pad to include commonly used ASCII characters (Refer to Manual Menu section for MDI description and illustration).

☞ **To Use MDI**

1. From MAIN menu select **MANUAL** (F6) and then **MDI** (F4) to go to MDI menu.

2. Type a MDI command such as G0 X2 Y2. See the chapter on **RS-274D Format** (page 3-1) for additional MDI commands.

Editing and Running a Program

AcroMill allows you to edit and run your own programs. This exercise assumes you have been able to successfully home (see **Homing the Machine** on page 2-6 the machine).

☞ **To view list of programs on disk**

1. Select **EDIT/FILES** (F7) menu from the **MAIN** menu.
2. Select **FILES DIR** (F2) menu to bring up DIRECTORY UTILITY dialog box.
3. Choose option 1 (PROGRAMS FILES ON CURRENT DRIVE) from the DIRECTORY UTILITY dialog. AcroMill will show you a list of text files on the drive that have the *.TXT extension.

4. Hit ESCAPE to go back to the **FILES/EDIT** menu.

☞ **To edit a program on disk**

5. Select **EDIT** menu (F1) to invoke the editor.

AcroMill will bring up the FILE NAME (.TXT) dialog box.

6. Choose the file name **1111.txt** by using the arrow (↓) keys. Hit Carriage Control after selection.

7. Enter the program shown below. The edited program will draw a complete square.

```
F100
G1X1
G1Y1
G1X–1
➔ G1Y–1
```

The following is a representation of the **1111.txt** program.

Program Statement	***Explanation***	**Action**
F100	*Set Feedrate to 100*	
G1X1	*In Feedmode, move X-axis by 1”*	
G1Y1	*In Feedmode, move Y-axis by 1”*	
G1X–1	*In Feedmode, move X-axis by -1”*	
G1Y–1	*In Feedmode, move Y-axis by -1”*	

8. Use the ESCAPE key to get the following prompt: SAVE THE FILE BEFORE EXITING? (Y/N):

9. Select **Y** (F8).

10. Hit the ESCAPE key again to go back to the main menu.

☞ **To load and run a program from disk**

11. Select **LOAD PROG** (F4) to go to the LOAD PROGRAM menu.

12. A message in the Input dialog box activates:

    HIT F1 TO SELECT KERF WIDTH.

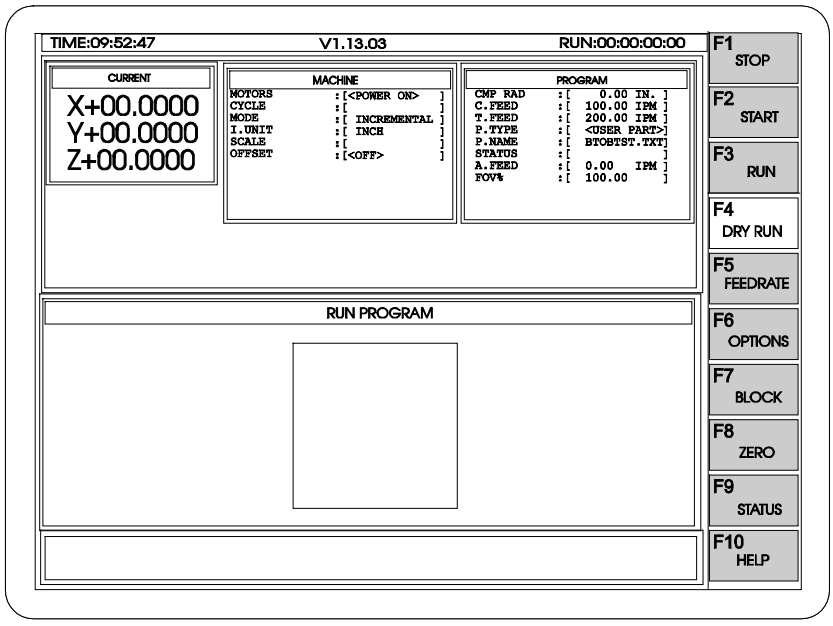
    Set the kerf width to the appropriate size.

13. Select **USER FILE** (F2) to indicate you want to load your own program.

14. Select **1111.txt** as the file name in the **PART PROGRAM (.TXT)** dialog box. Hit Carriage Return.

    AcroMill will respond by going into the **RUN PROG** menu.

The illustration below shows the **1111.txt** drawing on the AcroMill display screen. Note the DRY RUN command has been selected to test run the program.



15. Select **GRAPHICS** (F7) under the **OPTIONS** (F6) menu (Level 3) to instruct AcroMill to display the movement of the axes on the display screen. Hit the ESCAPE key.

16. Select DRY RUN(F4) to test run the program. Once you are sure you have the correct feedrates, acceleration, decelerations, and moves use the **RUN** (F3) command to run the program. Hit Carriage Return to run the program.

3. RS-274D Format

AcroMill uses Electronic Industries Association (EIA) standard RS-274D as the format for library parts, manual data commands, CAD converted files and programs coming in from the serial port. The RS-274D format is also referred to as "WORD ADDRESS" format in some publications.

All RS-274D commands consists of a command letter followed by a numerical argument. These commands are divided into the following categories.

Command Category	Description
Axis Movement	Lines and Arcs
Setup	Feedrate, Circle Direction, Kerf On/Off
G Codes	Preparatory Function; Modal and One-shot
M Codes	Cutting Tool Controls- On/Off
Scale Command	Scales spindle motor speed by a ratio
Program Flow	Conditional/Unconditional, routine Jumps
Parametric Math	Complex Evaluations; N Command

The following tables summarize the Command Category listed above.

Axis Movement Commands

Command	Description
X	Specify X axis endpoint
Y	Specify Y axis endpoint
Z	Specify Z axis endpoint
A	Specify A axis endpoint
B	Specify B axis endpoint
C	Specify C axis endpoint
U	Specify U axis endpoint
V	Specify V axis endpoint
I	Specify X center in XY, XZ ARC move
J	Specify Y center in XY, YZ ARC move
K	Specify Z center in XZ, YZ ARC move

Setup Commands

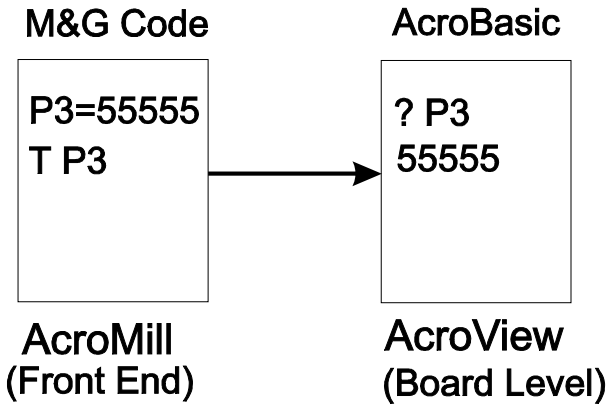
Command	Description
F	Feedrate
P	Program Parameters 1..100
S	Spindle Speed
D	Select Kerf
H	Select Offset

Spindle Scaling (Scaling Command)

Spindle Scaling multiplies all arguments to S commands by this factor before sending it to the control. The ratio of $\frac{Volts}{RPM}$ represents the units of measurement used in Spindle Scaling. If the maximum speed of the spindle motor is 3000 rpm, the corresponding voltage will be 10 volts which is the typical maximum analog signal output in Acroloop motion controllers. It follows that if the Spindle Scaling is set for 1500, the voltage is equal to a proportional 5 volts. Spindle scaling setup can be found under the Spindle Setup table on pages 7-27 through 7-29.

T-Codes

T-Codes can be used along side of M and G-Codes to attach parameter values from AcroMill and transfer these values to the board level. In general, the illustration below depicts transfer.



An example of a T-Code program would like the following steps procedure. In this example, program 5 (P05>) is used.

1. P05>10 P4=P0
   20 BIT60=NOT BIT60
   30 GOTO 10

   This program is on laptop and serially connected to AcroMill.

2. On AcroMill in M.D.I. the general format is:

   P*x*=*xxxxx*
   T P*x*

   Type in: **P3=55555**
   T P3

3. On AcroView (ask Acroloop for a copy of this diagnostic software) type in **?P0** or **?P4** Value come back as 55555.

G-Codes

Command	Description
G0	Rapid Positioning
G1	Linear Interpolation
G2	Circular or Helical Interpolation CW
G3	Circular or Helical Interpolation CCW
G4 Fxx	Dwell (Fxx seconds) where x=.1 to 999.9
G10	Set Offsets
G17	XY Plane Selection
G18	ZX Plane Selection
G19	YZ Plane Selection
G31	Block Skip
G40	Turn Off Kerf Compensation
G41	Turn On Left Kerf Compensation
G42	Turn On Right Kerf Compensation
G70	Inch Mode
G71	Metric Mode
G90	Absolute Mode
G91	Incremental Mode
G92	Floating Zero Preset
G100	Disable Fixture Offsets
G101-G132	Enable Fixture Offsets
G200	I/J Inversion (I/J=01,02)

**Note G100 is the same as Hoffset (H0). See HOFFSETS
G101-132 is the same as Hoffsets (H1-32). See HOFFSETS
G90 and G91 is not recommended to be used in the same program.

M Codes

The M-Codes must be setup with a corresponding output. These outputs can be any of the 32 outputs standard offered and are numbered 32-63. See OUTPUTS in Level 4 for output setup.

M-Codes are universally accepted when the RUN command is entered. However, the DRY RUN command which is used in test verification applications will inhibit the standard M-Codes listed below. It should be noted that customized M-Codes will function under both RUN and DRY RUN commands.

Command	Description
M0	Program Stop For Inspection
M1	Optional Stop For Inspection
M2	Stop (End) Program
M3	Spindle On Clockwise
M4	Spindle On Counterclockwise
M5	Spindle Off
M6	Tool Change
M7	Coolant Mist
M8	Coolant Flood
M9	Coolant Off
M12–M24	Turn On Discrete Outputs
M25–M37	Turn Off Discrete Outputs
M95 (Version 1.15)	Keeps axis tangential to the programmed path
M96 (Version 1.15)	Terminates or cancels M95
M97 (Version 1.15)	Keeps axis to the right of the programmed path
M98 (Version 1.15)	Keeps axis to the left of the programmed path
M99 (Version 1.15)	Terminates or cancels M97 and M98

M1XX Will wait until software relay#XX is energized.
M2XX Will wait until software relay#XX is de-energized.

} See OEM Manual on page 17 for setup of Custom M-Codes

**Note: M-codes M95, M96, M97, M98, and M99 will be available in AcroMill version 1.15.

Scale command

Format: **SCALE X____ Y____**

The Scale command will scale any axis to a desired amount. The Default is SCALE X1 Y1. Independent scaling of axis is allowed for non-Kerf width compensated programs. If Kerf compensation is required, all axes in the Kerf comp plane must be scaled the same. The following example will illustrate the use of the scaling feature.

```
G91
SCALE X1Y1
G1X1
GOSUB 2000
SCALE X2.5 Y2
G1X1
GOSUB 2000
SCALE X3 Y3.5
G1X1
GOSUB 2000
G90
G0 X0Y0
SCALE X1Y1
M2
N2000 G2I0J-1X0Y0
RET
```

Program Flow Commands

N Command Block Numbering

Format: Nxxxx

Example:
```
G91
F100
P5=0
N100
P5=P5+1
X1
Y1
IF P5<5 THEN GOTO 100
M2
```

Tip: If it was desired to run the same shape forever, remove the IF command line out and set the RepeatForEver parameter (F8-F8-F3) to the value one(1).

Example:
```
G91
F100
P5=0
N100
P5=5
```

X1
Y1
M2

The N command is the Block Number command

Unconditional Branch

Format: GOTO XXX

This command will transfer control to block number XXX.

Conditional Branch

Format: IF <Statement> THEN <GOTO Command>

This command specifies a conditional branch.

Examples: If P1=5 THEN GOTO 100
This line will jump to Block 100 if P1=5

If #1 = 1 THEN GOTO 100
This line will jump to Block 100 if Input 1 is energized.

Subroutines

Format: GOSUB XXX

This command will cause a jump to a valid block number XXX

Format: RET

This command will cause a return from a routine. An error is generated if a RET is entered before a GO.

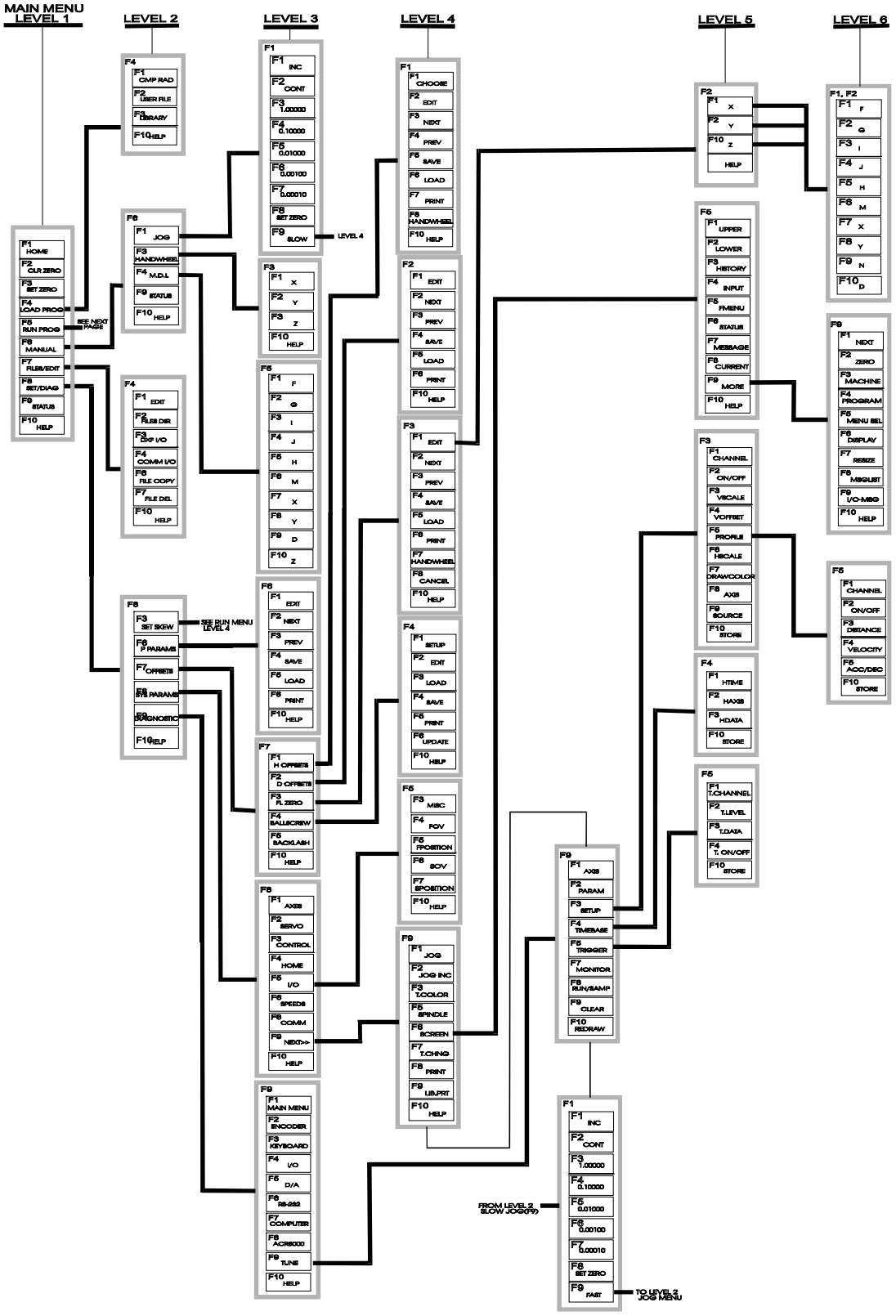
Up to 10 levels of GO and RET are supported.

Parametric Math Operations

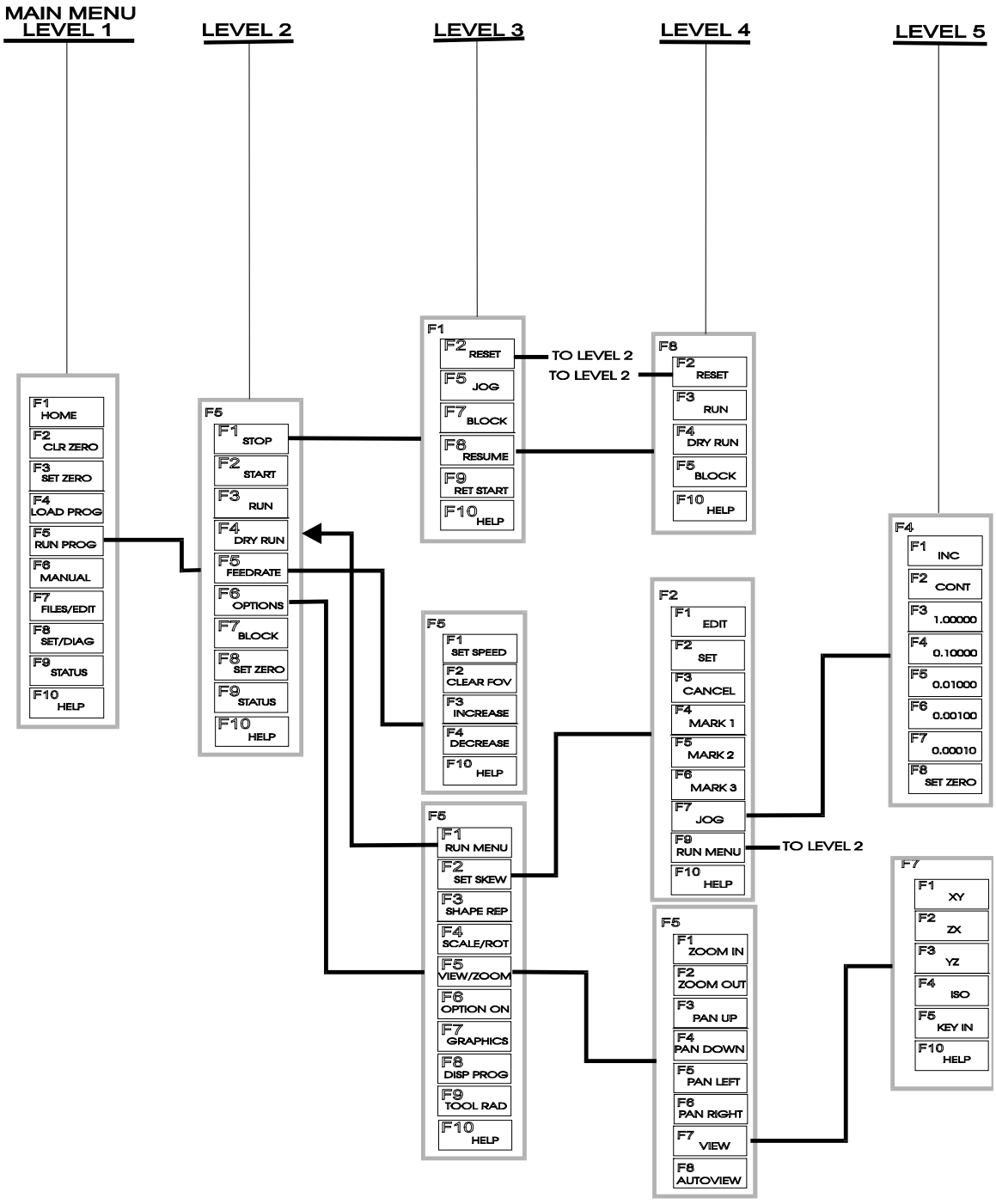
Format: P*xx* = Arg1 <operation> Arg2

This command will perform a math operation. P*xx* can be 1 of 100 program variables. Arg1 and Arg2 can be a literal, another parameter or another expression. Operation can be an arbitrary math or transcendental function .

4. FLOW DIAGRAM→MASTER

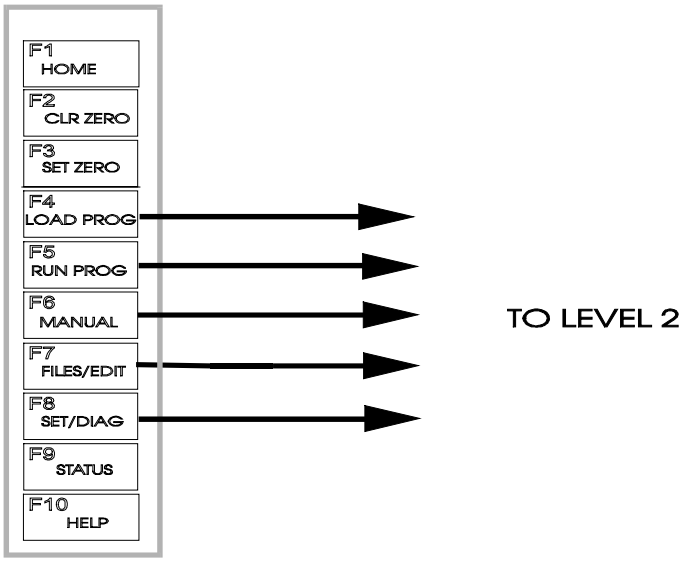


FLOW DIAGRAM→RUN MENU



RUN PROGRAM MENU

FLOW DIAGRAM→LEVEL 1



MAIN MENU

MAIN MENU
LEVEL 1

This section describes the overall menu structure for the AcroMill program. The MAIN menu table below provides a brief description to the menu commands. See the following pages in this section for in depth menu descriptions and illustrations.

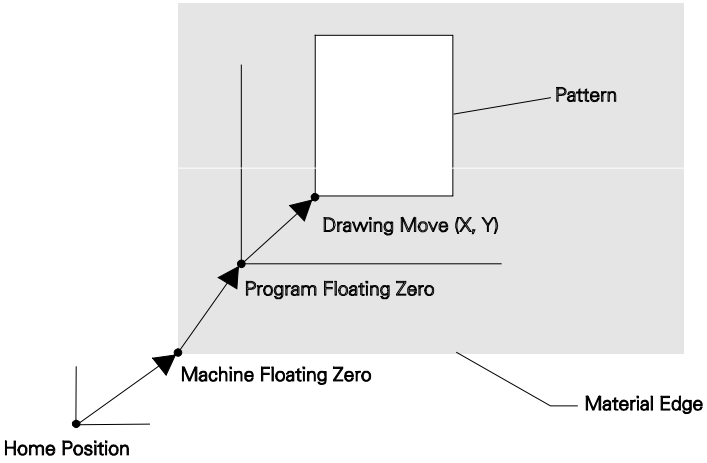
MAIN MENU	**Parent Menu**
Command	**Description**
HOME (F1)	Reference the machine
CLR ZERO (F2)	Not used
SET ZERO (F3)	Sets the axes to zero.
LOAD PROG (F4)	Initiates a menu to load a program or a library part
RUN PROG (F5)	Initiates a menu to run a program
MANUAL (F6)	Initiates a menu to the manual interface (Jog, Handwheel MDI)
FILES/EDIT (F7)	Initiates a menu to view and edit files
SET/DIAG (F8)	Initiates a menu to setup system parameters and run diagnostics
STATUS (F9)	Shows status of the machine. I/O, Servo Lag, Tool Info can be displayed.
HELP (F10)	Brings up the HELP screen

HOME
LEVEL 1

HOME (F1)

The HOME command is a physical reference an may be the position the cutting tool resides when the machine is not running a program or when disabled. Home is typically defined by a physical input such as a limit switch. Below, is an example illustrating the HOME position.

Also see **Home** setup command described on page 6-35.



The HOME key activates the homing command cycle of the program for your machine. Before the machine can be jogged or any axis moved about, the HOME cycle must be executed. The setup of the HOME cycle is entered into system parameters via the SETUP menu. The speeds, direction, and Home switch input number should be preset in this section (refer to HOMING THE MACHINE section).

Activating Home by hitting the F1 key followed by a Carriage Return will start the Home Cycle. A message in the dialog box lets you know the homing sequence is in progress. The HOME cycle moves all axes to their reference limit switches. After the switches are tripped, the motors will reverse direction *un-tripping* the switches. Then the motors will seek the marker on the encoder. When this execution is completed, all axes will move to the HOME OFFSET position (HOME offset position is also entered in the SETUP screen). To abort the homing sequence hit ESCAPE.

CLR ZERO
LEVEL 1

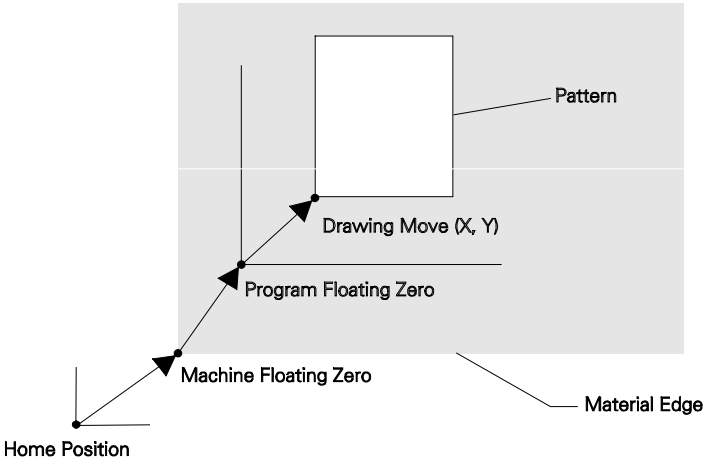
CLR ZERO (F2)

The CLR ZERO command is used to clear zero once the SET ZERO (F3)command is used. An example of how to use this command is jogging to a specific coordinate where *x* is 1.588 and *y* is –2.12. Using the SET ZERO command will set the coordinates to zero, (refer to page 4-7 for information on the SET ZERO command). Using the CLR ZERO command will reset the coordinates to the values above.

SET ZERO
LEVEL 1

SET ZERO (F3)

The SET ZERO command sets all axes to zero from the front end. SET ZERO relates to the machine floating zero **only** that it sets all axes to zero. Below, is an example illustrating the SET ZERO command.



Note:

The SET ZERO command is similar to the FL ZERO command. However, it is for setting floating zeroes to a *zero* value. The SET ZERO command when activated sets **all** axes to a floating zero. The SET ZERO command can be located under Level 3 menus (see F8 under FAST JOG, and SLOW JOG). Also, under Level 4 menus (see JOG SLOW (F3), AND JOG FAST (F4) menus).

LOAD PROG
LEVEL 1

LOAD PROG→ LOAD PROG MENU (F4)

The LOAD PROG command key initializes the following menu. The menu allows activating LIBRARY PARTS or customer programs, and downloading parts from the serial port (LINK).

LOAD PROG	**Parent: MAIN MENU**
Command	**Description**
CMP RAD (F1)	Sets the Compensation Width of cutting tool
USER FILE (F2)	Load a user program
LIBRARY (F3)	Load a library program
LINK (F4)	Links CAD file across RS-232 for uploading and down loading files
HARDDRIVE/ **FLOPPY** (F8)	Archiving programs
HELP (F10)	Brings up the HELP menu

The LOAD PROG table provides a brief description of the menu commands. See LOAD PROG under Level 2 for in depth menu descriptions and illustrations.

RUN PROG
LEVEL 1

RUN PROG→ RUN PROG MENU (F5)

The RUN PROG command key starts the loaded program and initializes the following menu. The RUN PROG table listed below provides a brief description of the menu commands. See RUN PROG under Level 2 for in depth menu descriptions and illustrations.

RUN PROG	**Parent: MAIN MENU**
Command	**Description**
STOP (F1)	Stops the running program
START (F2)	Start running the loaded program
RUN (F3)	Run the loaded program
DRY RUN (F4)	Run the program at maximum feed
FEEDRATE (F5)	Manipulate Feedrate Parameters
OPTIONS (F6)	Setup Options
BLOCK (F7)	Switch between Block and Auto Modes
SET ZERO (F8)	Sets all axes to a zero value
STATUS(F9)	Shows the status of the machine
HELP (F10)	Brings up HELP screen

MANUAL
LEVEL 1

MANUAL→ MANUAL MENU (F6)

The MANUAL menu allows manually moving the machine via Jogging, Handwheel, Manual Data Input (MDI) and Joystick. The following menu provides a brief description of the MANUAL menu. See MANUAL MENU under Level 2 for menu command descriptions and illustrations.

MANUAL MENU	**Parent: MAIN MENU**
Command	**Description**
JOG (F1)	Specifies fast jog in continuous or incremental motion.
HANDWHEEL (F3)	Permits movement of one or all axes by means of a handwheel
MDI (F4)	Permits direct issuance of RS-274D commands from command line by interface keyboard.
STATUS (F9)	Status select for quick access to servo tuning and program parameters.
HELP (F10)	Brings up HELP screen

FILES/EDIT
LEVEL 1

FILES/EDIT→ FILES/EDIT MENU (F7)

The FILES/EDIT menu key initializes the following menu. Editing, copying, sending, archiving, and viewing files are performed from this menu. The following FILES/EDIT table provides a brief description of the menu commands. See FILES/EDIT under Level 2 for in depth menu descriptions and illustrations.

FILES/EDIT MENU	**Parent: MAIN MENU**
Command	**Description**
EDIT (F1)	Edit a file
FILES DIR (F2)	View Directory of files
DXF I/O (F3)	Import, Export and Show Directory of DXF Files
COMM I/O (F4)	Send or Receive Files from COM port
FILE COPY (F6)	Copy file to floppy or harddrive
FILE DEL (F7)	Delete File
HELP (F10)	Brings up HELP screen

SET/DIAG
LEVEL 1

SET/DIAG→ SET/DIAG MENU (F8)

The SET/DIAG menu allows setting up the system parameters or to run system diagnostics. The machine system parameters deal with defining I/O assignments, axis feeds, limits, pulses per inch, accelerations, decelerations, COMM port communications, etc.

The menu permits setting offsets such as D codes, H codes, ballscrew, backlash compensation, and floating zero.

Diagnostics permit observing, analyzing, troubleshooting, and graphical tuning of the servo motors from this menu.

The SET/DIAG menu allows the setup of parameters associated with running the machine. Below is a summary of the menu commands.

SET/DIAG MENU	**Parent: MAIN MENU**
Command	**Description**
P PARAMS (F6)	Menu for editing Program Parameters.
OFFSETS (F7)	Menu for editing tool offsets and radius offsets.
SYS PARAMS (F8)	Menu for editing System Parameters
DIAGNOSTICS (F9)	Menu for performing diagnostics on the control
HELP (F10)	Brings up HELP screen

STATUS
LEVEL 1

STATUS (F9)

The STATUS command provides quick access for viewing I/O, tool information. and servo tuning and program parameters. The STATUS command also provides an on-line oscilloscope for viewing system gains and lags. The following number sequence describes selecting status types.

<SELECT STATUS>

I/O.....	1	Parm 41-60....6
Gain/Lag.....	2	Parm 61-80....7
Tool Info.....	3	Parm 81-100..8
Parm 01-20....	4	Disable.....9
Parm 21-40..	5	

To select a status type, simply select the corresponding number. To exit from a status type display, select the STATUS (F9) key again. AcroMill returns to the original STATUS screen. Exiting the STATUS menu requires selecting the number 9 (Disable). This will bring you back to the MAIN menu.

HELP MENU
LEVEL 1

HELP (F10)

The HELP command provides on line help in better understanding the AcroMill menu commands. To use the HELP menu, use the arrow (↓) key to scroll through the text. The following describes the HELP information sequence.

AcroMill Overview

This section is a synopsis of AcroMill and provides information on the software's powerful and dynamic capabilities. As you will see, AcroMill is designed for any kind of cutting machine requiring multi-axis control.

Selecting Commands

This section provides general information on selecting commands from the Menu bar.

Entering Numbers

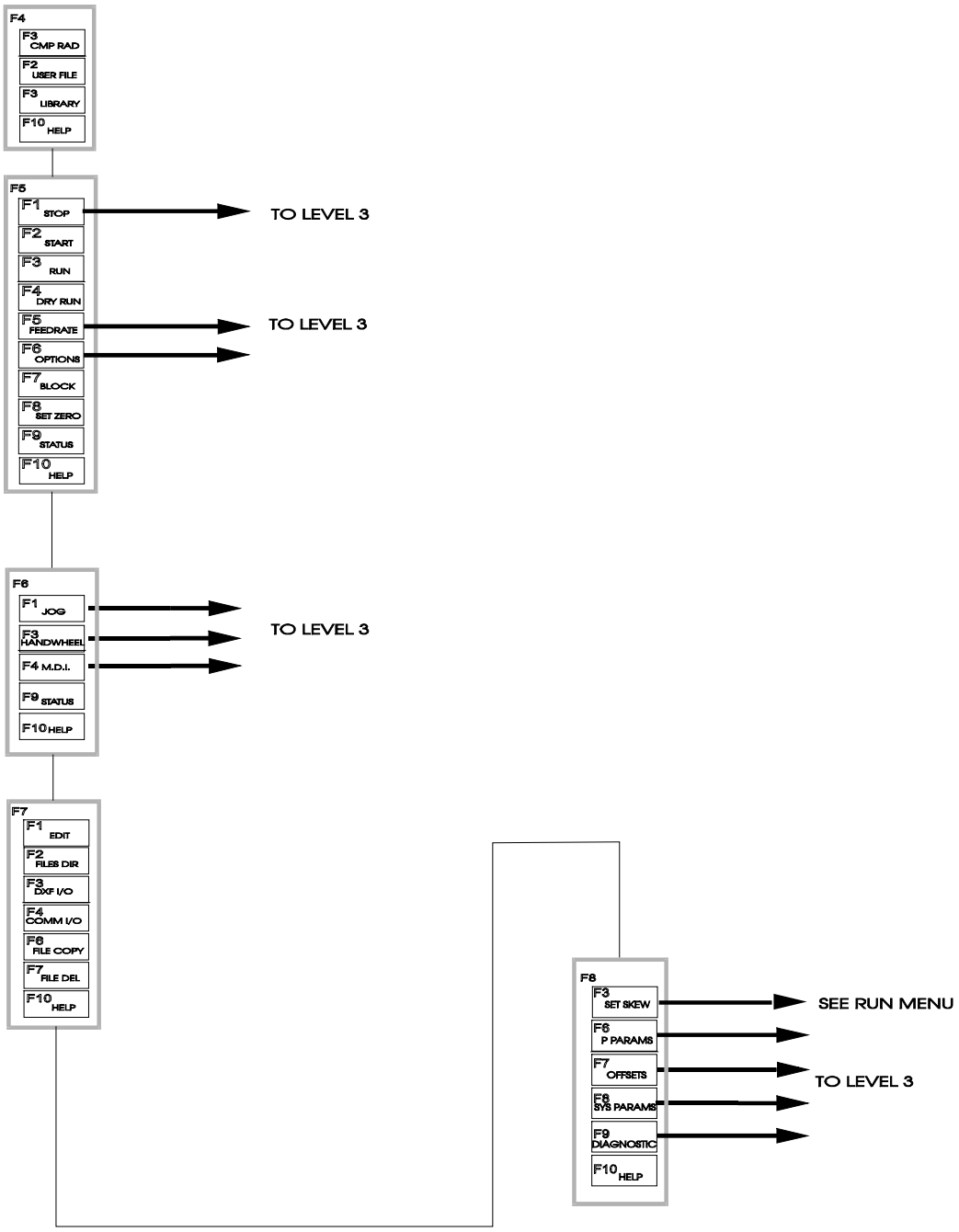
Numbers are entered into three types of dialog boxes. This section of HELP describes the purpose of these dialog boxes and how numbers are entered into these fields.

Tuning Servos

Servos require tuning before running the machine. This section goes through a step by step procedure in tuning your servos.

Please, take a few minutes to go through the HELP command information before running your machine. The HELP menus are convenient and easy to use when reviewing menu commands.

5. FLOW DIAGRAM→LEVEL 2



LOAD PROG MENU
LEVEL 2

LOAD PROG MENU

The LOAD PROG menu allows the machine operator to load an existing program or a library part. Before a program can be run on the Control, it must be loaded from the LOAD PROGRAM menu.
The first data entry required is the CMP RAD (F1) width. To activate CMP RAD, hit F1 and then enter the required kerf width (field provides a positive number between 0 and 99.9999).

Next, choose a program to load located under USER FILE (F2) or a built-in library (LIBRARY (F3)) part. Use the arrow (↓) key to scroll through the USER FILE library. For library parts, use the HELP screen to show graphic representations of the parts. Note, above each test pattern shape a number corresponds to the library program number.

After the selection is made, the control will load the program and perform cutter compensation.
The message window in the center of the screen will show the progress. If there are errors they will be reported at this time.

Once the entire program is successfully compensated, the screen will go to the RUN menu allowing the part to be RUN.

The following LOAD PROG table provides an overview of the menu commands. Each command is then described in detail.

LOAD PROG	**Parent: MAIN MENU**
Command	**Description**
CMP RAD (F1)	Sets the Compensation Width for the Cutting Tool
USER FILE (F2)	Load a user program
LIBRARY (F3)	Load a library program
HELP (F10)	Brings up HELP screen

CMP RAD (F1)

Sets the kerf compensation in inches or metric (mm). When loading a program, the Input dialog box will prompt you to set the kerf compensation before selecting the program. Select CMP RAD (F1) and type in the compensation radius required and hit Carriage Return. Note, the Program Status Window displays the kerf width and units in the upper right portion of your screen.

Note

Before loading a program, set the kerf compensation. This compensation should only be a positive number. A negative number will cause erroneous machine movement.

USER FILE (F2)

The USER FILE loads files created by the programmer. The PART PROGRAM (.TXT) dialog box appears with a list of archived **.txt** files. Note, either a pre-entered user program or a library part can be loaded up to run. User files are RS-274D based user files. For a pre-entered user program, the file must have a TXT extension and a valid DOS filename. Type the file name and hit Carriage Return to initialize the program. As an example, the following program can be stored in a file called SQUARE.TXT.

