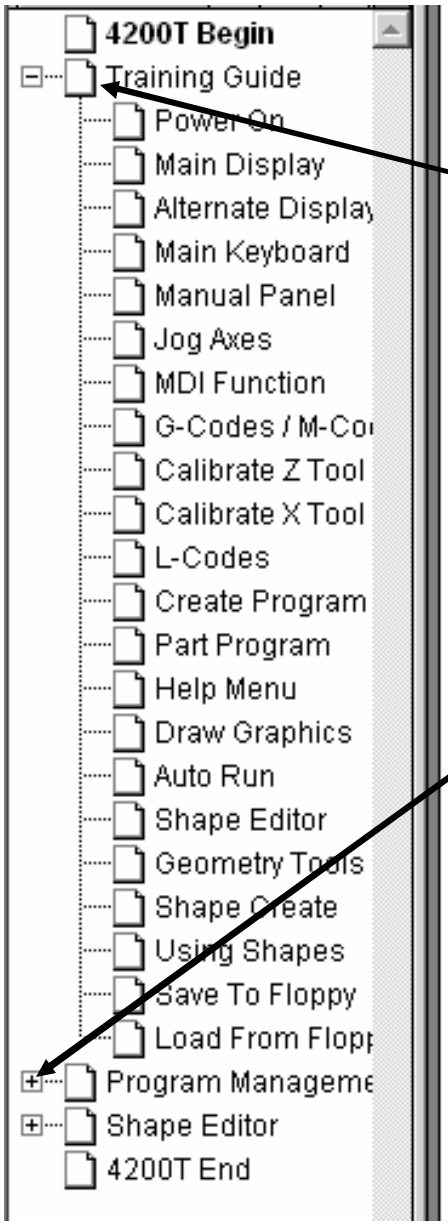
ANILAM

4200T CNC Control
Training Guide

Navigation Instructions

Bookmarks



Follow bookmarks at the left side of the page to navigate to desired topic

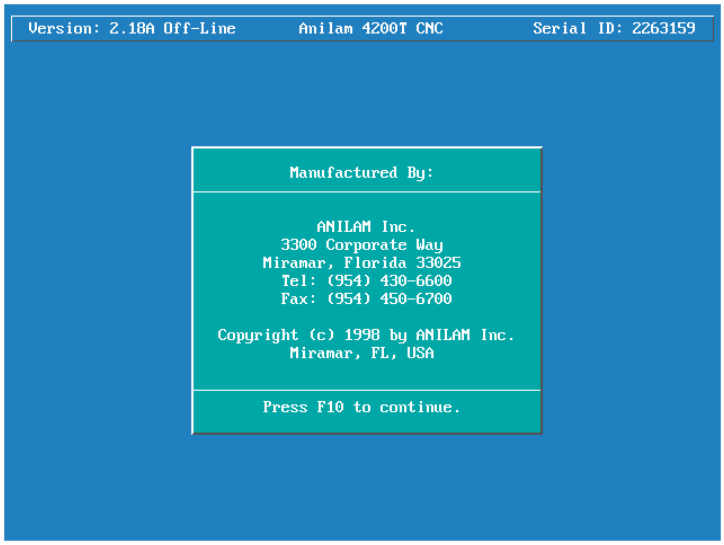
Click plus and minus symbols to expand and compress menu display

4200T CNC Control

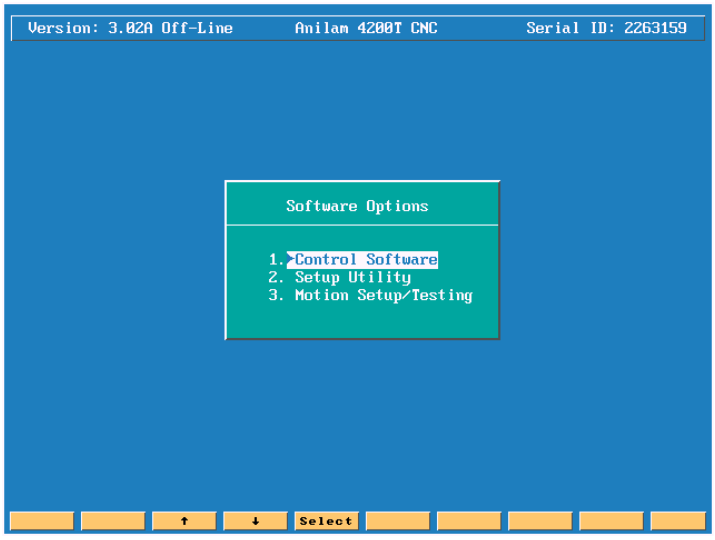
Training Guide

Turning the Control ON

After the control has been turned ON press F10 **F10** to continue.



Then press ENTER  to select CNC mode.



