



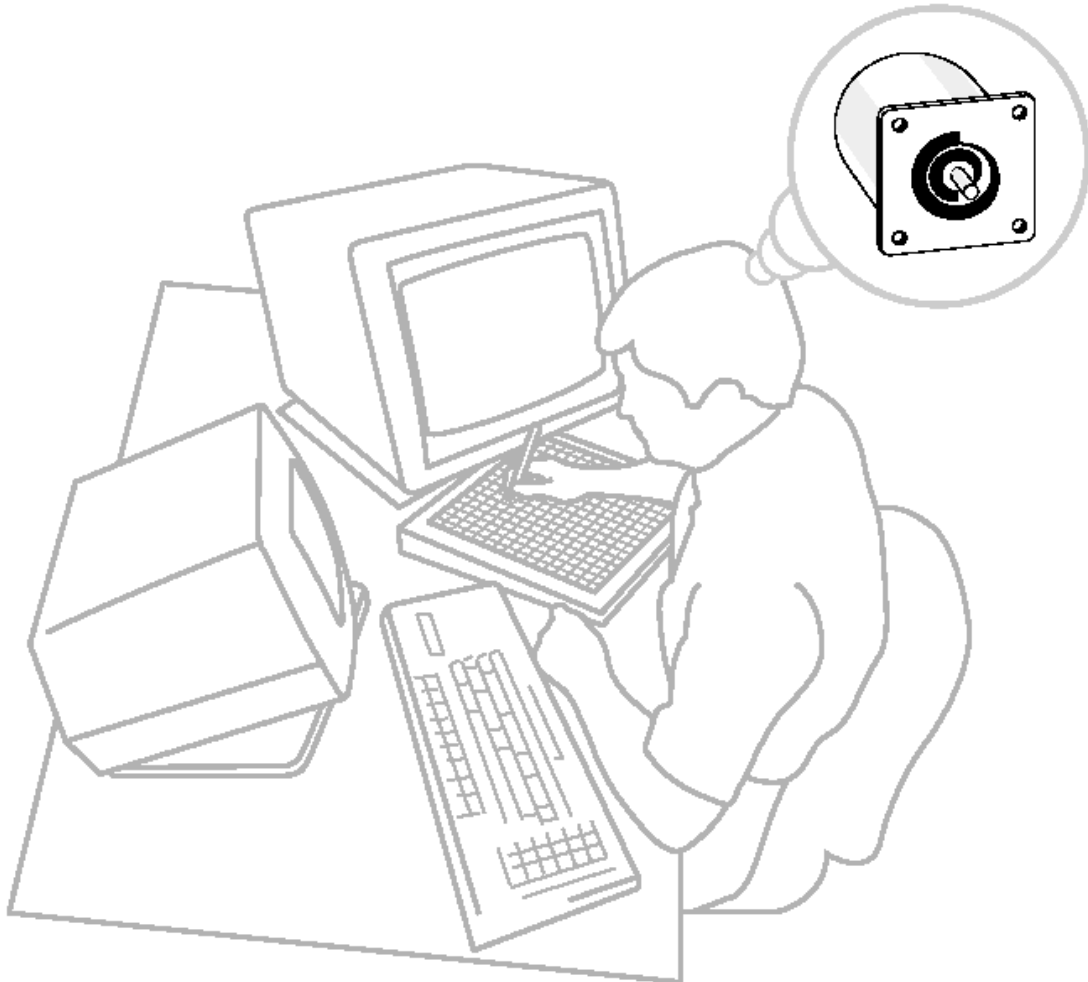
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# CompuCAM™

## Computer Aided Motion

Effective: May 6, 2001

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CompuCAM™  
Computer Aided Motion

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# Introducing CompuCAM

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## Overview

CompuCAM is a Microsoft Windows-based programming package that provides computer aided motion (CAM) support for the 6000 Series and 6K Series controllers. CompuCAM is a utility you can start from within Motion Architect or from the **Start** menu. (CompuCAM must be purchased separately. It does not come with Motion Architect.)

*Computer aided motion* means that CompuCAM can import 2D geometry from the sources listed below. For a discussion of the import filters, see [Appendix A](#).

- **CAD programs:** The DXF (Data Interchange File) file format, developed by AutoDesk Corporation for its AutoCAD program, is the standard for CAD file transfer with PC-based CAD systems.
- **Plotter files:** The HP-GL (Hewlett-Packard Graphics Language) is a motion control language developed by Hewlett-Packard Company for its line of plotters.
- **NC programs:** The G-Code language is a standard (EIA Standard RS-274-D) NC programming language for machine tool applications.

After importing the geometry, you can use CompuCAM to assign motion and I/O attributes and then generate commented programming code compatible with all Compumotor 6000 Series or 6K Series multi-axis stepper and servo controllers.

The resulting motion program can then be saved to disk and verified. The Motion Architect editor (**E**ditor) can be used to further edit the generated 6000 or 6K code. Then using the terminal emulator (**T**erminal) or test panel (**P**anel) you can download CompuCAM's generated code the controller.

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## User Interface

CompuCAM provides a highly interactive graphical environment for developing a motion program. Although full keyboard support is available, a mouse is recommended for maximum proficiency.

A two-paned window provides you with simultaneous views of the imported geometry and the generated 6000 or 6K code. At any time you can graphically correlate the geometry and the code. By selecting a segment in the geometry pane, CompuCAM highlights the corresponding code in the code pane and vice-versa.

With the menu bar you can ascribe motion and I/O attributes to the imported geometry. You can also save your work, retrieve previous sessions, zoom/pan the geometry, and access the Help system.

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# Basic Operations

CompuCAM automatically generates 6000 or 6K code for positioning applications. CompuCAM supports three basic positioning operations:

- **Point-to-Point Positioning:** Point-to-point positioning allows axes to reach their final destination without synchronizing with each other. Rapid traverse and homing moves are typically point-to-point operations.
- **Multi-Axis Linear Interpolation:** Linear interpolation allows multiple axes to achieve linear (straight line) motion. All axes start, accelerate, decelerate and stop in a synchronized manner. Motion must stop between segments in a linked chain of linear-interpolated segments.
- **2-Axis Contouring (Circular Interpolation):** Contouring allows two axes to achieve curvilinear motion. A contouring path consists of one or more connected line and arc segments. Motion will not stop between connected segments in a path, but motion will stop at the end of a path.

CompuCAM allows motion paths to be ordered (1, 2, 3, etc.), defined (linear interpolation, contouring, path acceleration, path velocity, etc.) and vectored. Furthermore, operations such as turning on an output or waiting for an input can be specified at the endpoints of each motion path.

## Reference Documentation

For more information about the 6000 language, see the **6000 Series Software Reference Guide**, or the on-line command reference in Motion Architect. For additional information on the user features available with each 6000 Series controller, see the respective controller user guide.