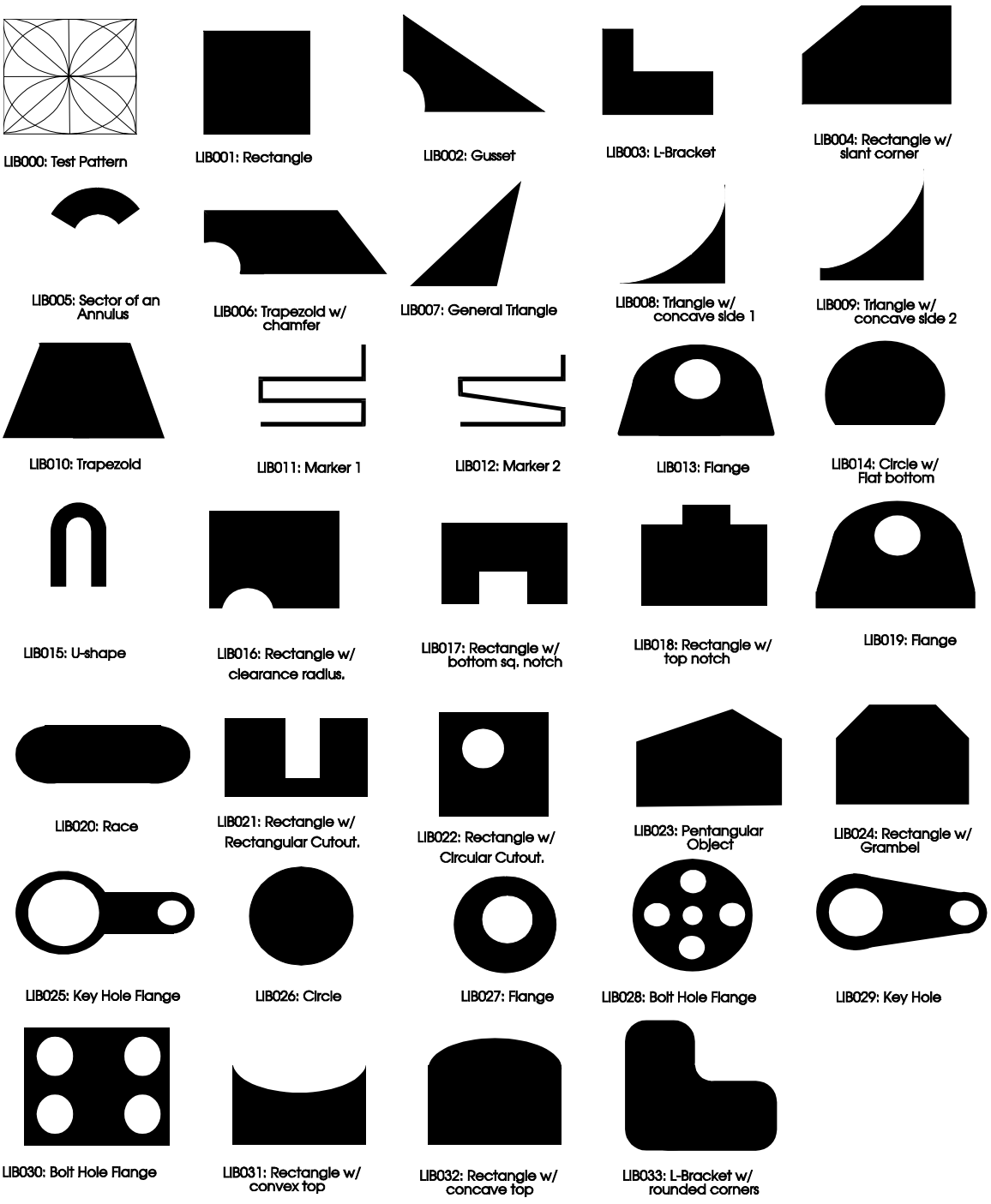
```
G1F100 X0Y0
X1
Y1
X0
Y0
```

In the GRAPHICS mode, the SQUARE.TXT program is a square geometric shape. The program can then be executed in RUN or DRY RUN mode (refer to the AcroMill flow diagram).

LIBRARY (F3)

AcroMill has 34 pre-stored library parts. More library parts can be added if required. The ACROMILL/ACROCUT *Programmer's Manual* explains the procedure for adding more library parts. Contact the ACROLOOP factory for more information.
Library parts are called by their numbers 0.....33. In the LIBRARY part menu, the "HELP" key will bring up graphical templates. All the available library geometric shapes can be scrolled through by using the arrow (↓) keys on your key pad. Once the desired shape is in view, enter the number and a dialog box will appear for the library part dimensions. Input the required dimensions for your specific application. Note, how the graphic representation parametrically adjusts to its new dimensions. When all the dimensions are entered, hit Carriage Return. The library part is loaded and the screen will show the part. Make sure the GRAPHICS is enabled to view the part. The Default Graphics under the Control Setup Input dialog box located in the DIAGNOSTIC menu (Level 2) should be set to one(1) for graphics enabled. The path from the MAIN menu is F8-F9-F3.

The following lists all the available library parts.



Library Parts 0-33.

HELP (F10)

On line help is available for description of the LOAD PROG menu commands.

RUN PROG MENU
LEVEL 2

RUN PROG MENU (F5)

The RUN PROG command key starts the loaded program and initializes the following menu. The menu is only accessible if a valid program part (user file or library file) has been loaded into the control. The following RUN PROG table provides an overview of the menu commands. Each command is then described in detail.

RUN PROG MENU	**Parent: MAIN MENU**
Command	**Description**
STOP (F1)	Stops the running program
START (F2)	Start running the loaded program
RUN (F3)	Run the loaded program
DRY RUN (F4)	Run the program at maximum feed
FEEDRATE (F5)	Manipulate Feedrate Parameters
OPTIONS (F6)	Setup Options
BLOCK (F7)	Switch between Block and Auto Modes
SET ZERO (F8)	Sets the axes to a zero value
STATUS (F9)	Shows the status of the machine
HELP (F10)	Brings up HELP screen

STOP→ STOP MENU (F1)

The STOP menu allows the machine operator to stop or pause the PROGRAM SEQUENCE. At the Status line in the Program Status Window, "----PAUSE----" is indicated when the STOP key is activated. The following STOP menu table provides a brief description of the menu commands. See STOP menu under Level 3 for in depth menu descriptions and illustrations.

STOP MENU	**Parent: RUN PROG MENU**
Command	**Description**
RESET (F1)	Resets the program to the start position
JOG (F5)	Jogs motors incrementally or by a continuous jog (see pages 6-10, 6-11)
BLOCK (F7)	Runs the program one block at a time
RESUME (F8)	Resume normal running of the program
RET START (F9)	Return to start of program
HELP (F10)	Brings up the HELP screen

START (F2)

The START key starts an already loaded program. This command would typically be issued after a PAUSE command. It is used in conjunction with the BLOCK and DRY RUN keys to allow stepping through each line of the program. First, activate the BLOCK command and then the DRY RUN command. Use the START key to step through each line of code.

RUN (F3)

The RUN key command runs the loaded program sequence. The command will ask for a starting line number. The HELP key when depressed will activate the status window and show the actual Converted file (CVT file). This allows selecting specific number lines to start the program from. Hitting the HELP key again will remove this display.

DRY RUN (F4)

The DRY RUN command allows an operator to do a dry run of the program at the DRY RUN feedrate. M Codes are not executed. The command will ask for a starting line number. The HELP key when depressed will activate the status window and show the actual Converted file (CVT file). This allows selecting specific number lines to start the program from. Hitting the HELP key again will remove this display.

FEEDRATE→ FEEDRATE MENU (F5)

The feedrate is the speed of the machine. The FEEDRATE menu key initializes the following menu and allows the machine operator to make adjustments to the feedrate. The programmed speed is overridden and the speed can be adjusted up or down. The following table provides a brief description to the menu commands. See FEEDRATE menu under Level 3 for in depth menu descriptions and illustrations.

FEEDRATE MENU Command	Parent: STOP MENU Description
SET SPEED (F3)	Set Cut Speed and Trial Speed
CLEAR FOV (F5)	Clear Feedrate override (back to 100%)
INCREASE (F7)	Increase Feedrate override
DECREASE (F8)	Decrease Feedrate override
HELP (F10)	Brings up HELP screen

OPTIONS→ OPTIONS MENU (F6)

The OPTIONS menu key activates the OPTIONS menu listed below. The menu is designated for setup options such as rotation, scaling and shape representation. Typically, the SHAPE REP commands prompts the operator to input the size of a sheet on which parts will be placed. The operator can then use ROTATE and SCALE commands to specify any rotation or scaling for the part. After these selections have been made, the operator must use the OPTIONS ON menu to make these options active.

OPTIONS MENU Command	Parent: STOP MENU Description
RUN MENU (F1)	Stops the running program
SET SKEW (F2)	Allows setting up plate skewed alignment.
SHAPE REP (F3)	Describe shape of the sheet on which the parts will be placed.
SCALE/ROT (F4)	Specify rotation angle for the part (degrees) and general scale (all axes same scale)
VIEW/ZOOM (F5)	Allows zooming, panning, viewing part
OPTION ON(F6)	Activates SKEW, ROTATE, SCALE options
GRAPHICS (F7)	Toggles Graphics display on and off
DISP PROG (F8)	Toggles run time display of RS274 programs
CMP RAD (F9)	Allows changing cutting device radius
HELP (F10)	Brings up HELP screen

BLOCK (F7)

This turns the block mode on. The BLOCK key activates the block mode command and is valuable for stepping through “blocks” of programming code. The BLOCK key toggles between the Block and auto modes. The block mode also allows the user to run the MDI program one block at a time. The auto mode runs the program continuously.

SET ZERO (F8)

The SET ZERO command key sets the axes to zero.

STATUS (F9)

The STATUS command allows viewing I/O status, Gain/Lag (Following error) status, Tool information, and Program parameters. The following number sequence describes selecting status types.

```
                <SELECT STATUS>
I/O.................1          Parm 41-60....6
Gain/Lag.......2               Parm 61-80....7
Tool Info.......3              Parm 81-100..8
Parm 01-20.. 4                 Disable.....9
Parm 21-40...5
```

To select a status type, simply select the corresponding number. To exit from a status type display, select the STATUS (F9) key again. AcroMill returns to the original STATUS screen. Exiting the STATUS menu requires selecting the number 9 (Disable). This will bring you back to the previous menu.

HELP (F10)

On line help is available for description of the RUN PROG menu commands.

MANUAL MENU
LEVEL 2

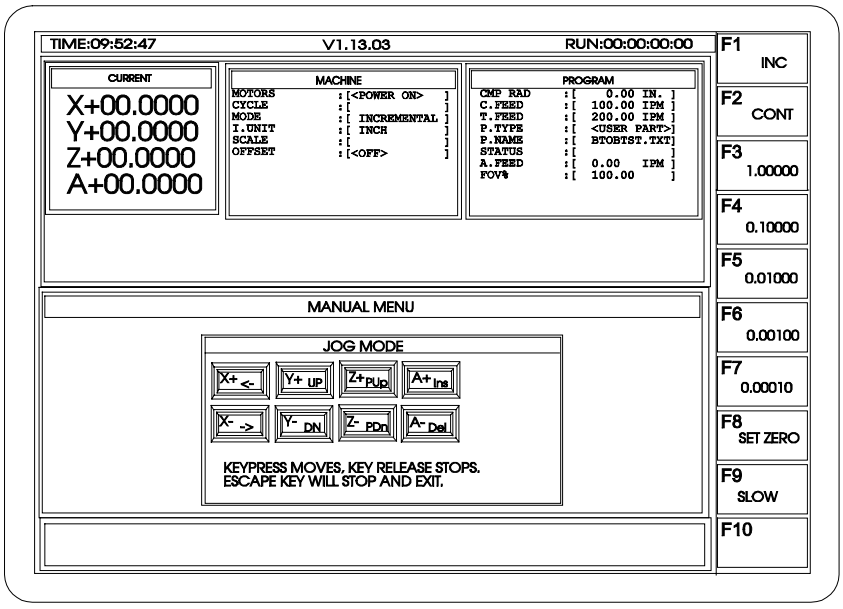
MANUAL MENU (F6)

The MANUAL menu allows manually moving the machine via Jogging, Handwheel, Manual Data Input (MDI), and by Joystick. The table below provides a summary of the menu commands. Each command is then described in detail.

MANUAL MENU	**Parent: MAIN MENU**
Command	**Description**
JOG (F1)	Slow jog set by Jog Feedrate parameter
HANDWHEEL (F3)	Allows a handwheel feature to be used.
MDI (F4)	Allows direct issuance of RS-274D commands from a command line by interface keyboard.
STATUS (F9)	Status select for quick access to servo tuning and program parameters.
HELP (F10)	Brings up HELP screen

JOG→ JOG MENU (F1)

The JOG menu allows jogging any attached axis to a desired position. Jogging can be executed continuously by using the CONT command or by small increments using the INC command. There are two velocities that the JOG menu can run at. These are the implied fast jog or slow jog. The slow jog can be activated by simply selecting the SLOW (F9) key. The following illustration shows the FAST JOG screen.



The JOG is measured in units per minute (UPM). Its parameters are set for *each* axis in JOG (F1) command under Level 4. Note, the JOG (Jog Rapid) default is 50 UPM. The acceleration, deceleration, and direction of fast jog and slow jog is also set up under the JOG command. The INC menu can be set up for fast jog and slow jog under the JOG INC (F2) command. See JOG INC under Level 3.

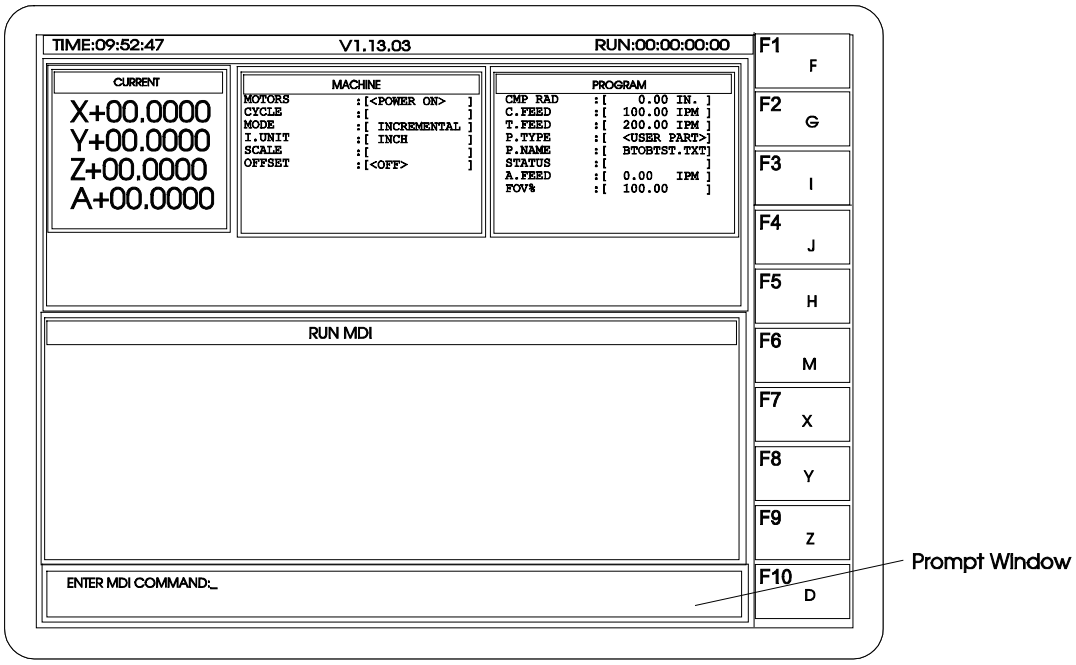
HANDWHEEL→ HANDWHEEL MENU (F3)

The HANDWHEEL menu permits attaching an axis to a handwheel and moving the cutting tool to the desired position. For this feature to work, a manual pulse generator option must be installed on the machine and the system parameters programmed to attach it. Each axis can have its own handwheel or they can all share ONE handwheel.

Also see HANDWHEEL menu described on page 6-11.

MDI→ MDI MENU (F4)

The MANUAL DATA INPUT menu permits direct issuance of RS-274D commands from a command line by means of the interface keyboard. See RS-274D Format described on page 3-1 for a description of the commands that are supported.



STATUS (F9)

The STATUS command provides quick access for viewing I/O, tool information. and servo tuning and program parameters. The STATUS command also provides an on line oscilloscope for viewing system gains and lags. The following number sequence describes selecting status types.

<SELECT STATUS>

I/O.....1	Parm 41-60....6
Gain/Lag..... 2	Parm 61-80....7
Tool Info..... 3	Parm 81-100..8
Parm 01-20...4	Disable.....9
Parm 21-40.. 5	

To select a status type, simply select the corresponding number. To exit from a status type display, select the STATUS (F9) key again. AcroMill returns to the original STATUS screen. Exiting the STATUS parameter table requires selecting the number 9 (Disable). This will bring you back to the previous menu.

HELP (F10)

On line help is available for description of the MANUAL menu commands.

FILES/EDIT MENU
LEVEL 2

FILES/EDIT MENU (F7)

The FILES/EDIT menu key initializes a menu for editing, copying, sending, archiving, and viewing files. The following FILES/EDIT table provides an overview of the menu commands. Each command is then described in detail.

FILES/EDIT MENU	**Parent: MAIN MENU**
Command	**Description**
EDIT (F1)	Edit a file
FILES DIR (F2**)**	View Directory of files
DXF I/O (F3)	Import, Export and Show Directory of DXF Files
COMM I/O (F4)	Send or Receive Files from COM port
FILE COPY (F6)	Copy a file to floppy or harddrive
FILE DEL (F7)	Delete a file
HELP (F10)	Brings up HELP screen

EDIT (F1)

The EDIT file launches the user selected DOS editor. AcroMill supports most DOS based editors. To configure the specified editor, enter the DOS path and filename in the **Useredit.txt** file. As a typical example, the following can be used to activate the DOS editor.

```
C: \DOS\EDIT.EXE
```

The DOS editor filename may vary for different versions of the DOS operating system. For example, the EDIT.EXE above may need to be changed to EDIT.COM. Check your DOS directory to verify the filename and extension. Once you have set up the DOS editor, you can write programs or edit existing files in the EDIT command.

Use the arrow (↓) key to scroll through the files listed. After selecting the file hit Carriage Return. When editing make sure you save your changes by hitting the ESCAPE key and selecting **Y** (F8) when the message in the Prompt Window appears. Your changes have been archived to the highlighted archive source (floppy or harddrive).

FILES DIR (F2)

The FILES DIRECTORY list the files in the current directory. The following DIRECTORY UTILITY dialog box message appears:

```
PROGRAM FILES ON CURRENT DRIVE.....    1
PROGRAM FILES ON DRIVE A: .....…       2
EXIT.....…..                           3
```

The machine operator can select the directory from the current drive (hard drive) or the floppy drive (a:) by selecting the corresponding number.

DXF I/O (F3)

DXF I/O menu allows importing and showing the directory of CAD files that have been converted to the DXF protocol. The following is the DXF <--> TEXT UTILITY dialog box that appears when DXF I/O is initiated.

IMPORT DXF FILE (CONVERT TO TEXT)..... 1
SHOW DIRECTORY OF DXF FILES..... 2
EXIT..... 3

The above menu will now be explained in more detail.

IMPORT DXF FILE

This menu allows importing a DXF file. The operator can specify CONTINUOUS PATH or DRILL PATTERN by selecting the appropriate numbers as listed below. The CONTINUOUS PATH option interprets the data in the DXF file as a continuous path for cutting. The DRILL PATTERN option interprets the data in the DXF file as a sequence of holes to be drilled.

CONTINUOUS PATH (PROFILE)..... 1
DRILL PATTERN..... 2
EXIT..... 3

SHOW DIRECTORY OF DXF FILES

The DXF I/O menu lists the DXF files in the current directory. The operator can select the current drive (hard drive) or the floppy drive (a:) by selecting the appropriate numbers as listed below.

PROGRAM FILES ON CURRENT DRIVE..... 1
PROGRAM FILES ON DRIVE A: 2
EXIT..... 3

The procedure for importing DXF files is as follows:

1. Look at the directory of all program files with the “TXT” extensions by selecting:

   SHOW DIRECTORY OF DXF FILES.....2

2. Import DXF cad files by selecting:

   IMPORT DXF FILE (CONVERT TO TEXT).....1

The DXF CAD protocol is explained next.

The DXF CAD interface allows the user to create the design on any CAD system that generates a DXF output and translates the file into standard EIA RS-274D format.

There are provisions to do multiple paths. Each path must be a “CONTINUOUS” geometry. This means that after the start point, the system keeps searching for connected LINES and ARCS emanating from the starting entity. When this process is finished, the conversion software removes these entities from its temporary data base and starts over again for more “CONTINUOUS” geometries. This process is repeated until all the entities in the original DXF file are processed. Between each of these geometries, there are provisions for the user to insert commands for feedrates, miscellaneous M-codes... etc.

These commands can be stored in one of four *optional* text files that the user can generate. DXF will automatically insert the following program text that is boxed.

1. START.TXT - This text file should contain any commands that are required to be inserted in the beginning of the output file.

   Example: START.TXT (Start of Program)

   ```
   G0  X0  Y0
   F100  M12  M13
   ```

2. INTOOL.TXT - This text file should contain any commands that are required to be inserted at the beginning of each continuous geometry.

   Example: INTOOL.TXT

   ```
   G1  M15
   ```

3. OUTTOOL.TXT - This text file should contain any commands that are required to be inserted at the end of each continuous geometry.

   Example: OUTTOOL.TXT

   ```
   G0  M16
   ```

4. END.TXT - This text file should contain any commands that are required to be inserted at the end of the program.

   Example: END.TXT

   ```
   M24  M25
   X0  Y0
   ```

   (End of Program)

The following entities are supported in the DXF Translation. Note that this allows reading AUTOCAD generated tool paths.

LINE

ARC

CIRCLE

POINT

The POINT entity is used to indicate the START position of the tool path. Insert one of these entities near the node you wish to start at. If the path is a closed loop path, make sure the point is on the outside of the path. This ensures the algorithm determining direction to move around a path (given a CW or CCW direction) functions properly. If no point is given, then (0,0) or (0,0,0) is assumed to be the start search point. If more than one point is given, only the first one is used.

EXAMPLE: A POINT is drawn closest to the top left corner. The start point will start at this position. There are two ways for the tool to traverse the part.

0. CW (Or first Horizontal X-axis)

1. CCW (Or first Vertically DOWN along Y-axis.)

The MENU will ask which direction is correct.

Assuming the following part (MINUS THE TEXT) is stored in DXF format in a file called "ANYNAME.DXF" and the CW direction is selected, the converted file will be downloaded to a file with the name

"ANYNAME.TXT"

Also, the following files are assumed to have been created prior to running the translator on "ANYNAME.DXF". Note that these files are optional.

File START.TXT
(START OF PROGRAM)

```
G0 X0 Y0
F100 M12 M13
```

File INTOOL.TXT

```
G1  M15
```

File OUTTOOL.TXT

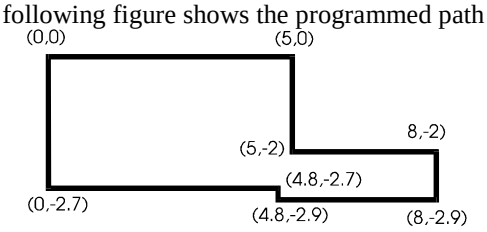
```
G0  M16
```

File END.TXT

```
M24 M25
X0Y0
```

(END OF PROGRAM)

The following figure shows the programmed path (In absolute mode).



After the conversion, the file "ANYNAME.TXT" will contain the following commands.

(START OF PROGRAM)

```
G0 X0 Y0 F100 M12 M13
```

```
G1 M15
X0 Y0
G1X5Y0
G1X5Y-2
G1X8
G1Y-2.9
G1X4.8
G1Y-2.7
G1X0
G1Y0

G0 M16

M24 M25
X0Y0

(END OF PROGRAM)
```

Note, all the lines except the first line has the G1 (Feed Mode) command in front of it. This feature allows making a rapid move at the start of the CUT by putting the G0 (Rapid Mode) command in the START.TXT and TOOLOUT.TXT files.

Now the user can add other commands if needed into the file.

COMM I/O (F4)

The COMM I/0 command allows sending or receiving program files from a serial (COM) port. The machine operator can set parameters of the serial port from the COMM setup menu described on page 6-39.

```
SEND FILE TO SERIAL COMM PORT..... 1
RECEIVE FILE FROM SERIAL PORT..... 2
EXIT.....                          3
```

SEND FILE TO SERIAL COMM PORT

This command allows a program file to be downloaded to the serial port.

RECEIVE FILE FROM SERIAL PORT

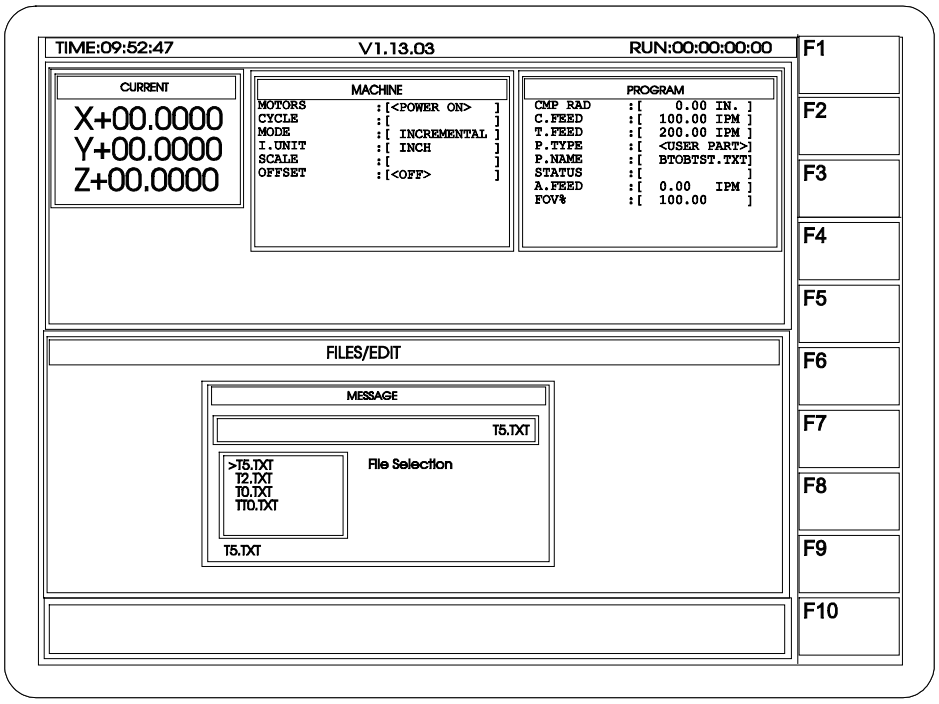
This command allows uploading a program file from the serial port. The screen allows receiving a parts program from a CAM system hooked up to either COM1: or COM2: port. Before using this feature, ensure the serial port parameters are set properly from the COMM menu (F8-F8-F8). The Serial Links parameters table will provide information such as baud rate, parity, and other serial port information. Note, when sending and receiving files via serial communications baud rate, parity, data and stop bits must be set the same on AcroMill and the serially connected computer. When sending a file from the serially connected computer to AcroMill, AcroMill must be in the receiving mode first before sending a file from the serially connected computer. The following example provide illustrations on receiving a file from a serially connected computer.

The serial port parameters are setup under the COMM (F8) command key. The path from the main menu is (F8→F8→F8). Ensure that both AcroMill and the serially connected computer have the same serial port parameters. From the main menu path (F7→F4) will bring up the Serial Communication menu listed below.

SERIAL COMMUNICATIONS

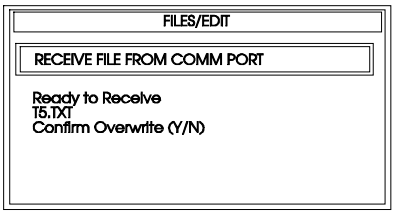
Send File to Serial Comm Port…….1
Receive File from Serial Port…….2
Exit……3

When receiving a file from a serially connected computer, select **2** by typing the number 2 from your keyboard (or keypad). The FILENAME(.TXT) window is shown below. Note, the file must have the .TXT extension.

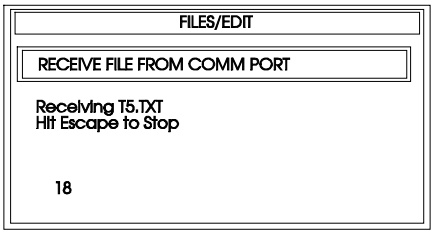


Next, enter the file name from your keyboard or by using the arrow(↓) key to scroll down to the correct file. Hit Carriage Return(Enter).

The RECEIVE FROM COMM PORT window is now initialized and is shown below. This window indicates AcroMill is ready to receive the file and asks to confirm overwriting the file. Specify Yes by typing **Y** from your keyboard.



Once your confirmation is verified, AcroMill is ready to receive the T5.TXT file. Hit the Enter key when you are ready. Recall, AcroMill must be receiving before the file can be sent by various serial communication programs such as Procomm, PCPlus, or Terminal for Windows. The following window is displayed when sending a file.



As the file is received, you will see an increasing number count in the window. In the above illustration this number is shown as 18. Once the file as been received, the number count or line count will halt at some value. A confirmation of whether the entire file was successfully received can be accomplished by hitting ESCAPE and entering EDIT(F1). Check the file size and then enter the program to ensure a successful transfer has been made.

FILE COPY (F6)

FILE COPY is useful when copying files to floppy or harddrive. Use the arrow (↓) key to select the file. Next, hit Carriage Return. The file is now copied to the destination file.

FILE DEL (F7)

FILE DELETE is used to delete files. Use the arrow (↓) key to select the file and hit Carriage Return. The following message appears in the Erase File Menu dialog box:

Deleting:
FILENAME.TXT
Confirm (Y/N):

Select **Y** (F8) to confirm or **N** (F9) to abort.

HELP (F10)

On line help is available for description of the FILES/EDIT menu commands.

SET/DIAG MENU
LEVEL 2

SET/DIAG MENU (F8)

The SET/DIAG menu permits setting up system parameters or running system diagnostics. The following table provides an overview of the menu commands.

SET/DIAG MENU	**Parent: MAIN MENU**
Command	**Description**
P PARAMS (F6)	Edit Program Parameters
OFFSETS (F7)	Edit H offsets and radius offsets
SYS PARAMS (F8)	Edit System Parameters
DIAGNOSTIC (F9)	Allows performing diagnostics on the control
HELP (F10)	Brings up HELP screen

P PARAMS→ P PARAMS MENU (F6)

The P PARAMS menu allows the machine operator to view, edit and print values for program parameters. The following table provides a summary of the P PARAMS menu commands. See P PARAMS menu under Level 3 for information on menu commands.

P PARAMS MENU	**Parent: SET/DIAG MENU**
Command	**Description**
EDIT (F1)	Change the value of the currently selected parameter
NEXT (F2)	Go to the next parameter
PREV (F3)	Go to the previous parameter
SAVE (F4)	Save the program parameters
LOAD (F5)	Load the program parameters
PRINT (F6)	Print the program parameters
HELP (F10)	Brings up HELP screen

OFFSETS→ OFFSETS MENU (F7)

The OFFSETS menu accesses the Tool, Kerf, and Floating Zero Offsets menus. Also, the menu includes commands for setting up ballscrew and backlash compensation. The following table provides a summary of the OFFSETS menu commands. See OFFSETS menu under Level 4 for information on menu commands.

OFFSETS MENU	**Parent: SET/DIAG MENU**
Command	**Description**
H OFFSETS (F1)	Activates menu for editing tool offsets
D OFFSETS (F2)	Activates menu for editing radius offsets
FL ZERO (F3)	Activates menu to preset the value of floating zero for each axis.
BALLSCREW (F4)	Activates menu for setting up ballscrew compensation.
BACKLASH (F5)	Sets backlash for each of the eight axes
HELP (F10)	Brings up HELP screen

SYS PARAMS→ SYS PARAMS MENU (F8)

The SYS PARAMS key initiates the SYSTEM PARAMETER menu for setting up parameters for the Axes, Servo, Control, Home, Inputs and Outputs, Speeds, Communication, Jog, Incremental Jog, Tool color, Display, Screen menu, Print, and Library Part. The following table provides a summary of the SYS PARAM menu. See SYS PARAMS menu under Level 3 and 4 for information on menu commands.

SYS PARAM MENU	**Parent: SET/DIAG MENU**
Command	**Description**
AXES (F1)	Setup Axes Parameters
SERVO (F2)	Setup Servo Parameters
CONTROL (F3)	Setup Control Parameters
HOME (F4)	Setup Home Parameters
I/O MENU (F5)	Setup Input/Output Parameters
SPEEDS (F6)	Setup Master FeedRate Parameters
COMM (F8)	Setup Communication Parameters
NEXT>> (F9)	Go to next tier of SYS PAR Menu
HELP (F10)	Brings up the HELP screen

DIAGNOSTIC→ DIAGNOSTIC MENU (F9)

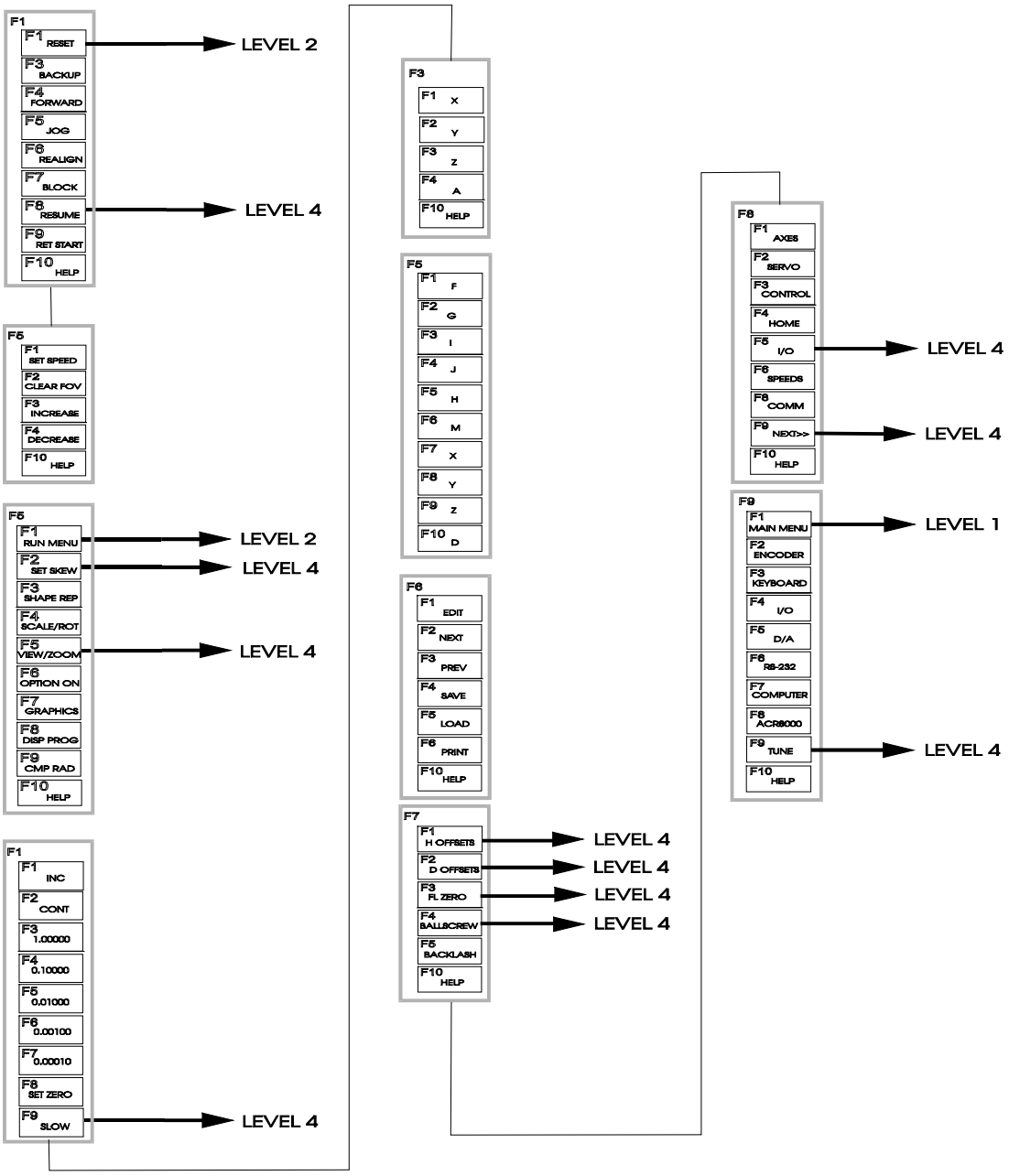
The DIAGNOSTIC menu is for running diagnostics on the machine. The following DIAGNOSTIC table provides a summary of the menu commands. See DIAGNOSTIC MENU under Level 3 for menu command descriptions and illustrations.

DIAGNOSTIC MENU	**Parent: SET/DIAG**
Command	**Description**
MAIN MENU (F1)	Go back to MAIN menu
ENCODER (F2)	Test Encoder
KEYBOARD (F3)	Test Keyboard
I/O (F4)	Test Input/Output
D/A (F5)	Test DAC Outputs
RS-232 (F6)	Test RS-232
COMPUTER (F7)	Test Interrupt processing by the host computer
ACR8000 (F8)	Test the ACR8000 card
TUNE (F9)	Tune motors
HELP (F10)	Brings up the HELP screen

HELP (F10)

On line help is available for description of the SET/DIAG menu commands.