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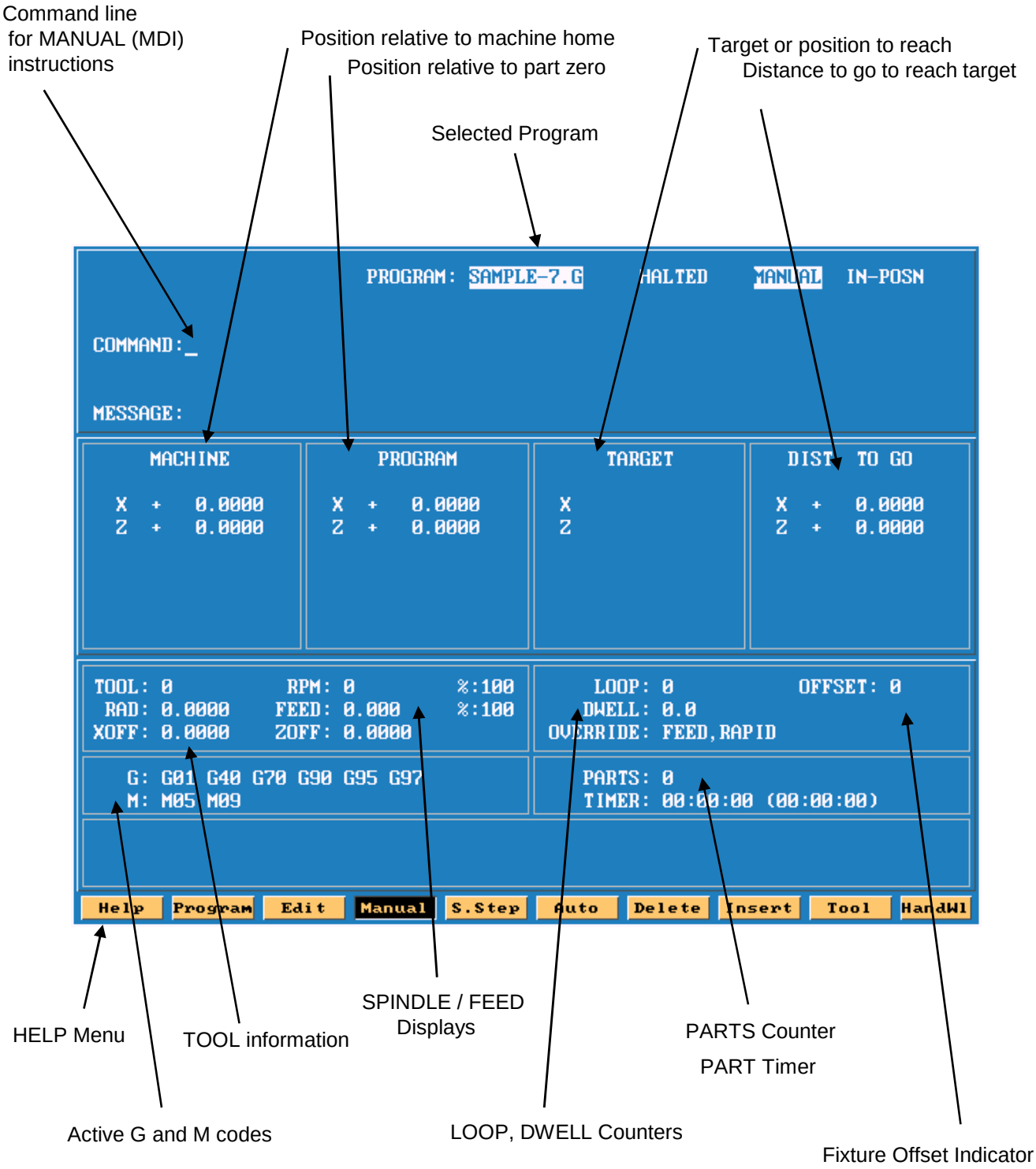
Main Areas of the Display

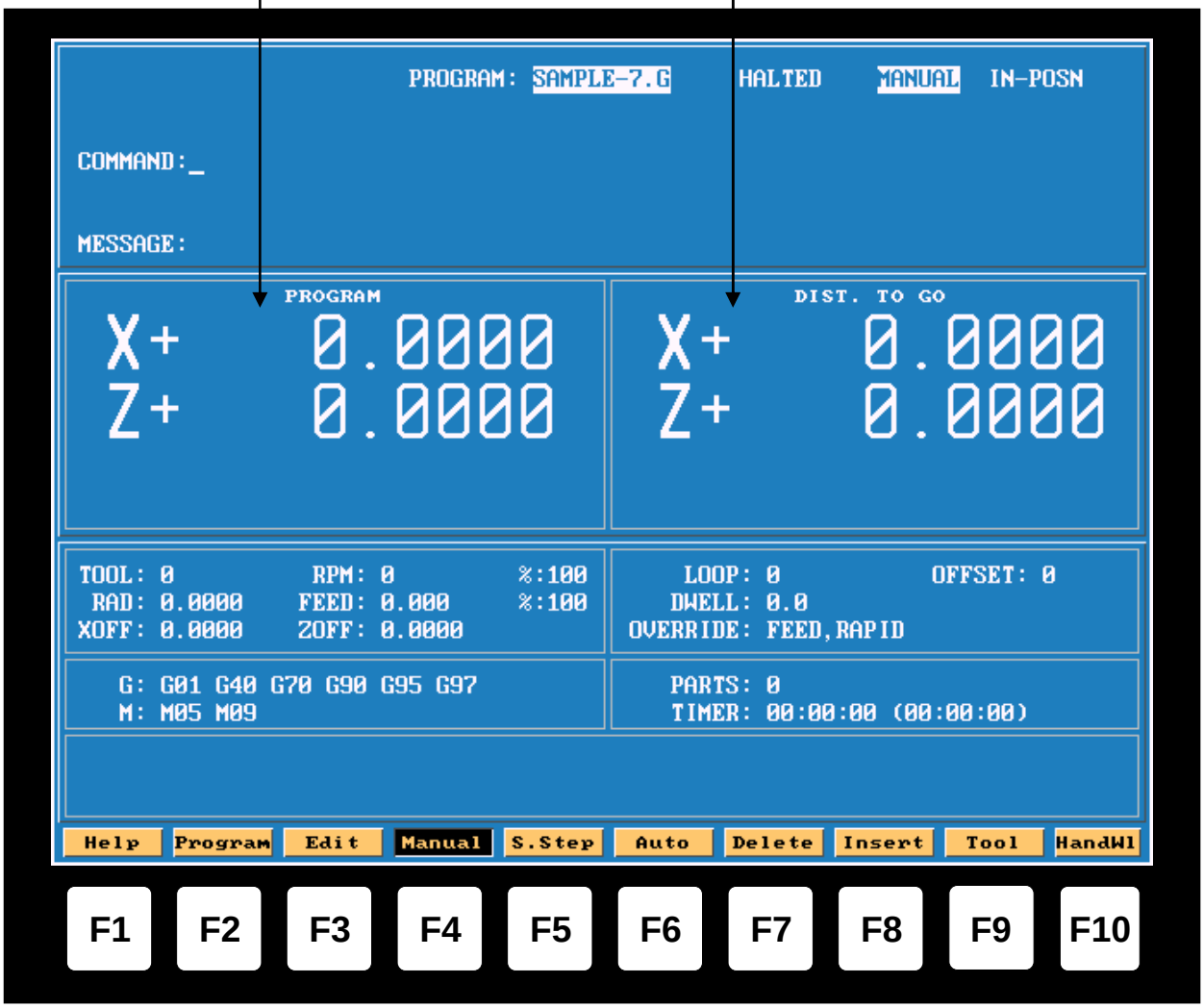


Alternative Display - Function Keys

The Large Position Displays can be toggled by pressing B and  when in the MANUAL Mode.
When in AUTO or SINGLE STEP Modes press B only.