For more information about the 6K language, see the **6K Command Reference Guide**, or the on-line command reference in Motion Planner. For additional information on the user features available with each 6K Series controller, see the respective controller user guide.

# Installing CompuCAM

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## Overview

This section describes the installation process for CompuCAM. To use CompuCAM, you will need an IBM/compatible computer with the following:

- Microsoft Windows 3.1, Windows 95, Windows 98, or Windows NT
- Motion Architect 2.2 or later (must be installed before CompuCAM)  
Or, Motion Planner 2.0 or later
- VGA color monitor
- At least 2MB of RAM
- At least 1MB of hard disk space
- *A math coprocessor is highly recommended*

---

## Installation Procedure

### Step 1

If you have not already done so, install Motion Architect or Motion Planner. *CompuCAM will not install unless Motion Architect is already installed.* Refer to the ***Motion Architect User Guide*** for installation instructions.

### Step 2

Insert the CompuCAM diskette labeled *Disk 1 with Setup* into the disk drive.

### Step 3

For Windows 3.1 do the following:

From the Program Manager, click **File** and click **Run**. You can also do this from the File Manager.

When the dialog box appears, type **a:setup** and click **OK**

When the Welcome screen appears, click **Continue**. After a short period, the registration screen will appear.

For Windows 95/98/NT do the following:

On the **Start** menu, click **Run**.

When the dialog box appears, type **a:setup** and click **OK**

When the Welcome screen appears, click **Continue**. After a short period, the registration screen will appear.

#### **Step 4**

In the **User Information** dialog box, enter your name and company name. Then click **Next**.

#### **Step 5**

In the **Setup Type** dialog box, you can select the type of installation you want—choose from **Typical**, **Compact**, and **Custom**. If you choose **Custom**, you can select the parts of CompuCAM to install:

- **CompuCAM Program** installs the files necessary to run CompuCAM.
- **CompuCAM Help** installs the on-line help system for CompuCAM.
- **CompuCAM Examples** installs sample geometry files that you can import into CompuCAM sessions.

Under **Destination Directory**, you can specify the path where CompuCAM is installed. Unless you indicate a path, CompuCAM is installed to C:\CCAM. To select the installation path, click the **Browse...** button.

After you have made the appropriate selections, click **Next**. You will be prompted to insert Disk 2 that contains the specific geometry import filters (**DXF**, **HP-GL**, and **G-Code**).

#### **Step 6**

After the installation is complete, the **Setup Complete** dialog box appears. You can choose to view the README file, run CompuCAM, or return to Windows.

---

## **Launching CompuCAM**

### ***Motion Architect***

After CompuCAM is installed on your hard drive, you can start the program from Motion Architect.

- If you are using Motion Architect 2.1 or earlier, you can launch CompuCAM only from the program group created at installation.
- If you are using Motion Architect 2.2 or later, you can launch CompuCAM from the **Utilities** menu.

### ***Motion Planner***

You cannot start CompuCAM from Motion Planner. But you can import the .prg file created in CompuCAM into Motion Planner.

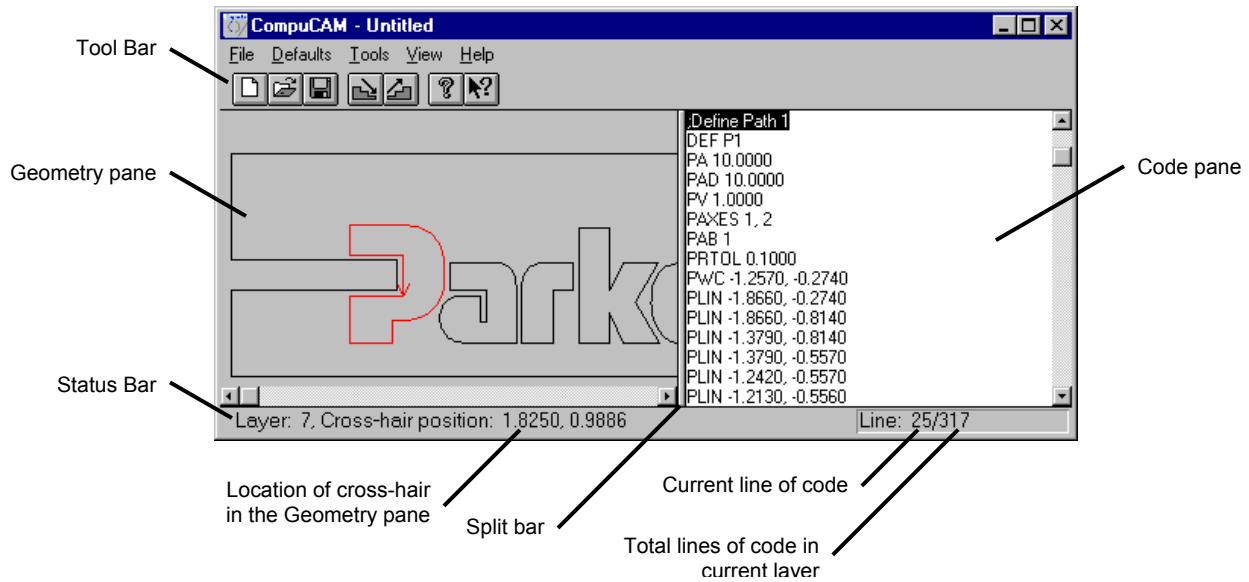


# CompuCAM Menus

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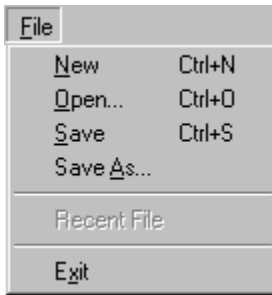
## Overview

This section describes all of the menus and commands that comprise CompuCAM.




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## File Menu




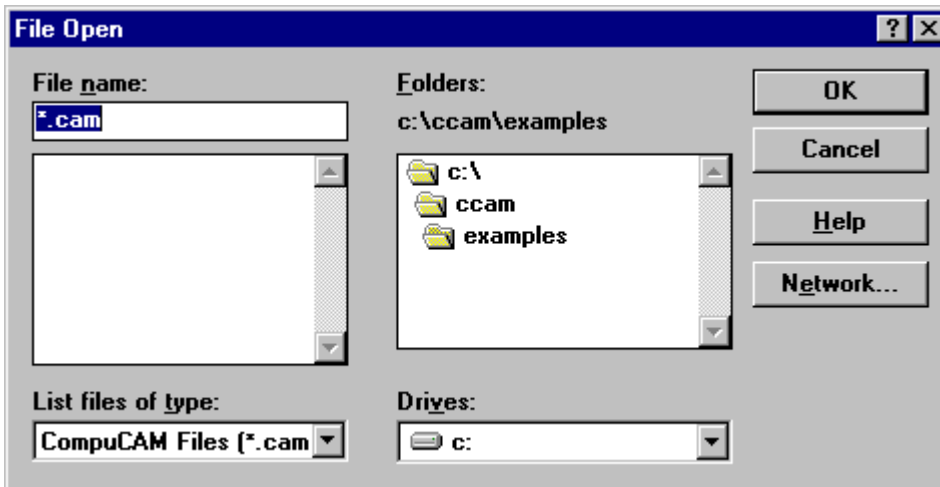
The **File** menu lets you initialize, save, retrieve, and quit CompuCAM sessions.