6. FLOW DIAGRAM→ LEVEL 3



STOP MENU
LEVEL 3

STOP MENU (F5-F1)

The STOP menu allows the machine operator to stop or pause the machine. At the Status line in the Program Status Window, "----PAUSE----" is indicated when the STOP key is activated.

STOP MENU	**Parent: RUN PROG MENU**
Command	**Description**
RESET (F1)	Resets the program to the start position
JOG (F5)	Jogs motors incrementally or by a continuous jog (see pages 6-10)
BLOCK (F7)	Runs the program one block at a time
RESUME (F8)	Resume normal running of the program
RET START (F9)	Return to start of program
HELP (F10)	Brings up HELP screen

RESET (F1)

The RESET key will terminate running the program.

Note:

After hitting this key, the terminated program can not be resumed from the same position easily, therefore care should be taken when using this selection.

JOG (F5)

This key will allow JOGGING the machine while remaining in the program mode. The JOG feature is used when the plate needs to be aligned during a "trial cut."

BLOCK (F7)

The BLOCK command makes the control go into the block mode. This is useful during trial cut only. It must not be used during the RUN mode.

RESUME→ RESUME MENU (F8)

The RESUME menu resumes cutting or trail running the part. The user can either select ON PATH or OFF PATH resume. Note that the OFF PATH resume works only if the part has an active G41 or a G42 G-code in it. Otherwise, the control is not able to determine which side of the part to approach from the lead in radius. Illustrated below is the RESUME menu. For detailed information on menu commands turn to the RESUME menu under Level 4.

RESUME MENU	**Parent: STOP MENU**
Command	**Description**
RESET (F2)	Resets the program to the start position
RUN (F3)	Run the loaded program
DRY RUN (F4)	Test run the loaded program
BLOCK (F7)	Runs the program one block at a time
HELP (F10)	Brings up HELP screen

RET START (F9)

The RET START command returns the program to its program start position.

HELP (F10)

On line help is available for description of the STOP menu commands.

FEEDRATE MENU
LEVEL 3

FEEDRATE MENU (F5-F5)

The FEEDRATE menu allows setting the feedrate dynamically or *on-the-fly*. This provides instantaneous control over the cutting speed when running a program. The feedrate override sets the percentage of the command velocity the cutting tool travels at. For example, if the Feedrate Override Velocity (FOV) is set to 100% (default FOV), the tool travel speed will travel at the velocity set in the SET SPEED command menu multiplied by 100%. If the FOV is set at 150%, then the speed will be the value set in SET SPEED multiplied by 150%. The INCREASE/DECREASE command keys are FOV algorithms which increase and decrease the tool travel speed. These commands are dynamic and can be changed while the program is running. The following FEEDRATE table provides an overview of the menu commands. Each command is then described in detail.

FEEDRATE MENU **Command**	**Parent: STOP MENU** **Description**
SET SPEED (F3)	Set Cut Speed and Trial Speed
CLEAR FOV (F5)	Clear Feedrate override (back to 100%)
INCREASE (F7)	Increase Feedrate override
DECREASE (F8)	Decrease Feedrate override
HELP (F10)	Brings up HELP screen

SET SPEED (F3)

The SET SPEED command presets the cut and trial speed (see G-Code section for G1, G2, and G3). SET SPEED cannot be changed while running a program. The INCREASE, DECREASE, and CLEAR FOV commands can be used while running the program. The following is a list of these parameters as viewed when the SET SPEED command is activated followed by a complete listing of FEEDRATE setup definitions. Use the arrow (↓) key to scroll down the parameter table when changing values. Hit Carriage Return or ESCAPE to save and exit the SET SPEED parameter table.

SET TRIAL, CUT SPEED			
CUT SPEED	IPM	:	50.00000
TRIAL SPEED	IPM	:	50.00000
RAPID SPEED	IPM	:	50.00000

Parameter	**Description**
Cut Speed IPM	The speed at which part is cut (see G-Codes)
Trial Speed IPM	The speed at which dry run is carried out (see G-Codes)
Rapid Speed IPM	The speed at which a rapid move block (G0) is carried out (see G-Codes).

CLEAR FOV (F5)

The CLEAR FOV resets the feedrate override to 100% of its set value. See note after DECREASE.

INCREASE (F6)

The INCREASE command dynamically increases the feedrate override *on-the-fly* at 5.0% each time the INCREASE (F7) key is hit. At the Program Status Window, the FOV% line provides dynamic viewing as the feedrate override changes. See Note after DECREASE.

DECREASE (F8)

The DECREASE command dynamically decreases the feedrate override *on-the-fly* at 5.0 each time the DECREASE (F8) key is hit. At the Program Status Window, the FOV% line provides dynamic viewing as the feedrate override changes. See Note below.

Note

CLEAR FOV, DECREASE, and **INCREASE** are only active if manual FOV potentiometers are not being utilized. See MANUAL INPUT for information on setting FOV potentiometers.

HELP

On line help is available for description of the FEEDRATE menu commands.

OPTIONS MENU
LEVEL 3

OPTIONS MENU (F6-F6)

The OPTIONS command key activates the OPTIONS menu listed below. The menu is designated for setup options such as rotation, scaling and shape representation. Typically, the SHAPE REP commands prompts the machine operator to input the size of a sheet on which parts will be placed. The operator can then use SCALE and ROTATE commands to specify any rotation or scaling for the part. After these selections have been made, the machine operator must use the OPTIONS ON menu to make these options active. The following OPTIONS table provides a summary of the menu commands. Each command is then described in detail.

OPTIONS MENU	**Parent: STOP MENU**
Command	**Description**
RUN MENU (F1)	Stops the running program
SET SKEW (F2)	Allows setting up plate skewed alignment.
SHAPE REP (F3)	Describe shape of the sheet on which the parts will be placed.
SCALE/ ROT (F4)	Specify rotation angle for the part (degrees) and general scale (all axes same scale)
VIEW/ZOOM (F5)	Allows zooming, panning, viewing part
OPTION ON(F6)	Activates SKEW, ROTATE, SCALE options
GRAPHICS (F7)	Toggles Graphics display on and off
DISP PROG (F8)	Toggles run time display of RS274 programs
TOOL RAD (F9)	Allows changing cutting tool radius
HELP (F10)	Brings up HELP screen

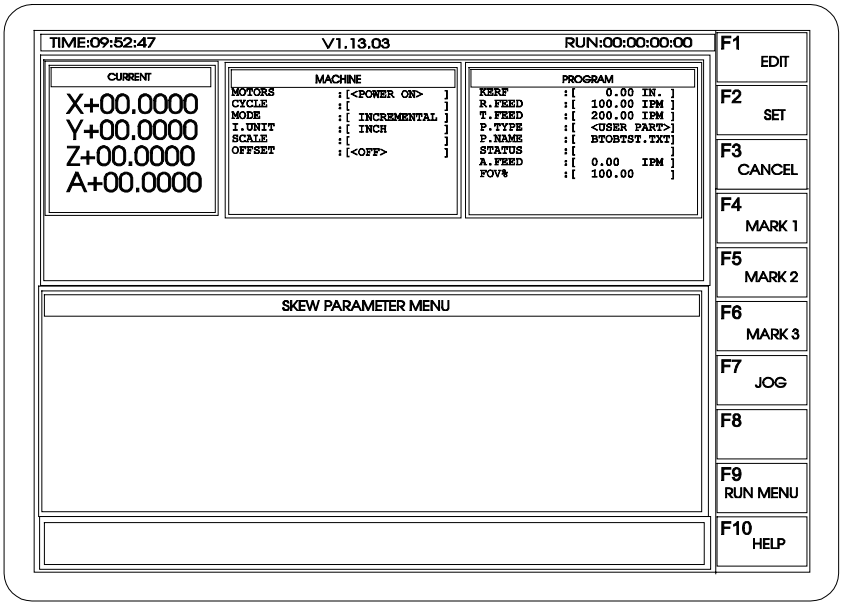
RUN MENU (F1)

The RUN MENU command activates the menu listed below. The RUN MENU is a menu link to the second tier STOP (OPTIONS) menu. For easy viewing, see the AcroMill Flow Diagram on pages 4-1 and 4-2.

RUN MENU	**Parent: OPTONS MENU**
Command	**Description**
STOP (F1)	Stops the running program
START (F2)	Start running the loaded program
RUN (F3)	Run the loaded program
DRY RUN (F4)	Run the program at maximum feed
FEEDRATE (F5)	Manipulate Feedrate Parameters
OPTIONS (F6)	Setup Options
BLOCK (F7)	Switch between Block and Auto Modes
SET ZERO (F8)	Sets the axes to a zero value
STATUS (F9)	Shows the status of the machine
HELP (F10)	Brings up HELP screen

SET SKEW→ SET SKEW MENU (F2)

The SET SKEW menu allows the machine operator to adjust for a plate that is not set squarely on the machine. Instead of aligning the material (which could be very heavy) to the table, it is more conductive to skew the *x, y* coordinate to the material. This command is very useful when cutting materials that weigh allot. By inputting three mark points on the material, a skew angle is automatically calculated by the control. The SET SKEW menu is also found under the RUN MENU. Details of the SET SKEW menu commands can be found under SET SKEW menu listed under Level 4. The diagram below illustrates the SET SKEW display screen.



The following table summarizes the SET SKEW commands

SET SKEW MENU	**Parent: OPTIONS MENU**
Command	**Description**
EDIT (F1)	Activates the Skew Data parameter table for determining the three mark points on the *x, y* coordinates.
SET (F2)	Makes active the inputted skew angle.
CANCEL(F3)	Cancel inputted skew angle
MARK 1 (F4)	Used in setting the first mark when using the jogging mode.
MARK 2 (F5)	Used in setting the second mark when using the jogging mode.
MARK 3 (F6)	Used in setting the third mark when using the jogging mode.
JOG (F7)	Activates the Fast/Slow Jog Menu
RUN MENU (F9)	Link to the RUN menu
HELP (F10)	Brings up HELP screen

SHAPE REP (F3)

The SHAPE REPEAT command sets the parameters for a sheet on which the part described in the current program will be placed. A list of these parameters as viewed when the SHAPE REP command is activated is presented below. Following the dialog box illustration is a complete listing of the SHAPE REP setup definitions.

REPEAT PATTERN		
SHEET SIZE X	:	50.00000
SHEET SIZE Y	:	50.00000
SCRAP CLEARANCE	:	0.00000
PART SIZE X	:	10.00000
PART SIZE Y	:	10.00000
PART REPEAT X	:	5
PART REPEAT Y	:	5

Parameter	Description
SHEET SIZE X	X dimension of the sheet (in inches or mm)
SHEET SIZE Y	Y dimension of the sheet (in inches or mm)
SCRAP CLEARANCE	Scrap clearance (in inches or mm)
PART SIZE X	X Size of the part*
PART SIZE Y	Y Size of the part*
PART REPEAT X	Number of times part is repeated in the X dimension
PART REPEAT Y	Number of times part is repeated in the Y dimension

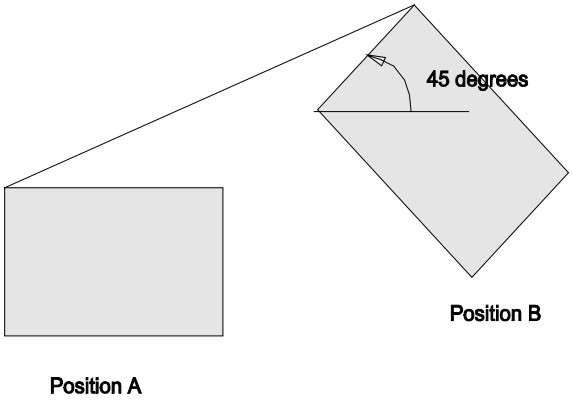
* These parameters are automatically calculated by AcroMill. Contact AMCS for further information.

SCALE/ ROT (F4)

The SCALE/ROTATE command allows specification of an angle rotation and the SCALE factor. These parameters are global to all axes. Note, do not confuse the Scale status under Scale commands with SCALE/ROT under the RUN menu bar (Level 3). Changing the Scale parameters under the SCALE/ROT changes the scaling of the part drawing to be created. The Scale status is set by using Scale Commands under MDI. The ROTATE and SCALE parameters are added on top of the Scale status value, and the SKEW angle. Below, is the parameter table of the SCALE, ROTATION dialog box. See the diagram on the previous page under SET SKEW for ROTATION depiction.

SCALE, ROTATION		
SCALE FACTOR	:	0.50000
ROTATION (DEGREES)	:	0.00000

Below, is an example of a graphical illustration using the SCALE/ROT command.



Rectangular Shape rotated 45 degrees.

VIEW/ ZOOM→ VIEW/ZOOM MENU (F5)

The VIEW/ZOOM command activates the following menu and provides a summary of the VIEW/ZOOM menu commands. The VIEW/ZOOM menu allows you to examine portions of the drawing up close or from a greater distance. The machine operator can pan to the specific segment of the drawing and zoom in for details. The VIEW/ZOOM menu is handy for providing close examination of pattern drawings before, during, and after trial runs. See VIEW/ZOOM under Level 4 for command descriptions and illustrations.

VIEW/ZOOM MENU	**Parent: OPTIONS MENU**
Command	**Description**
ZOOM IN (F1)	Allows zooming into the graphic image of the loaded part.
ZOOM OUT (F2)	Allows zooming out of the graphic image of the loaded part.
PAN UP (F3)	Allows panning the graphic image up each time the key is hit.
PAN DOWN (F4)	Allows panning the graphic image down each time the key is hit
PAN LEFT (F5)	Allow panning the graphic image to the left each time the key is hit.
PAN RIGHT (F6)	Allows panning the graphic image to the right each time the key is hit.
VIEW (F7)	Allow selecting XY, ZX, YZ, ISO plane viewing of the part
AUTOSCALE (F8)	Re-zooms and pans the image so it fits in the graphic window.

OPTIONS ON (F6)

The OPTIONS ON command is used in conjunction with the OPTIONS command (see page 6-6). OPTION ON enables additional commands (SHAPE REP and SCALE/ROT) that may be beneficial for pilot runs and production. Note, this menu *must* be chosen after the choices of SHAPE REP, ROTATE and SCALE commands have been made.

GRAPHICS ON (F7)

The GRAPHICS ON key toggles the real time Tool path Graphic display on the graphic screen as the program is running.

DISP PROG (F8)

This key toggles the real time display of the RS234D text as the program is running. The DISPLAY PROGRAM command, when enabled, updates the program and displays the code in the Prompt Window. DISP PROG is dynamic and can be enabled or disabled any time when running a program.

TOOL RAD (F9)

TOOL RAD allows changing the Kerf width. The program must be stopped before this command can be activated.

HELP (F10)

On line help is available for description of the OPTIONS menu commands.

JOG MENU
LEVEL 3

JOG MENU (F6-F1)

The JOG menu allows jogging any attached axis to a desired position. Jogging can be executed continuously by using the CONT command or by small increments using the INC command. JOG is measured in units per minute (UPM). Its parameters are set for *each* axis in JOG (F1) command under Level 4. Note, the JOG default is 50 UPM. The acceleration, deceleration, and direction of jog and slow jog is also set up under the JOG command. The INC menu can be set up for both jog and slow jog under the JOG INC (F2) command. See JOG INC under Level 3. Refer to the table below for menu command descriptions.

JOG MENU	**Parent: MANUAL MENU**
Command	**Description**
INC (F1)	Jog incrementally using the selected increments settings listed below.
CONT (F2)	Jog continuously
1.00000 (F3)	Set Jog increment to 1.0000 units (inches or millimeters)
0.10000 (F4)	Set Jog increment to 0.1 units (inches or millimeters)
0.01000 (F5)	Set Jog increment to 0.01 units (inches or millimeters)
0.00100 (F6)	Set Jog increment to 0.001 units (inches or millimeters)
0.00010 (F7)	Set Jog increment to 0.00010 units (inches or millimeters)
SET ZERO (F8)	Reset Jog increment to 0
SLOW (F9)	Sets the Jog to slow jog mode set up under the JOG command

Also see JOG setup on page 7-26 and Jog JoyStick IO# on page 7-22. JOG INC menu on page 7-26 and 7-26 shows how to change this menu to show different jog increments.

HANDWHEEL MENU
LEVEL 3

HANDWHEEL MENU (F6-F3)

The HANDWHEEL menu permits attaching an axis to a handwheel and moving the cutting tool to the desired position. For this feature to work, a manual pulse generator option must be installed on the machine and the system parameters programmed to look at it. Each axis can have its own handwheel or can all share ONE handwheel. The resolution of the handwheel can be changed. To increase or decrease resolution optional feedrate override selector switch must be installed. Ask your AMCS sales representative for details.

The following HANDWHEEL table provides an overview of the menu commands. Note, the AcroMill start up command **run *xx*** automatically specifies the number of axes viewed in the HANDWHEEL menu.

Also see HANDWHEEL menu described on page 6-11.

HANDWHEEL MENU	**Parent: MANUAL MENU**
Command	**Description**
X (F1)	Attached axis
Y (F2)	Attached axis
Z (F3)	Attached axis
A (F4)	Attached axis
HELP (F10)	Brings up HELP screen

MDI MENU
LEVEL 3

MDI MENU (F6-F4)

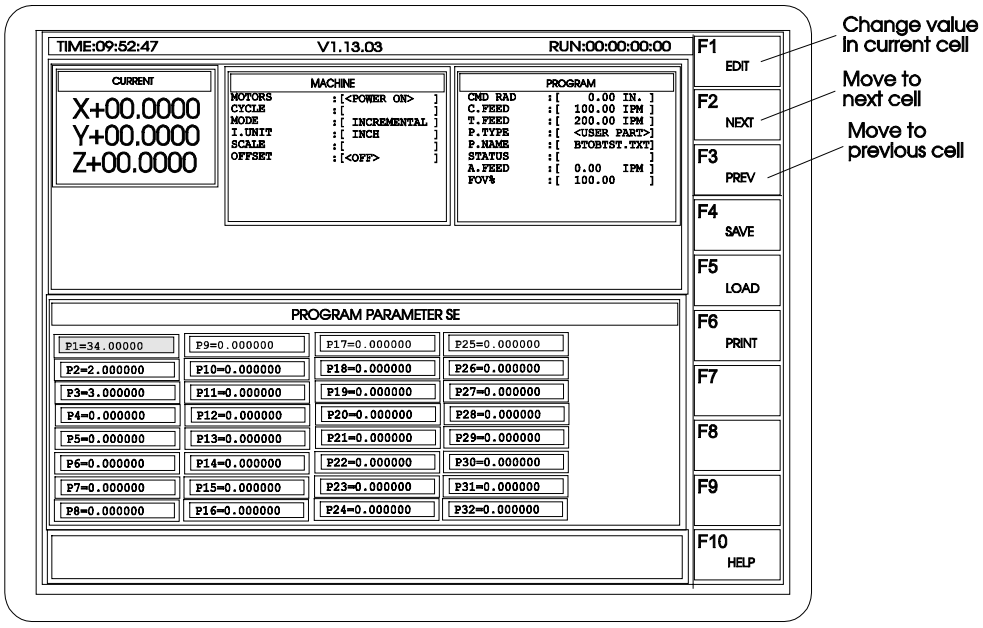
The MANUAL DATA INPUT menu is designed specifically for use on industrial type interfaces. The menu directly issues RS-274D format commands from a command line. The word addresses supported by AcroMill are shown below. See the RS-274D Format section of the USER'S GUIDE for information and descriptions of the commands supported.

MDI. MENU	**Parent: MANUAL MENU**
Command	**Description**
F (F1)	Feedrate (Cut Speed)
G (F2)	Preparatory Function
I (F3)	X Axis Integrand
J (F4)	Y Axis Integrand
H (F5)	Select Offset
M (F6)	Miscellaneous Functions
X (F7)	X Axis Endpoint or Dwell Time
Y (F8)	Y Axis Endpoint
Z (F9)	Z Axis Endpoint
D (F9)	Select Kerf

P PARAMS MENU
LEVEL 3

P PARAMS (F8-F6)

The PROGRAM PARAMETER menu allows the editing, loading, printing, and saving of any of the 100 output parameter values. Below, is a screen representation illustrating the PROGRAM PARAMETERS. Use the NEXT (F2) key to scroll to the next output and the PREV (F3) key to reverse scroll. The EDIT (F1) key allows changing the highlighted parameter in the Input dialog box. Just type in a number and hit Carriage Return. Note, the highlighted parameter in the dialog box changes. AcroMill is designed for parameters to change on-the-fly. This allows last minute editing and checking of parameters.



The following table is a summary of the P PARAMS menu commands.

P PARAMS MENU	**Parent: SET/DIAG MENU**
Command	**Description**
EDIT (F1)	Change the value of the currently selected parameter
NEXT (F2)	Go to the next parameter
PREV (F3)	Go to the previous parameter
SAVE (F4)	Save the program parameters
LOAD (F5)	Load the program parameters
PRINT (F6)	Print the program parameters
HELP (F10)	Brings up HELP screen

EDIT (F1)

The EDIT command changes the value of the Program Parameter for the current selected window. When selecting F1, the Program Parameter that is highlighted in the Display Window appears in the Prompt Window. For example, the following prompt appears:

(32.000000)

Type a number and hit Carriage Return. Now, the Program Parameter has been entered and the new value is shown in the Display Window. Use the ESCAPE key to get out of the EDIT mode.

NEXT (F3)

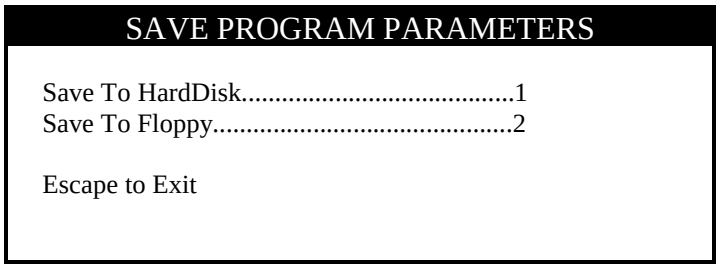
The NEXT command changes the selection to the next Program Parameter on the display screen (see the diagram above).

PREV (F4)

The PREV command changes the selection to the previous Program Parameter on the display screen (see the diagram above) to the previous axis.

SAVE (F5)

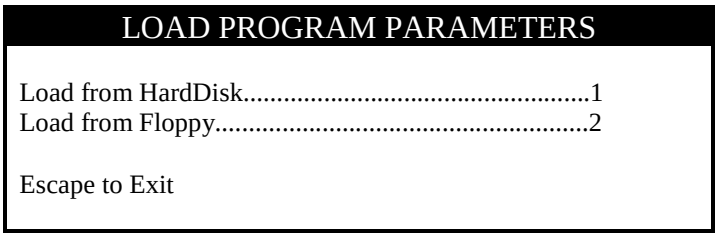
The SAVE command saves the Program Parameters settings to the harddrive or to the floppy drive. The following message appears under the SAVE PROGRAM PARAMETER dialog box:



Enter the Save destination by entering 1 or 2.

LOAD (F6)

The LOAD command loads the Program Parameters from the harddrive or from the floppy drive to AcroMill. The following message appears under the LOAD PROGRAMPARAMETER dialog box:



Enter the Load source by entering 1 or 2.

PRINT (F7)

The PRINT command sends the Program Parameters to the printer to print them out. This is a valuable source for archiving settings on hard copy.

HELP (F10)

On line help is available for description of the P PARAMS menu commands.

OFFSETS
LEVEL 3

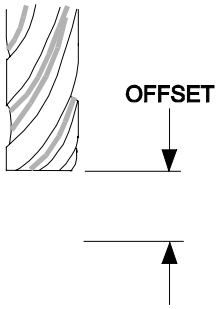
OFFSETS→ OFFSETS MENU (F8-F7)

The OFFSETS menu allows access for editing the Tool Offsets, Kerf Offsets, Floating Zeroes, Backlash and Ballscrew parameters. Below, is a summary of the OFFSETS menu commands followed by individual command descriptions.

OFFSETS MENU	**Parent: SET/DIAG MENU**
Command	**Description**
H OFFSETS (F1)	Edit tool length offsets
D OFFSETS (F2)	Edit kerf width offsets
FL ZERO (F3)	Edit Floating Zeroes
BALLSCREW (F4)	Edit Backlash Parameters
BACKLASH(F5)	Edit Ballscrew Parameters
HELP (F10)	Brings up HELP screen

H OFFSETS→ H OFFSETS MENU (F1)

H OFFSETS is the tool length offset. Offsets are made for different tool lengths compensating for material thickness, and tool wear. The H OFFSET compensation is useful for any milling applications. The following illustration provides an example of a tool length offset.

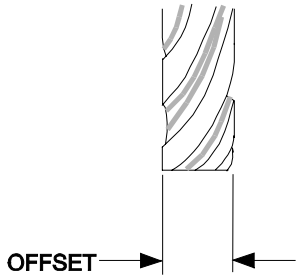


Below, is a summary of the H OFFSETS menu commands.

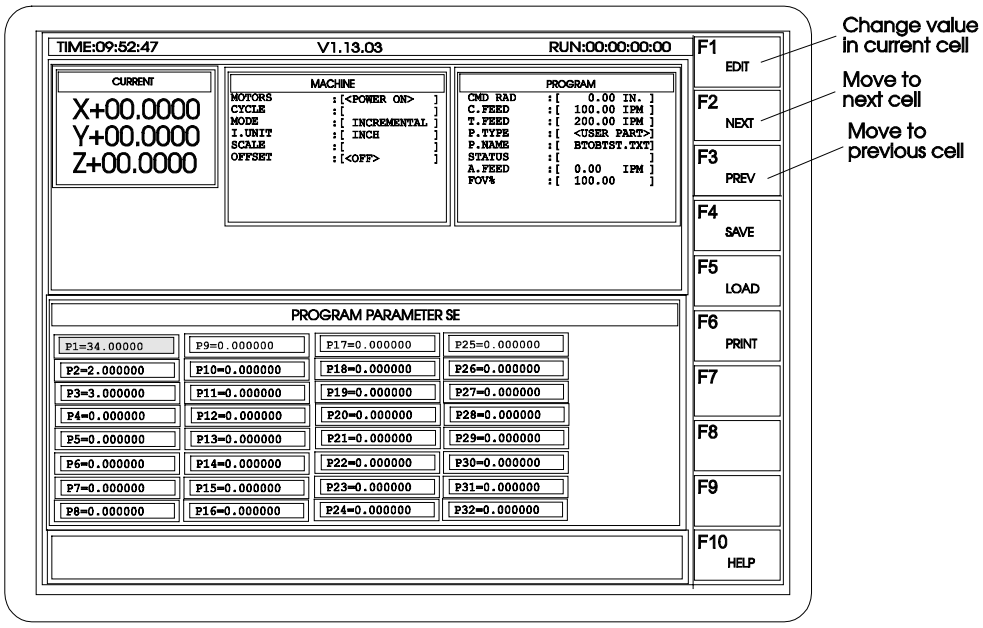
H OFFSETS MENU	**Parent: OFFSETS MENU**
Command	**Description**
CHOOSE (F1)	Select a tool offset number
EDIT (F2)	Change the value of offset for currently selected axis
NEXT (F3)	Go to offset for next axis
PREV (F4)	Go to offset for previous axis
SAVE (F5)	Save offsets
LOAD (F6)	Load offsets
PRINT (F7)	Print offsets
HANDWHEEL (F8)	Use handwheel to set the currently selected offset
HELP (F10)	Brings up the HELP screen

D OFFSETS→ D OFFSETS MENU (F2)

The D OFFSETS menu is for viewing, editing and printing the kerf width offsets. The following illustration provides an example of a kerf width offset.



There are 32 available kerf width offsets that can be used during the program. These offsets are numbered 1 through 32. These offsets are called via the D01-D32 commands. The D OFFSETS screen is illustrated below.



The table listed below is a summary of the D OFFSETS menu commands.

D OFFSETS MENU	**Parent: OFFSETS MENU**
Command	**Description**
EDIT (F1)	Change the value of the currently selected kerf offset
NEXT (F2)	Go to the next kerf offset
PREV (F3)	Go to the previous kerf offset
SAVE (F4)	Save kerf offsets to disk
LOAD (F5)	Load kerf offsets from disk
PRINT (F6)	Print kerf offsets
HELP (F10)	Brings up the HELP menu

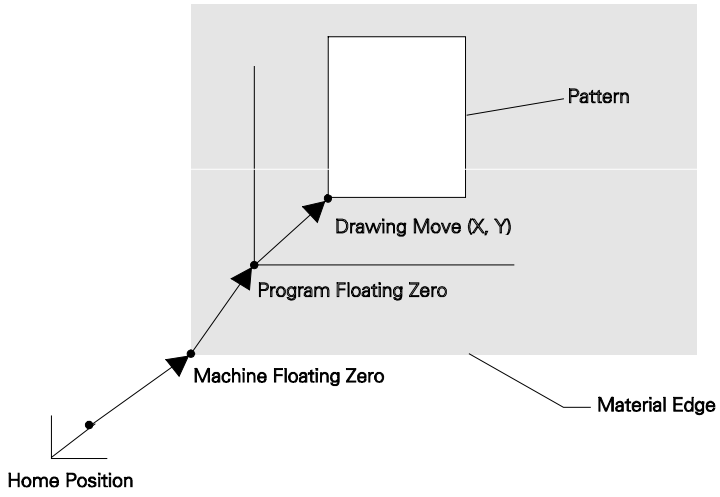
FL. ZERO→ FL. ZERO MENU (F3)

The FL ZERO menu provides machine floating zeroes or *any* parameter to be preset before setting up the material and running the part program. The FL ZERO menu sets floating parameters to *each* axis by using the EDIT (F1) key. Use the NEXT (F2) and PREV (F3) keys to toggle to the next axis parameter.

Note

The SET ZERO command is similar to the FL ZERO command. However, it is limited to setting floating zeroes to a *zero* value. The SET ZERO command when activated sets all axes to a floating zero. Refer to the SET ZERO command located under the MAIN (F3) menu and Level 3 (see F8 under FAST JOG, SLOW JOG, JOG SLOW, AND JOG FAST menus) .

Below, is an example illustration showing the FL ZERO command. In this example, the FL ZERO command (machine floating zero) references the position of the material for cutting. Do not confuse the machine floating zero with program floating zeroes. Program floating zeroes are defined in the part program by the RS-274D Format (see G92 under G-Codes section). The Home position is also shown the illustration below. Home is typically defined by a physical input such as a limit switch (see HOME command in the MAIN menu).



To set a machine floating zero, use the Jog command or MDI to move the cutting tool to the required location. Hit the FL ZERO (F3) key to activate the following dialog box.

Position Preset

X: -3.785000
Y: -4.000000
Z: 0.000000

Use the EDIT key to enter parameters for each axis. The table below summarizes the FL ZERO menu commands.

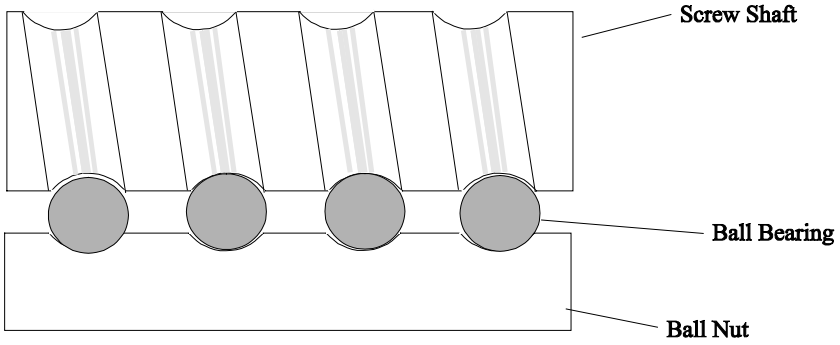
FL. ZERO	**FL. ZERO MENU**
Command	**Description**
EDIT (F1)	Change the value of preset floating zero for the selected axis
NEXT (F2)	Go to preset floating zero point for next axis
PREV (F3)	Go to preset floating zero point for previous axis
SAVE (F4)	Save primary preset floating zero points to disk
LOAD (F5)	Load primary preset floating zero points from disk
PRINT (F6)	Print preset floating reference points
HANDWHEEL (F7)	Use handwheel to set the currently selected preset floating zero point
CANCEL (F8)	Cancel the handwheel move
HELP (F10)	Brings up HELP screen

BALLSCREW→ BALLSCREW MENU (F4)

The BALLSCREW menu sets up ballscrew compensation. The following table provides a brief description of commands to setup, edit, load, save, print, and update ballscrew compensation parameters. See BALLSCREW menu under Level 4 (et seq.) for detailed information and illustrations of BALLSCREW commands.

BALLSCREW MENU	**Parent: OFFSETS MENU**
Command	**Description**
SETUP (F1)	Setup Ballscrew increments for each axis
EDIT (F2)	Edit Ballscrew files associated with the attached axes
LOAD (F3)	Loads Ballscrew files from HardDisk or floppy.
SAVE (F4)	Saves Ballscrew compensation
PRINT (F5)	Prints Ballscrew file parameters.
UPDATE (F6)	Updates files and changes made for increment settings.
HELP (F10)	Brings up the HELP screen

The illustration below depicts a screw shaft with ball nut.

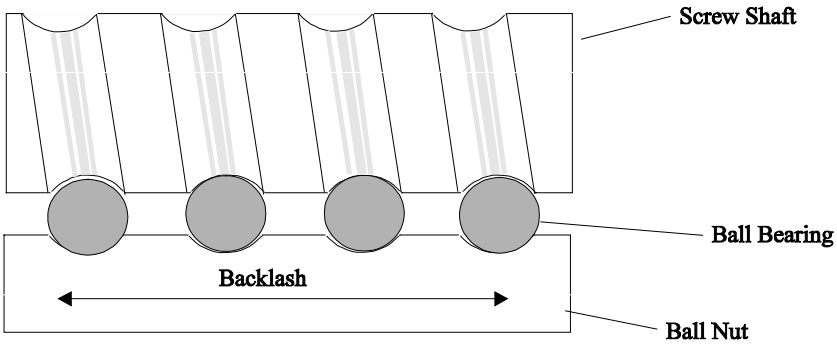


Ballscrew and Ballnut

Ballscrew compensation adjusts for static and dynamic criterion affecting the ballscrew(s) functionality. Such static factors are resultant accumulation of tolerances in pitch diameter (root and major), lead, and the groove radius of the ball. Some dynamic factors are compression, tension, radial, eccentric loading, and critical speed. All of these may be factors that affect ballscrew compensation. See APPENDIX A for Ballscrew compensation procedures.

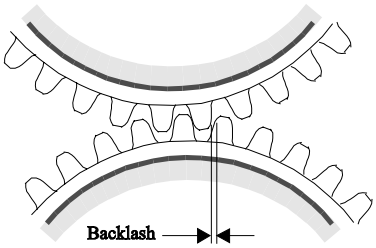
BACKLASH (F5)

The BACKLASH command sets the backlash for each of the eight possible axes. Backlash or axial lash is the axial free motion between the ball nut and screw; a measure of system stiffness. Below is an illustration of a screw shaft with ball nut depicting backlash.



Ballscrew and Ballnut

Another common example of backlash can be seen in gears. The illustration below shows gear backlash.



Gear Backlash

The following Input dialog box appears when the BACKLASH key is initialized. Type in the compensation required for each of the axes. Use the arrow (↓) keys to scroll down to the next axis and hit Carriage Return when finished. Backlash is entered in units (in./mm).

BACKLASH COMPENSATION SETUP	
Backlash for X	0.00000
Backlash for Y	0.00000
Backlash for Z	0.00000
UNATTACHED	0.00000
UNATTACHED	0.00000
UNATTACHED	0.00000
UNATTACHED	0.00000
UNATTACHED	0.00000

HELP (F10)

On line help is available for description of the OFFSETS menu commands.

SYS PARAMS LEVEL 3

SYS PARAMS MENU (F8-F8)

The SYS PARAM menu sets up the system parameters. The table below summarizes the SYSTEM PARAMETER commands. The commands in the table are described in detail below. Use the flow diagram for Level 3 at the beginning of this section for reference.

SYS PARAMS MENU	**Parent: SET/DIAG MENU**
Command	**Description**
AXES (F1)	Setup Axes Parameters
SERVO (F2)	Setup Servo Parameters
CONTROL (F3)	Setup Control Parameters
HOME (F4)	Setup Home Parameters
I/O (F5)	Setup Input/Output Parameters
SPEEDS (F6)	Setup Master FeedRate Parameters
COMM (F8)	Setup Communication Parameters
NEXT>> (F9)	Go to Rest of SYS PAR Menu
HELP (F10)	Brings up the HELP screen

AXES (F1)

The AXES command allows changing values of the following parameters for each axis. The table below shows the default values, units, and a descriptive summary. For in-depth definitions of the servo parameters refer to the TUNE (F9) menu under the Level 4 section.