Position relative to Part Zero

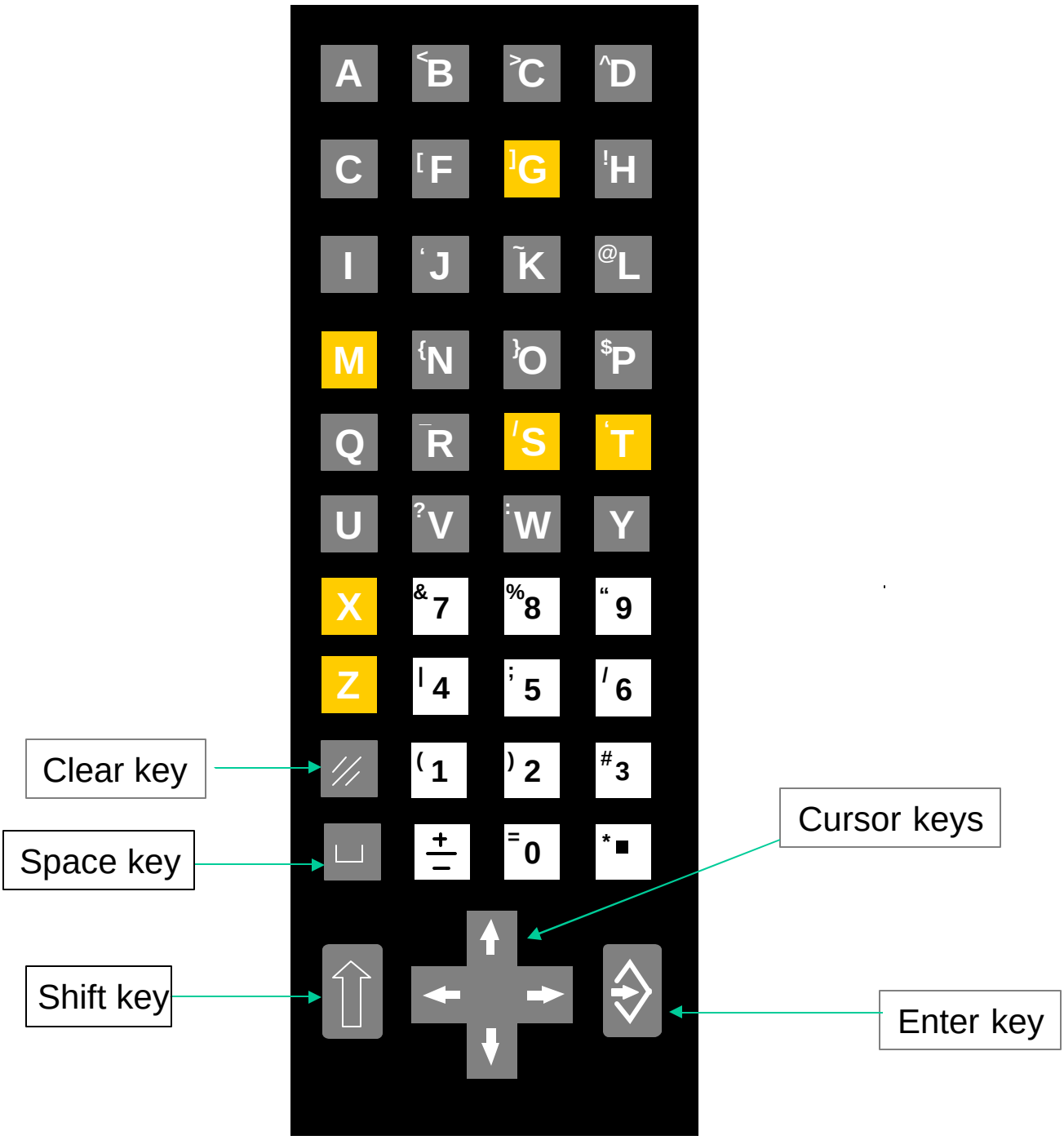
Distance to go to reach Target



The Function (or F keys) activate the Mode shown directly above on the Display screen.
The meaning of F keys change, depending upon what Mode of operation is selected.
Example: With the AUTO Mode selected the F keys have the following meanings, shown below

Alfa - Numeric key board

Note :- Most used key are yellow . Most key also double functions , the shift key is use to use secondary functions.



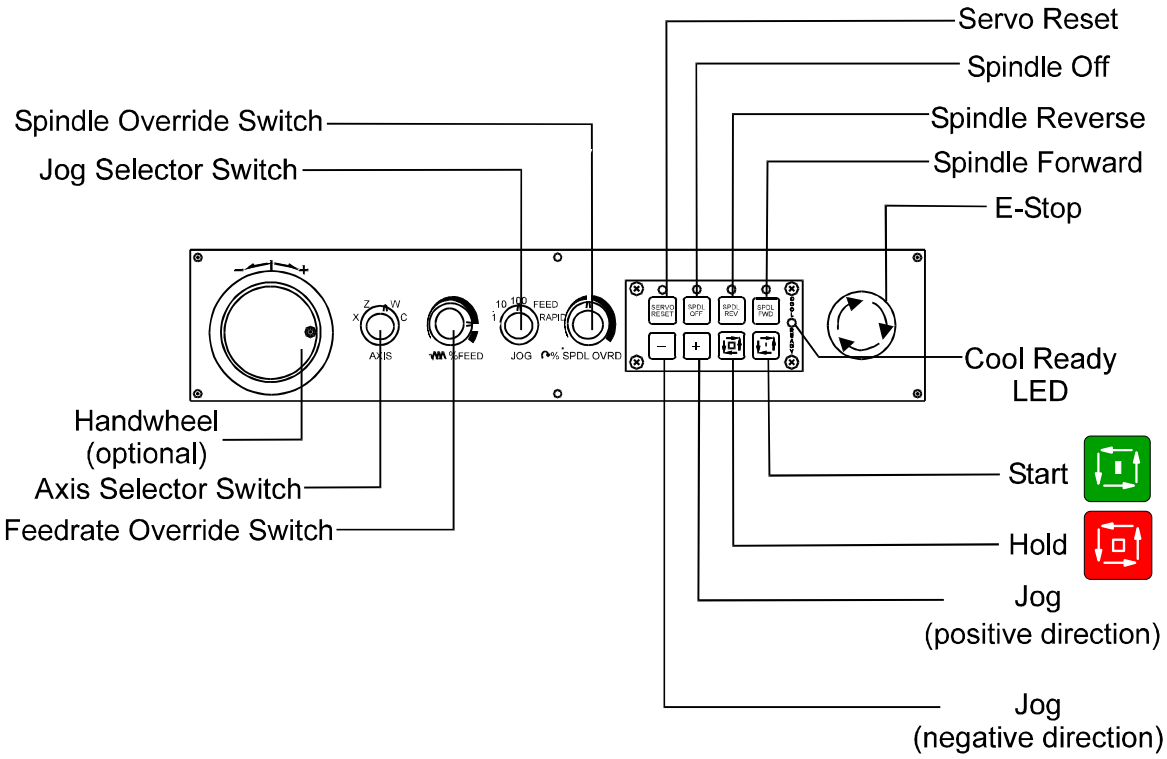
MANUAL MOVES

In **MANUAL** mode moves can be made in 3 different ways

MOVING WITH HANDWHEELS

1) Activate the handwheel(s) by pressing **HandWl**

2) Turn the jog mode selector switch on the **MANUAL PANEL** to **100, 10** or **1** to select the feedrate required (100=fast, 10=medium, 1=slow)



MOVING WITH JOG MOVEMENTS

MANPAN

1) Turn the jog mode selector switch on the **MANUAL PANEL** to **100, 10, 1, FEED or RAPID**

2) Select the axis to move with the **AXIS SELECTOR** switch at the **MANUAL PANEL**

3) Press the [–] or the [+] key to move in the desired direction.