### New


The **New** command initializes the CompuCAM database to the default settings, and clears the geometry and code panes. This command duplicates the  button on the toolbar.

### Open...

The **Open** command lets you retrieve a previous CompuCAM session (\*.cam file). This command duplicates the  button on the toolbar.

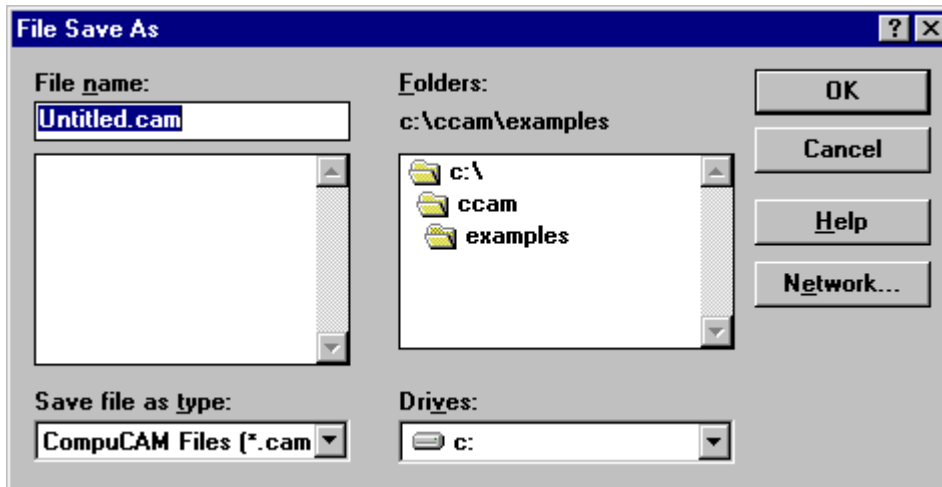


### Save

The **Save** command lets you save the current CompuCAM session to a \*.cam file. This command duplicates the  button on the toolbar.

## Save As...

The **Save As** command lets you save the current CompuCAM session to a different \*.cam file.

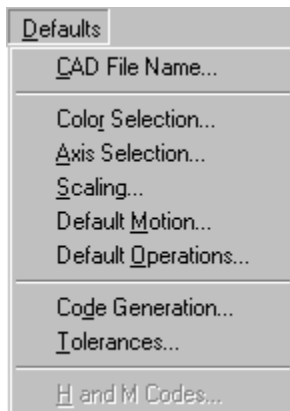


## Exit

The **Exit** command lets you quit the CompuCAM session. Before quitting the program, you are prompted to save your work.

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## Defaults Menu

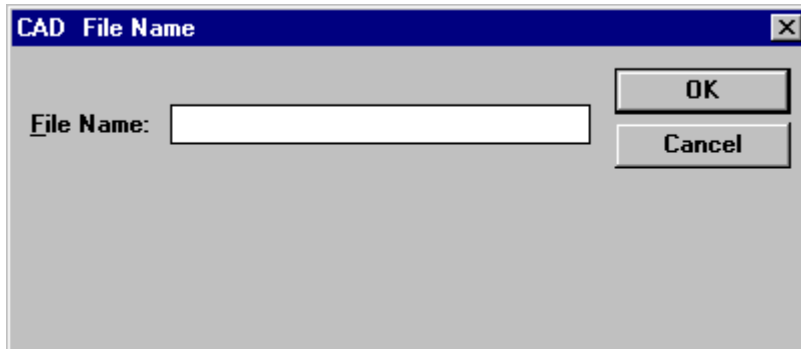


The **Defaults** menu lets you determine the default behavior of the CompuCAM environment. If you are using CompuCAM for the first time, before importing the geometry you should check the default settings and make any necessary changes to meet your application's requirements. *Subsequent sessions of CompuCAM will use the setup parameters you select under the **Defaults** menu.*

**Note:** If you change the defaults during a current session, you must import the current geometry again for the new defaults to take affect.

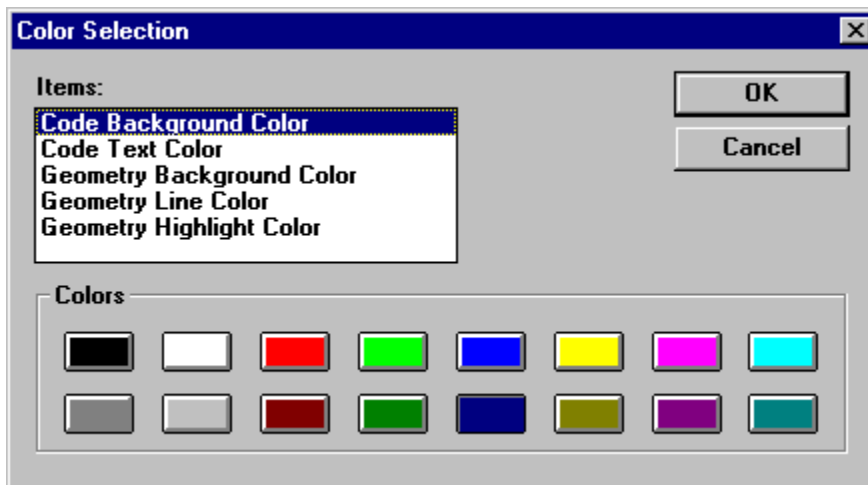
## CAD Name...

The **CAD File Name** dialog box prompts you for the path and file name of your CAD software package. Later, when you choose the **Run CAD** command under the **Tools** menu, CompuCAM uses this path and file name to find and run your CAD software package.



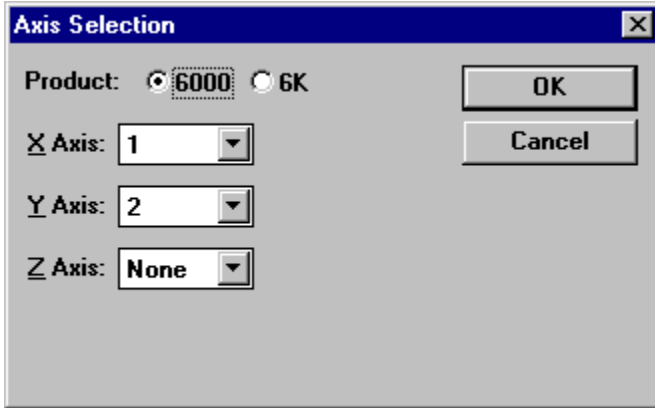
## Color Selection...