Parameter	**Typical Value**	**Default Value**	**Units**	**Description**
P Gain	0.001	0.00244	volts/pulses of following error	Proportional Gain
I Gain	0.001	0.00000	volts/second/pulses of following error	Integral Gain
I Delay	1.0	0.00000	second	Integral Delay
I Limit	1.0	0.00000	volts	Integral Limit
D Gain	0.00001	0.00000	volts/pulses of following error/second	Derivative Gain
D Time	0.002	0.00000	second	Derivative Sample Time
ACC FFwd	0.0001	0.00000	volts/incoming setpoint pulses/sec^2	FeedForward Acceleration
Vel FFwd	0	0.00000	volts/incoming setpoint pulses/second	FeedForward Velocity
Torque Limits	0-10	10	volts	Torque Limits

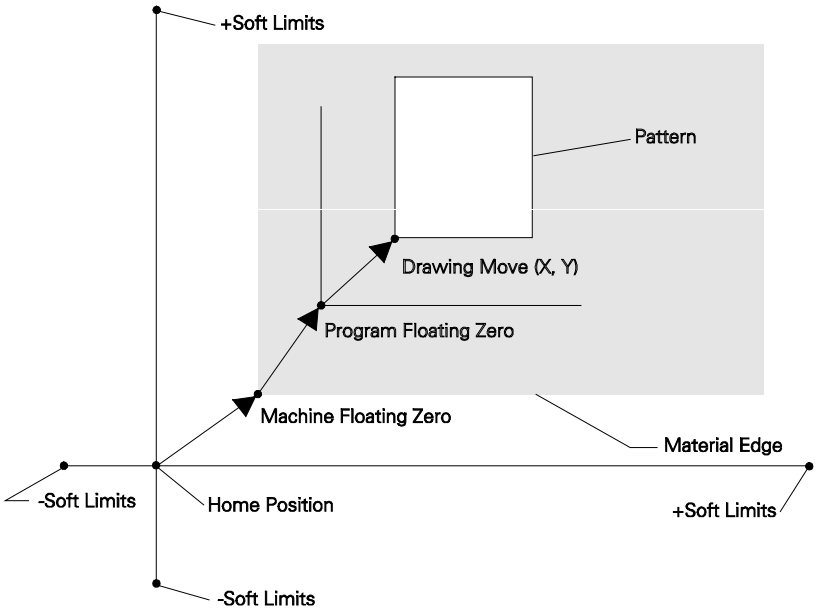
SERVO (F2)

The SERVO command sets servo parameters for each axis. The following table is an illustration of the *complete* SERVO parameter table for the x axis. There are two parameter dialog boxes for *each* axis. Use the arrow (↓) key to scroll down the table and Carriage Return to bring up the next set of parameter dialog boxes.

SERVO PARAMETERS FOR AXIS X >		
+Soft Travel Limit	:[	200.00000]
- Soft travel limit	:[	200.00000]
Disable Limit? (1=Y, 0=N)	:[	1.00000]
Inposition Band (units)	:[	0.00000]
ExcessError Band (units)	:[	0.00000]
Enc. Multiplier (1,2,4)	:[	1.00000]
DAC Polarity (-1, +1)	:[	1.00000]
Pulses Per Linear Unit	:[	1000.00000]
Home Required (1=y, 0=N)	:[	0.00000]
ASCII Designator	:[	0.00000]
Handwheel SOURCE (-1=None)	:[	-1.00000]
Handwheel Ratio	:[	10.00000]

+ Soft Travel Limit

The positive Soft Travel Limit is the software positive over travel limit for the cutting tool. The following diagram illustrates the +Soft Travel Limits. These values are set to the requirements of your specific machine. The default setting is set at 200 units. After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.



- Soft travel Limit

The negative Soft Travel Limit negative over travel limit for the cutting tool. The diagram above illustrates the –Soft Travel Limits . These values are set to the requirements of your specific machine.

The default setting is set at -200 units. After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.

Disable Limit?

The Disable Limit is a Bit indicating whether the Limit is required for the current servo. The default setting for the Disable Limit is set for disabled (1=Y). After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.

Inposition Band

The Inposition Band is the Inposition error band measured in units for the following error. It can be set as low as one pulse. The default is at zero. After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.

ExcessError Band

The Excess Error Band is the fault check band for the Following Error. The default is set at zero which is disable. After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required. The ExcessErrorBand can be used to prevent runaway. To accomplish this, create a PLC program and add this to the **Initfile.8k** file. For example, the following PLC program to set an output (output 60)when excess error is detected.

```
DIM PLC2
PLC2
10 LD NOT 529
20 OUT 60
RUN
```

Be sure to set the ExcessErrorBand to the appropriate value.

Encoder Multipliers

The Encoder Multipliers is the control for multiplying encoder counts. AcroMill is set up where encoder counts can multiply encoder counts by 1, 2, or 4. For instance, if the x axis encoder is a 1000 count encoder, the control can effectively yield 1000, 2000, 4000 counts per revolution. The default setting is set at 1. After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.

DAC Polarity (-1,+1)

The DAC Polarity determines the polarity of the digital to analog converters. These parameters allow the analog output polarity to be changed to establish proper control loop feedback without any wiring changes. The encoders for each axis should be installed so that the positive counts result in the defined positive direction. Once this has been established, use the DAC polarity parameter to set the correct feedback polarity for *each* axis. The *normal* setting for these parameters is positive for both ***x*** (traverse) and ***y*** (rail). The default setting is set at +1 (+1=Positive polarity). After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.

Pulses Per Linear Unit

The Pulses Per Linear Unit are the number of pulses in a specified unit of measurement. The default setting is set at 1000 units. If English Units are selected, enter a value that is the number of encoder pulses per inch for each axis. For example, if your machine uses 1000 line encoders on a rack and pinion system where 1 encoder revolution results from 4 inches of axis travel, the Pulses Per Linear Unit parameter is calculated as follows:

$$\frac{1000 Lines}{1 \text{Re} volution} \times \frac{1 \text{Re} volution}{4 Inch} = \frac{250 Pulses}{Inch}$$

If Metric Units are selected, enter a value that is the number of encoder pulses per millimeter for each axis. For example, if your machine uses 1000 line encoders on a rack and pinion system where 1 encoder revolution results from 100 millimeters of axis travel, the Pulses Per Linear Unit parameter is calculated as follows:

$$\frac{1000 Lines}{1 \text{Re} volution} \times \frac{1 \text{Re} volution}{100 mm} = \frac{10 Pulses}{mm}$$

Note

Changing the resolution affects the acceleration, error tolerance, and speed range. Review acceleration, error tolerance and maximum machine values after editing the resolution to assure proper machine performance.

After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.

Home Required

The Home Required is a Bit indicating whether Home is required for the current servo. The default setting is set at zero (0=N) which is Home disabled. Remember to change Home Required for each axis as needed and to ESCAPE and *exit* the system (Ctrl-Break) to reset the Home Required parameter. Now, re-enter AcroMill to run your program. After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required. Also, it is required to change the relating JOG*x*.8K and HOME*x*.8K files.

ASCII Designator

The ASCII Designator is the ASCII value for one letter code for the axis. The default setting is set at zero. This implies AcroMill recognizes the axes designated as *x, y,* and *z.* After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required. An example of using the ASCII Designator is by swapping the *x* and *y* axes. To change the *x* and *y* axis to the *y* axis, type ASCII code 89 (ASCII 89=Y). Next, change the *y* axis (hit Carriage Return) and type ASCII code 88 (ASCII 88=X). Hit Enter and ESCAPE to exit. Note, the Current Window has been changed.

HandWheel Source (-1=None)

The HandWheel Source is the axis the handwheel (encoder) is attached to. The default setting is set at -1 (-1=None). After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.

Hand Wheel Ratio

The Hand Wheel Ratio is the gear ratio between the handwheel and the servo. The default setting is set at 10. After parameter values are changed, hit Carriage Return and then hit ESCAPE to exit the table. If the message prompt "Do you want to save changes?" appears, answer **Y** for yes, **N** for no. Remember to make changes for each axis required.

CONTROL (F3)

The CONTROL command allows the machine operator to set values for the following control parameters. The table below is an illustration of the *complete* CONTROL Parameter table for the x axis. There are two parameter dialog boxes for *each* axis. Use the arrow (↓) key to scroll down the CONTROL SETUP parameter table. Hit Carriage Return to save and ESCAPE to exit back to the CONTROL command.

CONTROL SETUP >>		
Default Metric	:[	0]
Default Graphics	:[	0]
I/J Inversion	:[	1]
Lib Part I/J Inversion	:[	1]
Default Lead Radius	:[	2]
GoTo Start After Trial	:[	0.00000]
X Axis Cutting Size	:[	0.00000]
Y Axis Cutting Size	:[	0.00000]
Acute Angle Threshold	:[	0.00000]
Angular Vel. Threshold	:[	0.00000]
Repeat For Ever (0/1)	:[	0]
Use Native Editor (0/1)	:[	1]
Epsilon for compensat.	:[	0.00010]
Sweep Epsilon (radians)	:[	0.00100]
Graphic Resolution	:[	100]
Inputs 0-15 Logic	:[	0]
Inputs 16-31 Logic	:[	0]
Outputs 32-47 Logic	:[	0]
Outputs 48- 63 Logic	:[	0]
Root Epsilon	:[	–5.0]
Corner Arc Threshold	:[	90.00000]
Mode Incr/Abs	:[	0]
Path Color	:[	0]
IgnoreCycleStart	:[	0]

Default Metric

Default Metric is the default for the control's unit of measurement. Units are in inches or metric. Default setting is metric.

Default Graphics

A value of 1 means that default graphics will be shown on power up.

I/J Inversion

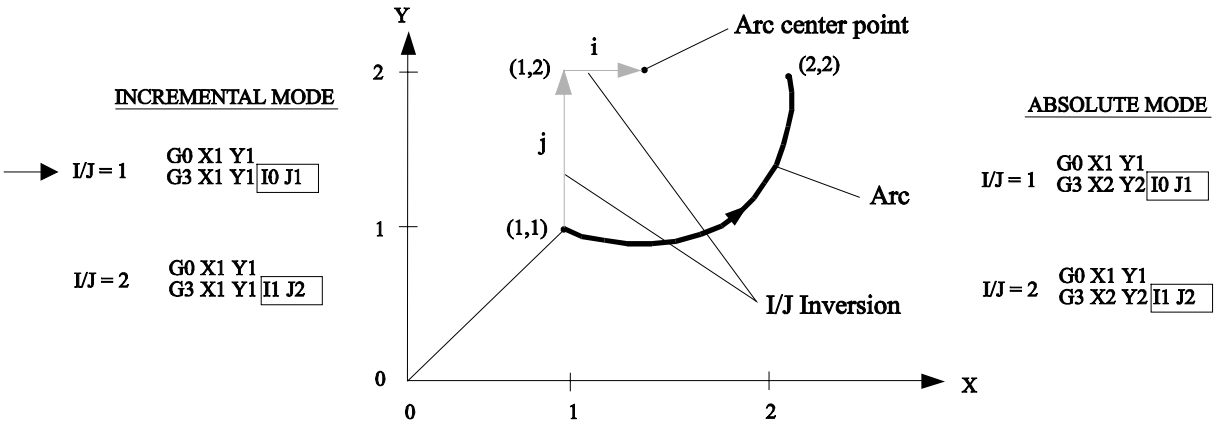
The I/J Inversion defines the inverse vector relationship for the start of the arc or the center point of the arc cut. I/J Inversion depends on the reference point setting. Below is a listing of these setting.

1 - means I/J is treated as the incremental positive value from the start of the arc
2 - means I/J is treated as a *absolute* position.* See Mode Commands on page 1-6.

Note:

I/J Inversion includes the following, but is intended for special applications.
0 - means I/J is treated as the incremental negative value from the start of the arc.

The diagram below depicts the I/J Inversion setting. In this example, the settings are in the incremental mode. An arrow is positioned next to the correct code for the illustration. Note the G-Command code is determined by the I/J Inversion settings. In this case, I/J = 0. Also, note the I/J Inversion values do not change in either incremental or absolute modes.



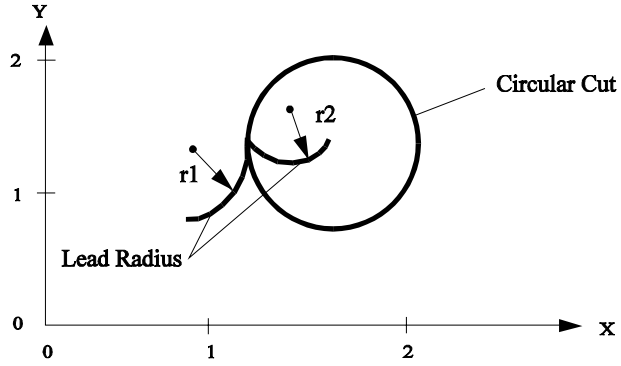
*Disparate CNC formats interpret I,J definitions in a CIRCLE/ARC command differently. The ability to select this mode makes this RS274D interface flexible.

Lib Part I/J Inversion

The Lib Part I/J Inversion is the library of parts for I/J inversion files. The quantity of part files saved is determined by the size specifications of the harddrive.

Default Lead Radius

The Default Lead Radius command is used *only* in the AcroMill library parts. It is normally set at zero. By setting the Lead Radius to some value, the *lead-in cut* is established. The illustration below shows two arbitrary Lead Radii labeled **r1** and **r2** for a circular cut. When using any of the 34 Library parts, utilize this command when lead radii is required.



GoTo Start After Trial

GoTo Start After Trial travels around the part command path without cutting. It essentially executes a Dry Run and Run sequentially.

X Axis Cutting Size

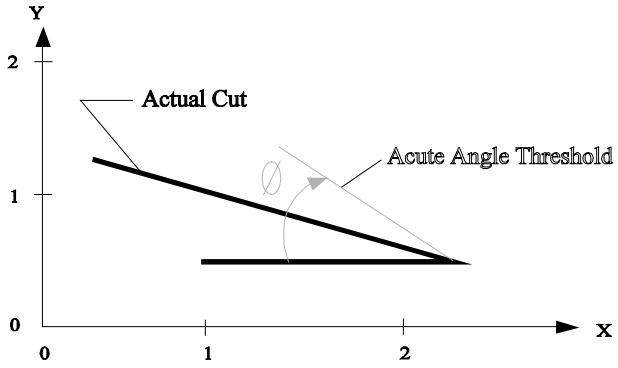
The X Axis Cutting Size sets the x axis size for a *xy* table. Measurements are in units (inches or metric).

Y Axis Cutting Size

The Y Axis Cutting Size is the same as the *x* Axis Cutting Size except is used for the y-axis. It sets the y axis size for a *xy* table. Measurements are in units (inches or metric).

Acute Angle Threshold

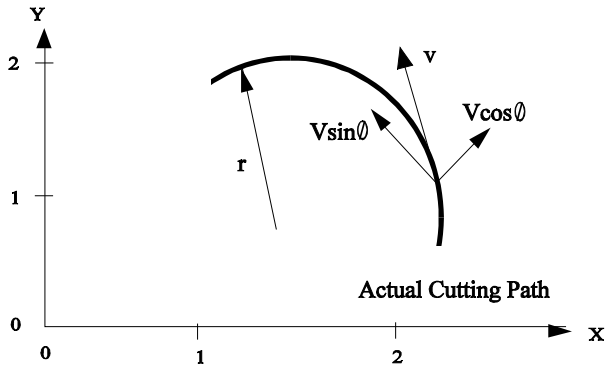
The Acute Angle Threshold is the threshold (in degrees) at which the acute angle of the corner(s) below which the control will slow down around the corner. AcroMill is designed to move the cutting device smoothly at all times. It is used to minimize overshoot or the *rounding of corners* as a result of tool head velocity. This means the machine accelerates and decelerates smoothly and slows down as needed between the segments of a part (depending on the angle of intersection or corner). This command greatly increases precision on corners making sharp corner cuts where needed. The diagram below shows the Acute Angle Threshold set at some angle ϕ versus the actual cut. Note, as long as the actual cut angle is less than or equal to the Angle Threshold, the cutting speed will intuitively slow down as the cutting head approaches the corner. Sometimes the acceleration (ACC) and deceleration (DEC) are set too high for the THD to be indicated on the display. Decreasing the ACC and DEC to a lower value, say, one(1) will permit the THD to be displayed at a slow enough observable rate.



Angular Acc. Threshold

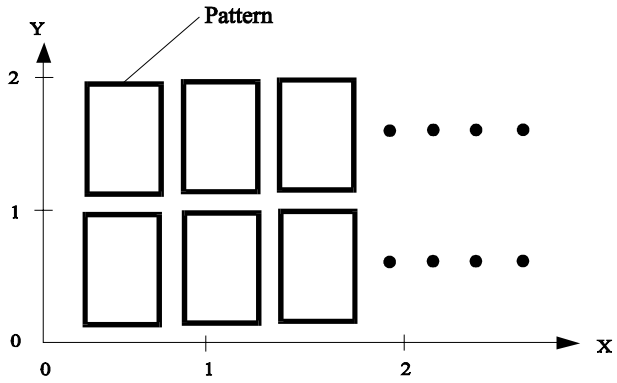
The Angular Acc. Threshold is provided to prevent machine tool shaking as a result of tangential acceleration of the cutting tool following the radial path. AcroMill is designed to move the cutting device smoothly at all times. This means the machine accelerates and decelerates smoothly and slows down as needed between the segments of a part (depending on the angle of intersection). Maximum velocity on arcs is also limited according to centripetal acceleration. The acceleration value entered is used as the centripetal acceleration limit.

Different mechanical systems and cutting devices require different acceleration values to operate smoothly and repeatedly. The greater the curved path, the greater the acceleration of the cutting tool. Angular Acc. Threshold sets the maximum angular velocity of the cutting tool. Enter a value for the desired acceleration rate. The Angular Acc. Threshold parameters are in units per second^2. The diagram below depicts the velocity vectors associated with the cutting tool following a curved path.



Repeat For Ever (0 - Disabled, 1 - Activated) For testing only.

The Repeat For Ever command allows the machine operator to replicate the same pattern cut over and over. The default is set at zero(0) which indicates Repeat For Ever is disabled. The illustration below shows a simple pattern cut repetition using the Repeat For Ever command. Note, the Repeat For Ever command should be used in the Incremental Mode.

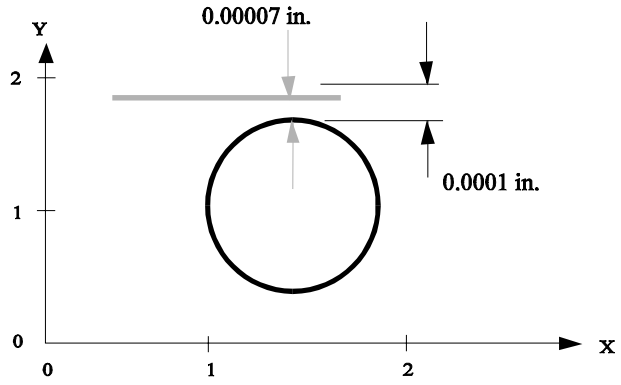


Use Native Editor (0/1)

Use Native Editor is used to set the source of the editor. 1-sets the editor in AcroMill.
2-sets the editor in DOS.

Epsilon for Compensat.

Epsilon for Compensation sets the compensation for CAD drawings where lines do not meet. For example, if Epsilon for Compensation is set for 0.0001, all lines will be interpreted as joined within this threshold range. The drawing below summarizes the usefulness of this command. Note, the actual Epsilon distance is 0.0007 inches which is less than the Epsilon compensation setting. In this example, AcroMill would interpret the line and circle as being tangential or joined.



Sweep Epsilon (radians)

The Sweep Epsilon defines in radians the smallest valid sweep of an arc below which the arc can be treated as a straight line. This is used in Kerf compensation math. Sweep Epsilon defines an arc as two points. If the angle ϕ is small enough as it approaches zero (this depends on such variables as arc radius or distance between the start and stop points), the Sweep Epsilon will interpret the start and stop points as one point. As a result, a circle will be interpreted. This is shown in Figure A below. Use the Sweep Epsilon when defining the small angles.

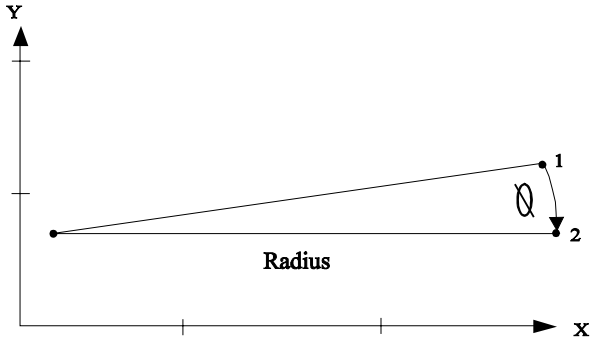


Figure A

Likewise, if an arc sweep (radius) approaches $\pi/180$ radians (180°), Sweep Epsilon will interpret the start and end points as a straight line. This is shown in Figure B below.

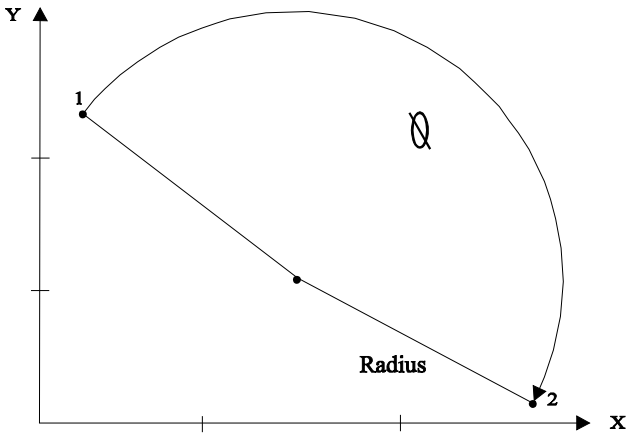


Figure B

Graphic Resolution

The Graphic Resolution is used to set up the graphic display resolution This increases or decreases the resolution of how arcs are drawn by the tool path graphics. The resolution settings does not affect machine operation in any way but merely slows or speeds up the graphics. A typical value is about 100.

Inputs 0-15 Logic

Inputs 0–15 Logic are discrete inputs in the AcroMill software. There are a total of 32 inputs starting with Input 0 and ending with Input 31. Normally, (i.e. with INPUT LOGIC=0) an active input generates an internal active (+) state, and vice versa. By using the Input Logic parameter, the polarity of each input can be inverted, so that an active input generates an internal (–) state.

Use the following table to determine the appropriate value for the INPUT LOGIC value.

AcroMill Input Logic	
To change the polarity of input	*Add this number to INPUT LOGIC*
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096
13	8192
14	16,384
15	32,768

Inputs 16-31 Logic

Inputs 16-31 Logic are discrete inputs in the AcroMill software. There are a total of 32 inputs starting with Input 0 and ending with Input 31. This section outlines Inputs 16–31. Normally (i.e. with INPUT LOGIC=0) an active input generates an internal active (+) state, and vice versa. By using the Input Logic parameter, the polarity of each input can be inverted, so that an active input generates an internal (–) state.

Use the following table to determine the appropriate value for the INPUT LOGIC value. A calculator is useful in calculating the Input Logic value. Use $\mathbf{2^n}$ where **n** is the corresponding input. For example $\mathbf{2^{17}}$ = 131,072.

AcroMill Input Logic	
To change the polarity of input	*Add this number to INPUT LOGIC*
16	65,536
17	131,072
18	262,144
•	•
•	•
•	•
31	2,147,483,648

Outputs 32–47 Logic

Outputs 32–47 Logic are discrete outputs in the AcroMill software. There are a total of 32 inputs starting with Input 32 and ending with Input 63. These outputs can be switched on or off by adjusting the output logic parameter. This is the same as changing from normally open to normally closed contacts on a relay.

With OUTPUT LOGIC=0, the internal active (+) state of an output activates that output (closes the switch). By changing this number, the polarity of each output can be inverted, so that an active output generates an internal (+) state deactivating the output (opens the switch).

Use the following table to determine the appropriate value for the OUTPUT LOGIC value.

AcroMill Output Logic	
To change the polarity of output	*Add this number to OUTPUT LOGIC*
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096
13	8192
14	16,384
15	32,768

Outputs 48- 63 Logic

Outputs 48–64 Logic are discrete outputs in the AcroMill software. There are a total of 32 inputs starting with Input 32 and ending with Input 63. These outputs can be switched on or off by adjusting the output logic parameter. This is the same as changing from normally open to normally closed contacts on a relay.

With OUTPUT LOGIC=0, the internal active (+) state of an output activates that output (closes the switch). By changing this number, the polarity of each output can be inverted, so that an active output generates an internal (+) state deactivating the output (opens the switch).

Use the following table to determine the appropriate value for the OUTPUT LOGIC value. A calculator is useful in calculating the Output Logic value. Use $\mathbf{2^n}$ where **n** is the corresponding input. For example $\mathbf{2^{17}}$ = 131,072.

AcroMill Output Logic	
To change the polarity of output	*Add this number to OUTPUT LOGIC*
16	65,536
17	131,072
18	262,144
•	•
•	•
•	•
31	2,147,483,648

Root Epsilon

The Root Epsilon command allows the machine operator to adjust precision problems that may result in the M and G-code program. Occasionally, a line may be inserted as a consequence of two object end points not intersecting. Root Epsilon can be used by inputting increasing or decreasing values and testing the program. This command may require some knowledge of programming with M and G-code

Corner Arc Threshold

The Corner Arc Threshold is used in kerf compensation where a corner inserted block is automatically inserted to compensate for what appears to be overshoot when cutting sharp angled corners (see Figure 1 below). In essence, the cutting tool is following the cutting path correctly. However, a sharp angled corner will cause the cutting tool to cut over some of the same path. To prevent this condition from occurring, the Corner Arc Threshold command has been provided in AcroMill.

In general, if the acute angle is less than the threshold then a compensatory line is added. Figure 1 illustrates the Corner Arc Threshold line. The importance of this feature is evident in Figure 1 and illustrates the cutting path without the Corner Arc Threshold.

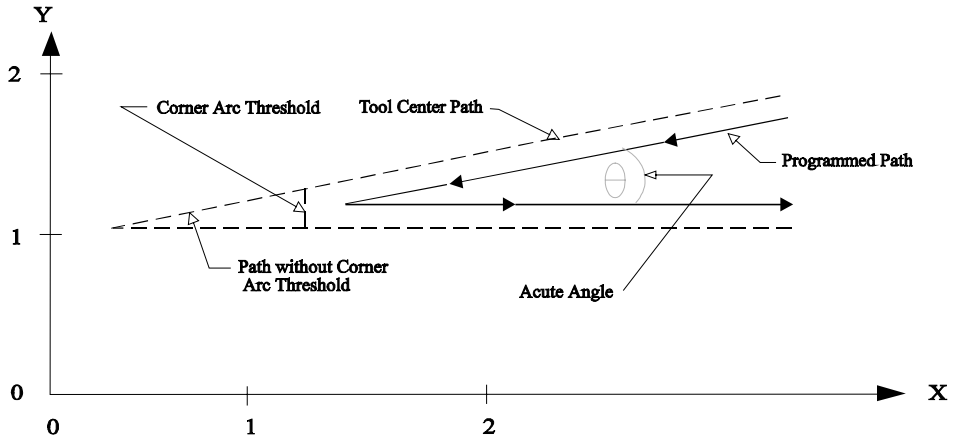


Figure 1

Mode Incr/Abs (0/1)

The Mode Incr/Abs (Incremental/Absolute) is used as a default in changing from incremental or absolute modes. Here, Incremental mode equals zero(0) and Absolute mode equals one(1).

Path Color (0–15)
When cutting, the Path Color changes the color of the current block to the default setting in Path Color. There are a total of 16 color settings that can be used.

IgnoreCycleStart (0/1)
IgnoreCycleStart is used when cycle starting the cutting machine remotely. To activate the IgnoreCycleStart, it must be set to a value of one(1) in the Control Setup table. Once activated, an input from the remote device must be inputted to cycle start the machine. The input can be set up under MISC (F3) under the I/O MENU (See page 7-22).

HOME (F4)

The HOME command allows the machine operator to setup home parameters for the required axes. The following table is an illustration of the Home Parameter table for the x axis. There are parameter dialog boxes for each axis. Use the Carriage Return to bring up the next set of parameter dialog boxes for each axis.

HOME SETUP FOR AXIS X		
Home Direction (0=+) (1 = –)	:[	0]
Home Preset	:[	0]
Home Switch Input	:[	–1.00000]
Home Fast Speed	:[	50.00000]
Home Slow Speed	:[	5.00000]
Home Priority (0..8)	:[	0]

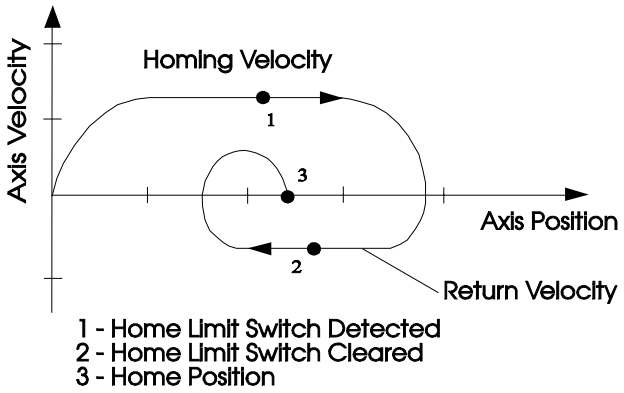
Home Direction (0=+) (1= –)
The Home Direction specifies the direction in which the x (transverse) axis and y (rail) axis moves to start its homing sequence. The default is set at zero.

Home Preset
The Home Preset specifies the preset position for Home. The default setting for this command is set at zero.

Home Switch Input
The Home Switch Input specifies the number of inputs wired to the Home Switch. The default is set at –1.

Home Fast Speed
The Home Fast Speed is the velocity used when the axis starts its homing sequence while moving toward the Home limit switch. The default setting for this command is set at 50.

Home Slow Speed
The Home Slow Speed is the velocity used after AcroMill encounters the Home limit switch during its search for the encoder marker pulse. The default is 5. The diagram below illustrates how AcroMill can be configured to an encoder marker pulse in addition to the limit switch. Homing to a switch and a marker pulse is the most accurate method of determining the cutting machine's absolute position.



Home Priority (0-8)

The Home Priority determines the order in which axes will Home. A priority of 0 specifies the axis will not Home. A value of 1 is the highest priority. Two axes with the same priority will Home simultaneously.

I/O→ I/O MENU (F5)

The Input/output menu allows the setup of Input/Output parameters for the machine. The following is a table that describes the overall function of the I/O command keys. See Level 4 Input/Output for detailed descriptions and illustrations.

I/O MENU	**Parent: DIAGNOSTIC**
Command	**Description**
MISC (F3)	Setup miscellaneous I/O parameters
FOV (F4)	Setup feedrate override parameters
FPOSITION (F5)	Setup feedrate override percentages
SOV (F7)	Setup spindled override parameters
SPOSITION (F8)	Setup spindle override percentages
HELP (F10)	Brings up HELP screen

SPEEDS (F6)

The SPEEDS parameter menu allows the setup of control speeds for the machine. The following parameters can be set to the specific requirements for your machine. The parameter table is the Control Speed Setup table. Hitting Carriage Return will activate another table which is provided below. This is called the Control Ramp Setup.

CONTROL SPEED SETUP >>				
Maximum Machine Speed	UPM	:[	0.00000	]
Trial Speed	UPM	:[	50.00000	]
Rapid Speed	UPM	:[	50.00000	]
Cut Speed	UPM	:[	50.00000	]
Minimum Corner Speed	UPM	:[	0.00000	]
Marker Speed	UPM	:[	0.00000	]
For/Backward Speed	UPM	:[	50.00000	]

Maximum Machine Speed

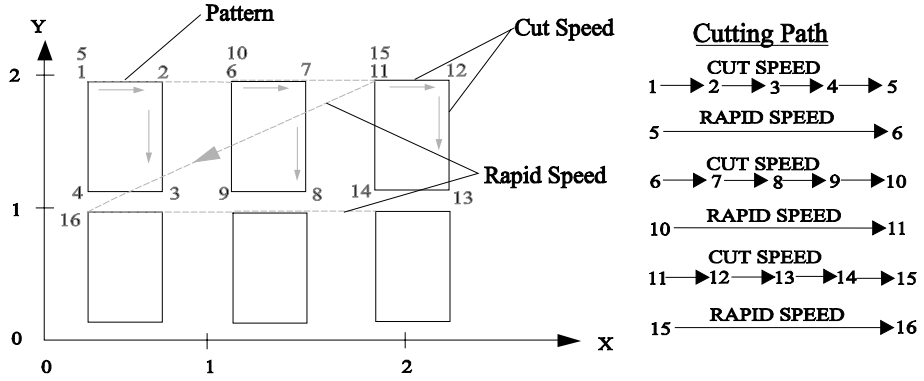
Maximum Machine Speed - Reserved for future use.

Trial Speed

The Trial Speed is the *dry run* speed at which the cutting tool is not engaged. Typically, a trial or dry run is completed to set up a new pattern. The default for the Trial Run Speed is set at 50 UPM (inches or metric).

Rapid Speed

The Rapid Speed is the set up control for the transverse speed between parts. The illustration below shows the cutting path for the six patterns. The program path is initiated at corner 1, then travels to corner 2, and so forth. Between corner points 1 and 5 is the Rapid Speed. The default for Rapid Speed is 50 UPM (inches or metric).

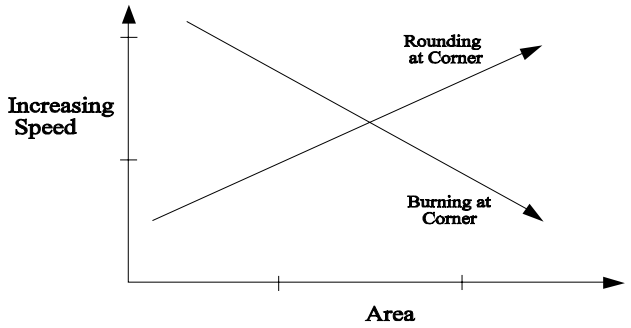


Cut Speed

The Cut speed is the velocity at which the cutting tool is engaged. The cutting tool, material type, and thickness are some factors that determine cutting velocity. Observe the illustration above for Cut Speed. The default for the Cut Speed is 50 UPM (inches or metric).

Minimum Corner Speed

The Minimum Corner Speed is used to ensure precise sharp corners and line intersections when cutting angles. The default for Minimum Corner Speed is 0 UPM (inches or metric) and provides for best geometric results. Set this parameter to the value that provides the optimal result to prevent binding at the corners with milling systems. Values greater than zero will cause rounding of corners. Other factors such as tool size and sharpness, material type, and thickness determine the Minimum Corner Speed value. The diagram below illustrates Minimum Corner Speed increasing-decreasing values versus rounding at corner and burning at corner factors.

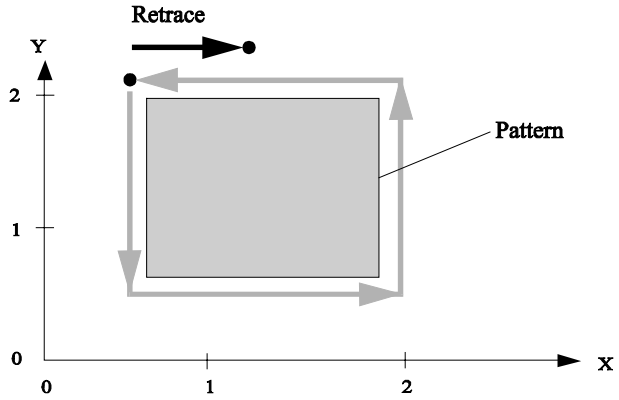


Marker Speed

The Marker Speed sets the angular velocity at which to search for the encoder marker. This speed is used between EIA RS-274D M-codes M9 and M10. Refer to the M-codes section in the User's Guide. The default for the Marker Speed is 0 UPM (inches or metric).

For/ Backward Speed

For/ Backward Speed can be used in situations where pattern retrace is desired. An example, is where the cutting tool needs to be replaced as a result of wear or breakage. The Backward Speed control allows the tool to retrace the pattern path to a location on the material where the cut can be reinstated. The drawing below illustrates a simple pattern using Forward/Backward Speed control. The default for Forward/ Backward Speed is 50 UPM (inches or metric).



A second parameter table appears after the Control Speed Setup table. Activate this table by hitting Carriage Return. The table below is the Control Ramp Setup table. Use the arrow(↓) key to scroll down the table when changing values.

CONTROL RAMP SETUP					
Master Rapid	ACC	UPM	:[	100.00000	]
Master Rapid	STP	UPM	:[	100.00000	]
Master Feed	ACC	UPM	:[	100.00000	]
Master Feed	DEC	UPM	:[	100.00000	]
Master Feed	STP	UPM	:[	100.00000	]

Master Rapid ACC

The Master Rapid Acceleration is the default setting for the motion profiler acceleration. This command uses the G0 G-Code (Rapid Mode). Its default setting is 100 UPM.

Master Rapid STP

The Master Rapid Stop is the default setting for the motion profiler stop. This command uses the G0 G-Code (Rapid Mode). The Master Rapid Stop default setting is 100 UPM.

Master Feed ACC

The Master Feed Acceleration is the default setting for the motion profiler acceleration. This command uses the G1 G-Code (Feed Mode). The default setting is 100 UPM.

Master Feed DEC

The Master Feed Deceleration is the default setting for the motion profiler deceleration. This command uses the G1 G-Code (Feed Mode). The default setting is 100 UPM.

Master Feed STP

The Master Feed Stop is the default setting for the motion profiler stop. This command uses the G1 G-Code (Feed Mode). The default setting is 100 UPM.

COMM (F8)

The COMM command allows selecting communication parameters for the serial communication line. There are two parameter tables that appear. The first table is the Serial Link Parameters which are offered for use in uploading and downloading programs. The second parameter table is activated by hitting Carriage Return. This table is the DNC Link Parameters and is shown after the Serial Link Parameters descriptions.

SERIAL LINK PARAMETERS >>		
Baudrate	:[	9600]
Stop Bits (1, 2)	:[	1]
Data Bits (7, 8)	:[	8]
Parity 0=None, 1=Odd, 2=Even	:[	0]
Comm Port (1, 2)	:[	1]
Transmit Delay (sec)	:[	5.0]

BaudRate

The BaudRate default setting is 9600 and is used for the serial port. Toggle to the desired baud rate for the remote communications link. The range of baud rate supported is 300, 600, 1200, 2400, 4800, 9600, and 19,200 baud.

Stop Bits (1, 2)

Stop Bits range of entry is 1 or 2. The default setting for the Stop Bits is one(1) and is for the serial port.

Data Bits (7, 8)

The Data Bits range of entry is 7 or 8. The default is set at 7.