MOVING WITH COMMANDS

Type commands as needed and press the START button  located on the MANUAL PANEL

EXAMPLE:

Type: **G0 G90 Z10** and press Start  Z axis goes to Z10 in ABS and RAPID

EXAMPLE:

Type **G97 S1000 M3** and press START  to start the spindle at a fixed 1000 rpm.

MOST COMMON COMMANDS TO REMEMBER:

G1 Fxxx: Feed Rate in Inch per minute / Inch per rev. (mm/min or mm/revolutions)

G0: Rapid

G90: Absolute co-ordinate system

G91: Incremental co-ordinate system

G94: Feed Rate in Inch per minute (mm per minute)

G95: Feed Rate in Inch per revolution (mm per revolution

G96 Sxxx: Constant surface speed in Feet / Miinute (Meters / Minute)

G97 Sxxxx Spindle Speed in direct RPM

M41 or M42 or M43 or M44 Spindle speed gear selection

M3: Spindle forward

M4: Spindle reverse

M5: Spindle Stop

M8: Coolant ON

M9: Coolant OFF

CALIBRATING TOOLS

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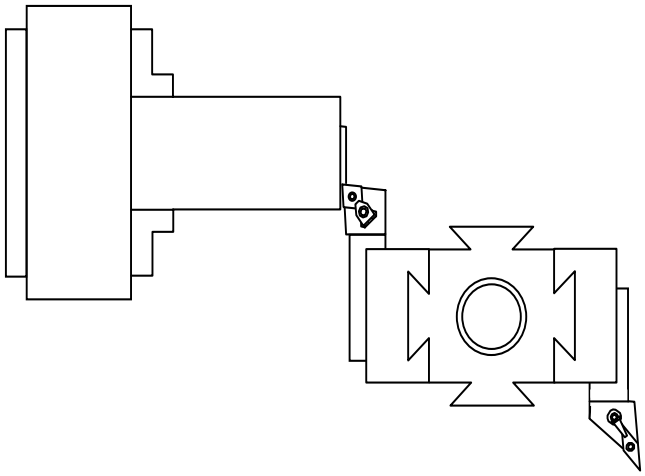
Calibrating The Z Axis

F9

TOOL

1) Access the Tool table by pressing F9 TOOL in manual mode
2) Move the Tool to the face of the part (using either the Handwheels or Jog keys) and make a skim cut



MACHINE			PROGRAM		
X	+	0.0000	X	+	0.0000
Z	+	0.0000	Z	+	0.0000

TOOL: 0 OFFSET: 0
RPM: 0 %: 100
FEED: 0.000 %: 100

G: G01 G40 G70 G90 G95 G97
M: M05 M09

No.	Radius	X Offset	Z Offset	X Wear	Z Wear	L-Code
1	0.0320	-10.2500	-24.5000	0.0000	0.0000	3
2	0.0000	0.0000	0.0000	0.0000	0.0000	0
3	0.0000	0.0000	0.0000	0.0000	0.0000	0
4	0.0000	0.0000	0.0000	0.0000	0.0000	0
5	0.0000	0.0000	0.0000	0.0000	0.0000	0
6	0.0000	0.0000	0.0000	0.0000	0.0000	0
7	0.0000	0.0000	0.0000	0.0000	0.0000	0
8	0.0000	0.0000	0.0000	0.0000	0.0000	0
9	0.0000	0.0000	0.0000	0.0000	0.0000	0
10	0.0000	0.0000	0.0000	0.0000	0.0000	0
11	0.0000	0.0000	0.0000	0.0000	0.0000	0
12	0.0000	0.0000	0.0000	0.0000	0.0000	0
13	0.0000	0.0000	0.0000	0.0000	0.0000	0
14	0.0000	0.0000	0.0000	0.0000	0.0000	0
15	0.0000	0.0000	0.0000	0.0000	0.0000	0

Enter tool location code [0-8]

Offsets | L-Code | ClrLine | Find | PgUp | PgDn | Calib X | Calib Z | | Exit

3) Without moving the Tool in the Z axis, Press F8 Calib Z

Calib Z

CALIBRATING TOOLS

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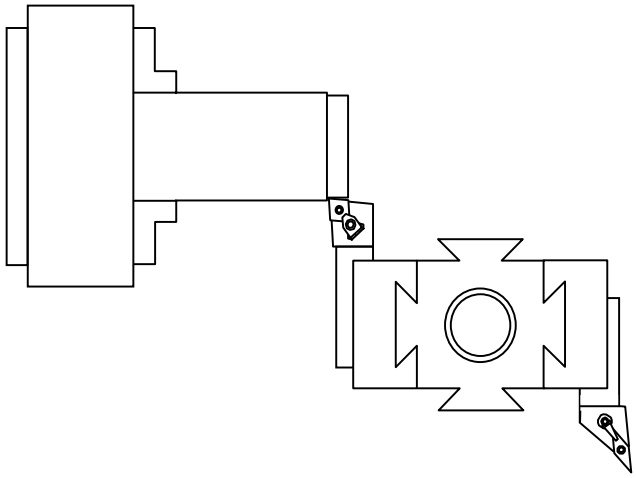
Calibrating The X Axis

F9

1) Access the Tool table by pressing F9 TOOL in manual mode **TOOL**
2) Move the Tool to the diameter of the part (using either Handwheels or Jog keys) and make a skim cut