The **Color Selection** dialog box lets you specify the colors used in the geometry and code panes.



## Axis Selection...

The **Axis Selection** dialog box lets you specify the default X/Y axes and the Z axis of the target product. In the geometry pane, the X axis is the horizontal axis and the Y axis is vertical axis. The Z axis is only for use with [G-Code](#) .

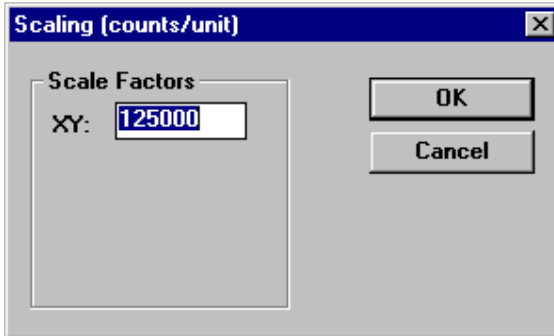


## Scaling...

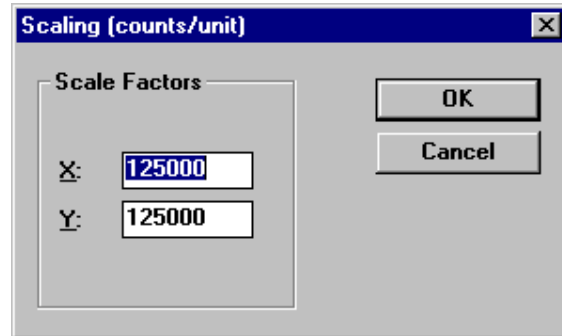
The **Scaling** dialog box lets you specify acceleration, velocity, and distance scale factors for XY path and Z axes (Z axis is for G-Code use only). The 6000 and 6K Series controllers perform scaling.

As an example, suppose the drawing you are importing is scaled to inches and you are operating a stepper motion control system with a resolution of 25,000 steps/rev, and each motor is attached to a 5-pitch (5 turns per inch) leadscrew. The scale factors for this application are depicted below.

Scaling for 6000 Series controllers



Scaling for 6K Series controllers

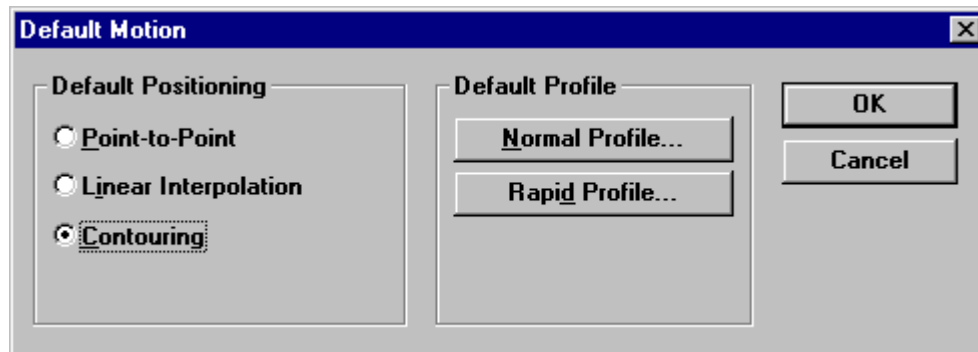


## Default Motion...

Use the **Default Motion** dialog box to specify the default motion parameters:

- **Default Positioning**
  - **Point-to-Point:** Point-to-point positioning allows axes to reach their final destination without regard to synchronization with each other. Rapid traverse and homing moves are typical examples.
  - **Linear Interpolation:** Linear interpolation allows multiple axes to achieve linear (straight line) motion. All axes start, accelerate, decelerate, and stop in a synchronized manner. Motion must stop between segments in a linked chain of linear interpolated segments. Linear interpolated profiles are executed with the GOL command.
  - **Contouring (circular interpolation):** Contouring (circular interpolation) allows multiple axes to achieve curvilinear motion in two or three dimensions (X-Y plane or X-Y-Z plane). Contouring motion is executed in a "path", a continuous-motion compound profile comprising any combination of contiguous line and arc segments. All axes involved in a path start, accelerate, decelerate, and stop in a synchronized manner. Contouring paths are defined like programs (using DEF and END commands), but are compiled with the PCOMP command and executed with the PRUN command.
- **Default Profile**
  - **Normal Profile...:** A *normal profile* is the profile for executing the path associated with the lines on the drawing. Specify velocity, acceleration, and deceleration for XY path axes and the Z axis (Z axis is G-Code only).
  - **Rapid Profile...:** A *rapid profile* is the profile for traversing between normal profile paths. Specify velocity, acceleration, and deceleration for XY path axes and the Z axis (Z axis is G-Code only).

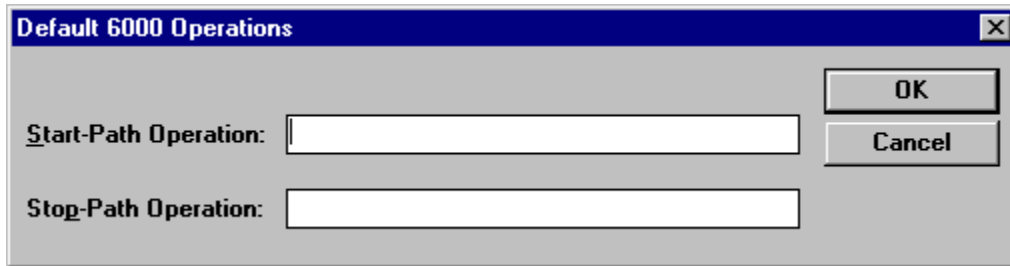
These motion parameters can also be configured on a path-by-path basis in the **Edit Motion** dialog box found in the **Edit Paths** dialog box under the **Tools** menu. While in the **Edit Paths** dialog box, you can select **All** in the **Paths** selector to override the **Default Motion** settings, but only for the current imported geometry. The **Edit Paths** dialog box also lets you change the [Path Direction](#).



## Default Operations...

The **Default Operations** dialog box lets you specify default *operations* (execution of 6000 Series commands) that you want to occur at path endpoints. Each path operation text box can contain multiple commands separated by colons ( : ), limited to a maximum of 256 characters including the colons.

- Start-path operation (for example, turning on a laser)
- Stop-path operation (for example, turning off a laser)

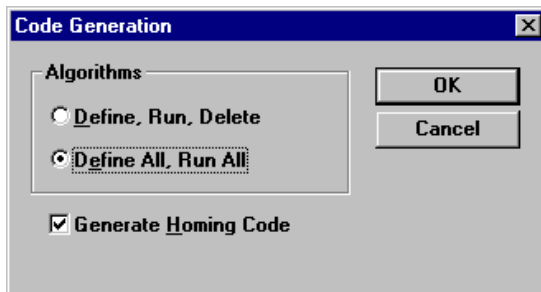


You can also configure the operations on a path-by-path basis from the **Edit Paths** dialog box. In the **Edit Paths** dialog box select the path you want to edit, and then click the **Edit Operations** button. For example, in the **Edit Paths** dialog box under **Paths**, you can select **All** to override the **Default Operations** settings, but only for the current imported geometry.