Parity 0=None, 1=Odd, 2=Even

If the ASCII character code is chosen, the parity mode may also be selected. The Parity setup can be for 0=None, 1=Odd, or 2=Even. The default Parity is 0=None.

Comm Port (1, 2)

The Comm Port is the serial port being used. There are two COM port settings. These are 1=COM1, 2=COM2. The default setting for AcroMill is 1=COM1.

Transmit Delay (sec)

Some host CAD systems require a small delay between characters to receive information reliably. If your system has problems receiving information reliably at high baud rates you can introduce a small delay between the transmission of each character by setting this value to some parameter other than zero. The default setting is 5 seconds. In most cases Transmit Delay is not needed. The Transmit Delay is measured in seconds and is the transmission delay setup command. The range of entry for this command is 0 to 99999 seconds. Use the arrow(↓) key to scroll down the parameter table when changing values.

DNC LINK PARAMETERS			
ASCII Dialog Start	:[	33	]
ASCII Dialog Done	:[	42	]
ASCII Dialog Prompt	:[	3	]
ASCII Dialog Acknowledge	:[	62	]
Scan For EOF Ctrl-Z (1=Y)	:[	1	]
Dripfeed Threshold	:[	50.0	]
DNC Timeout	:[	10.0	]
ASCII EOF	:[	37	]

ASCII Dialog Start

AcroMill sends the Dialog Start character to the host CAD system followed by S (ASCII 53) in a download session. The ASCII Dialog Start default is set at 33 in AcroMill.

ASCII Dialog Done

The AcroMill software terminates the DNC Link when the Dialog Done character is received. All subsequent characters are assumed to be valid EIA RS-274D program data. The ASCII Dialog Start default is set at 42.

ASCII Dialog Prompt

The ASCII Dialog Prompt character allows numeric entry at the control, which is then transmitted to the host CAD system. The ASCII Dialog Start default is set at 3 in AcroMill.

ASCII Dialog Acknowledge

The ASCII Dialog Acknowledge character is used to allow handshaking between AcroMill and the host CAD system. Upon receiving a Dialog Start character, the receiving system will issue a Dialog Acknowledge to signal that it is ready to receive information. This continues throughout the transmission after every End of Block (EOB) character received. The ASCII Dialog Prompt is the same as the EOB character. The information and table listed below is reiterated for referencing.

Character codes must be set to ASCII and the four dialog parameters must be set to legal ASCII values. These are listed below. Any ASCII code with the exception of CR (ASCII 13), LF (ASCII 10), ~ (ASCII 126), and SUB (ASCII 26) may be used for the four dialog parameters.

Recommended Setup for using LINK command		
Parameter	*Value*	*Character*
ASCII Dialog Start	33	!
ASCII Dialog Done	42	*
ASCII Dialog Prompt	3	ETX
ASCII Dialog Acknowledge	62	>

Scan For EOF Ctrl-Z (1=Y)

Some host CAD systems require that AcroMill detect the **%** DOS End-of-File character at the end of the program download for proper operation. If your CAD system requires this operation, leave this parameter to **1**=Yes otherwise type **0**=No.

Dripfeed Threshold (Reserved)

The Dripfeed Threshold allows downloading part files via the RS-232 serial interface. The machine may run the part files before the part files are completely downloaded. The advantage of using the Dripfeed Threshold is it provides *time savings* for downloading large part files. The machine will start executing before the part file is fully downloaded.

DNC Timeout

The DNC Timeout is the transmission time out. The value of DNC Timeout determines how long AcroMill waits between characters before reporting a time out fault. Enter a value in seconds between value. The range of entry is 0 to 99999 seconds. The default setting is 10 seconds.

ASCII EOF

The ASCII EOF is the **%** DOS End-of-File character at the end of the program. The default in AcroMill is set at the value 37.

NEXT>> → NEXT>> MENU (F9)

The NEXT>> key activates the second part of the System Parameters menu. It is used for setting up the following commands. The table provides a summary of the commands under this menu. More detailed command descriptions are found under Level 4 section.

NEXT>> MENU	**Parent: SYS PARAM MENU**
Command	**Description**
JOG (F1)	Setup Jog Parameters
JOG INC (F2)	Setup Jog Increment Parameters
T.COLOR (F3)	Tool Color allows editing the color table that is used to draw tool path graphics. This table can be linked to either D Codes or H Codes.
DISPLAY (F5)	Setup Parameters for the Display
SCREEN (F6)	Setup of Window parameters
PRINT (F8)	Allows printing of the system parameters
LIB.PART (F9)	Library Parts allows specifying the maximum number of library parts in the system.
HELP (F10)	Brings up the HELP screen

HELP (F10)

On line help is available for description of the SYS PARAMS menu commands.

DIAGNOSTIC MENU
LEVEL 3

DIAGNOSTIC MENU (F8-F9)

The DIAGNOSTIC menu provides diagnostic commands to verify proper communication between the ACR8000, CPU, RS-232, keyboard, and motors. The menu also provides I/O monitoring and setup, Digital-to-Analog output diagnostic verification, and servo tuning parameter setup. For tuning servos refer to the Tuning Servo section of the Use's Guide. The following table provides a summary of the menu commands. The command functions are then explained in detail.

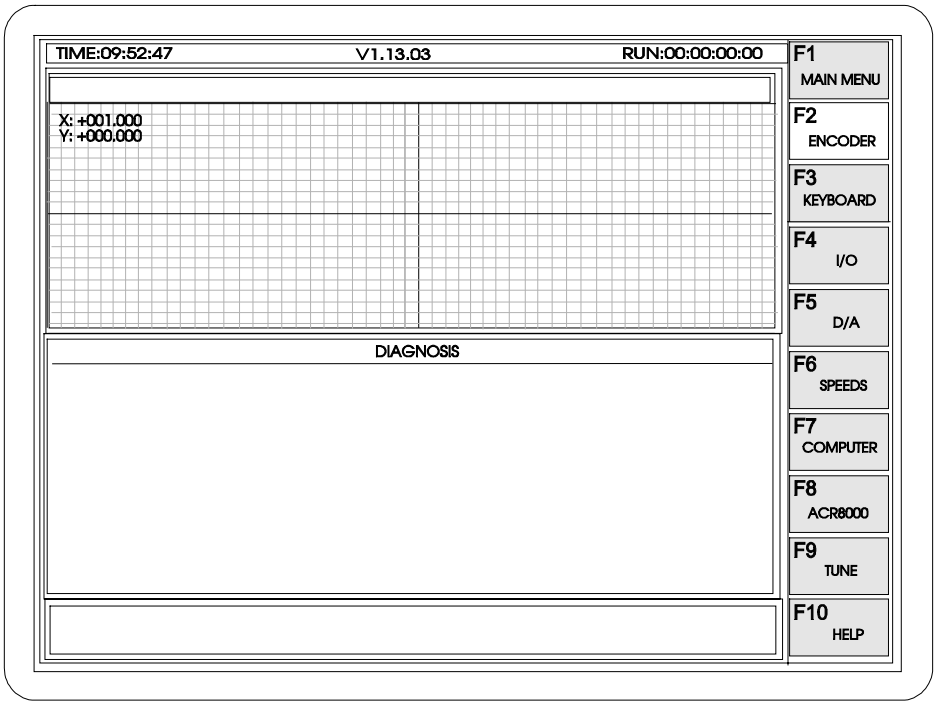
DIAGNOSTIC MENU	**Parent: SET/DIAG MENU**
Command	**Description**
MAIN MENU (F1)	Link to Level 1; returns you to the MAIN MENU
ENCODER (F2)	Provides an oscilloscope to view and diagnose encoder feedback.
KEYBOARD (F3)	Diagnostic test for the individual keys on the keyboard.
I/O (F4)	Command provides dynamic display of the 64 inputs and outputs. The I/O can be activated or deactivated from the I/O command.
D/A (F5)	Provides DAC output verification test.
RS-232 (F6)	Diagnostic test for RS-232 communication.
COMPUTER (F7)	Test interrupt processing by CPU.
ACR8000 (F8)	Establishes whether the ACR8000 card is communicating correctly.
TUNE (F9)	Setup for servo parameters to establish optimal motor response.
HELP (F10)	Brings up the HELP screen

MAIN MENU (F1)

The MAIN menu is a menu *link* for quick access from the present menu to the top level MAIN menu.

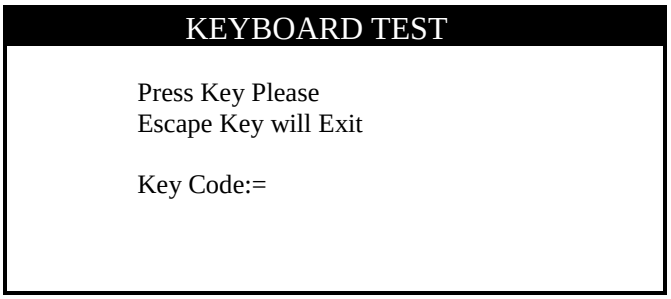
ENCODER (F2)

The ENCODER command brings up a real time display of the following error. The scale is 10 encoder counts per division. As the encoder is turned, the display graphically shows the cursor moving. The diagram below shows the ENCODER screen display.



KEYBOARD (F3)

The KEYBOARD command brings up an Input Dialog Box that shows the keyboard code for any pressed key. Just enter any key command to verify the key is functioning. The figure below illustrates the Keyboard Test dialog box.



I/O (F4)

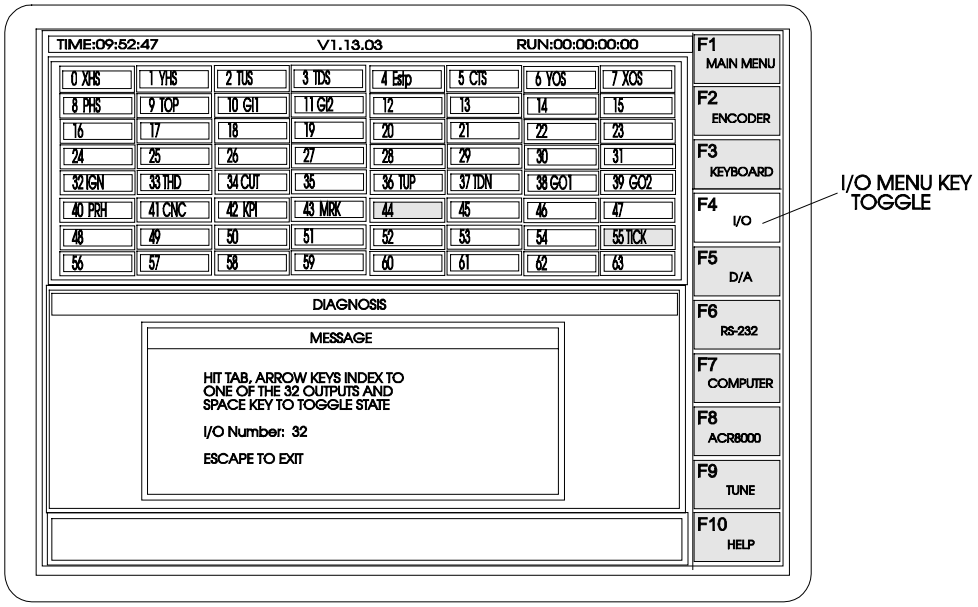
The I/O command allows the machine operator to view and toggle the 32 outputs. The figure illustrated below shows the I/O display screen.

The I/O number can be selected and toggled on or off by using the following keys.

Tab Key - toggles I/O number

Arrow(→←) keys - toggle I/O number

Space key - activates and deactivates I/O.

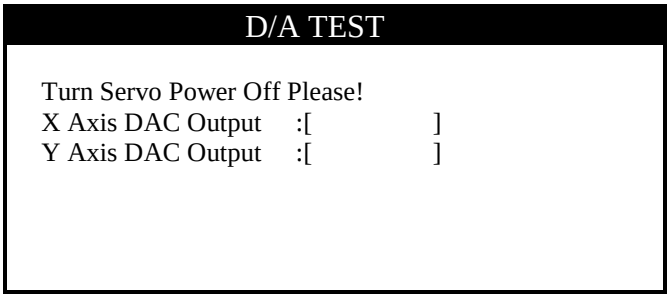


Listed below are suggested default settings that can be changed or configured to anything you want them to be. There are no dedicated inputs and outputs that may restrict design criterion. The 32 inputs and 32 outputs can be configured to your specific application.

XHS-	Sample specification
YHS-	Sample specification
TDS-	Sample specification
Estp-	Emergency stop
YOS-	*y* axis Over-travel Switch
XOS-	*x* axis Over-travel Switch
PHS-	Sample specification
TOP-	Tracer On Path
GI1-	General Purpose Input 1
GI2-	General Purpose Input 2
IGN-	Sample specification
THD-	Sample specification
CUT-	Cut Control
TUP-	Sample specification
G01-	Rapid Positioning
G02-	Circular or Helical Interpolation
PRH-	Sample specification
CNC-	CNC/Tracer
KPI-	Key Press Indicator
MRK-	Mark Enable
TICK-	

D/A (F5)

The D/A command allows the machine operator to check the real-time value of DAC values for axes. The illustration below depicts the message box that appears when the D/A command key is activated. Note, the servo power should be turned off when using this verification test.

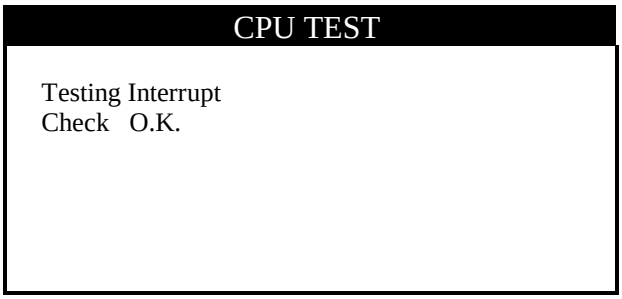


RS-232 (F6)

The RS-232 command allows the machine operator to test the RS232 interface. In order to conduct this test, the operator must use a loop back connector on the RS232 plug that ties **Transmit** pin to **Receive** pin. After this is done, the control sends a stream of data and verifies that is receives it all back correctly. All errors are reported to the screen.

COMPUTER (F7)

The COMPUTER command allows verification that the ACR8000 controller card is properly plugged into the chassis and that it is able to interrupt the host CPU properly. All errors are reported to the screen. The illustration below shows the message box that appears when the COMPUTER command key is activated. The message below states the CPU test was successful.



ACR8000 (F8)

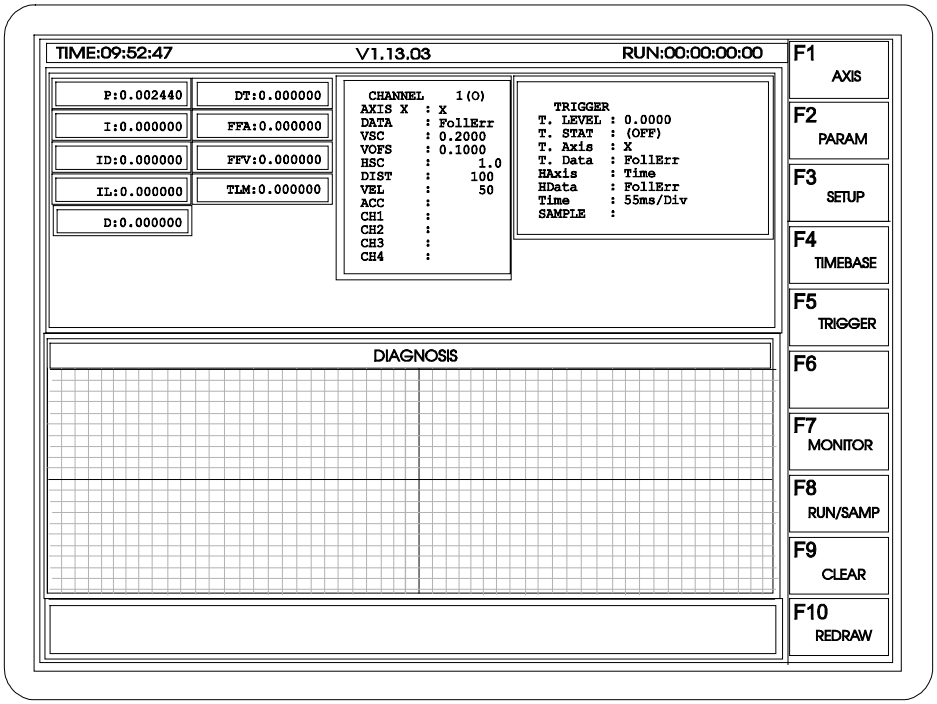
The ACR8000 command allows verification of the ACR2000/8000 card is operating properly. This test fetches the Version number of the ACR2000/8000 Controller and displays it on the screen. All errors are reported to the screen. The illustration below depicts the message box that appears when the ACR8000 command key is activated. The message below names the card revision level and states the test was successful.

```
ACR8000 TEST

Testing.....................
1.13.03 CARD 0.       System   O.K.
```

TUNE→ TUNE MENU (F9)

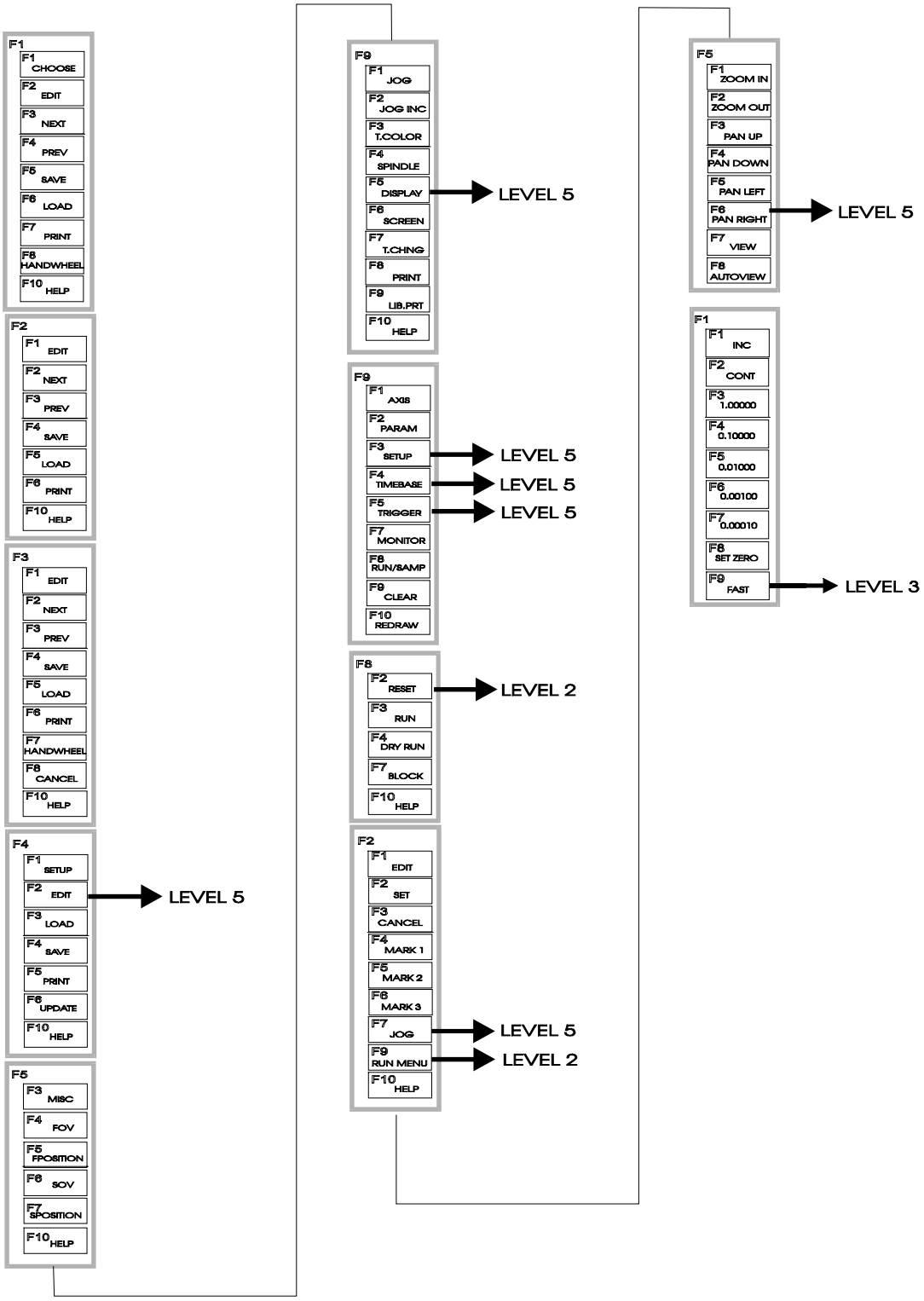
The figure listed below is the TUNE display screen for tuning the servos motors. Note, there is an on-board four channel oscilloscope for dynamic viewing of such parameters as following error, command position, actual position, actual velocity, and voltage output. By initializing RUN/SAMP (F8), each channel can be programmed to excite a motor with distance and velocity profiles. Gain settings can be changed and the response of the motors stored onto the disk. See Tuning Servos section on page 2-3 for tuning procedures.



HELP (F10)

On line help is available for description of the DIAGNOSTIC menu commands.

7. FLOW DIAGRAM→LEVEL 4



RESUME MENU
LEVEL 4

RESUME MENU (F5-F1-F8)

The RESUME menu resumes cutting or trail running the part. The program must be loaded, run, and stopped (paused) first before the RESUME menu command is initiated. The machine operator can select ON PATH or OFF PATH resume. Note that the OFF PATH resume works only if the part has an active G41 or a G42 in it. Otherwise, the control is not able to determine which side of the part to approach from the lead in radius. Illustrated below is the RESUME menu. For detailed information on menu commands see the command descriptions provided below the table.

RESUME MENU	**Parent: STOP MENU**
Command	**Description**
RESET (F2)	Resets the program to the start position
RUN (F3)	Activates the pattern program sequence *with* the cutting tool engaged.
DRY RUN (F4)	Activates the pattern program sequence *without* the cutting tool engaged. Used for test and diagnostics.
BLOCK (F7)	Runs the program one block at a time
HELP (F10)	Brings up HELP screen

RESET (F2)

The RESET command is linked to the RESET command in the next Level RESUME menu (refer to the AcroMill flow diagram).

RUN (F3)

The RUN key runs the loaded program sequence. Depending on whether the OFFPATH resume has been selected or not, the RUN control will resume running the program from the pause position. It is linked to the RUN command in the secondary Level STOP menu (see RUN command under STOP menu under Level 2 menus).

DRY RUN (F4)

The DRY RUN key trial runs the program sequence for testing and diagnostic purposes. Depending on whether the OFFPATH resume has been selected or not, the control will resume “trial running” the program from the resume position. The command is linked to the DRY RUN command in the secondary Level STOP menu (see DRY RUN command under STOP menu under Level 2 menus). DRY RUN will inhibit the standard M-codes but will inhibit the customized M-codes.

BLOCK (F7)

Linked to the BLOCK command in the secondary Level STOP menu (see BLOCK command under STOP menu listed below).

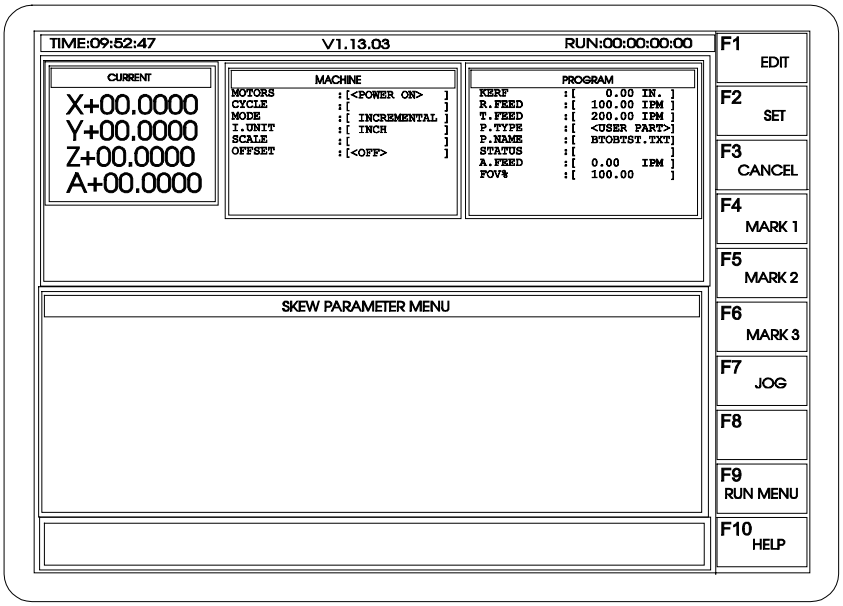
HELP (F10)

On line help is available for description of the RESUME menu commands.

SET SKEW MENU
LEVEL 4

SET SKEW MENU (F5-F6-F2)

The SET SKEW menu allows the machine operator to adjust for a plate that is not set squarely on the machine. Instead of aligning the material to the table, it is now more conducive to skew the *x, y* coordinate to the material. This command is very useful when cutting materials that may weigh a lot. By inputting three mark points on the material, a skew angle is automatically calculated by the control. The SET SKEW menu is also found under the RUN MENU. Details of the SET SKEW menu commands can be found under SET SKEW menu listed in Level 4.



The following table summarizes the SET SKEW commands. Each command is then described in detail following the table.

SET SKEW MENU	**Parent: SET/DIAG MENU**
Command	**Description**
EDIT (F1)	Activates the Skew Data parameter table for determining the three mark points on the *x, y* coordinates.
SET (F2)	Makes active the inputted skew angle.
CANCEL(F3)	Cancel inputted skew angle
MARK 1 (F4)	Used in setting the first mark when using the jogging mode.
MARK 2 (F5)	Used in setting the second mark when using the jogging mode.
MARK 3 (F6)	Used in setting the third mark when using the jogging mode.
JOG (F7)	Activates the Fast/Slow Jog Menu
RUN MENU (F9)	Link to the RUN menu
HELP (F10)	Brings up HELP screen

EDIT (F1)

The EDIT command permits entering known coordinate values for each of the three Mark sites. Each Mark is defined by its corresponding *x, y* value. Just enter the *x, y* values for each of the Marks and select the Enter key to enter the values. Note, that theta (θ) is automatically calculated for you in the SKEW DATA table, (see CALC. THETA). This is useful for verifying your material setup and assuring your program corresponds to the exact location of where you want to start cutting. If the Mark data is entered incorrectly, the MARK 2X, 2Y and MARK 3X, 3Y will not be retained once the values have been entered. Assure that your values define a right triangle. The USER THETA entry is the angle of skew entered by the machine operator. A reference mark (MARK 1X, MARK 1Y) is all that is required when using the USER THETA entry. Refer to the SKEW DATA table and cutting machine illustration (figure A) below.

SKEW DATA			
MARK 1X	=	:	0.00000
MARK 1Y	=	:	0.00000
MARK 2X	=	:	0.00000
MARK 2Y	=	:	0.00000
MARK 3X	=	:	0.00000
MARK 3Y	=	:	0.00000
CALC. THETA	=	:	0.00000
USER. THETA	=	:	0.00000

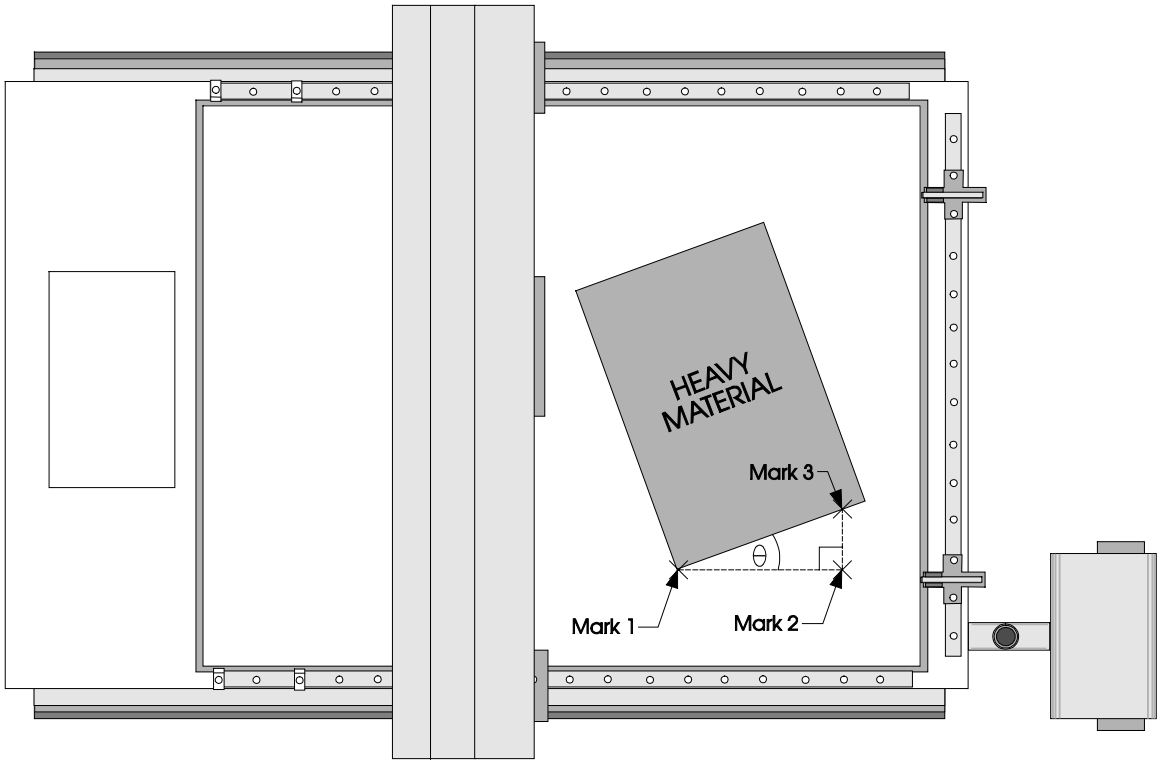


FIGURE A
Setting the Skew

SET (F2)

The SET command is used to activate the skew values. In general, you must *set* the skew values regardless of the method used in determining the skew. The EDIT(F1) command and the MARK(F4, F5, F6) commands both require using the SET(F2) command to activate the skew values. A message window will appear signifying your values have been activated. Select any key to return you to the previous menu. A sample MESSAGE window is shown below.

MESSAGE
SKEW DETECTED= 0.00000 DEGREES
HIT ANY KEY..

CANCEL (F3)

The CANCEL command deactivates the skew values.

MARK 1 (F4)

The MARK 1, MARK 2, and MARK 3 are used in conjunction with the JOG command when the position of the material skew is unknown. Simply jog to the MARK 1 position, then enter the position by selecting MARK 1. Do the same for MARK 2 and MARK 3. Remember, the three(3) mark sites make a right triangle. You can reference the Marks in either a clockwise or counterclockwise direction. It is necessary to jog in one coordinate direction at a time. For example, jogging from Mark1 to Mark2 may be an *x* only (or *y* only) jog move, etc.

MARK 2 (F5)

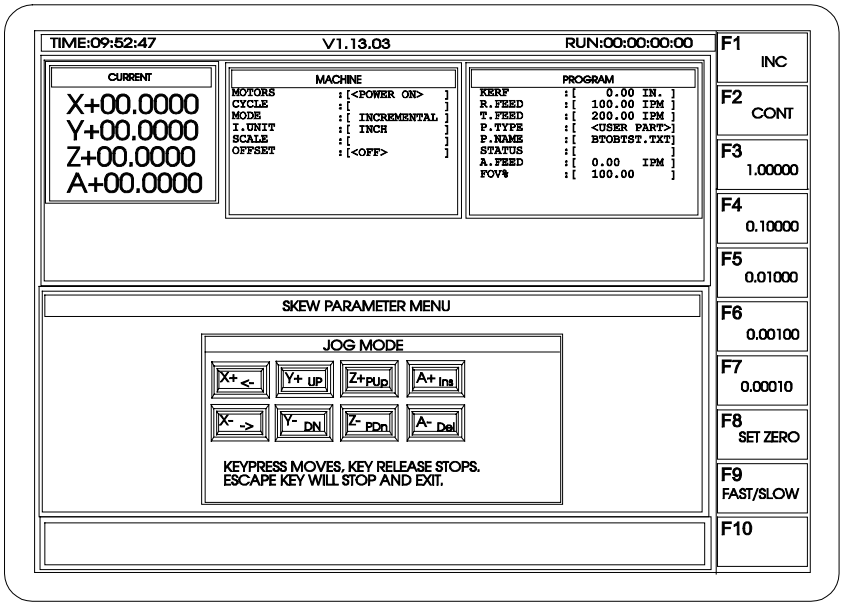
See the description provided above under MARK 1

MARK 3 (F6)

See the description provided above under MARK 1.

JOG → JOG MENU (F7)

The JOG menu allows jogging any attached axis to a desired position. Jogging can be executed continuously by using the CONT command or by small increments using the INC command. Increments are set under the JOG INC (F8→F8→F9→F2) command. The Jog Feedrate, Jog Rapid, Jog Acceleration and Deceleration, and Jog Direction can be set under the JOG (F8→F8→F9→F1) command. The following illustration shows the JOG display screen. Note, the display screen is the same for JOG and located on Level 2 of the MANUAL MENU (F6→F1 or F2).



The JOG command is measured in units per minute (UPM). Its parameters are set for *each* axis in JOG (F1) command under Level 4 (path F8→F8→F9→F1). Note, the JOG command default is 50 UPM. The acceleration, deceleration, and direction of JOG is also set up under the JOG command.

RUN MENU (F9)

The RUN MENU command activates the menu listed below. The RUN MENU is a menu link to the second tier STOP (OPTIONS) menu. For easy viewing, see the AcroMill Flow Diagram on pages 4-1, 4-2.

RUN MENU Command	**Link Menu** Description
STOP (F1)	Stops the running program
START (F2)	Start running the loaded program
RUN (F3)	Run the loaded program
DRY RUN (F4)	Run the program at maximum feed
FEEDRATE (F5)	Manipulate Feedrate Parameters
OPTIONS (F6)	Setup Options
BLOCK (F7)	Switch between Block and Auto Modes
SET ZERO (F8)	Sets the axes to a zero value
STATUS (F9)	Shows the status of the machine
HELP (F10)	Brings up HELP screen

HELP (F10)

On line help is available for description of the SET SKEW menu commands.

VIEW/ZOOM MENU
LEVEL 4

VIEW/ZOOM (F5-F6-F5)

The VIEW/ZOOM menu provides viewing manipulation for the graphic representations on AcroMill. There are four basic command features: Zoom, Pan, View, and Autoscale. The menu table below summarizes the menu commands. Following this, detailed command features and illustrations are presented.

VIEW/ZOOM MENU	**Parent: OPTIONS MENU**
Command	**Description**
ZOOM IN (F1)	Allows zooming into the graphic image of the loaded part.
ZOOM OUT (F2)	Allows zooming out of the graphic image of the loaded part.
PAN UP (F3)	Allows panning the graphic image up each time the key is selected.
PAN DOWN (F4)	Allows panning the graphic image down each time the key is hit
PAN LEFT (F5)	Allow panning the graphic image to the left each time the key is selected.
PAN RIGHT (F6)	Allows panning the graphic image to the right each time the key is hit.
VIEW (F7)	Allow selecting XY, ZX,YZ, ISO plane viewing of the part
AUTOSCALE (F8)	Re-zooms and pans the image so it fits in the graphic window.

ZOOM IN (F1)

The ZOOM IN command allows *zooming into* the graphic representation. Each time the F1 key is selected, the pattern increase by 5%. The ZOOM IN command percent parameter is a discreet value which is intrinsic to the AcroMill program.

ZOOM OUT (F2)

The ZOOM OUT command allows *zooming out* the graphic image. Each time the F2 key is selected, the pattern decrease by 5%. The ZOOM OUT command percent parameter is a discreet value which is intrinsic to the AcroMill program.

PAN UP (F3)

The PAN UP command moves the part up. The PAN UP command parameter is intrinsic to the AcroMill program and the move distance depends on such variables as pattern size.

PAN DOWN (F4)

The PAN DOWN command moves the part down. Each time the F4 key is selected, the graphic image moves down. The PAN DOWN command parameter is intrinsic to the AcroMill program and the move distance depends on such variables as pattern size.

PAN LEFT (F5)

The PAN LEFT command moves the part to the left. Each time the F5 key is selected, the graphic image moves left. The PAN LEFT command parameter is intrinsic to the AcroMill program and the move distance depends on such variables as pattern size.

PAN RIGHT(F6)

The PAN RIGHT command moves the part to the left. Each time the F6 key is hit, the graphic image moves left.

VIEW→ VIEW MENU (F7)

The VIEW menu allows selecting XY, ZX, and YZ coordinate viewing. The VIEW menu also provides isometric viewing of pattern parts. The menu table listed below provides a summary of the menu commands. Refer to Level 5 under the VIEW MENU section for further command descriptions.