MACHINE		PROGRAM		TOOL: 0	OFFSET: 0
X +	0.0000	X +	0.0000	RPM: 0	%: 100
Z +	0.0000	Z +	0.0000	FEED: 0.000	%: 100

G: G01 G40 G70 G90 G95 G97
M: M05 M09

No.	Radius	X Offset	Z Offset	X Wear	Z Wear	L-Code
1	0.0320	-10.2500	-24.5000	0.0000	0.0000	3
2	0.0000	0.0000	0.0000	0.0000	0.0000	0
3	0.0000	0.0000	0.0000	0.0000	0.0000	0
4	0.0000	0.0000	0.0000	0.0000	0.0000	0
5	0.0000	0.0000	0.0000	0.0000	0.0000	0
6	0.0000	0.0000	0.0000	0.0000	0.0000	0
7	0.0000	0.0000	0.0000	0.0000	0.0000	0
8	0.0000	0.0000	0.0000	0.0000	0.0000	0
9	0.0000	0.0000	0.0000	0.0000	0.0000	0
10	0.0000	0.0000	0.0000	0.0000	0.0000	0
11	0.0000	0.0000	0.0000	0.0000	0.0000	0
12	0.0000	0.0000	0.0000	0.0000	0.0000	0
13	0.0000	0.0000	0.0000	0.0000	0.0000	0
14	0.0000	0.0000	0.0000	0.0000	0.0000	0
15	0.0000	0.0000	0.0000	0.0000	0.0000	0

Enter tool location code [0-8]

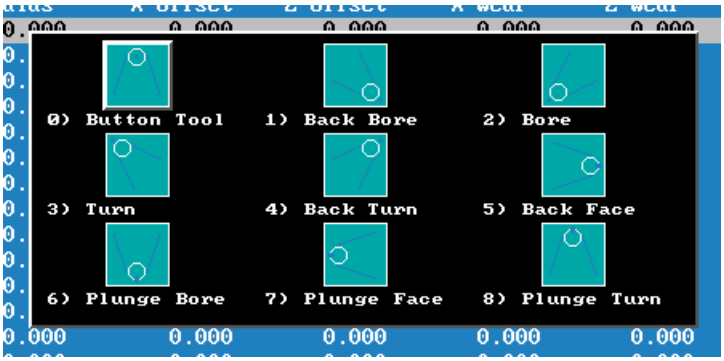
Offsets | L-Code | ClrLine | Find | PgUp | PgDn | Calib X | Calib Z | | Exit

3) Without moving the Tool in the X axis, Press F7 Calib X **Calib X**
4) Measure and enter the diameter of the part and Press Enter……..

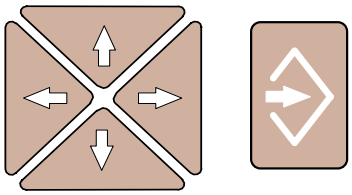
CALIBRATING TOOLS

4) Enter the remaining information, move the cursor to RADIUS and enter the value of the tool nose radius

5) To enter the Location code of the tool, Press: **L-CODE** **F2**



Use the arrow Keys to select the the type of tool to be used and press Enter



Repeat the procedure for additional tools without leaving the tool page .

Press **EXIT** **F10** when finished.

To use the Tool, mount it on the Tool Post and activate the Tool call command:

Example:

Type: **T 1**  to activate TOOL 1 settings.

CREATING A PROGRAM

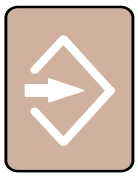
A program must be created, then Selected and finally edited

PROGRAM **CREATE**

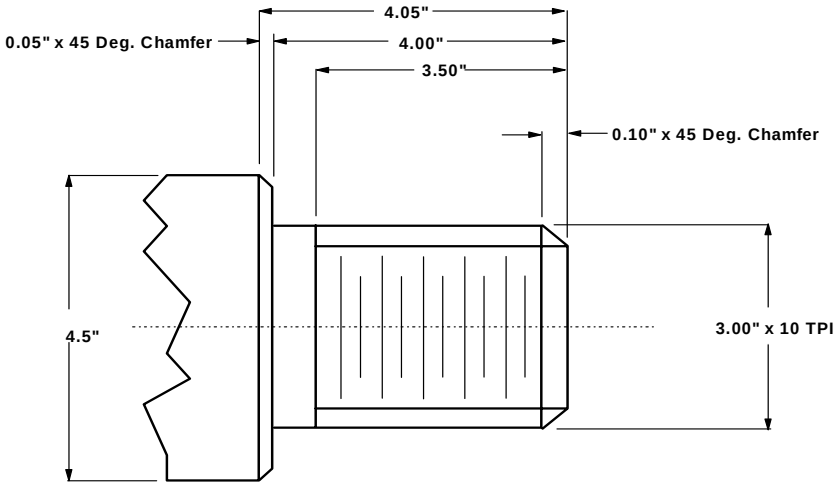
F2 **F2**

Type the program name (Maximum 8 letters/numbers)

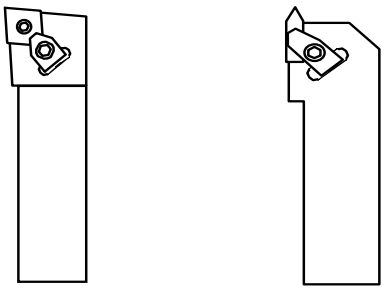
Press Enter to enter the program in the directory



Then press **EDIT** **F4**



TOOLS REQUIRED
OPERATION No.1



TOOL No.1
ROUGH TURN

TOOL No.2
O.D. THREAD

PART PROGRAM

```
G70 G90 G0 X0 Z0 T0       *INCH, ABSOLUTE, RAPID X Z, TOOL 0
M43                       *HIGH SPINDLE RANGE
G24 S1600                 *RPM LIMIT WITH CONSTANT SURFACE SPEED
T1                        *CALL TOOL NO.1 (ROUGH/FINISH FACE/TURN TOOL)
G96 S400                  *400 SURFACE FEET PER MINUTE
X4.7 Z0 M3                *RAPID POSITION TO FACE OFF, SPINDLE FORWARD
M8                        *COOLANT ON
G1 X-.065 G95 F.007       *FACE OFF AT 0.007" INCH PER REV.
G0 X4.5 Z.1               *RAPID POSITION FOR AREA CLEAR. CYCLE
G73 W10 A.1 R.02 S.005 C1 B1 J.015 K.008 *AREA CLEAR. CYCLE
G0 X0 Z0 T0 M9            *RAPID TO TOOL CHANGE POSITION, COOLANT OFF
M5                        *SPINDLE STOP
T2                        *CALL TOOL NO.2 (THREADING TOOL)
M42                       *MID SPINDLE RANGE
G97 S500                  *500 RPM
X3.2 Z.5 M3 G95 F.04      *RAPID POSN FOR THD CYCLE, SET FEED 0.04" PER REV
M8                        *COOLANT ON
G83 E10 Z-4 C-0.015 S2 R-0.1 *THREADING CANNED CYCLE
G0 X0 Z0 T0 M9            *RAPID TO TOOL CHANGE POSITION, COOLANT OFF
M5                        *SPINDLE OFF
M2                        *END OF MAIN PROGRAM

O10                       *SUB-PROGRAM NO.10 (OD PROFILE)
G0 X2.6 Z.1               *START POSITION OF FINISH PROFILE
G1 X3 Z-.1                *CHAMFER 3" DIAMETER
Z-4                       *TURN 3" DIAMETER
X4.4                      *FACE OUT TO 4.4" DIA.
X4.5 Z-4.05               *CHAMFER 4.5" DIAMETER
M99                       *END OF SUB-PROGRAM
```