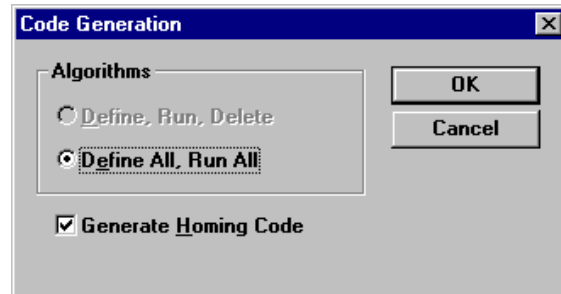
## Code Generation...

The **Code Generation** dialog box lets you specify 6000 code generation characteristics. For the 6K Series, the **Code Generation** dialog box does not provide a choice for code generation characteristics.

Code Generation for 6000 Series controllers



Code Generation for 6K Series controllers

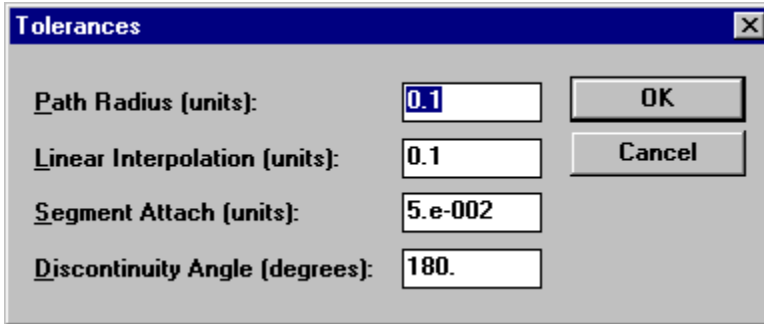


- **Algorithms** (not applicable to [Point-to-Point](#) or [Linear Interpolation](#) code):
  - **Define, Run, Delete** (6000 Series controllers only): Select this option to define, run, and delete the code for each path in sequential order throughout the selected layer of the geometry (i.e., path #1 is defined, run, and deleted before generating code for path #2). Using this method, only one path is allowed in the 6000 controller's memory at any given time. Typically, large CAD drawings will require this code generation method.
  - **Define All, Run All** (6000 and 6K Series controllers): Select this option to define all paths in the selected layer of the geometry at one time, and then run all paths. This option requires a larger portion of memory than the **Define, Run, Delete** option, since all paths reside in the controller's memory. The code for running all paths is not generated until you save all code to a \*.prg file (see **Save All Code** under the **Tools** menu).
- **Generate Homing Code**: Selecting this box will insert homing code (homes all axes) at the beginning of the \*.prg file when you save all the code related to the imported geometry (**Save**

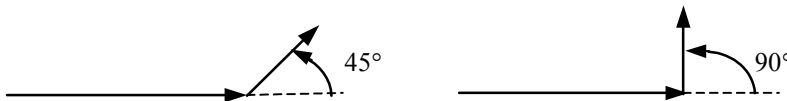
**All Code**). The *Using CompuCAM* section [below](#) illustrates an example of the homing code as viewed in Motion Architect's Editor module.

## Tolerances...

The **Tolerances** dialog box lets you specify tolerances required by CompuCAM's code generator. You can set the unit of measure for path radius, linear interpolation, and segment attach tolerances in the [Scaling](#) dialog box.



- **Path Radius tolerance (units):** Maximum allowable radius error when creating an arc. Exceeding this tolerance will cause an error when downloading the program to the 6000 Series product.
- **Linear Interpolation (units):** Also known as the *chord tolerance*, it is the maximum allowed distance between the curve and any chord of the polygonal approximation. A smaller tolerance setting will allow a smoother curve by allowing more chords per degree of arc.
- **Segment Attach (units):** Maximum allowable distance between path segment endpoints. Exceeding this tolerance will force a path break between the segments, placing the subsequent segment into a different path.
- **Discontinuity Angle (degrees):** Maximum allowable angle between two path segments (see illustration below). Exceeding this tolerance will force a path break between the segments, placing the subsequent segment into a different path. This tolerance is especially useful in stepper systems, which are prone to stalling when attempting radical direction changes.





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## Tools Menu



The **Tools** menu lets you create motion from the imported geometry. The typical order of usage for **DXF** and **HP-GL** users is listed below.

1. Run CAD (create drawing, save as DXF or HP-GL)
2. Import Geometry
3. Select DXF Layer (DXF only)
4. Edit and order Paths
5. Generate Code
6. Repeat steps 3 - 5 for each DXF layer
7. Order DXF layers (DXF only)
8. Save All Code

**G-Code** users will use only the **Import Geometry** and **Save All Code** commands.

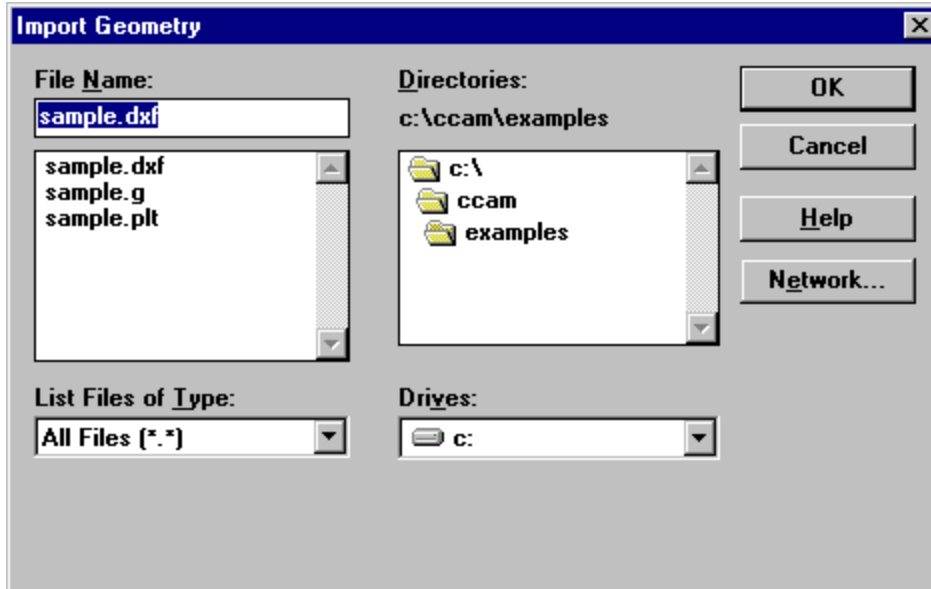
### Run CAD

The **Run CAD** command lets you run your CAD software package. When you choose the **Run CAD** command, CompuCAM will use the path and file name you specified earlier in the **CAD File Name** dialog box to find and run your CAD software package. Once a drawing has been created, it should be saved as a DXF file (\*.dxf) or an HP-GL plot file (\*.plt). Appendix A provides general tips for creating CAD drawings for use with CompuCAM.