VIEW MENU	**Parent: VIEW/ZOOM MENU**
Commands	**Description**
XY (F1)	Orients geometry in *xy* plane
ZX (F2)	Orients geometry in *zx* plane
YZ (F3)	Orients geometry in *yz* plane
ISO (F4)	Provides isometric viewing of drawing
KEY IN (F9)	Specifies input for object rotation in the x, y, and z planes.
HELP (F10)	Brings up the HELP screen

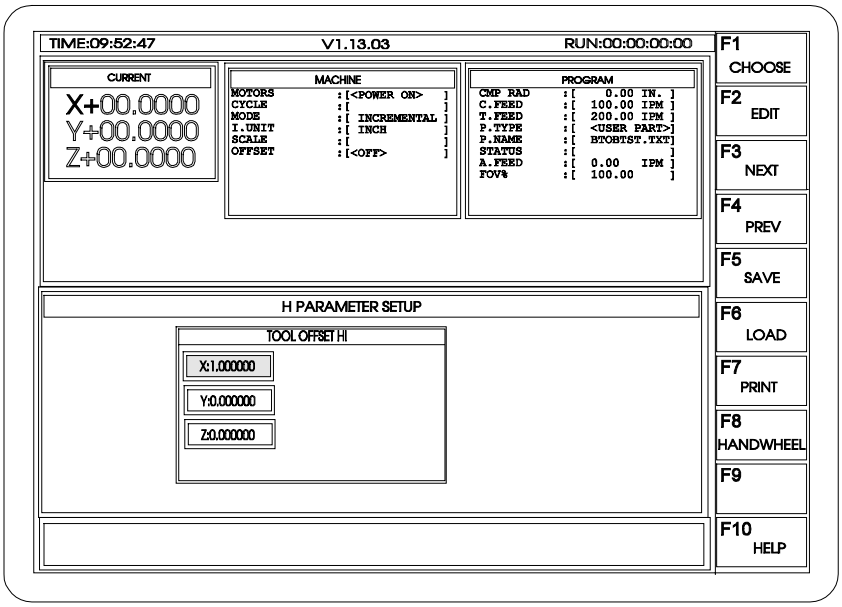
AUTOSCALE (F8)

The AUTOSCALE command establishes a total display screen fit by automatically zooming and panning the graphic image.

H OFFSETS MENU
LEVEL 4

H OFFSETS MENU (F8-F7-F1)

The H OFFSETS menu permits viewing, editing and printing values of the tool offsets. The diagram below illustrates the H OFFSETS screen.



H OFFSETS MENU **Command**	**Parent: OFFSETS MENU** **Description**
CHOOSE (F1)	Select a tool offset number
EDIT (F2)	Change the value of offset for currently selected axis
NEXT (F3)	Go to offset for next axis
PREV (F4)	Go to offset for previous axis
SAVE (F5)	Save offsets
LOAD (F6)	Load offsets
PRINT (F7)	Print offsets
HANDWHEEL (F8)	Use handwheel to set the currently selected offset
HELP (F10)	Brings up HELP screen

The menu table above provides a summary of the menu commands. Listed below are the menu commands described in detail.

CHOOSE (F1)

The CHOOSE command specifies the tool offset number. When selecting F1, the CHOOSE command bar key is highlighted and the Prompt Window appears with the following prompt:

Please Enter the Offset Number (1 - 32):(1)

Enter a number form 1-32 and select the Enter key. Now, the tool offset has been entered. Use the ESCAPE key to get out of the CHOOSE mode.

EDIT (F2)

The EDIT command changes the value of the offset value for the current selected window. When selecting F2, the EDIT command bar key is high lighted and the Prompt Window appears with the following prompt:

ENTER A NUMBER: (1.000000)

Enter a number and select the Enter key. Now, the tool offset has been entered. Use the ESCAPE key to get out of the EDIT mode.

NEXT (F3)

The NEXT command changes the Input Dialog Box on the display screen (see the diagram above) to the next axis. In this case, changes the H Offsets to the Y axis.

PREV (F4)

The PREV command changes the Input Dialog Box on the display screen (see the diagram above) to the previous axis.

SAVE (F5)

The SAVE command saves the H Offsets parameters to the harddrive or to the floppy drive. The following message appears under the SAVE H OFFSET PARAMETER dialog box:

SAVE H OFFSET PARAMETER

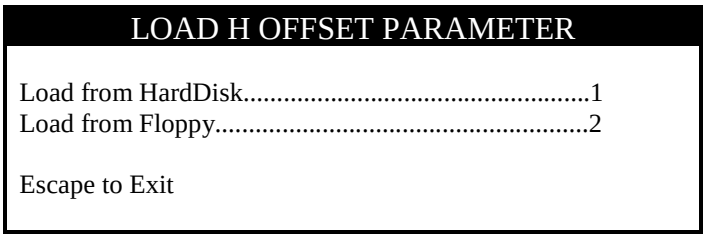
Save To HardDisk.....1
Save To Floppy.....2

Escape to Exit

Enter the Save destination by entering 1 or 2.

LOAD (F6)

The LOAD command loads the H Offsets parameters from the harddrive or from the floppy drive to AcroMill. The following message appears under the LOAD H OFFSET PARAMETER dialog box:



Enter the Load source by entering 1 or 2.

PRINT (F7)

The PRINT command sends the H Offset parameters to the printer to print them out. This is a valuable source for archiving settings on hard copy.

HANDWHEEL (F8)

The HANDWHEEL command can only be used if a handwheel option has been properly installed. The command is used to set the currently selected offset. When selecting F8, the HANDWHEEL command bar key is highlighted and the Prompt Window appears with the following prompt:

Select Escape to Abort, Return to Accept Offset Value

Hit the Enter key to accept Offset value. Now, the tool offset has been entered. Use the ESCAPE key to exit the HANDWHEEL mode.

HELP (F10)

On line help is available for description of the H OFFETS menu commands.

D OFFSETS MENU
LEVEL 4

D OFFSETS MENU (F8-F7-F2)

The D OFFSETS menu allows viewing, editing and printing of the kerf offsets. There are 32 available kerf width offsets that can be used during the program. These offsets are numbered 1 through 32 are called via the D01-D32 commands. The D OFFSETS display screen is illustrated on page 6-17 under Level 3.

D OFFSETS	**Parent: D OFFSETS MENU**
Command	**Description**
EDIT (F1)	Change the value of the currently selected kerf offset
NEXT (F2)	Go to the next kerf offset
PREV (F3)	Go to the previous kerf offset
SAVE (F4)	Save kerf offsets to disk
LOAD (F5)	Load kerf offsets from disk
PRINT (F6)	Print kerf offsets
HELP (F10)	Brings up the HELP screen

The menu table above provides a summary of the menu commands. Listed below are the menu commands described in detail.

EDIT (F1)

The EDIT command changes the value of the offset value for the current selected window. When selecting F1, the Prompt Window appears with the following prompt:

ENTER #: (0.000000)

Enter a number and Select the Enter key. Now, the kerf offset has been entered. Use the ESCAPE key to get out of the EDIT mode.

NEXT (F2)

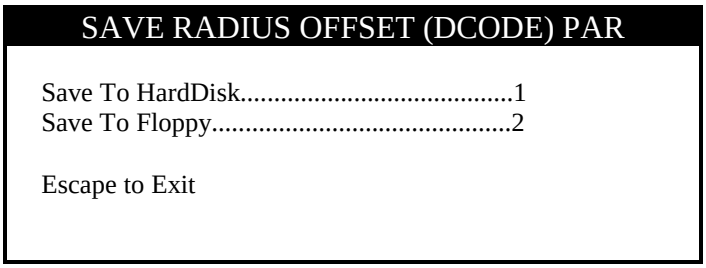
The NEXT command changes the offset number (D01-D32) on the display screen (see the diagram on page 6-17) to the next axis. Note each selected kerf offset is highlighted.

PREV (F3)

The PREV command changes to the previous offset number (D01-D32) on the display screen (see the diagram on page 6-17). Note each selected kerf offset is highlighted.

SAVE (F4)

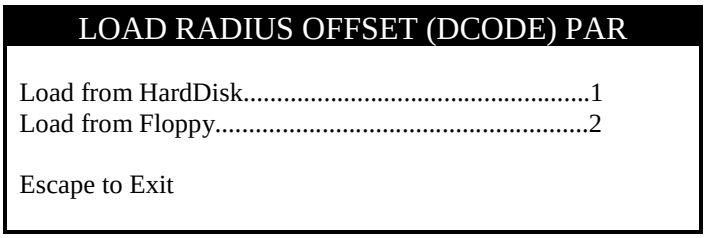
The SAVE command saves the D Offsets parameters to the harddrive or to the floppy drive. The following message appears under the SAVE RADIUS OFFSET (DCODE) PAR dialog box:



Enter the Save destination by entering 1 or 2.

LOAD (F5)

The LOAD command loads the D Offsets parameters from the harddrive or from the floppy drive to AcroMill. The following message appears under the LOAD RADIUS OFFSET (DCODE) PAR dialog box:



Enter the Load source by entering 1 or 2.

PRINT (F6)

The PRINT command sends the D Offset parameters to the printer to print them out. This is a valuable source for archiving settings on hard copy.

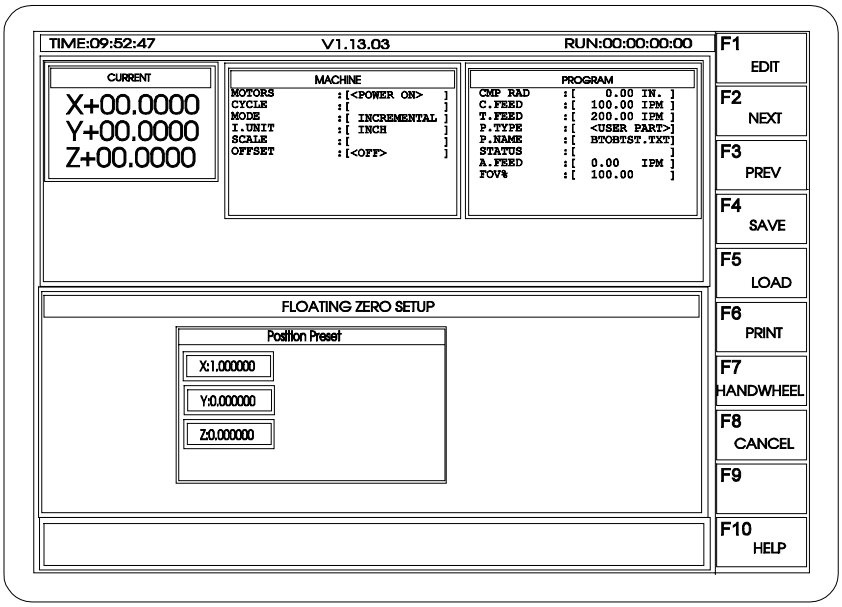
HELP (F10)

On line help is available for description of the D OFFSETS menu commands.

FL ZERO MENU
LEVEL 4

FL ZERO MENU (F8-F7-F3)

The FL ZERO menu permits viewing, editing and printing values of the Position Presets. The diagram below is the FL ZERO display screen.



FL. ZERO MENU	**Parent: OFFSETS**
Command	**Description**
EDIT (F1)	Change the value of preset floating zero for the selected axis
NEXT (F2)	Go to preset floating zero point for next axis
PREV (F3)	Go to preset floating zero point for previous axis
SAVE (F4)	Save primary preset floating zero points to disk
LOAD (F5)	Load primary preset floating zero points from disk
PRINT (F6)	Print preset floating reference points
HANDWHEEL (F7)	Use handwheel to set the currently selected preset floating zero point
CANCEL (F8)	Cancel the handwheel move
HELP (F10)	Brings up HELP screen

The menu table above provides a summary of the menu commands. Listed below are the menu commands described in detail.

EDIT (F1)

The EDIT command changes the value of the offset value for the current selected window. When selecting F1, the EDIT command bar key is highlighted and the Prompt Window appears with the following prompt:

ENTER POSTION PRESET: (0.000000)

Enter a number and select the Enter key. Now, the Position Preset has been entered. Use the ESCAPE key to get out of the EDIT mode.

NEXT (F2)

The NEXT command changes the Input Dialog Box on the display screen (see the diagram above) to the next axis. In this case, changes the Position Preset to the Y axis.

PREV (F3)

The PREV command changes the Input Dialog Box on the display screen (see the diagram above) to the previous axis.

SAVE (F4)

The SAVE command saves the primary Floating Zero preset to the harddrive or to the floppy drive.

LOAD (F5)

The LOAD command loads the FL ZERO preset parameters from the harddrive or from the floppy drive to AcroMill.

PRINT (F6)

The PRINT command sends the FL ZERO preset parameters to the printer to print them out. This is a valuable source for archiving settings on hard copy.

HANDWHEEL (F7)

The HANDWHEEL command can only be used if a handwheel option has been properly installed. The command is used to set the currently selected preset floating point. When selecting F7, the HANDWHEEL command bar key is highlighted. Use the CANCEL (F8) or ESCAPE key to exit the HANDWHEEL mode.

CANCEL (F8)

The CANCEL command cancels the HANDWHEEL command.

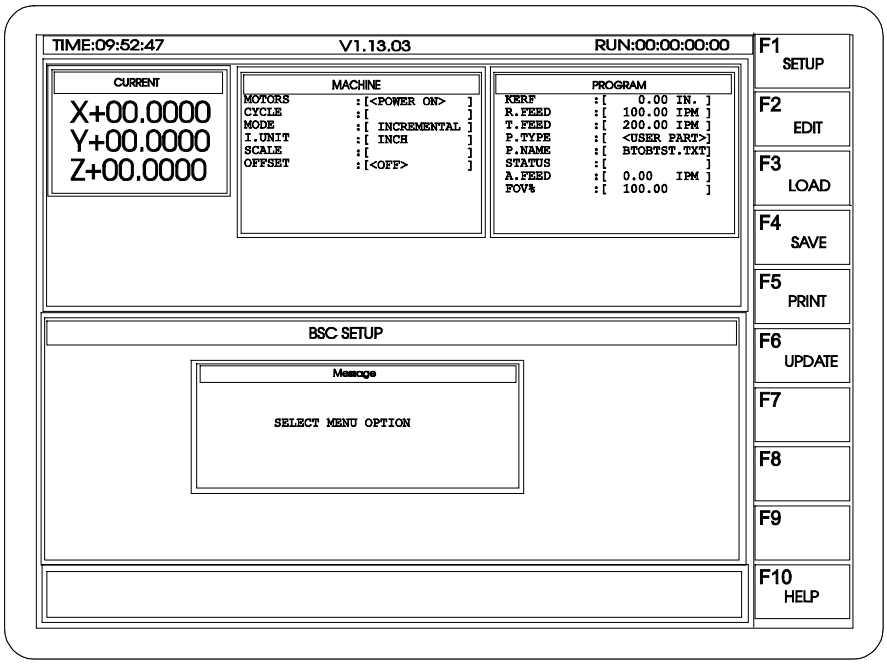
HELP (F10)

On line help is available for description of the OFFSETS menu commands.

BALLSCREW MENU
LEVEL 4

BALLSCREW MENU (F8-F7-F4)

The BALLSCREW menu allows set up for ballscrew compensation. The display screen listed below appears when the BALLSCREW (F4) key is selected.



The menu table provided below summarizes the BALLSCREW commands.

BALLSCREW OFFSETS MENU	
Command	**Description**
SETUP (F1)	Setup Ballscrew increments for each axis
EDIT (F2)	Edit Ballscrew Files associated with the attached axes
LOAD (F3)	Load primary Ballscrew compensation data from disk
SAVE (F4)	Save primary Ballscrew parameters to disk
PRINT (F5)	Print the values
UPDATE (F6)	Updates Ballscrew compensation data.
HELP (F10)	Brings up HELP screen

NOTE

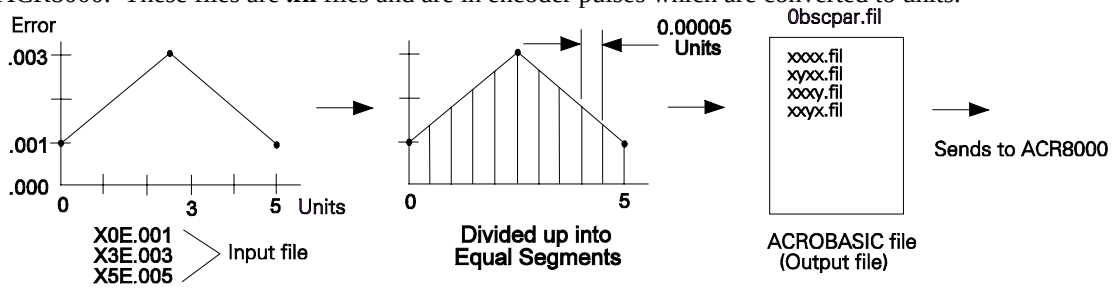
A recommended diagnostic tool for Ballscrew compensation is the ACROVIEW software. Acroview allows monitoring the Ballscrew compensation (Axis Parameters P12294 and P12295). Contact our factory or your area representative to receive this valuable diagnostic tool. For more information using Acroview for Ballscrew compensation, see Appendix A.

SETUP (F1)

The SETUP command provides the increment setup for each of the eight(8) Ballscrew axes. The following table represents the Input dialog box that appears when the SETUP is activated. The SETUP key stays highlighted when activated. Note the default settings are all set at 0.5. To change the increment compensation, use the arrow (↓) keys to move to the specific axis. Type in the numeric value required and then select the Enter key.

BSC INCREMENT SETUP			
Increment for Axis0	:[	0.50000	]
Increment for Axis1	:[	0.50000	]
Increment for Axis2	:[	0.50000	]
Increment for Axis3	:[	0.50000	]
Increment for Axis4	:[	0.50000	]
Increment for Axis5	:[	0.50000	]
Increment for Axis6	:[	0.50000	]
Increment for Axis7	:[	0.50000	]

The SETUP (F1) key provides a table for setting up to eight axes of ballscrew increment compensation. Below, is an example illustrating the BALLSCREW compensation. The first graph is an input program showing ballscrew error vs. distance in units. The SETUP (F1) key allows entering increment settings which divide the profile into equal intervals. In this example, an interval of 0.0005 units is used. AcroMill calculates the error compensation by generating a ACROBASIC file which is dynamically uploaded to the ACR8000. These files are **.fil** files and are in encoder pulses which are converted to units.



EDIT → EDIT MENU (F2)

The following menu table appears when the EDIT command is activated. Refer to page 8-5 under Level 5 for information on menu commands.

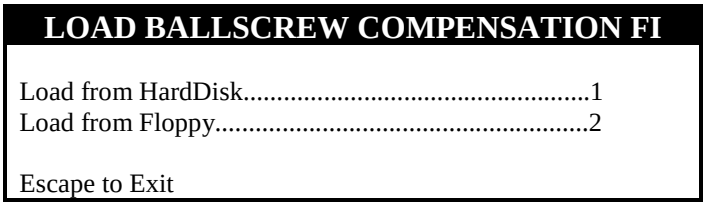
BSC EDIT	**Parent: OFFSETS MENU**
Command	**Description**
X (F1)	Allows editing the Input File for x-axis
Y (F2)	Allows editing the Input File for y-axis.
HELP (F10)	Brings up HELP screen

A dialog box in the display window states:

In the EDIT mode, select the axis for the compensation program. Type in the compensation data and hit ESCAPE. The message box will ask to save the program. Type **Y** for yes.

LOAD (F3)

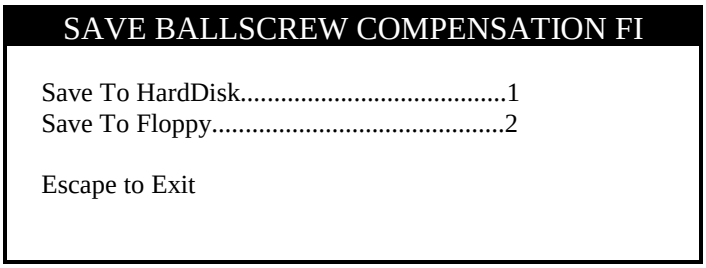
When the LOAD (F3) key is activated, the following Input dialog box appears.



Enter a number to load the ballscrew compensation. If there is no compensation archived, select ESCAPE and the BALLSCREW menu table listed above activates.

SAVE (F4)

The SAVE command saves the Ballscrew compensation parameters to the harddrive or to the floppy drive. The following message appears under the SAVE BALLSCREW COMPENSATION FILE dialog box:



PRINT (F5)

The PRINT command sends the Ballscrew compensation parameters to the printer to print them out. This is a valuable source for archiving settings on hard copy.

UPDATE (F6)

The UPDATE command is used to update any changes to the parameters made in the BALLSCREW menu commands. Make sure you update your changes before using the SAVE command.

HELP (F10)

On line help is available for description of the BALLSCREW menu commands.

I/O MENU
LEVEL 4

I/O MENU (F8-F8-F5)

The Input/Output menu allows the setup of Input/Output parameters for the machine.

I/O MENU	**Parent: SYS PARAMS**
Command	**Description**
MISC (F3)	Setup miscellaneous I/O parameters
FOV (F4)	Setup feedrate override parameters
FPOSITION (F5)	Setup feedrate override percentages
SOV (F6)	Setup Spindle override Velocity parameters
SPOSITION (F7)	Setup Spindle override Velocity percentages
HELP (F10)	Brings up HELP screen

MISC (F3)

The MISC command when activated is highlighted and the following parameter table appears. The Miscellaneous Input Command allows setup of the following inputs and outputs: Note, that the default value **-1** means that the input is not connected to any of the available inputs (0-31). To use any of the Miscellaneous I/O, set the appropriate parameter to the I/O number you intend on using. For instance, Feedhold is set to **5**. This means that Feedhold is now tied to input5.

MISC I/O SETUP 1 (0..63)				
Block Skip IO#	(–1=N.C)	:[	–1	]
Optional Stop IO#	(–1=N.C)	:[	–1	]
Feedhold IO#	(–1=N.C)	:[	–1	]
CycleStart IO#	(–1=N.C)	:[	–1	]
EmergencyStop IO#	(–1=N.C)	:[	–1	]
SoftLimits IO#	(–1=N.C)	:[	–1	]
Jog JoyStick IO#	(–1=N.C)	:[	–1	]
LubeError IO#	(–1=N.C)	:[	–1	]

The table provided below gives a summary of the number of input wired to the respective parameter. The number –1 indicates the parameter is not connected. Any of the 64 inputs and outputs can be specified by entering the I/O number in the brackets listed above. The numbering sequence for the I/O is 0 through 63. Use the arrow (↓) keys to scroll down to the I/O parameter(s) you want to make specifications to.

Parameter	**Description**
Block Skip IO# (–1= N.C.)	Number of input wired to the Option Block Skip switch.
Optional Stop IO# (–1= N.C.)	Number of input for the OPTIONAL Stop command M1.
Feedhold IO# (–1= N.C.)	Number of input wired to the FOV BCD switch.
CycleStart IO# (–1= N.C.)	Number of input wired to Cycle Start switch.
Emergency Stop IO# (–1= N.C.)	Number of input wired to Emergency Stop switch.
Soft Limits IO# (–1= N.C.)	Allows installing an optional remote Soft Limit switch for the machine.
Jog JoyStick IO# (–1= N.C.)	Number of input wired to the jog Joy Stick.
LubeError IO# (–1= N.C.)	Number of input wired to LubeError switch.

The parameter I/Os are defined below.

Block Skip - is G-code (G31) and can be found in the Setup G-Codes section of this manual.

Optional Stop - is an M-code (M1) and is used for inspection purposes (see M-Codes section).

Feedhold - allows installing an optional remote Feedhold switch for pausing the machine.

Cycle Start - allows installing an optional remote Cycle Start switch for starting machine movement.

Emergency Stop - is a *required* input to tell the control if the motor power relay is ON or OFF.

Soft Limits - allows installing an optional remote Soft Limit switch for the machine.

Jog JoyStick - is a *required* input for setting up the first input of the Joystick.

LubeError - allows tool to complete its path when the machine lubrication is low or goes out. LubeError input allows installing a sensor or switch which indicates the lubrication fluid level is low.

FOV (F4)

The Feedrate Override uses only the Manual Input line and is a temporary command when the program is running. It will reset after each program run. The Feedrate Override uses a binary potentiometer of four inputs. For example, if the Manual Input is set to 20, this means the four binary switches starts at input 20 and ends at 23. The default is set normally to –1 which indicates the input is not connected. AcroMill provides an on-line Status panel for all 64 inputs and outputs. Under the MAIN MENU observe the inputs/outputs under the STATUS (F9) command key.
Note: the Maximum and Increment FOV lines are reserved for future use.

The table provided below is the parameter table that appears when FOV is activated. The F4 key is highlighted when FOV is activated. . Use the arrow (↓) keys to scroll down when changing parameters.

FEEDRATE OVERRIDE SETUP	
Maximum	:[100.00000]
Increment	:[10.00000 ....]
Manual Input	:[–1.00000]

The Feedrate Override Setup Definitions are provided below.

Maximum - The maximum feedrate override (Reserved for future use).

Increment - Feedrate override increment (Reserved for future use).

Manual Input (–1=N.C) - The number of first (of four) inputs used for the manual feedrate override pot. A value of –1 indicates that the pot is not connected.

FPOSITION (F5)

The FPOSITION key sets up 16 incremental percentages for the feedrate override. Illustrated below is the Feedrate Override Position Set table. This is activated when the FPOSITION command is pressed (the F5 will be highlighted). Enter a number between 0 and 29 to signify which inputs the FOV BCD switch is wired.

FEEDRATE OVERRIDE POSITION SET

FOV 1st POS%	:[	10.00000	]	Enter desired Percentage
FOV 2nd POS%	:[	20.00000	]	
FOV 3rd POS%	:[	0.00000	]	
FOV 4th POS%	:[	0.00000	]	
FOV 5th POS%	:[	0.00000	]	
FOV 6th POS%	:[	0.00000	]	
FOV 7th POS%	:[	0.00000	]	
FOV 8th POS%	:[	0.00000	]	
FOV 9th POS%	:[	0.00000	]	
FOV 10th POS%	:[	0.00000	]	
FOV 11th POS%	:[	20.00000	]	
FOV 12th POS%	:[	0.00000	]	
FOV 13th POS%	:[	0.00000	]	
FOV 14th POS%	:[	0.00000	]	
FOV 15th POS%	:[	0.00000	]	
FOV 16th POS%	:[	0.00000	]	

SOV (F6)

The Spindle Override uses only the Manual Input line. It uses a binary potentiometer of four inputs. For example, if the Manual Input is set to 20, this means the four binary switches starts at input 20 and ends at 23. The default is set normally to −1which indicates the input is not connected. AcroMill provides an on-line Status panel for all 64 inputs and outputs. Under the MAIN MENU observe the inputs/outputs under the STATUS (F9) command key.
Note: the Maximum and Increment SOV lines are reserved for future use.

The table provided below is the parameter table that appears when SOV is activated. The F6 key is highlighted when SOV is activated. Use the arrow (↓) keys to scroll down when changing parameters.

SPINDLE OVERRIDE SETUP

Maximum	:[100.00000	]
Increment	:[10.00000	]
Manual Input	:[−1.00000	]

The Spindle Override Setup Definitions are provided below.

Maximum - The maximum spindle override (Reserved for future use).

Increment - spindle override increment (Reserved for future use).

Manual Input (–1=N.C) - The number of first (of four) inputs used for the manual spindle override pot. A value of –1 indicates that the pot is not connected.

SPOSITION (F7)

The SPOSITION key sets up 16 incremental percentages for the spindle override. Illustrated below is the spindle Override Position Set table. This is activated when the SPOSITION command is pressed (the F7 will be highlighted). Enter a number between 0 and 29 to signify which inputs the SOV BCD switch is wired.

SPINDLE OVERRIDE POSITION SET

SOV 1st POS%	:[	10.00000	]
SOV 2nd POS%	:[	20.00000	]
SOV 3rd POS%	:[	0.00000	]
SOV 4th POS%	:[	0.00000	]
SOV 5th POS%	:[	0.00000	]
SOV 6th POS%	:[	0.00000	]
SOV 7th POS%	:[	0.00000	]
SOV 8th POS%	:[	0.00000	]
SOV 9th POS%	:[	0.00000	]
SOV 10th POS%	:[	0.00000	]
SOV 11th POS%	:[	20.00000	]
SOV 12th POS%	:[	0.00000	]
SOV 13th POS%	:[	0.00000	]
SOV 14th POS%	:[	0.00000	]
SOV 15th POS%	:[	0.00000	]
SOV 16th POS%	:[	0.00000	]

HELP (F10)

On line help is available for description of the I/O menu commands.

NEXT>> MENU
LEVEL 4

NEXT>> MENU (F8-F8-F9)

The NEXT>> menu activates the next menu provided below. Here, a summary of the menu commands are provided.

NEXT>> MENU	**Parent: SYS PARAM MENU**
Command	**Description**
JOG (F1)	Setup Jog Parameters
JOG INC (F2)	Setup Jog Increment Parameters
T. COLOR (F3)	Allows editing the color table that is used to draw tool path graphics. This table can be linked to either D Codes or H Codes.
DISPLAY (F5)	Setup Parameters for the Display
SCREEN (F6)	Setup of Window parameters
PRINT (F8)	Allows printing of the system parameters
LIB. PART (F9)	Allows specifying the maximum number of library parts in the system.
HELP (F10)	Brings up the HELP screen

JOG (F1)

The JOG command allows the machine operator to set the jog parameters for each axis. Illustrated below is the x-axis Jog Parameter table that appears and is highlighted when the F1 key is activated. Use the arrow(↓) keys to scroll down when changing parameters.

AXIS X JOG PARAMETERS		
Jog Feedrate	UPM	50.00000
Jog Rapid	UPM	50.00000
Jog ACC and DEC	UPS2	100.00000
Jog Direction(0=N, !=REV)		0

A description of the Jog commands are provided below.

Jog Feedrate - Feedrate for jogging the axis.

Jog Rapid - Rapid Feedrate for jogging the axis.

Jog ACC and DEC - Acceleration and Deceleration for jogging the axis.

Jog Direction - Direction for jogging.

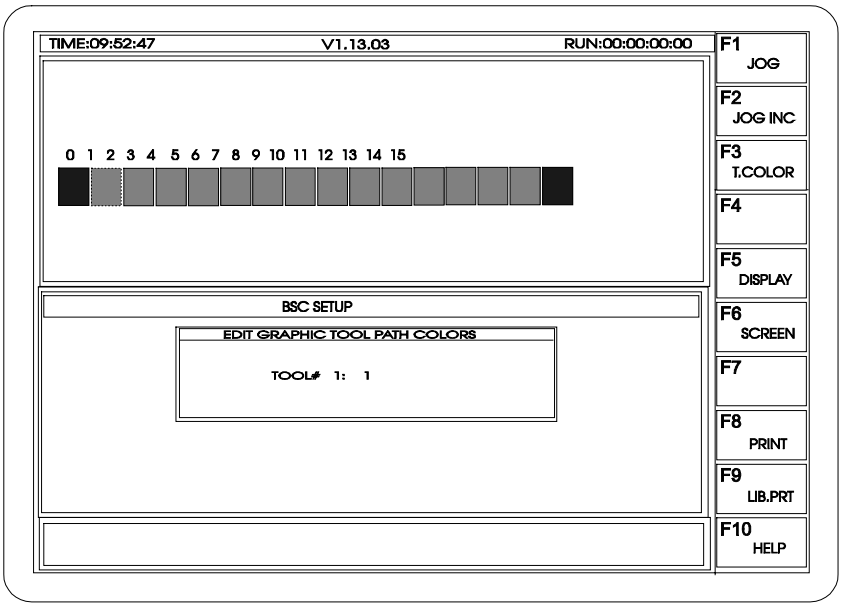
JOG INC (F2)

This menu allows the machine operator to set five jog increments that are used in the **JOG** menu (Also see page 6-10). Illustrated below is the Jog Increment Parameters table that appears and is highlighted when the F2 key is activated. Use the arrow(↓) keys to scroll down when changing parameters.

JOG INCREMENT PARAMETERS		
Jog Increment #1	:[1.00000	]
Jog Increment #2	:[0.10000	]
Jog Increment #3	:[0.01000	]
Jog Increment #4	:[0.00100	]
Jog Increment #5	:[0.00010	]

T. COLOR (F3)

This menu allows setting up of a color chart for up to 32 D Codes or H Codes. These colors are used in tool path graphics to highlight various paths belonging to different D Codes or H Codes.
In the system parameter setup for ”DISPLAY” the user can select either D Code or H Offset to trigger the color change. The illustration below shows the T.COLOR menu screen.



SPINDLE (F4)

The SPINDLE command activates the Spindle Setup table. The Spindle Setup information is invaluable for *programmers* in initial machine setup. It is recommended that the machine operator contact their machine builder before changing any of these values. The table below shows the Spindle Setup table as it appears in AcroMill. Use the arrow(↓) key to scroll down the parameter table when changing values. Use the Enter key and ESCAPE key to save and exit the table.

SPINDLE SETUP		
Spindle Code	:[0.00000	]
Spindle Scaling	:[0.00000	]
SpindleDAC (0..7)	:[−1.00000	]
At Zero Input	:[−1.00000	]
At Speed Input	:[−1.00000	]
SpindleCW Out	:[32.00000	]
SpindleCCW Out	:[33.00000	]
SpindleOFF Out	:[34.00000	]
Flood OutPut Out	:[35.00000	]
Mist OutPut Out	:[36.00000	]
SpindleExc.In	:[−1.00000	]

Spindle Code- designates five different bit codes which commands the Spindle to perform the following:

BIT4= 1 means LOOK for HI on ZERO SPEED.
BIT3= 1 means LOOK for ZERO SPEED.
BIT2= 1 means LOOK for HI on UPTOSPEED.
BIT1= 1 means WAIT for UPTOSPEED.
BIT0= 0 for an output between 0 and 10 volts and 1 for an output between −10 and 10 volts.

The above information is invaluable for programmers in initial machine setup. It is recommended that the machine operator contact their machine builder before changing any of these values.

Spindle Scaling- multiplies all arguments to S commands (see description on page 3-1) by this factor before sending it to the control.

SpindleDAC (0..7)- indicates the DAC number (0-7) attached to the spindle. See Note below.

At Zero Input- specifies the spindle is at zero speed. If this entry is not **−1**, the control will wait until it gets a spindle At Zero speed acknowledge on the input number (based on the spindle code) on a SpindleOFF Out Command.

At Speed Input- specifies the spindle is at speed. If this entry is not **−1**, the control will wait until it gets a spindle At Speed acknowledge on the input number (based on the spindle code) on a SpindleCW or SpindleCCW Out Commands.

SpindleCW Out- specifies the spindle ON output for clockwise direction.

SpindleCCW Out- specifies the spindle ON output for counterclockwise direction.

SpindleOFF Out- specifies the spindleOFF output.

Flood OutPut Out- specifies the Flood output.

Mist OutPut Out- specifies the Mist output

SpindleExc.In- is the Spindle Exception Input and is a *user defined* input for sensing spindle faults. The programmer can choose the specific spindle fault that is required for their application.

Note

If the DAC number for the spindle is changed, you ***must*** change the statement **P6480=P9993** in two files called the INITFILE.8K and RUNFILE.8K in AcroMill. This statement should be changed to the following: **Pxxxx=P9993**, where **xxxx** is the index for the DAC output. Use the following table below to set up the SpindleDAC.

DAC Number	Index for DAC Output
0	6400
1	6416
2	6432
3	6448
4	6464
5	6480
6	6496
7	6512

DISPLAY (F5)

The DISPLAY menu allows the operator to specify the precision for each axis. Both Inch and Metric formats are allowed. These parameters specify the number of digits to the left, the number of digits to the right of the decimal point for position, and data display for each axis. For example, if for the X axis, one needs to see three digits to the left and 4 digits to the right of the decimal point, the parameter should be 3.4.

In addition the following parameters that affect displaying of data on the control can be entered. Illustrated below is the Display Parameters table that appears and is highlighted when the F5 key is activated. Use the arrow(↓) keys to scroll down when changing parameters.

DISPLAY PARAMETERS (INCHES)>>			
X Precision (inch)	:[	0.00000	]
Y Precision (inch)	:[	0.00000	]
Z Precision (inch)	:[	0.00000	]
A Precision (inch)	:[	0.00000	]
B Precision (inch)	:[	0.00000	]
C Precision (inch)	:[	0.00000	]
U Precision (inch)	:[	0.00000	]
V Precision (inch)	:[	0.00000	]

When Enter key is entered, the following Setup Display Parameters table appears for metric unit setup.

DISPLAY PARAMETERS (MM)>			
X Precision (MM)	:[	0.00000	]
Y Precision (MM)	:[	0.00000	]
Z Precision (MM)	:[	0.00000	]
A Precision (MM)	:[	0.00000	]
B Precision (MM)	:[	0.00000	]
C Precision (MM)	:[	0.00000	]
U Precision (MM)	:[	0.00000	]
V Precision (MM)	:[	0.00000	]

When the Enter key is selected again, the following Setup Display Graphics table appears. Use the arrow(↓) keys to scroll down when changing parameters.

SETUP DISPLAY GRAPHICS			
Color via Dcodes (1=yes, 0=No)	:[	0	]
FlipX Axis (1=yes, 0=No)	:[	0	]
FlipY Axis (1=yes, 0=No)	:[	0	]
Exchange XY (1=yes, 0=No)	:[	0	]
Control Mode (1=yes, 0=No)	:[	0	]

A description of the Setup Display Graphics commands are provided below.

Color Via D Code - This allows setting a color associated with one of 32 Tool Codes or H Offsets. Then during running of programs, tool paths will show up in different colors depending on which tool or H Code is active.

Flip X Axis - If this entry is set to a 1 from a 0, X axis tool path will go from right to left instead of left to right for positive X movement. Note that this is only for display purposes and does not affect machine operation.

Flip Y Axis - If this entry is set to a 1 from a 0, Y axis tool path will go from top to bottom instead of bottom to top for positive Y movement. Note that this is only for display purposes and does not affect machine operation.

Exchange XY - If this entry is set to a 1 instead of 0, X axis will be shown vertically and Y axis horizontally. Note that this is only used for display purpose and does not affect machine operation.

Control Mode -If this entry is 0, the machine is on the ENGLISH mode. This means that all position, data display is in inches. This is regardless of whether the part program being run is in the G70 (Inch) or G71(Metric) mode. Note that all dimensions for tool tables, floating zeros, feedrates are all entered in the CONTROL MODE Units. If this entry is 1 then the control mode is in METRIC. You must exit AcroMill to set this mode.