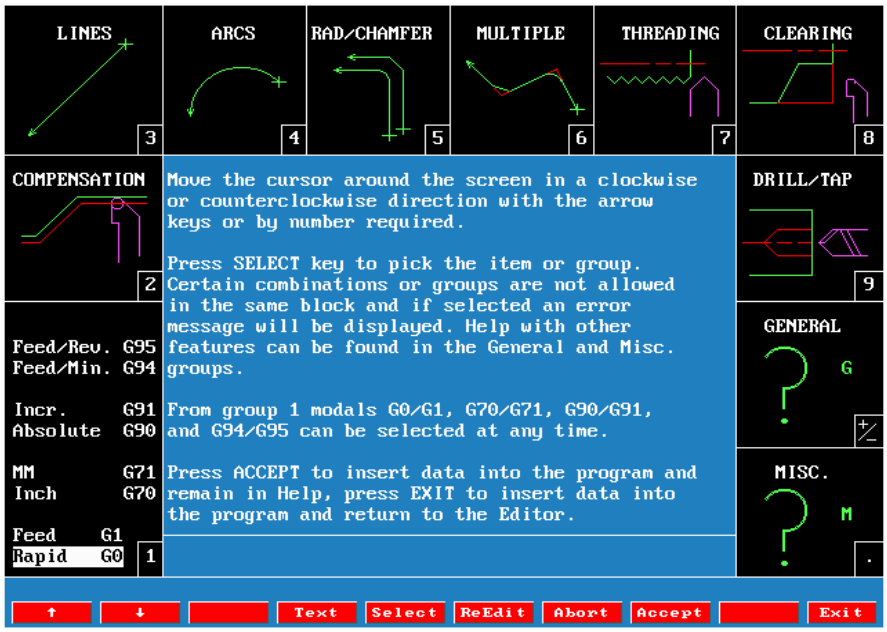
The program can be typed directly in the editor or through the interactive HELP menu.

Use help when in doubt about what function to use or the meaning of it's parameters.

To use HELP press : **HELP** **F1**

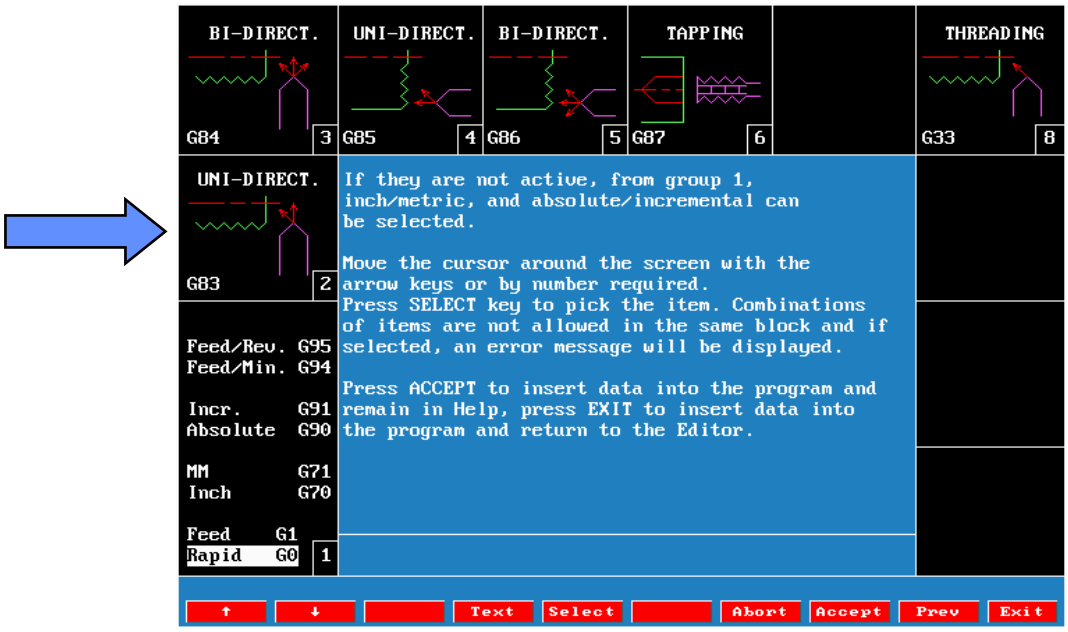
Example: Use HELP for the threading cycle in the program