### Import Geometry...



The **Import Geometry** command displays a dialog box that lets you import geometry (DXF, HP-GL, G-code) into CompuCAM. The geometry will appear in the geometry pane of CompuCAM.

CAD packages typically do not save geometry in the order in which they were drawn. The path of geometry is an end-to-end chain of line and/or arc segments. Segments are considered connected if the *segment attach* tolerance and the *discontinuity angle* tolerance are not violated. The segment-attach and discontinuity-angle tolerances are set in the **Tolerances** dialog box under the **Defaults** menu. You can change the path direction on a path-by-path basis in the **Edit Paths** dialog box under the **Tools** menu.

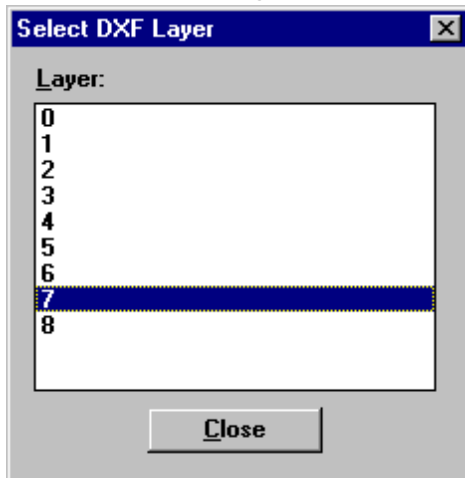


### Correlating Code and Geometry

You can correlate the generated code and the imported geometry in several ways. Correlating the code and geometry is an easy way to step through the code and verify the path order.

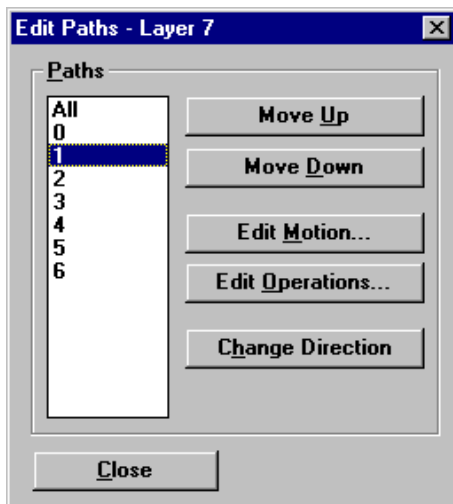
- Click the ";Run Path n" field in the code pane to highlight the associated path in the geometry pane. *The arrow superimposed on the path indicates the [Path Direction](#).*
- Click the path in the geometry pane to highlight the associated motion-related code in the code pane.
- Double-click the ";Run Path n" field in the code pane to display the **Edit Paths** dialog box.
- Double-click the path in the geometry pane to display the **Edit Paths** dialog box.
- Click  (step down) in the toolbar to highlight the next path in the geometry (or select the **Step Down** command under the **Tools** menu).
- Click  (step up) in the toolbar to highlight the previous path in the geometry (or select the **Step Up** command under the **Tools** menu).

## Select DXF Layer...



The **Select DXF Layer** dialog box lets you select a layer of an imported CAD (DXF) drawing for display in the geometry pane. You can subsequently [Generate Code](#) for each layer of the CAD drawing.

## Edit Paths...



The **Edit Paths** dialog box lets you order the paths (for code generation), define motion attributes and end-of-path operations for each path, change the [Path Direction](#), generate code, and correlate paths with the related geometry in the geometry pane.

To order paths, select the path number with the mouse or UP/DOWN ARROW keys, and then click **Move Up** or **Move Down** to reposition the path in relation to the other paths.

### Correlating Code and Geometry

Double-clicking a path either in the geometry pane or in the code pane (**;Run Path n**) will display the **Edit Paths** dialog box. Also, clicking a path in the geometry pane will highlight the related path in the **Edit Paths** dialog box (and vice-versa).

### **Path Direction**

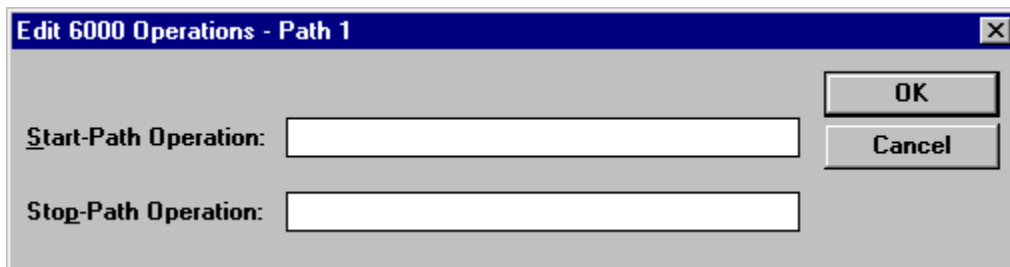
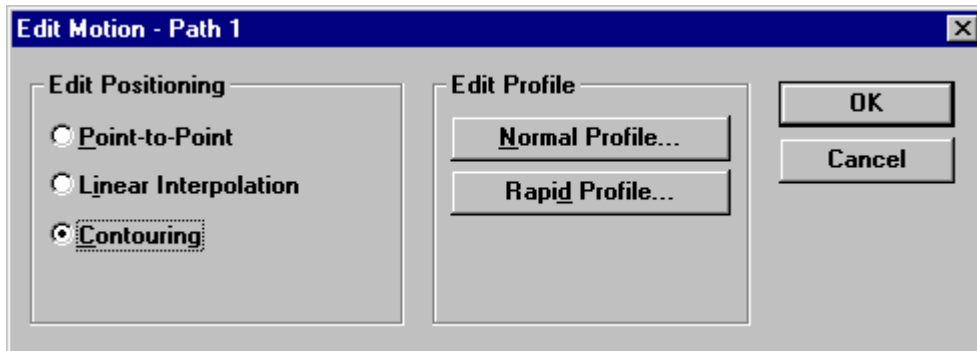
Clicking the **Change Direction** button can change the direction of each path. To view the path's direction relative to the rest of the geometry, click the path in the geometry pane, or click the associated **;Run Path n** comment in the code pane, or click the path number in the **Paths** selector in the **Edit Paths** dialog box. The arrowhead superimposed on the highlighted path in the geometry pane indicates the direction of the path.

### **Path Motion Attributes and Endpoint Operations**

Where the [Default Motion](#) and [Default Operations](#) dialog boxes let you define a default motion attribute and default end-of-path operations for all paths, the **Edit Motion** and **Edit Operations** dialog boxes let you define the attributes and operations for individual paths.