SCREEN→ SCREEN MENU (F6)

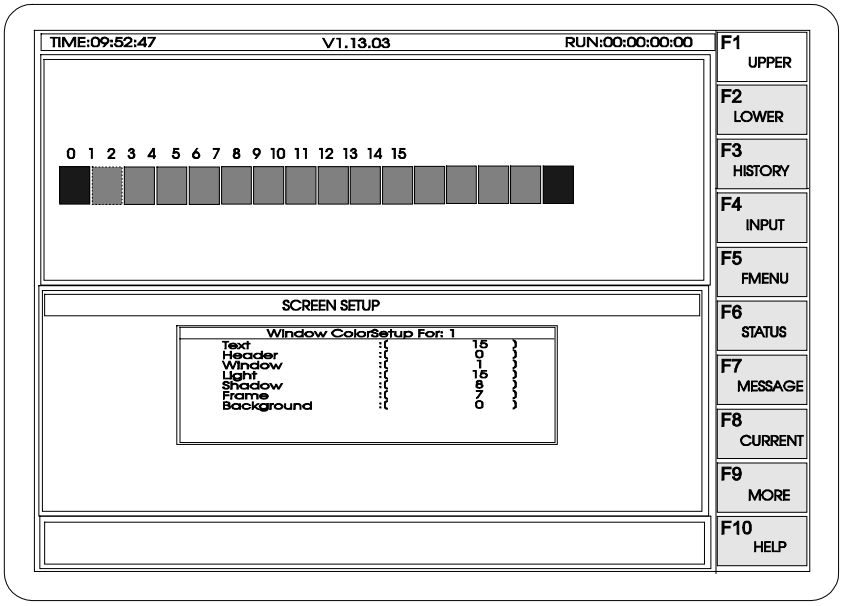
This menu allows the machine operator to configure the AcroMill display windows. The size and color of any window can be configured.

SCREEN MENU	**Parent: NEXT>> MENU**
Command	**Description**
UPPER (F1)	Edit Upper Window
LOWER (F2)	Edit Lower Window
HISTORY (F3)	Edit History Window
INPUT (F4)	Edit Input Window
FMENU (F5)	Edit FMENU Window
STATUS (F6)	Edit Status Window
MESSAGE (F7)	Edit Message Window
CURRENT (F8)	Edit Current Window
MORE (F9)	Edit Next Window
HELP (F10)	Brings up the HELP screen

The SCREEN menu is divided into 14 different areas as listed below. Information for areas (windows) 9 through 14 are provided under the Level 6 section (see MORE menu). Each can be customized to a particular color. Colors range from 0 to 15 for the VGA standard. The Window parameter table listed below appear when any of the F-keys (F1 through F9) are selected. Use the arrow(↓) keys to scroll down when changing variables.

Window:1			
Size X	:[	542	]
Size Y	:[	185	]
Origin X	:[	0	]
Origin Y	:[	21	]
Top Space	:[	5	]
Window Type	:[	1	]
Window On	:[	0	]
Top Bar	:[	0	]
Header	:[	0	]

The illustration below shows the second screen when the Enter key is entered. Note any of the windows can be configured to the color of your choosing. Sixteen colors are available for personalizing your AcroMill screen.



Listed below is a complete listing of windows (ports) that can be manipulated. The MORE key (F9) will activate six more windows (F1 through F6).

1. UPPER PORT
2. LOWERPORT PORT:
3. HISTORY PORT.
4. INPUT PORT
5. F KEY MENU PORT.
6. STATUS PORT.
7. MESSAGE PORT.
8. CURRENT POSITION PORT.
9. NEXT POSITION PORT.
10. FLOATING ZERO PORT.
11. MACHINE STATUS PORT.
12. PROGRAM STATUS PORT.
13. SELECT MENU PORT.
14. GRAPHICS DISPLAY PORT.

For each of these ports, the following variables can be set for positioning and re-sizing.

X1, Y1	Top Left Corner
X2, Y2	Bottom Right Corner.
OrgX, OrgY	Location.
Top Space	Vertical distance between top border and start of text
Port Type	(0,1,2,3)
Port On/Off	
Top Bar	On/Off
Header	Top header Text pointer. The text is in the Message file.
Text Color	(0-15)
Header Text Color	(0-15)
Window	(0-15)
Port Color	(0-15)
Shadow Color	(0-15)
Frame Color	(0-15)
Background Color	(0-15)

T.CHNG (F7)

The TOOL CHANGE command initializes the Tool Change Setup parameter table listed below. This permits the machine operator to setup Tool Changer input and output. Use the arrow(↓) key to scroll down the table when changing values. The **–1** value specifies the parameter is disabled. Values **0**–**31** specify the the designated input. Use the Enter key to enter the value and then ESCAPE to exit.

ToolChange SETUP		
T.Changed Input	:[	–1]
T.Change Output	:[	–1]
Manual T.C. (1=Yes, 0=No)	:[	1 .]

T.Changed Input- is the Tool Changed Input. This input can be used as a switch to indicate the tool has been changed as a result of a M6 command. The typical sequence will be explained as follows. As a result of a M6 command, a M5 command turns the spindle off. Now, the system remains in a pause state until a machine operator inputs the Tool Changed Input (i.e. by a push button). Next, the M6 (tool change) command will be deactivated. Now, the sequence is complete.

T.Change Output- is the Tool Change Output. This output occurs as a result of a M6 code and drops out an external relay circuit which prevents M3 or M4 from occurring during tool change.

Manual T.C. (1=Yes, 0=No)- The Manual Tool Change is used to activate the two commands above when changing the cutting tool. Enter **1** to enable the Manual Tool Change.

PRINT (F8)

The PRINT command sends the parameters to the printer to print them out. This is a valuable source for archiving settings on hard copy.

LIB.PRT (F9)

The LIB.PRT command provides a library of 34 Maximum parts.

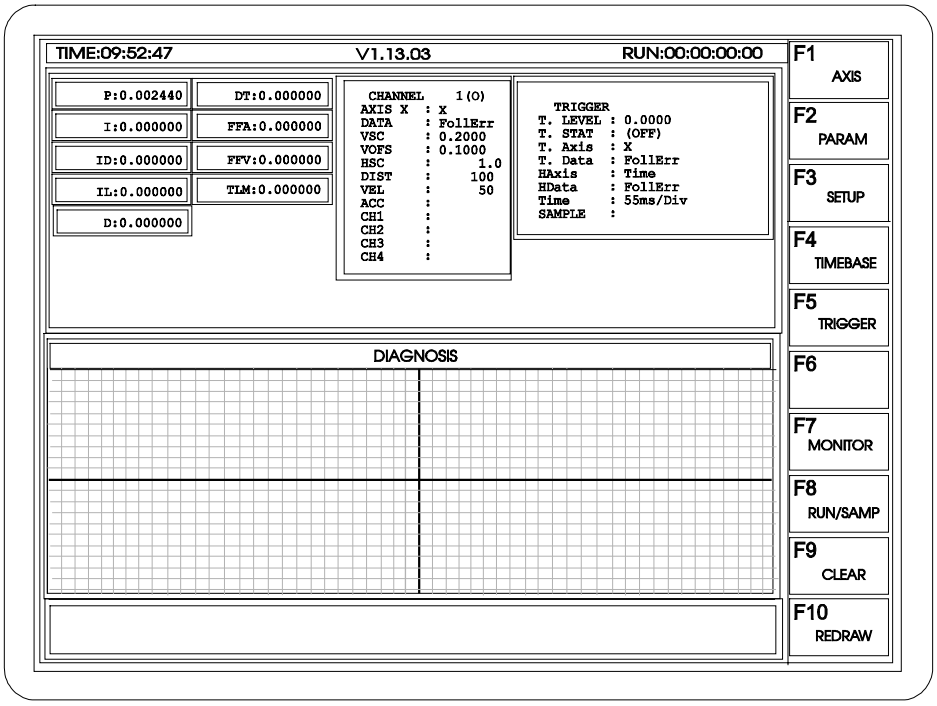
HELP (F10)

On line help is available for description of the NEXT>> menu commands.

TUNE MENU
LEVEL 4

TUNE MENU (F8-F9-F9)

Illustrated below is the TUNE screen for tuning your servos. Note, there is an on-board four channel oscilloscope for dynamic viewing of such parameters as following error, command position, actual position, actual velocity, and voltage output. By initializing RUN/SAMP (F8), each channel can be programmed to excite a motor with distance and velocity profiles. Gain settings can be changed and the response of the motors stored onto the disk. See Tuning Servos section for tuning procedures.



The TUNE menu allows tuning the servos.

TUNE MENU	**Parent: DIAGNOSTIC MENU**
Commands	**Description**
AXIS (F1)	Select an axis for attaching to the current channel and also gain parameter setup. This key will toggle through all available axes each time it is selected
PARAM (F2)	Select a servo parameter to edit. This key will advance to the next servo tune parameter. Selecting the "ENTER" key will allow editing the highlighted parameter.
SETUP (F3)	Setup Display. This will bring up the Channel Setup screen allowing setup of Vertical scale, Vertical offset, Motion profile, Horizontal scale, Draw Color, Axis, Data Source type and also allows storage of all these parameters to disk.
TIMEBASE (F4)	Allows setting up of the horizontal axis time base. This includes horizontal time per division. Alternately if time is not to be displayed on the horizontal display, an Axis can be selected along with one of 5 different types of data.(Following Error, Current Position, Actual position, Inst Velocity and DAC Vout).
TRIGGER (F5)	Selects a channel to use for triggering, a trigger level, trigger data (.(Following Error, Current Position, Actual position, Inst Velocity and DAC Vout) and Trigger ON/OFF control.
MONITOR (F7)	Monitoring up to 4 channels simultaneously on the screen. These channels can show data from any combination of axes. This does not store any data at this time. All displayed data is shown in real time only.
RUN/SAMP (F8)	Starts the excitation of as many profiles as are enabled and stores the sampled data into a maximum of 4 arrays.
CLEAR (F9)	Clears the display of any traces
REDRAW (F10)	Redraws the sampled data from up to 4 arrays. Each array can be shown in programmable colors.

AXIS (F1)

The AXIS command selects the axis for tuning and toggles to the next axis each time the F1 key is selected. The change of axis can be observed in the upper right hand side of the display after the caption AXIS.

PARAM (F2)

This PARAM command key provides a menu for changing critical tuning parameters of the servo loop. The PARAM (F2) key toggles to the next parameter each time the F2 key is selected. Changing the value of a tuning parameter is a simple matter of toggling to the parameter (it will be highlighted) and then selecting the Enter key. Next, type in the value required and hit the Enter key. The new value will be shown in the parameter window.

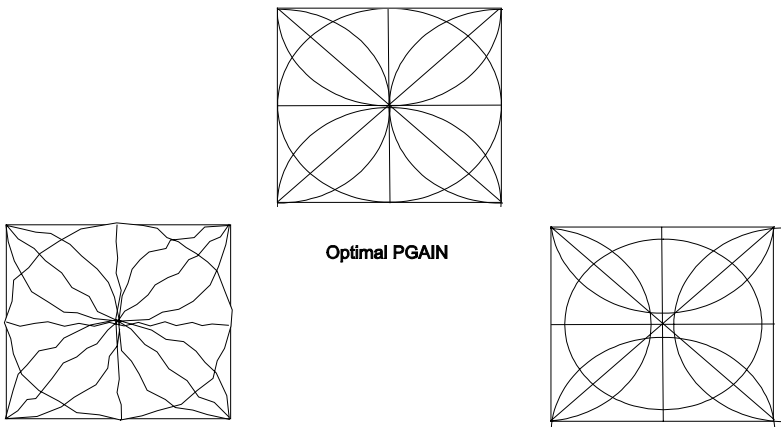
Parameters	Description
P	Proportional Gain
I	Integral Gain
ID	Integral Delay
IL	Integral Limit
D	Derivative Gain
DT	Derivative Time
FFA	FeedForward Acceleration
FFV	FeedForward Velocity
TLM	Torque Limit

Note

Refer to the Tuning Servos section for step by step tuning procedures.

Proportional Gain (P): increasing proportional gain reduces the time required to reach the commanded velocity. In general, the higher the P-gain the faster the settling time . However, too much proportional gain may cause over shooting and ringing.

The Test Pattern located in the part LIBRARY as part# 0 can be used to trace the pattern on paper by using a pen mounted in the cutting device position. This pattern provides an excellent means of testing *many* of the control's performance and may be used as part of the tuning procedure. The figure below shows the affects of PGAIN. When it is too low, the outside corners of the test pattern are rounded and the circle segments do not all intersect at the center. With PGAIN is too high, the machine overshoots, and is *hyper* stable. When PGAIN is set correctly, all corners should be sharp, the circle segments should intersect in the center, and all machine motions should be smooth.



Integral Gain (I): provides stiffness, or the ability to reject load disturbances and friction torques (usually handled in a velocity mode). Too much integral gain will cause overshooting and results in the system becoming unstable. Integral gain in a position controller is used conservatively.

Integral Delay (ID): to prevent integration during moves. ID determines the amount of time after a move ends before integration begins. When set at zero, the integrator is always active even during moves. When the delay is a non-zero, the integrator is turned off during moves and remains off (measured in units of seconds). The default gain is zero for all axes.

Integral Limit (IL): modifies the value used by the PID filter to limit the amount of integral term allowed to build up in the loop. Used in conjunction with integral gain (I)and integral delay(ID). The default is set at zero.

Derivative Gain (D): reduces the amount of overshoot caused by the integral gain. Derivative gain also reduces the torsional resonance between the motor and the load. Although stiffer couplings also improve the torsional resonance. Derivative gain of the position loop is intended for use in the torque mode.

Derivative Time (DT): Also, Dwidth. The DT variable modifies the value in the PID algorithm to control the derivative sampling rate. Setting the value to zero will set the sampling to occur at the servo interrupt rate(default is zero) of 500 μsec. Derivative Time is intended for use with derivative gain (D) in torque mode.

FeedForward Acceleration (FFA): allows position following error to be reduced when velocity is changing. FFA is useful in combination with the velocity feedforward term when trying to maintain a low following error at all times. This could be useful in a tracking application or when a fast settling time is required.

FeedForward Velocity (FFV): used in the position loop to minimize error when the system is moving. In other words, FFV reduces following error. Too high of a value can cause position overshoot.

Torque Limit (TLM): sets the voltage limits monitored by the "not torque limit" flag (see ACR8000 User's Guide). The limits set by the TLM command cause the output of the servo loop to be clipped the given values.

SETUP→ SETUP MENU (F3)

The SETUP menu is useful for changing parameters of the display. The menu table listed below provides a summary of the menu commands.

SETUP MENU	**Parent: TUNE MENU**
Commands	**Description**
CHANNEL (F1)	Channel Select
ON/OFF (F2)	Toggles the currently selected channel On/Off state.
VSCALE (F3)	Vertical scale in units per division
VOFFSET (F4)	Vertical offset in units per division.
PROFILE (F5)	Setup of and excitation profile for the selected channel.
HSCALE (F6)	Horizontal scale in units per division.
DRAWCOLOR (F7)	Sets up the drawing color for the selected channel. Valid numbers are 1...15.
AXIS (F8)	Selects which axis to display on the currently selected channel.
SOURCE (F9)	Selects which type of data to collect from the selected axis.
STORE (F10)	Stores the setup parameters as well as any sampled data on to disk.

TIME BASE→ TIME BASE MENU (F4)

The TIMEBASE menu activates the oscilloscope. Listed below is a table that summarizes the TIMEBASE menu commands.

TIMEBASE MENU	**Parent: TUNE MENU**
Commands	**Description**
HTIME (F1)	Allows changing the time in milliseconds per division of the horizontal display when time chosen to be display against data on the vertical display.
HAXIS (F2)	Toggles through axes In the case that an axis' data instead of time needs to be displayed on the horizontal display, this key will toggle through all the available axes.
HDATA (F3)	In the case that the horizontal display is used to show axis data instead of time, this key will toggle through all the available data types. 1. FollErr (Following Error) 2. CurPos (Current Position) 3. ActPos (Actual Position) 4. InstVel (Instantaneous Velocity) 5. Vout (DAC Output Voltage)
STORE (F10)	This will store the setup parameters as well as any sampled data on to disk.

TRIGGER→ TRIGGER MENU (F5)

The TIMEBASE menu allows the user to manipulate the oscilloscope timebase settings. The following menu table summarizes the commands.

TRIGGER MENU	**Parent: TUNE MENU**
Commands	**Description**
T. CHANNEL (F1)	This key allows selecting one of 4 channels to serve as trigger during MONITORING data. Note that the trigger does not work when data is being sampled and stored during Profile Excitation.
T.LEVEL (F2)	This selects the trigger level from the Channel source Axis and selected HDATA.
T.DATA (F3)	This selects the type of data to use as the trigger. The available data types are. 1. Following Error. 2. Current Position. 3. Actual Position. 4. Instantaneous Velocity. 5. DAC Output Voltage Note that the Trigger can be done from a data type that is not being displayed!
T.ON/OFF (F4)	This toggles the ON/OFF status of the trigger.
STORE (F10)	This will store the setup parameters as well as any sampled data on to disk.

MONITOR (F7)

This menu allows the machine operator to start real-time monitoring of the selected source (see SOURCE menu) for the selected axes (see AXIS menu). The actual value of the source will be displayed graphically and in the upper right hand side corner on the display. Re-selecting the MONITOR menu (by selecting the appropriate function key) or *Escape* key will turn the monitoring off.

RUN/SAMP (F8)

This menu allows an operator to start real time sampling of the selected source (see SOURCE menu) for the selected axes (see AXIS menu) by sending the excitation input profile (selected by using the TRIGGER, VELOC, SLOPE and VELOC menus) to the card and storing the response into the selected array (see ARRAY menu).

Note

Selecting this menu will stop any previously running programs on the ACR8000.

CLEAR (F9)

This menu allows an operator to clear the display. This command will only clear the display and **not** the values stored in sampling arrays (see RUN/SAMP menu).

REDRAW (F10)

The REDRAW menu redraws the values currently selected that are stored in the currently selected array. These values were stored by using the RUN/SAMP command (see RUN/SAMP menu).

SLOW (JOG) MENU
LEVEL 4

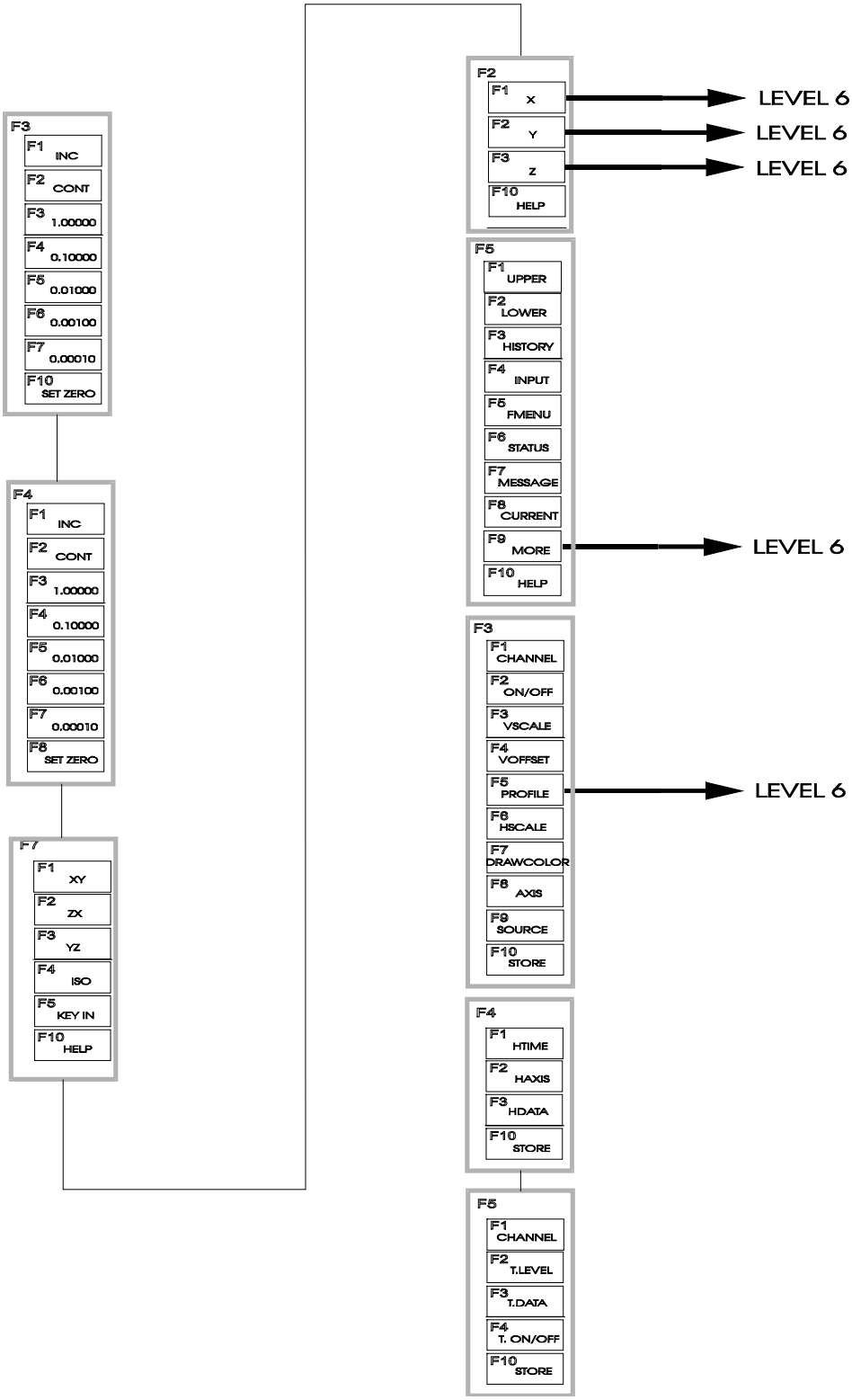
SLOW (JOG) MENU (F6→F1→F9)

The SLOW (JOG) menu allows jogging any attached axis to a desired position. Jogging can be executed continuously by using the CONT command or by small increments using the INC command. JOG is measured in units per minute (UPM). Its parameters are set for *each* axis in JOG (F1) command under Level 4. Note, the JOG default is 50 UPM. The acceleration, deceleration, and direction of jog and slow jog is also set up under the JOG command. The INC menu can be set up for both jog and slow jog under the JOG INC (F2) command. Refer to the table below for menu command descriptions.

JOG MENU	**Parent: MANUAL MENU**
Command	**Description**
INC (F1)	Jog incrementally using the selected increments settings listed below.
CONT (F2)	Jog continuously
1.00000 (F3)	Set Jog increment to 1.0000 units (inches or millimeters)
0.10000 (F4)	Set Jog increment to 0.1 units (inches or millimeters)
0.01000 (F5)	Set Jog increment to 0.01 units (inches or millimeters)
0.00100 (F6)	Set Jog increment to 0.001 units (inches or millimeters)
0.00010 (F7)	Set Jog increment to 0.00010 units (inches or millimeters)
SET ZERO (F8)	Reset Jog increment to 0
FAST (F9)	Sets the Jog to fast jog mode and is set up under the JOG command

Also see JOG setup on page 7-26 and Jog JoyStick IO# on page 7-22. JOG INC menu on page 7-26 shows how to change this menu to show different jog increments.

8. FLOW DIAGRAM LEVEL 5



VIEW MENU
LEVEL 5

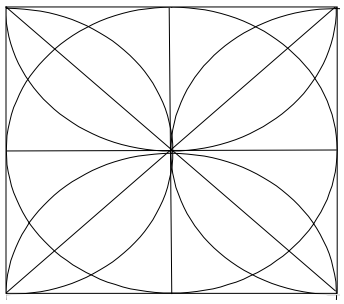
VIEW MENU (F5-F6-F5-F7)

The VIEW menu allows viewing the pattern drawing in different geometric planes. This includes isometric viewing as well. The table below provides a summary of the menu commands.

VIEW MENU	**Parent: VIEW/ZOOM MENU**
Commands	**Description**
XY (F1)	Orients geometry in *xy* plane
ZX (F2)	Orients geometry in *zx* plane
YZ (F3)	Orients geometry in *yz* plane
ISO (F4)	Provides isometric viewing of drawing
KEY IN (F9)	Specifies input for object rotation in the x, y, and z planes.
HELP (F10)	Brings up the HELP screen

XY (F1)

The XY command orients the pattern in the XY plane. This command is useful for setting up the pattern to the machine's required coordinates. The illustration below shows an object in the XY view.



ZX (F2)

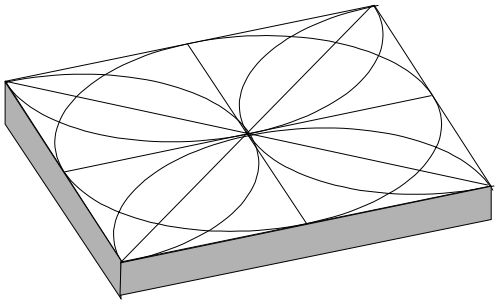
The ZX command orients the pattern in the ZX plane. This command is useful for setting up the pattern to the machine's required coordinates. The illustration below shows an object in the ZX view

YZ (F3)

The YZ command orients the pattern in the YZ plane. This command is useful for setting up the pattern to the machine's required coordinates. The illustration below shows an object in the YZ view

ISO (F4)

The ISO command is for viewing the pattern in the isometric view. This command can be used to view drawings that are in 3-D. The diagram below illustrates a two dimensional drawing in an isometric view.



KEY IN (F9)

The KEY IN command allows you to *key in* the angle of rotation for the object. The object can be oriented in any direction.

DISPLAY ROTATION		
X (DEGREES)	:	0.000
Y (DEGREES)	:	0.000
Z (DEGREES)	:	0.000

HELP (F10)

On line help is available for description of the VIEW menu commands.

BSC EDIT MENU
LEVEL 5

BSC EDIT MENU (F8-F7-F4-F2)

The BSC EDIT menu activates the G-Code menu for ballscrew compensation programming. The following menu table appears when the EDIT command is activated. For G-Code information turn to the G-Code section on page 3-3 or view the summary tables listed below under X and Y command descriptions.

BSC EDIT	**Parent: OFFSETS MENU**
Command	**Description**
X (F1)	Starts up the *x* axis G-code menu
Y (F2)	Starts up the *y* axis G-code menu
Z (F3)	Starts up the *z* axis G-code menu
HELP (F10)	Brings up HELP screen

X (F1)

The MANUAL DATA INPUT menu is designed specifically for use on industrial type interfaces. The menu directly issues RS274D format commands from a command line. The word addresses supported by AcroMill are shown below. See the RS274D Format section of the *User's Guide* for information and descriptions of the commands supported. See the X menu display diagram on page 9-2 under Level 6.

BSC X MENU	**Parent: MENU**
Command	**Description**
F (F1)	Feedrate (Cut Speed)
G (F2)	Preparatory Function
I (F3)	X Axis Integrand
J (F4)	Y Axis Integrand
H (F5)	Select Offset
M (F6)	Miscellaneous Functions
X (F7)	X Axis Endpoint or Dwell Time
Y (F8)	Y Axis Endpoint
N (F9)	Number sequence command
D (F10)	Select Kerf

Y (F2)

The MANUAL DATA INPUT menu is designed specifically for use on industrial type interfaces. The menu directly issues RS274D format commands from a command line. The word addresses supported by AcroMill are shown below. See the RS274D Format section of the USER'S GUIDE for information and descriptions of the commands supported. See the Y menu display diagram on page 9-3 under Level 6.

BSC Y MENU **Command**	**Parent: MENU** **Description**
F (F1)	Feedrate (Cut Speed)
G (F2)	Preparatory Function
I (F3)	X Axis Integrand
J (F4)	Y Axis Integrand
H (F5)	Select Offset
M (F6)	Miscellaneous Functions
X (F7)	X Axis Endpoint or Dwell Time
Y (F8)	Y Axis Endpoint
N (F9)	Number sequence command
D (F10)	Select Kerf

Z (F3)

The MANUAL DATA INPUT menu is designed specifically for use on industrial type interfaces. The menu directly issues RS274D format commands from a command line. The word addresses supported by AcroMill are shown below. See the RS274D Format section of the USER'S GUIDE for information and descriptions of the commands supported. See the Z menu display diagram on page 9-4 under Level 6.

BSC Z MENU **Command**	**Parent: MENU** **Description**
F (F1)	Feedrate (Cut Speed)
G (F2)	Preparatory Function
I (F3)	X Axis Integrand
J (F4)	Y Axis Integrand
H (F5)	Select Offset
M (F6)	Miscellaneous Functions
X (F7)	X Axis Endpoint or Dwell Time
Y (F8)	Y Axis Endpoint
N (F9)	Number sequence command
D (F10)	Select Kerf

HELP (F10)

On line help is available for description of the BSC EDIT menu commands.

SCREEN MENU
LEVEL 5

SCREEN MENU (F8-F8-F9-F6)

The SCREEN menu allows the operator to configure the various windows on the user interface.

SCREEN MENU	**Parent: NEXT>> MENU**
Command	**Description**
UPPER (F1)	Edit Upper Window
LOWER (F2)	Edit Lower Window
HISTORY (F3)	Edit History Window
INPUT (F4)	Edit Input Window
FMENU (F5)	Edit FMENU Window
STATUS (F6)	Edit Status Window
MESSAGE (F7)	Edit Message Window
CURRENT (F8)	Edit Current Window
MORE (F9)	Edit Next Window
HELP (F10)	Brings up the HELP screen

For each window, the machine operator can change the following parameters.

Parameter	**Description**
Size X	Width of the window
Size Y	Height of the window
Origin X	Top left-hand corner X for the window
Origin Y	Top left-hand corner Y for the window
Top Space	Width of space filler on top of the window
Window Type	Type of Window (0,1,2,3)
Window On	Indicating if the window is showing
Top bar	Width of top bar
Header	Width of header
Text Color	Color of Main Text
Header Color	Color of Header
Window Color	Color of Window
Light Color	Color of Lighted parts of window
Shadow Color	Color of shadowed parts of windows
Frame Color	Color of frames of window
BackGround	Color of background

Each can be customized to a particular color. Colors range from 0 to 15 for the VGA standard.

For each of these ports, the following variables can be set for positioning and re-sizing.

X1, Y1	Top Left Corner
X2, Y2	Bottom Right Corner.
OrgX, OrgY	Location.
Top Space	Vertical distance between top border and start of text
Port Type	(0,1,2,3)
Port On/Off	
Top Bar	On/Off
Header	Top header Text pointer. The text is in the Message file.

Text Color	(0-15)
Header Text Color	(0-15)
Window	(0-15)
Port Color	(0-15)
Shadow Color	(0-15)
Frame Color	(0-15)
Border Color	(0-15)
Background Color	(0-15)

UPPER (F1)

The UPPER command is the Upper Port. Refer to the above information for setting the positioning and re-sizing variables.

LOWER (F2)

The LOWER command is the Lowerport Port. Refer to the above information for setting the positioning and re-sizing variables.

HISTORY (F3)

The HISTORY command is the History Port. Refer to the above information for setting the positioning and re-sizing variables.

INPUT (F4)

The INPUT command is the Input Port**.** Refer to the above information for setting the positioning and re-sizing variables.

FMENU (F5)

The FMENU command is the F Key Menu Port. Refer to the above information for setting the positioning and re-sizing variables.

STATUS (F6)

The STATUS command is the Status Port. Refer to the above information for setting the positioning and re-sizing variables.

MESSAGE (F7)

The MESSAGE command is the Message Port. Refer to the above information for setting the positioning and re-sizing variables.

CURRENT (F8)

The CURRENT command is the Current Position Port
Refer to the above information for setting the positioning and re-sizing variables.

MORE (F9)

The MORE menu activates the second portion of the SCREEN menu. It is used to setting the positioning and re-sizing variables. Refer to the MORE menu under Level 6 for definitions on these key commands.

HELP (F10)

On line help is available for description of the SCREEN menu commands.

SETUP MENU
LEVEL 5

SETUP MENU (F8-F9-F9-F3)

The SETUP menu is useful for changing parameters of the display.

SETUP MENU	**Parent: TUNE MENU**
Commands	**Description**
CHANNEL (F1)	Channel Select
ON/OFF (F2)	Toggles the currently selected channel On/Off state.
VSCALE (F3)	Vertical scale in units per division
VOFFSET (F4)	Vertical offset in units per division.
PROFILE (F5)	Setup of and excitation profile for the selected channel.
HSCALE (F6)	Horizontal scale in units per division.
DRAWCOLOR (F7)	Sets up the drawing color for the selected channel. Valid numbers are 1...15.
AXIS (F8)	Selects which axis to display on the currently selected channel.
SOURCE (F9)	Selects which type of data to collect from the selected axis.
STORE (F10)	Stores the setup parameters as well as any sampled data on to disk.

CHANNEL (F1)

There are 4 channels available for monitoring and storing of data from all axes. This key will toggle through 4 available channels. Each channel has associated with it

1. On/Off Status
2. A source Axis
3. Source Data type.
4. Display Scaling (Horizontal, Vertical).
5. Motor Excitation profile.(Distance, Velocity, Acceleration).

ON/OFF (F2)

This key will toggle the ON/OFF state of the currently selected channel. As long as the channel is turned on, the data will be displayed and stored in MONITOR and SAMPLING modes.

VSCALE (F3)

The vertical scale is applied to sampled data for each channel. It is programmed in Units per square. Once set, it can be stored for later recall by using the “STORE” function.

VOFFSET (F4)

Once set, it can be stored for later recall by using the “STORE” function.

The vertical offset is applied to sampled data for each channel. It is programmed in Units per square. Using the offset allows separating each channel trace so that it can be viewed easily. Once set, it can be stored for later recall by using the “STORE” function.

PROFILE MENU (F5)

This allows setting up of a motor excitation profile for each axes.

HSCALE (F6)

Horizontal scale is normally not used when the horizontal display is TIME. In this case the time base is set in the “TIMESCALE” menu. Only when the horizontal display is used to display Axis data instead of TIME is the HSCALE used. It is programmed in Units per Square. Once set, it can be stored for later recall by using the “STORE” function.

DRAWCOLOR (F7)

DRAWCOLOR is available for each channel. All data displayed pertaining to that channel is drawn in this color. Once the color is set, it can be stored for later recall by using the “STORE” function.

AXIS (F8)

The AXIS command assigns the axes to the currently selected channel. This is similar to hooking up an Oscilloscope probe to various points. Each time the key is hit it will select the next available axes.
This selection can be stored for later recall by using the “STORE” function.

SOURCE (F9)

This key will scroll through various data types available for displaying and storing.
The available data types are

1. Following Error.
2. Current Position.
3. Actual Position.
4. Instantaneous Velocity.
5. Output Voltage

Once set, this setting can be stored for later recall by using the “STORE” function.

STORE (F10)

This command will store all the current settings of the parameters as well any sampled data onto the disk.

TIMEBASE
LEVEL 5

TIMEBASE MENU (F8-F9-F9-F4)

The TIMEBASE menu allows the user to manipulate the oscilloscope timebase settings. The following menu table summarizes the commands.

TIMEBASE MENU **Commands**	**Parent: TUNE MENU** **Description**
HTIME (F1)	Allows changing the time in milliseconds per division of the horizontal display when time is chosen to be displayed against data on the vertical display.
HAXIS (F2)	Toggles through axes In the case that an axis' data instead of time needs to be displayed on the horizontal display, this key will toggle through all the available axes.
HDATA (F3)	In the case that the horizontal display is used to show axis data instead of time, this key will toggle through all the available data types. 1. FollErr (Following Error) 2. CurPos (Current Position) 3. ActPos (Actual Position) 4. InstVel (Instantaneous Velocity) 5. Vout (Dac Output Voltage)
STORE (F10)	This will store the setup parameters as well as any sampled data on to disk.

HTIME (F1)

The HTIME allows changing the time in milliseconds per division of the horizontal display when time is chosen to be displayed against data on the vertical display.

HAXIS (F2)

The HAXIS command toggles through axes In the case that an axis' data instead of time needs to be displayed on the horizontal display, this key will toggle through all the available axes.

HDATA (F3)

The HDATA command is used for the horizontal display when showing axis data instead of time, this key will toggle through all the available data types.

1. FollErr (Following Error)
2. CurPos (Current Position)
3. ActPos (Actual Position)
4. InstVel (Instantaneous Velocity)
5. Vout (DAC Output Voltage)

STORE (F10)

This key will store all the current settings of the parameters as well any sampled data onto the disk.

TRIGGER
LEVEL 5

TRIGGER MENU (F8-F9-F9-F5)

The TRIGGER menu is the selects the Trigger Channel, Trigger Level, type of data used as a trigger, and stores the setup parameters for the oscilloscope triggering. The following table is a summary of the TRIGGER commands.

TRIGGER MENU	**Parent: TUNE MENU**
Commands	**Description**
T. CHANNEL (F1)	This key allows selecting one of 4 channels to serve as trigger during MONITORING data. Note that the trigger does not work when data is being sampled and stored during Profile Excitation.
T.LEVEL (F2)	This selects the trigger level from the Channel source Axis and selected HDATA.
T.DATA (F3)	Selects the type of data to use as the trigger. The available data types are Following Error, Current Position, Actual Position, DAC Output Voltage (Vout). Note: the triggering can be accomplished from a data type that is not being displayed.
T. ON/OFF (F4)	This toggles the ON/OFF status of the trigger.
STORE (F10)	This will store the setup parameters as well as any sampled data on to disk.

T.CHANNEL (F1)

This key allows selecting one of 4 channels to serve as trigger during MONITORING data. Note that the trigger does not work when data is being sampled and stored during Profile Excitation.