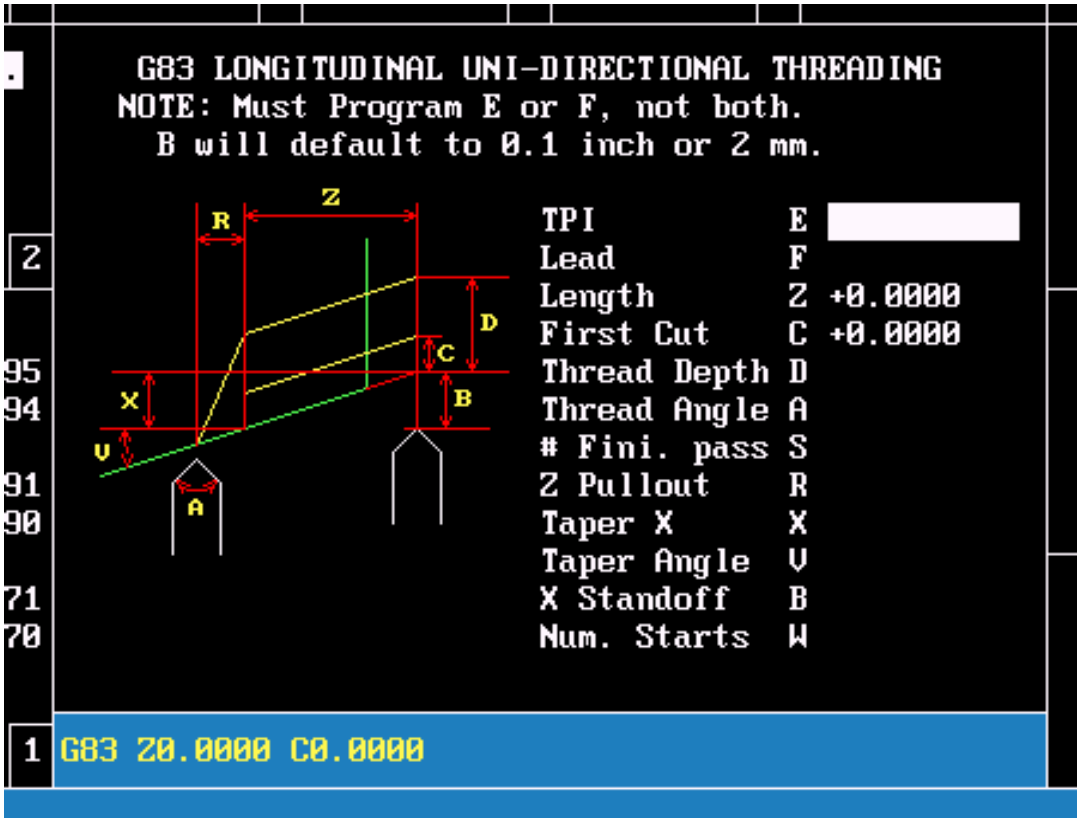
Select Threading by pressing the key 



Followed by 

for the Uni directional threading cycle G83





Please note

1) All dimensions are relative to the current position of the tool. The tool MUST be programmed in the correct position before using this function, in particular, it must be 0.1” (2mm) clear of the diameter to be machined (add 0.2” (4mm) to the diameter to be machined).

2) All distances are **INCREMENTAL**. Negative signs must be used in case of an OD thread.

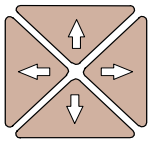
3) Programming **(TPI) or (LEAD), LENGTH, FIRST CUT** is mandatory. The rest of the data is optional. Thread depth is calculated by the control.

4) When all the necessary data has been given press **F10 EXIT** to save the line and leave **HELP**. Or press **F8 ACCEPT** to save the line and remain in the **HELP** mode

DRAW GRAPHICS

Draw graphics shows a graphical representation of all programmed moves.

1) To DRAW a program the control must be in the **Program** page.



2) Hi-lite the program name to be drawn using the arrow keys……

3) Press **Draw** to access the Draw screen

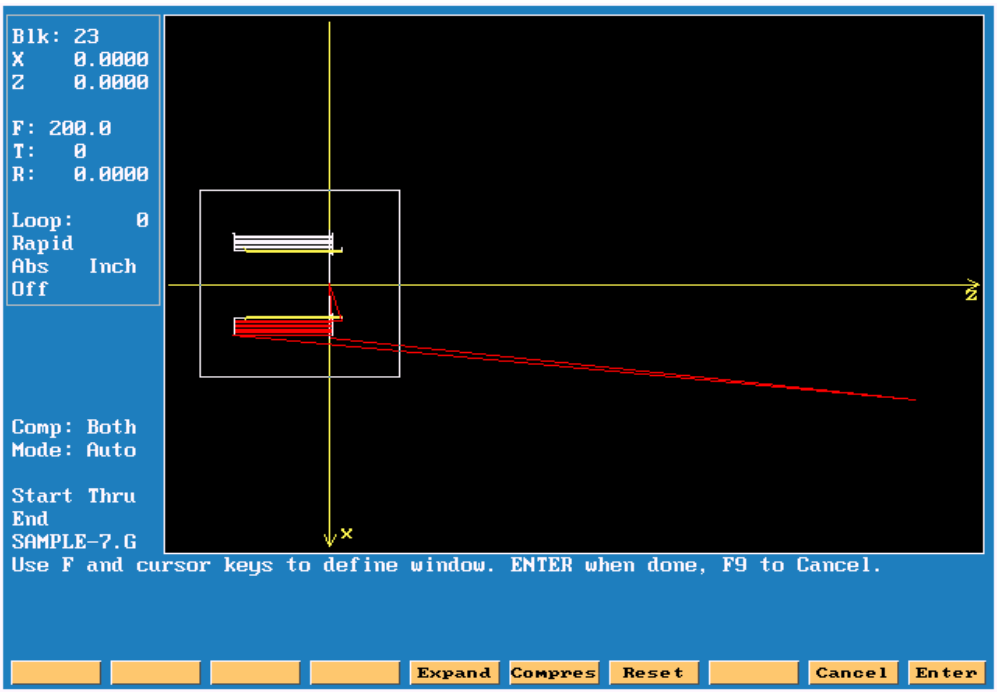
4) Press **Run** to Draw the program

5) To resize or arrange the drawn program press **Display** and select FIT or WINDOW or HALF etc. from the menu using the arrow keys.

EXAMPLE: Hi-LIte WINDOW, press ENTER. Use the arrow keys to move the zoom box to the required location. Use the **Expand** or **Compres** keys to increase or decrease the size of the box (the graphics will draw the content of the box).

Press **Enter** to redraw the content of the box.

To Exit the Draw mode press **Exit**

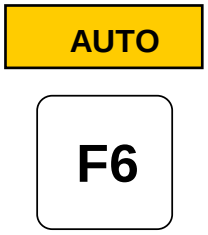


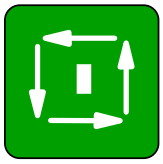
TO RUN PART

After ensuring the program graphics correspond to the desired tool path:

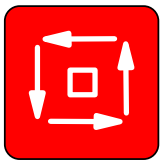
- Exit the Editor
- verify the program is SELECTED
- then leave the program page returning into MANUAL mode
- Ensure the SERVOS are turned ON.
- As a precaution turn the FEED OVERRIDE button to 0%

Then Press:





Allow the machine to move by turning the FEED OVERRIDE gradually clockwise until the tool speed is satisfactory. Do not hesitate to turn it back to 0% to stop it again.

Or press  to stop the movement of the machine

DISCLAIMER

Anilam accepts no responsibility for accident, injury, loss or damage to equipment arising from use or misuse of this presentation.

Anilam's policy of continued development means that product operatio, features and capabilities may alter without notice.

REMEMBER MACHINE TOOLS CAN BE DANGEROUS !!!
IF IN DOUBT ASK !!!