In the **Edit Motion** and **Edit Operations** dialog boxes, you can also define the attributes and operations for all paths. To do this, first select **All** in the **Edit Paths** dialog box. When you then define the motion attributes and end-of-path operations in the **Edit Motion** and **Edit Operations** dialog boxes, those changes are applied to all paths in the entire imported geometry.

**Note:** This overrides, for the current imported geometry only, the default settings as defined in the **Default Motion...** and **Default Operations...** dialog boxes.



### **Re-Generating the Code**

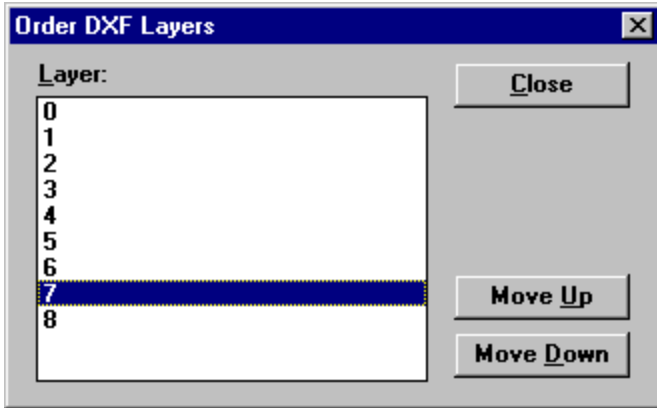
If you edit paths after having generated code, you will have to re-generate the code (**Generate Code** command) if you want to view the changes.

### **Generate Code**

Use the **Generate Code** command to generate code for the currently selected layer that is displayed in the geometry pane. The code for each path is generated according to the order specified in the **Edit Paths** dialog box. The generated code appears in code pane.

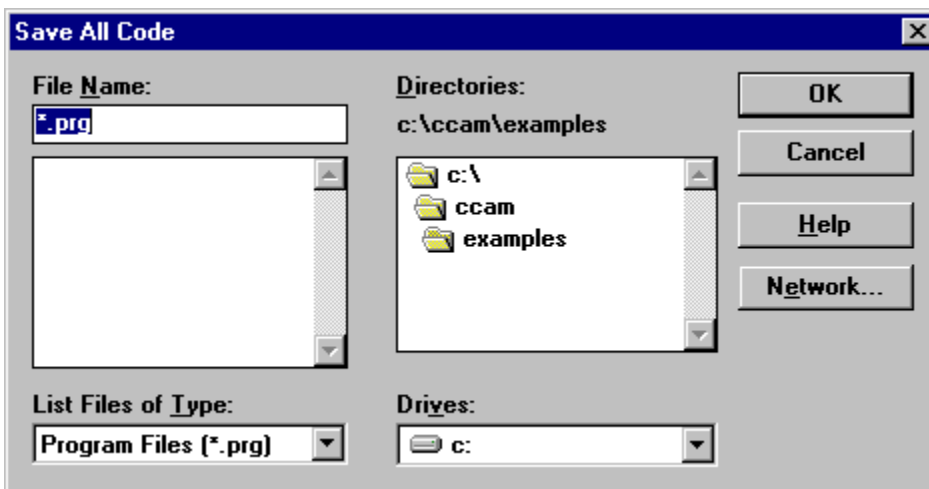
### **Order DXF Layers...**

The **Order DXF Layers** dialog box lets you sequentially order the layers of an imported CAD drawing. You can order the layers at any time after you **Import Geometry** and before you **Save All Code**. CompuCAM's code generator will obey this ordering when you save all code with the **Save All Code** command.



## Save All Code...

The **Save All Code** dialog box lets you save all the code generated in the current CompuCAM session to a program (.prg) file. For **DXF** users, the code for all layers is saved at one time. The order in which the code is saved is determined by the order established in the **Order DXF Layers** and **Edit Paths** dialog boxes.



In addition to the geometry code, the program file contains all the set-up and homing code associated with the parameters established under the **Defaults** menu.

After the program file is created, you can further edit it in Motion Architect or Motion Planner using the Program Editor. And once you download the program to your controller, you can execute the generated code using the Terminal Emulator.



For more information about the Program Editor, Terminal Emulator, or downloading programs,

refer to the Motion Architect or Motion Planner on-line help or printed guides.

## WARNING! WARNING!

Downloading the program file will cause motion. Before downloading the program file to the 6000 or 6K Series controller, make the necessary precautions to ensure the safe operation of the equipment. Failure to do so can result in damage to equipment and/or serious injury to personnel.

### Step Down and Step Up

- Select the **Step Down** command to highlight the next path in the geometry (for example, step from path #4 to path #5). You can also click  (step down) in the toolbar.
- Select the **Step Up** command to highlight the previous path in the geometry (for example, step from path #4 to path #3). You can also click  (step up) in the toolbar.

---

### View Menu



The **View** menu provides various options for viewing the imported geometry.

### Zoom In

The **Zoom In** command doubles the size of the geometry view.

### Zoom Out

The **Zoom Out** command reduces the current geometry view to half-size.

### Initial Size

The **Initial Size** command restores the geometry view to its original viewing size at the time it was imported.

## Show All

The **Show All** command resizes the current geometry view so that it fits entirely inside the geometry pane. The aspect ratio of the geometry is maintained.

## Toolbar

The **Toolbar** command lets you show or hide the toolbar. The toolbar button functions are as follows:



Same function as the **New** command under the **File** menu.



Same function as the **Open...** command under the **File** menu.



Same function as the **Save** command under the **File** menu.



Same function as the **Step Down** command under the **Tools** menu.



Same function as the **Step Up** command under the **Tools** menu.



Same function as the **About CompuCAM** command under the **Help** menu.



Point-and-click **Help**. Select this button and click an item in the CompuCAM window to find out more about how to use that item.

## Status Bar

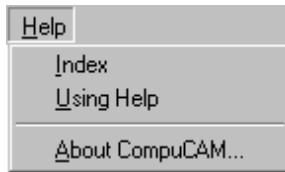
The **Status Bar** command lets you show or hide the status bar.

## Split

The **Split** command lets you move the split bar with the LEFT or RIGHT ARROW keys (you can also drag the split bar using the mouse). For coarse adjustments, just press the LEFT or RIGHT ARROW keys. For fine adjustments, hold down the CTRL key while pressing the LEFT or RIGHT ARROW keys.

---

## Help Menu



The commands in the **Help** menu let you access the on-line help system, as well as verify the version number and registration information of the program.