T.LEVEL (F2)

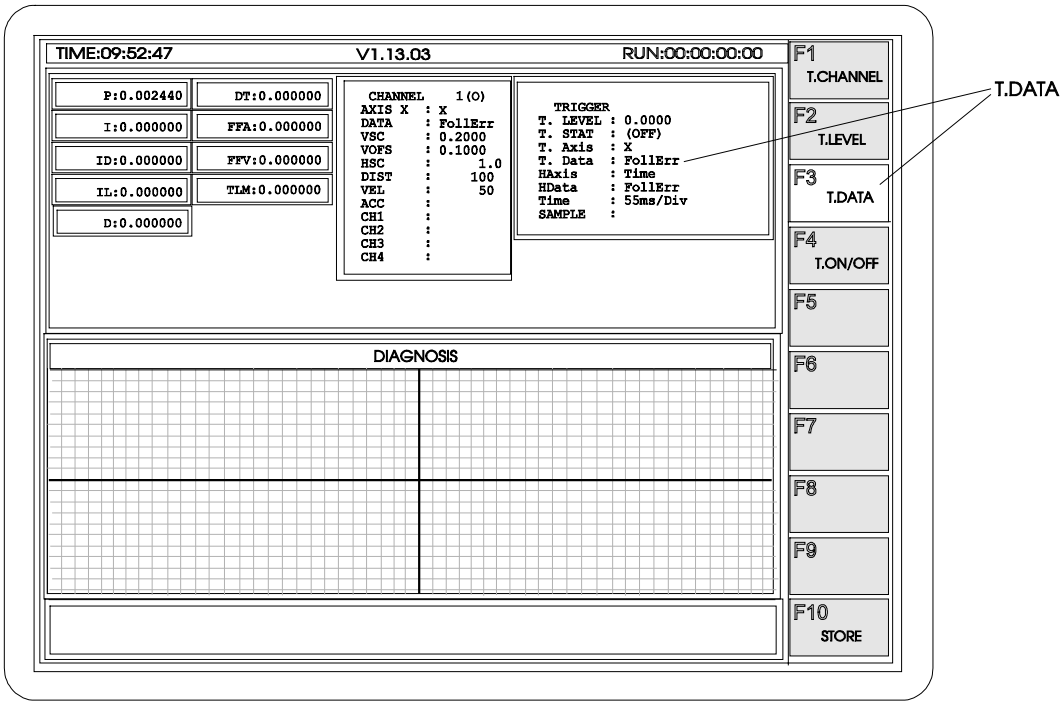
This selects the trigger level from the Channel source axis and selected HDATA.

T.DATA (F3)

The Trigger Data key is a toggle that selects one of four types of data to be viewed on the oscilloscope. These are:

1. Following Error
2. Current Position
3. Actual Position
4. DAC Output Voltage (Vout)

Use the F3 key to toggle through the parameters. Note, the T. Data line in the Trigger Status Window changes as the F3 key is toggled. The following is an illustration of the TRIGGER menu. The T.DATA key is shown to be activated.



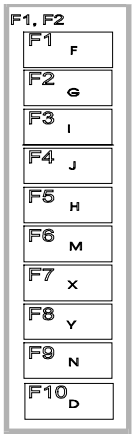
T.ON/OFF (F4)

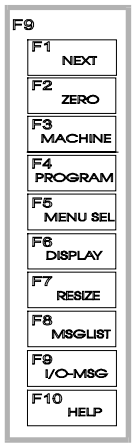
The T.ON/OFF command toggles the ON/OFF status of the trigger.

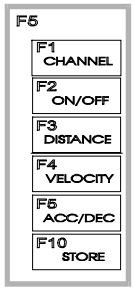
STORE (F10)

This will store the setup parameters as well as any sampled data on to disk.

9. FLOW DIAGRAM-LEVEL 6



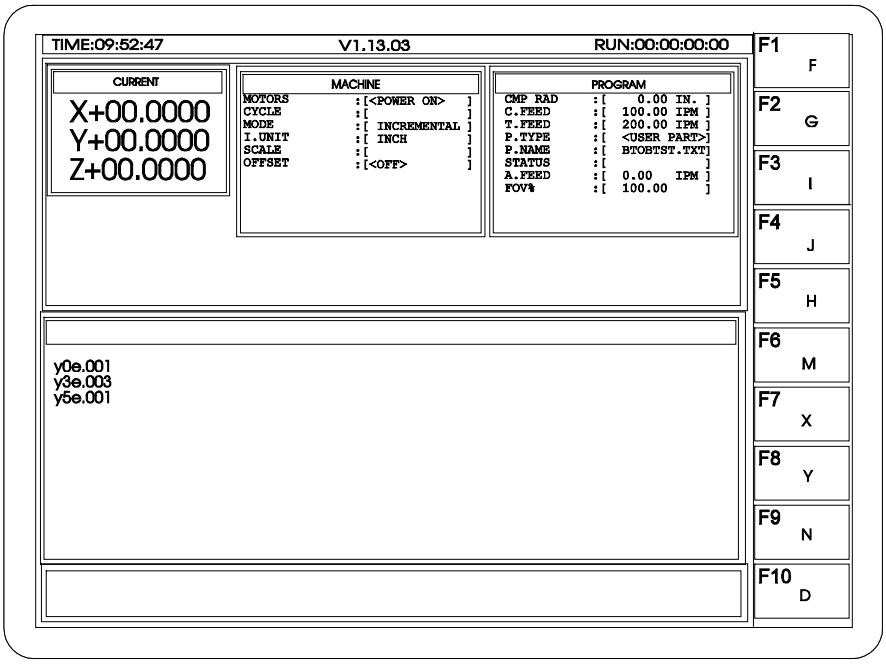




BSC X MENU
LEVEL 6

BSC X MENU (F8-F7-F4-F2-F1)

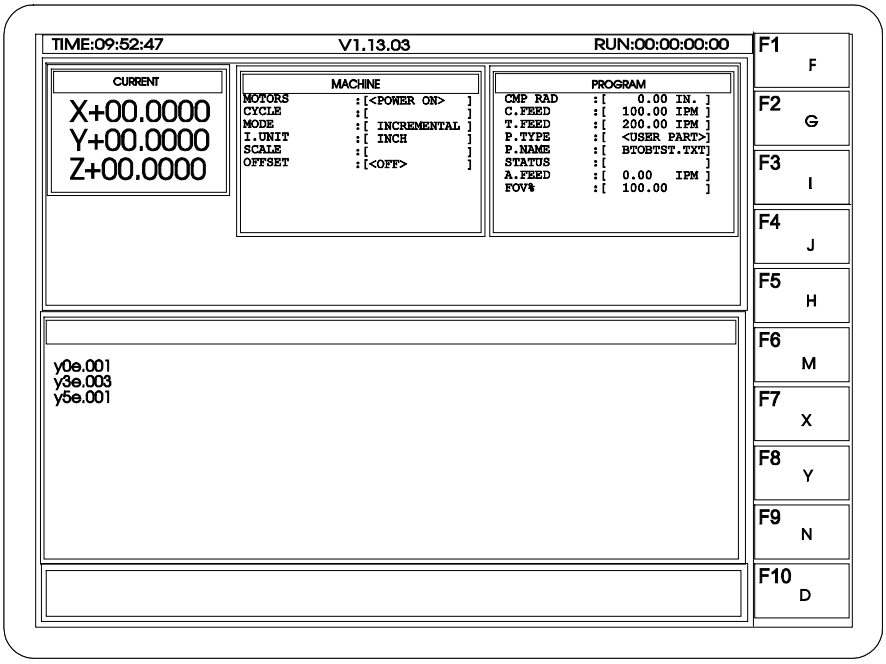
The BSC X menu activates the following display screen.



BSC Y MENU
LEVEL 6

BSC Y MENU (F8-F7-F4-F2-F2)

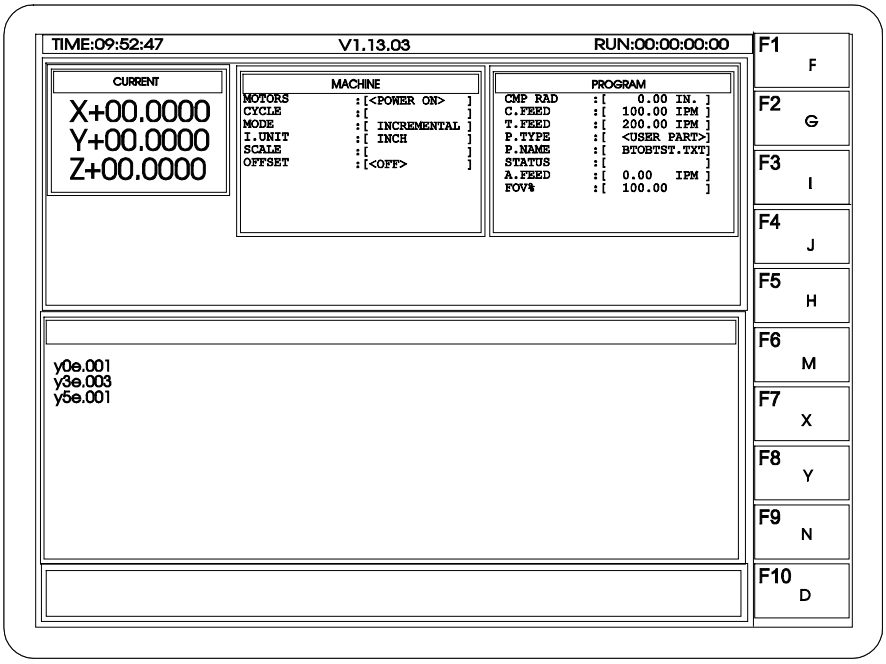
The BSC Y menu activates the following display screen.



BSC Z MENU
LEVEL 6

BSC Z MENU (F8-F7-F4-F2-F3)

The BSC Z menu activates the following display screen.



MORE MENU
LEVEL 6

MORE MENU (F8-F8-F9-F6-F9)

The MORE menu activates a menu layer provides nine additional commands that are summarized in their following table.

RESUME MENU	**Parent: STOP MENU**
Command	**Description**
NEXT (F1)	Next Position Port
ZERO (F2)	Floating Zero port
MACHINE (F3)	Machine Status port
PROGRAM (F4)	Program Status port
MENUSEL (F5)	Select Menu port
DISPLAY (F6)	Graphics Display port
RESIZE (F7)	Re-sizes the windows on the display screen
MSGLIST (F8)	Table containing string messages used in displaying names for all windows, inputs, and outputs.
I/O-MSG (F9)	Allows programming the Alarm Message screen.
HELP (F10)	Brings up HELP screen

For each of these ports, the following variables can be set for positioning and re-sizing.

X1,Y1	Top Left Corner
X2,Y2	Bottom Right Corner.
OrgX, OrgY	Location.
Top Space	Vertical distance between top border and start of text
Port Type	(0,1,2,3)
Port On/Off	
Top Bar	On/Off
Header	Top header Text pointer. The text is in the Message file.
Text Color	(0-15)
Header Text Color	(0-15)
Window	(0-15)
Port Color	(0-15)
Shadow Color	(0-15)
Frame Color	(0-15)
Background Color	(0-15)

NEXT (F1)

The NEXT command is the Next Position Port. Refer to the above information for setting the positioning and re-sizing variables.

ZERO (F2)

The ZERO command is the Floating Zero Port. Refer to the above information for setting the positioning and re-sizing variables.

MACHINE (F3)

The MACHINE command is the Machine Status Port. Refer to the above information for setting the positioning and re-sizing variables.

PROGRAM (F4)

The PROGRAM command is the Program Status Port. Refer to the above information for setting the positioning and re-sizing variables.

MENUSEL (F5)

The MENUSEL is the Select Menu Port. Refer to the above information for setting the positioning and re-sizing variables.

DISPLAY (F6)

The DISPLAY is the Graphics Display Port. Refer to the above information for setting the positioning and re-sizing variables.

RESIZE (F7)

Before using the RESIZE command, back up the **syspar.fil** under the current directory. This command is used for re-sizing the windows on the display. Use the RESIZE command sparingly. It is a window sizing tool designed for advanced AcroMill software users.

MSG LIST (F8)

A 100 message table is provided that can be edited and stored on the disk. This table contains string messages that are used in displaying names for all the windows, all the inputs and outputs. Each message can be up to 16 digits long.
Message#0...16 are typically used for header displays on all the windows.
Message#32...64 are used to name the inputs and outputs so that when a I/O STATUS is done, English names for all the I/O can be displayed.
The rest of the messages can be used for ALARM displays. This is explained below.

I/O MSG (F9)

This screen allow programming the ALARM MESSAGE screen. There are 32 Alarms that can be programmed to pop up upon getting triggered by Input00...31 and Outputs 32...63. The following screen will show up.

Parameter	Description
I/O#	This is a number between 00 and 63. This is the source of the ALARM trigger. The alarm will always trigger when the I/O goes from the LOW to the HIGH state.
Message	This tells the ALARM screen which message to put up when this alarm occurs. This message number points into the MSGLIST described previously
ON/OFF	This turns this alarm on or off.
Message Column	The message can be made to appear at a particular Row or Column in the Message Window. This entry sets the Column
Message Row	The message can be made to appear at a particular Row or Column in the Message Window. This entry sets the Row

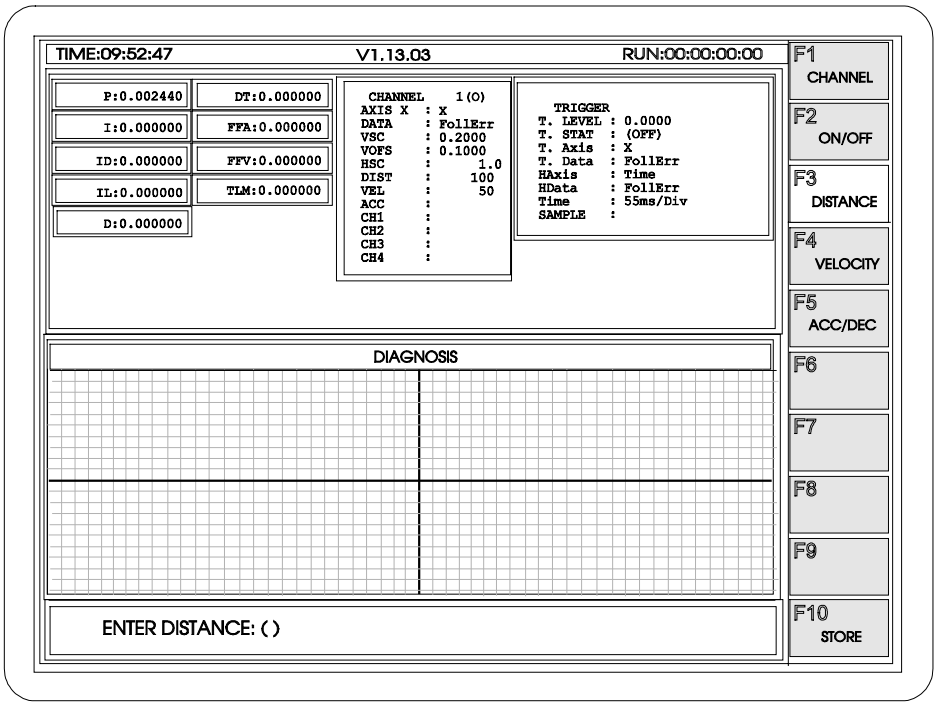
HELP (F10)

On line help is available for description of the RESUME menu commands.

PROFILE MENU
LEVEL 6

PROFILE MENU (F8-F9-F9-F3-F5)

The PROFILE menu allows the machine operator to evaluate and change motion profiles dynamically on AcroMill's oscilloscope. The diagram below shows the PROFILE menu display screen.



The table below provides a summary of the PROFILE menu commands.

PROFILE MENU	**Parent: STOP MENU**
Command	**Description**
CHANNEL(F1)	Selects channel for diagnostic viewing
ON/OFF (F2)	Activates or deactivates any of the 4 Channels
DISTANCE(F3)	Specifies the motion profile distance
VELOCITY(F4)	Specifies the motion profile velocity
ACC/DEC (F5)	Specifies the motion profile acceleration and deceleration
HELP F(10)	Brings up HELP screen

CHANNEL (F1)

The CHANNEL command selects the oscilloscope channel for viewing. There are a total 4 channels to perform diagnostic analysis from.

ON/OFF (F2)

The ON/OFF command is a switch for activating and deactivating any of the oscilloscope Channels.

DISTANCE (F3)

The DISTANCE command provides an excitation profile for Distance (Units) that can be viewed on the oscilloscope. Note the DISTANCE command stays highlighted until a parameter is entered in the Prompt Window. this can be seen in the diagram provided above.

VELOCITY (F4)

The VELOCITY command provides an excitation profile for Velocity (Units per minute) that can be viewed on the oscilloscope. Note the VELOCITY command stays highlighted until a parameter is entered in the Prompt Window.

ACC/DEC (F5)

The ACC/DEC command provides an excitation profile for Acceleration/Deceleration (Units per minute per minute) that can be viewed on the oscilloscope. Note the ACC/DEC command stays highlighted until a parameter is entered in the Prompt Window.

STORE (F10)

Once the PROFILE parameters are set, it can be stored and later recalled by using the STORE function.

10. TroubleShooting

This section describes common problems and their resolution.

Problem	What to Do
ACR8000 Test Fails in the DIAGNOSTICS Menu	1. Check to see that ACR8000 card is present and properly seated in the chassis.
Limit Check Error	1. Soft Limit parameters are beyond home reference and need to be adjusted.
Part or User Pattern does not appear on the screen	1. Check the Path Color to ensure it is not set at the same color value as the background.
COMPUTER Test Fails in the DIAGNOSTICS Menu	1. Make sure that INTERRUPT 5 is not being used by any other device (card). ACR8000 uses this interrupt for the move counter.

ERROR MESSAGES

ERROR#	MESSAGE	MEANING
1	'FILE NOT FOUND.....',	File was not found on disk or floppy.
2	'SYNTAX ERROR.....',	Part program syntax is not correct.
4	'NO SUCH LINE/BLK IN PROG..',	No named block with the indicated line number was found in the program.
5	'REFERENCE BEYOND RANGE....',	An Hoffset, parameter of I/O number was out of range.
6	'DIVIDE BY ZERO.....',	Part program is attempting to divide a number by zero.
7	'ILLEGAL NEGATIVE ARGUMENT.',	The function (e.g. square root) does not take - re arguments.
8	'ERROR.....',	An unknown error has occurred.
9	'BAD STRING REFERENCE.....',	Illegal character referenced in CHR command.
10	'ESCAPE HIT. MODE ABORTED!',	Escape is canceling current operation.
11	'MACHINE POWER OFF.....',	An E-stop condition occurred while the CNC was jogging the machine.
12	'SOFTLIMIT TRIPPED.....',	A software limit was tripped while the CNC was executing a part program, or while the CNC was jogging the machine.
13	'RETURN WITHOUT GOSUB....',	A RET was programmed in the part program without a GOSUB call.
14	'SUBROUTINE NESTED TOO DEEP',	The program has exceeded ten nested GOSUB calls in the part program.
15	'MORE THAN 10000 SUB LOOPS.',	The program has exceeded 10,000 sub loops in the part program.
16	'PROGRAM STOP.....',	(Not an error) program stopped.
17	'OPTIONAL STOP.....',	(Not an error) program optional stop.
18	'MUST HAVE VGA GRAPHICS..',	The evolution 1000 requires VGA graphics to run properly. This machine does not support VGA graphics.
25	'BAD ARGUMENT FOR COMMAND',	Bad argument to a G-code command. E.g.re-feed rated.
29	'Unknown Proc Assignment...',	An internal draw/update or draw procedure is not present.
31	'BAD FLOW FILE ENCOUNTERED',	One of *.flo is corrupted-could be a bad/missing disk error.
32	'NO PATH INTERSECTION....',	Compensation routine cannot find intersection of two curves.
35	'Communications Error....',	Cannot talk to the ACR8000 card.
40	'BSC INCREMENT IS TOO SMALL',	Not enough memory to generate a ballscrew table.
41	BSC INCREMENT IS ILLEGAL...',	Ball screw is negative or 0.
42	'NO CIRCLES IN DXF FILE...',	DXF file does not have any circles to convert for a drill pattern.
43	'HOME Required.....',	A home is required before the CNC will execute a part program.
44	'I/O Error (Disk, Floppy....',	Could not read the disk or floppy.
45	'THIS FILE IS READ ONLY....',	The operator is attempting to write over a read-only file.
46	'FILE CANNOT BE ERASED....',	The operator is attempting to erase a read-only file.

47	'COPYING FILE ONTO ITSELF',	The operator is attempting to copy a file onto itself.
48	'COMPENSATION ERROR.....',	Could not compensate two blocks correctly.
49	'COMPENSATION WARNING..',	Compensated path has been reversed from original path. Change Root Epsilon to a negative value.
50.	'LIBRARY PART NOT AVAILABLE',	Library part files were not found.
51	'HEAP OVERFLOW.....',	General fault caught by the heap overflow trap function.
52	'NOT ENOUGH MEM IN PROGRAM',	Not enough memory in program 15 to set up ballscrew table.
53	'RUN TIME ERROR.....',	General protection fault caught in runtime trap function.
54	'UNDEFINED ERROR.....',	An unexpected / un-trapped error has occurred.
DOS 1	'ERROR.....',	DOS ERROR: a call was made to a nonexistent DOS function.
DOS 2	'FILE NOT FOUND.....',	DOS ERROR: attempting to access a file that does not exist.
DOS 3	'PATH NOT FOUND.....',	DOS ERROR: attempting to access a directory that does not exist.
DOS 4	'TOO MANY OPEN FILES.....',	DOS error: too many files open. DOS allows a maximum of 15 files open per process.
DOS 5	'FILE ACCESS DENIED.....',	DOS ERROR: attempting to write over a read-only file, or attempting to rename a file to a name that already exists.
DOS 6	'INVALID FILE HANDLE.....',	DOS ERROR: an invalid file handle was passed to a DOS systems call. This error should never occur; if it does, it is an indication that the file variable is somehow trashed.
I/O 100	'DISK READ ERROR.....',	I/O ERROR: attempted to read past the end of the file.
I/O 101	'DISK WRITE ERROR.....',	I/O ERROR: disk is full.
I/O 102	'FILE NOT ASSIGNED.....',	I/O ERROR: program did not assign a file variable a file name before attempting to write the file.
I/O 103	'FILE NOT OPEN.....',	I/O ERROR: program attempted to access a file that was not opened.
I/O 104	'FILE NOT OPEN FOR INPUT....',	I/O ERROR: program attempted to access a file that was not open for input.
I/O 105	'FILE NOT OPEN FOR OUTPUT....',	I/O ERROR: program attempted to access a file that was not opened for output.
I/O 106	'INVALID NUMERIC FORMAT.....',	I/O ERROR: a numeric value read from a text file does not conform to the proper numeric format.
CRITICAL 160	'PRINTER RESPOND ERROR....',	Device write fault. Printer is not responding to CNC.
CRITICAL 152	'DRIVE NOT READY.....',	Drive not ready.

11. APPENDIX A

BALLSCREW COMPENSATION SETUP PROCEDURE

Use the following illustrations for guidance in setting up Ballscrew compensation. A recommended diagnostic tool for Ballscrew compensation is the ACROVIEW software. Acroview allows monitoring the Ballscrew compensation for Axes 0 through 7 by observing the Axis Parameters. For axis 0 the Axis Parameters would be P12294 and P12294 (see the *User's Guide* for additional Axis Parameter information). The illustration below depicts Setpoint Summation. The Primary Setpoint (P12294) can be monitored against the Secondary Setpoint (P12295) by subtracting the two parameters. The resultant value will provide the Ballscrew compensation. Note the Secondary Setpoint is the summation of Primary Setpoint, Backlash and Ballscrew Offsets. If Backlash is used, this value must be subtracted to get the Ballscrew offset value (Ballscrew compensation).

Contact our factory or your area representative to receive this valuable diagnostic tool.

The procedure for setting up ballscrew compensation requires comparative data from Primary Setpoint ballscrew travel data and actual travel data (see table below). These values are found from encoder information which are measured in control units (factory set in inches or metric units) and from ballscrew travel measuring devices such as laser interferometers. The following is the procedure for setting up ballscrew compensation.

1. Determine the Home position as it relates to the position of the ballscrew(s). The HOME command is a physical reference and may be the position cutting tool resides when the machine is not running a program or when disabled. Home is typically defined by a physical input such as a limit switch. See the two drawings depicted below. Home is defined in the drawings by positions *x*=2.000, *y*=2.000.

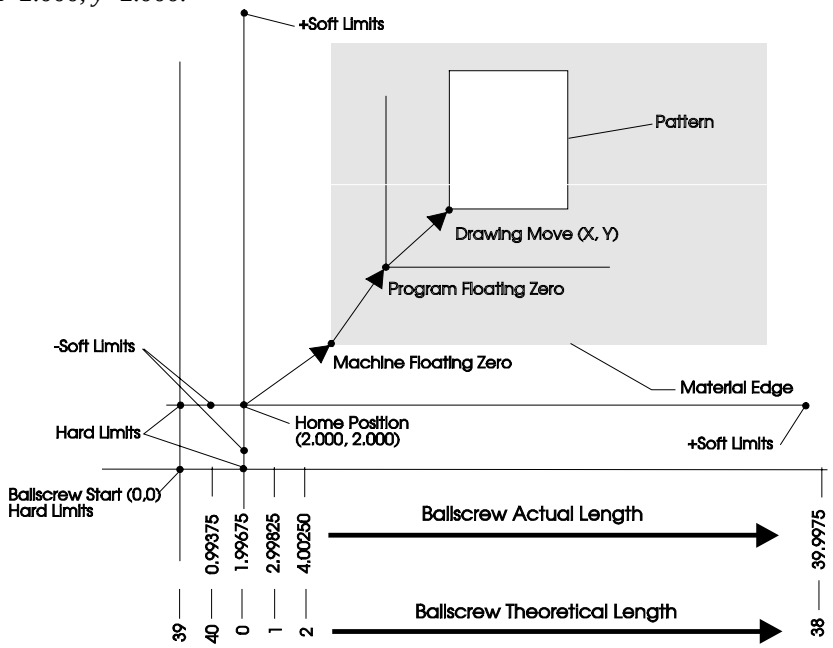


Figure A

The illustration below depicts a typical gantry style cutting table.

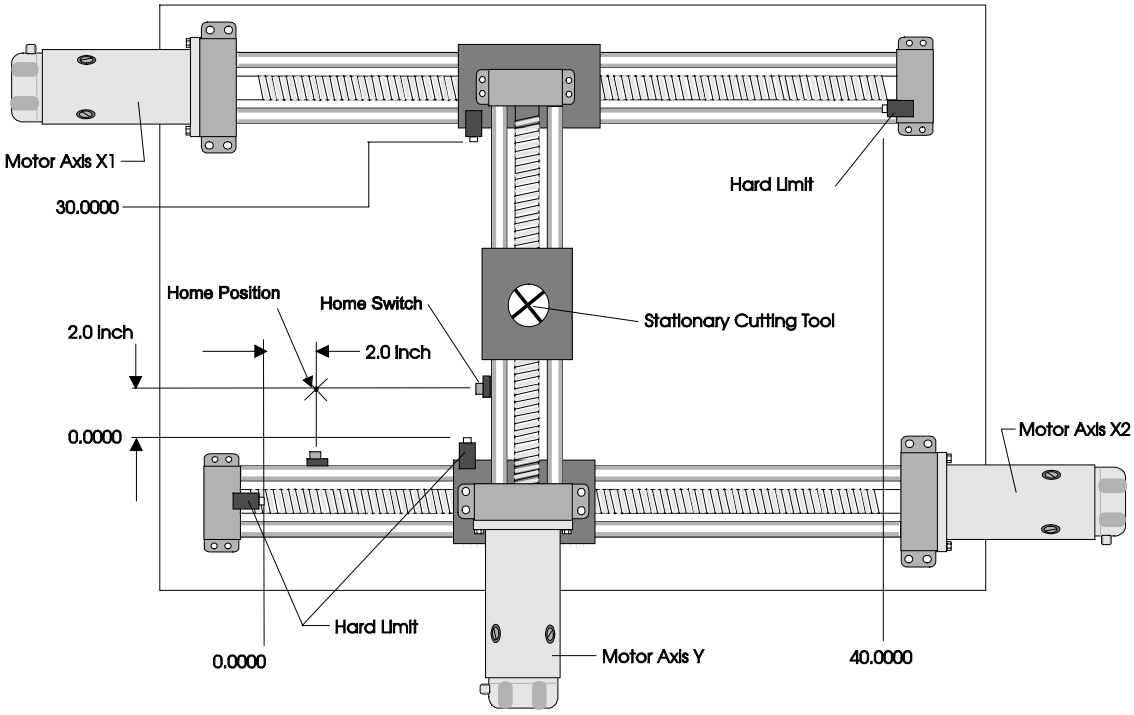


Figure B

2. Calculate the mean difference to get the ballscrew compensation required. A sample table is provided below. Note the Actual Mean Values in the table are shown in Figure A above.

Primary Setpoint (N)	Actual 1 (n1)	Actual 2 (n2)	Actual 3 (n3)	Actual 4 (n4)	Actual $_{Mean}$ (n1+n2+n3+n4)/Σn	Actual Difference (N−Actual$_{Mean}$)
0	0	0	0	0	0	0
1	0.979	1.000	0.997	0.999	0.99375	0.00625
2	1.996	1.998	1.995	1.998	1.99675	0.00325
3	2.997	3.000	2.997	2.999	2.99825	0.00175
4	4.004	4.001	4.004	4.001	4.00250	−0.00250
•	•	•	•	•	•	•
•	•	•	•	•	•	•
•	•	•	•	•	•	•
40	39.996	39.999	39.996	39.999	40.9975	0.00250

3. Since the Home position is defined at physical travel position (2.000,2.000), building the BSC input file will always start by interpreting Home position at zero (0). The BSC input file will look like the following:

X0E.00325
X1E.00175
X2E−.00250
•
•
•

X39E.00250
X40E.00000
X41E.00625

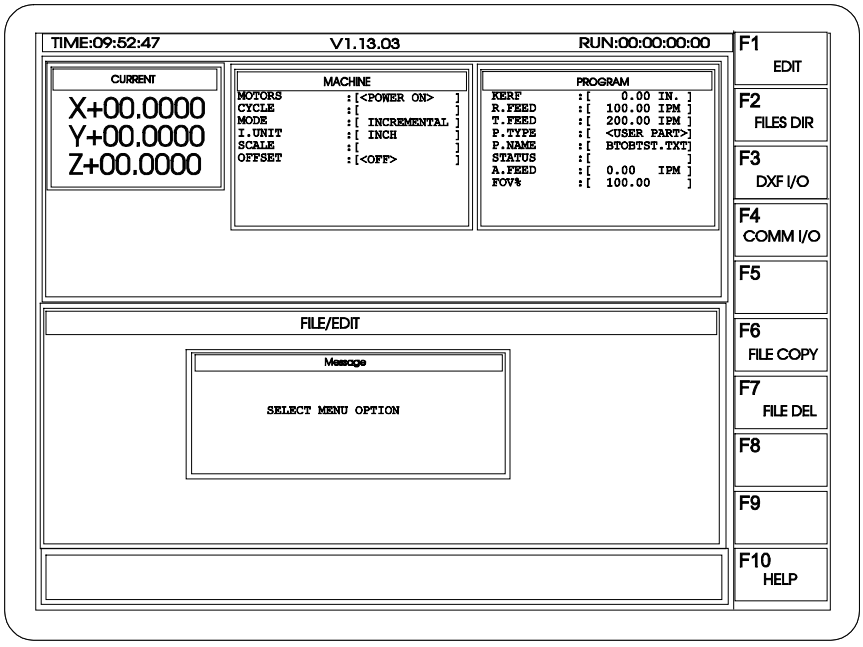
Note, lines X40 and X41 are the *wrap-around* compensation for where the Home position is located.

Be aware of static and dynamic criterion that may affect the ballscrew(s) functionality. Static factors are factors such as resultant accumulation of tolerances in pitch diameter (root and major), lead, and the groove radius of ball. Some dynamic factors are compression, tension, radial, and eccentric loading, and critical speed. All of these may be factors that affect ballscrew compensation.

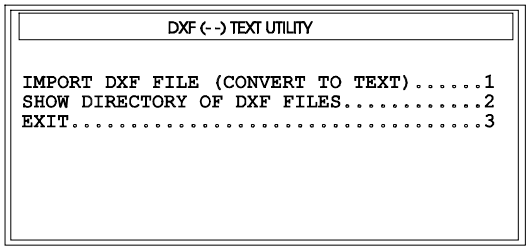
12. APPENDIX B

PROCEDURE FOR IMPORTING DXF FILES

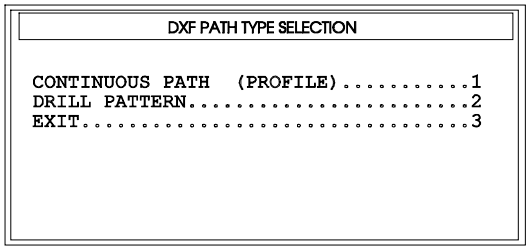
1. The procedure for importing a DXF file from diskette is described below. Starting from the MAIN menu, enter the FILES/EDIT menu by hitting the F7 key. The following display screen displays the DXF I/O menu. The DXF I/O menu allows importing and showing the directory of CAD files that have been converted to the DXF protocol.



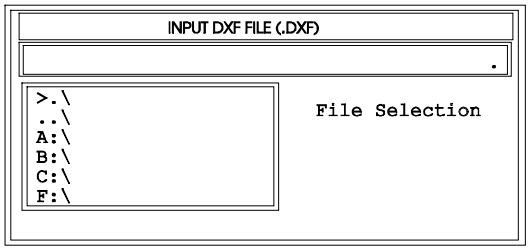
2. Enter the DXF I/O menu by hitting the F3 key. The following table is the DXF <--> TEXT UTILITY dialog box that appears when DXF I/O is initiated. Choose number **1** for importing DXF files from your keypad.



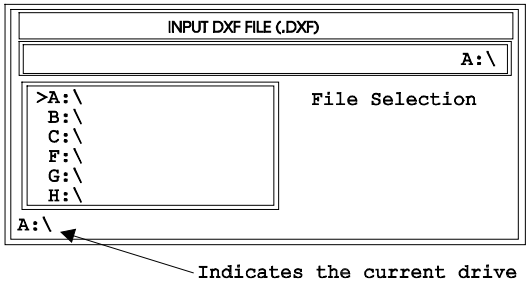
3. The following table is initiated *on-the*-fly as soon as your number selection is entered. The operator can specify CONTINUOUS PATH or DRILL PATTERN by selecting the appropriate numbers as listed below. The CONTINUOUS PATH option interprets the data in the DXF file as a continuous path for cutting. The DRILL PATTERN option interprets the data in the DXF file as a sequence of holes to be drilled. In our example we will select CONTINUOUS PATH by entering number **1**.



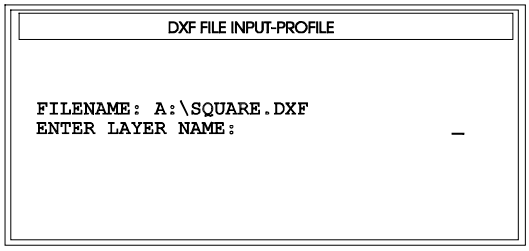
4. The INPUT DXF FILE (.DXF) table is activated immediately after entering your number selection from the previous table. Use the arrow(↓) keys to scroll down to the appropriate floppy drive. In this example, the floppy drive is designated by A:\. Hit Carriage Return to enter your selection.



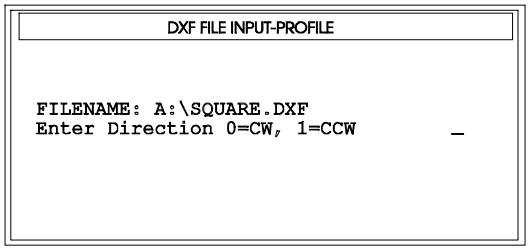
5. The INPUT DXF FILE (.DXF) will display the current drive as shown below.



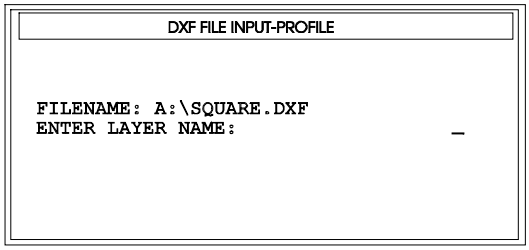
6. Next, type in ***.DXF** to list the DXF file(s) you want to import. If you know the specific name(s) of the DXF file(s), enter the file name now and hit Carriage Return. Illustrated below in the INPUT DXF FILE (DXF) table is a sample DXF file that has been entered as described above. Hit Carriage Return to enter the next display table.



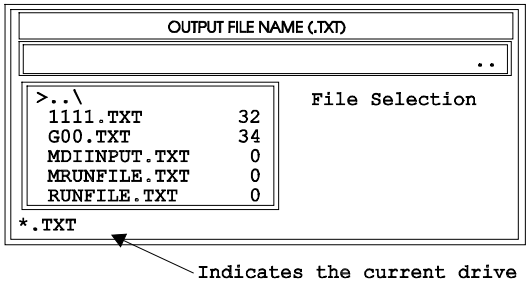
7. The DXF FILE INPUT -PROFILE table is activated and prompts you to enter the desired trace direction. Enter zero(**0**) for clockwise direction or one(**1**) for counterclockwise direction. Hit Carriage Return to enter your value.



8. Next, the same display table prompts you to whether you require entering a specific CAD layer name. Enter the CAD layer name and hit Carriage Return. Disregard this table by hitting Carriage Return if the CAD layer name is inconsequential.



9. For the OUTPUT FILE NAME (.TXT) table, type in the filename with a .TXT extension. As an example, you would type in the DXF file such as **SQUARE.TXT** with a .TXT extension. The OUTPUT FILE NAME (.TXT) table illustrated below shows the directory of .TXT files.



10. Once the DXF file has been converted (you will see a flash message indicating the conversion was successful), verify whether your program requires additional editing by entering the EDIT menu (F1). You have now successfully imported a DXF file to AcroMill.

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