## Index

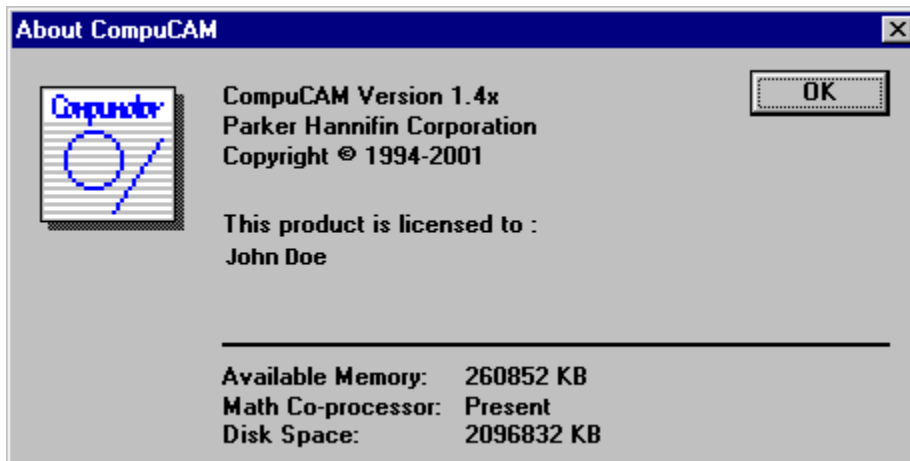
The **Index** command displays a list of Help topics.

## Using Help

The **Using Help** command displays instructions on how to use help.

## About CompuCAM...

The **About CompuCAM** command displays a dialog box showing the program version number, serial number, copyright notice, and the CompuCAM icon.





# Using CompuCAM

The following is a quick-start guide on how to use CompuCAM with the installed sample files.

## Step 1: Import Geometry

Import a sample geometry file into CompuCAM—On the **Tools** menu, click **Import Geometry**.

You can then select one of the following sample files to import:

- SAMPLE.DXF
- SAMPLE.PLT
- SAMPLE.G

## Step 2: Generate Code (DXF and HP-GL only)

On the **Tools** menu, click **Generate Code**. The generated code appears in the code pane.

## Step 3: Save All Code

On the **Tools** menu, click **Save All Code**. This saves your generated code to a program (.prg) file.

After creating the program file, you can edit it in Motion Architect's Program Editor (**E**ditor) module. One parameter you should edit is the PSET command value to establish the proper home location for your application (see illustration below).

The illustration below shows an example of the program file as viewed in the **E**ditor module.

```

6250 Editor - [LOGO.PRG]
File Edit View Window Help
:Filename - LOGO.PRG
:Created On - 8-01AM Tuesday, May 7, 2001
:Created By- CompuCAM, Copyright 1994-2001 Parker Hannifin Corp.

:Setup
:X = Axis 1, Y=Axis 2
SCLA 125000, 125000,,
SCLV 125000, 125000,,
SCLD 125000, 125000,,
PSCLA 125000
PSCLV 125000
PSCLD 125000
SCALE 1
MC 00xx
MA 11xx
HOMA 20.0000, 20.0000,,
HOMAD 20.0000, 20.0000,,
HOMV 2.0000, 2.0000,,
HOM 11XX
:Minimum X = -3.2170, Maximum X = 3.2130
:Minimum Y = -1.2010, Maximum Y = 1.3550
PSET -3.2170, -1.2010,,

```

PSET command establishes home location

In Motion Architect or Motion Planner, download the program file to the controller, and then use Terminal Editor to execute the generated code.

For more information about the Terminal Emulator, or downloading programs, refer to the Motion Architect or Motion Planner on-line help or printed guides.

## WARNING! WARNING!

Downloading the program file will cause motion. Before downloading the program file to the 6000 or 6K Series controller, make the necessary precautions to ensure the safe operation of the equipment. Failure to do so can result in damage to equipment and/or serious injury to personnel.

# Appendix A: DXF & HP-GL Import Filters

---

## DXF Import Filter

The DXF import filter accepts the following geometric entities:

- Arcs
- Circles
- Lines
- Polylines (for representing complex geometry such as ellipses, splines, & Bezier curves)
- Solids
- Traces

The DXF filter will only import curve geometry and does not handle points, text, and blocks.

---

## HP-GL Import Filter

The HP-GL import filter accepts the following subset of HP-GL:

<b>AA</b>	Arc Absolute
<b>AR</b>	Arc Relative
<b>CI</b>	Circle
<b>IP</b>	Input P1 and P2
<b>PA</b>	Plot Absolute
<b>PD</b>	Pen Down
<b>PR</b>	Plot Relative
<b>PU</b>	Pen Up
<b>SC</b>	Scale

The HP-GL import filter does not handle any of the instructions from the *polygon* group, the *line and fill attributes* group, the *character* group, nor any of the advanced extensions.

---

## Tips for CAD Development

Use the following general guidelines when creating CAD files for use with CompuCAM.

- Use the CAD program's **Attach** tool to precisely connect line and arc segments.
- Use the CAD program's **Ungroup** tool to break apart grouped geometry.
- Delete unneeded layers.

---

## Homing Location

Most applications require a homing location that is removed from the geometry area. To ensure a proper homing location, you should edit the PSET command value in the final program file. After completing the CompuCAM session, select the Save All Code—CompuCAM then creates the program (.prg) file. To edit the program file, refer to Step 3 in the chapter above entitled *Using CompuCAM*.

# Appendix B: G-Code Import Filter

The G-Code import filter accepts the following subset of EIA RS-274-D G-Codes:

<b>F Codes:</b>	Feedrate
<b>G Codes:</b>	G00 Rapid traverse positioning mode (Default)
	G01 Linear interpolation mode
	G02 Clockwise contouring mode
	G03 Counterclockwise contouring mode
	G04 Time Delay
	G28 Move to home switch input
	G61 Turn off continuous path motion
	G64 Turn on continuous path motion (Default)
	G79 Execute a subroutine before each subsequent move
	G80 Cancel G79 mode (Default)
	G90 Absolute positioning mode (Default)
	G91 Incremental positioning mode
	G92 Set current position
<b>H Codes:</b>	Allow you to add an offset to each axis (user customizable)
<b>I Codes:</b>	First axis incremental distance to center point
<b>J Codes:</b>	Second axis incremental distance to center point
<b>L Codes:</b>	Number of repeats for a subroutine call
<b>M Codes:</b>	M01 End of program
	M06 Same as M01
	M98 Execute a gosub
	M99 Return from a subroutine
	<b>NOTE:</b> M02 - M05 and M07 - M97 are user customizable
<b>N Codes:</b>	Optional line number
<b>O Codes:</b>	Begin definition of a subroutine
<b>P Codes:</b>	Time delay or subroutine definition number
<b>R Codes:</b>	Radius of an arc
<b>X Codes:</b>	Commands a move on the X-axis
<b>Y Codes:</b>	Commands a move on the Y-axis
<b>Z Codes:</b>	Commands a move on the Z-axis
<b>" " Codes:</b>	All characters between quotes are sent directly to 6000 product
<b>( ) Codes:</b>	All characters between parentheses are ignored

The G-Code filter will import geometry from NC programs that do interpolated motion, as well as XY motion, with an unrelated Z motion. The XYZ interpolated motion includes linear XYZ motion and arcs in the XY plane. It does not include arcs in the XZ or YZ planes.

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