THE SHAPE EDITOR :

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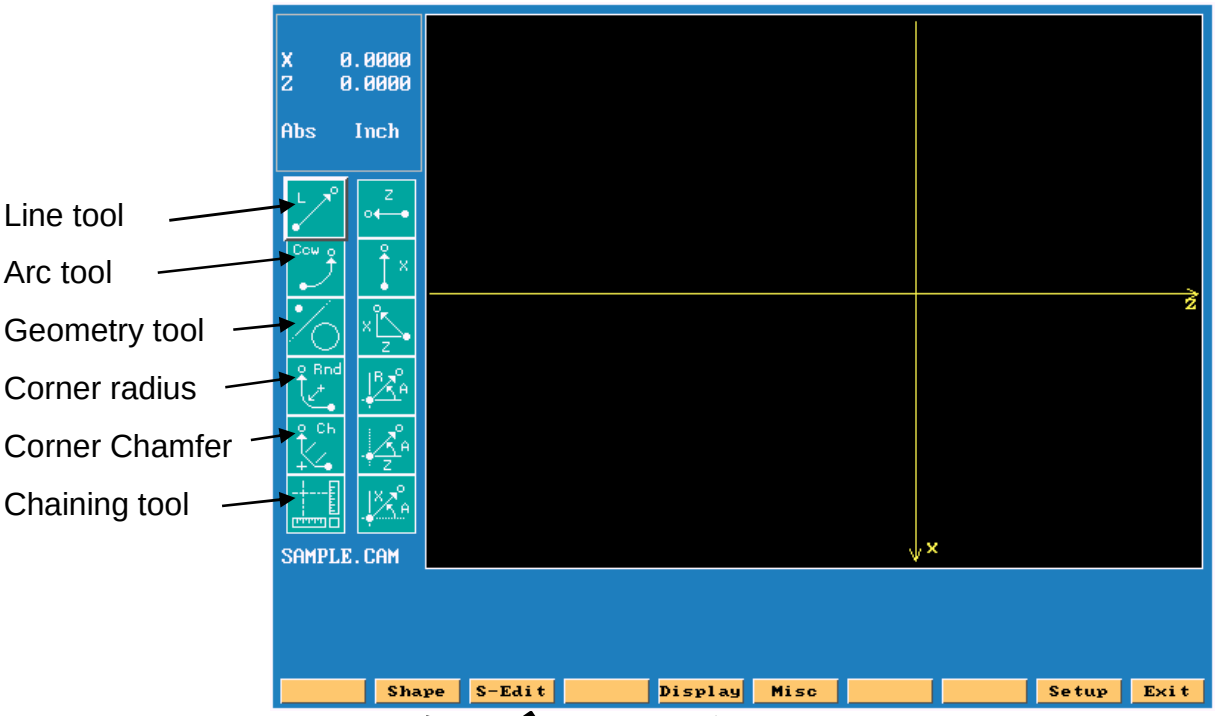
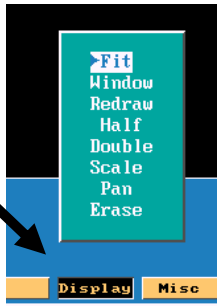
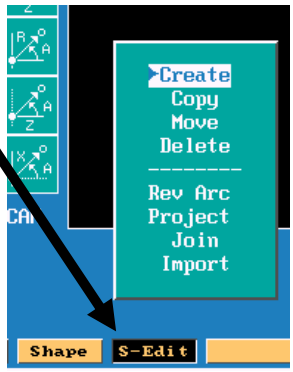
- The shape editor will create subprograms that can be used in the main program:
- A main program must be created before using the shape editor.
- Hi-Lite the created program prior to entering the shape editor.
- Geometry can be used to assist in the creation of the a shape.



Used to size the display



Once a Shape has been created, Back / Forw allows moving the shape cursor to places where it needs to be modified



Allows the creation of a shape Press ENTER to define a starting point. Also allows to reverse an ARC

Shape Editing Tools

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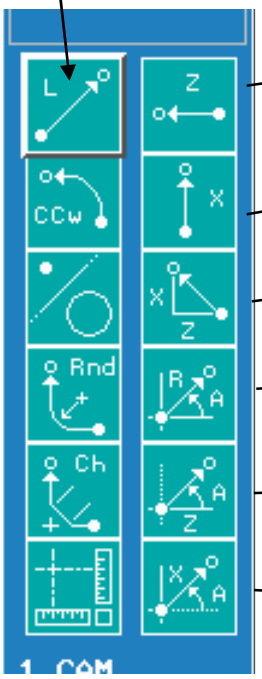
Line tool is selected



Z Move (M to toggle INC or ABS move)

X Move (M to toggle INC or ABS move)

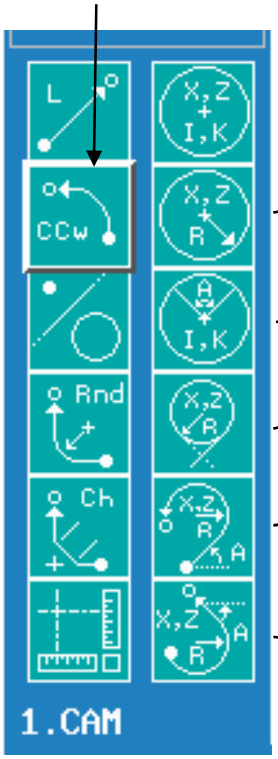
X & Z Move combined (M to toggle INC or ABS move)

Move a distance R (radius) and angle A. (INC movement)

Move to Z position at an angle

Move to Z position at an angle

Arc tool is selected Press ENTER to change ARC direction before selecting an ICON



Arc defined by an endpoint and a centre

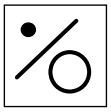
Arc defined by an end point and a radius

Arc defined by a centre and an angle

Arc tangent to a line at a radius

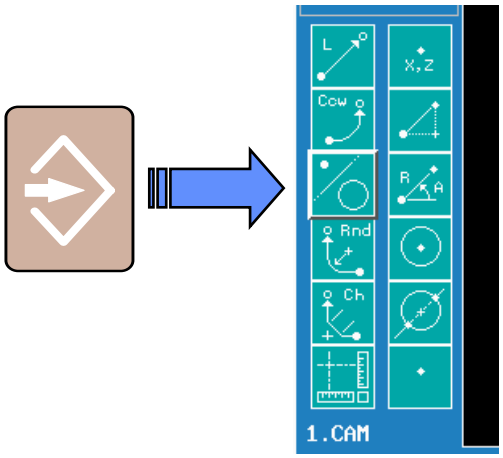
Line from pointer at an angle followed by tangent arc.
Arc defined by end point and radius.

Arc from pointer followed by a line.
Arc defined by end point and radius.
Line defined by endpoint and angle

When the Geometry tool  **is selected,**

Pressing the ENTER key toggles the selection of either POINTS, LINES or ARC definitions

Point Definitions



Point defined by co-ordinates **X** and **Z**

Point at a position **X & Z** from a previously defined point

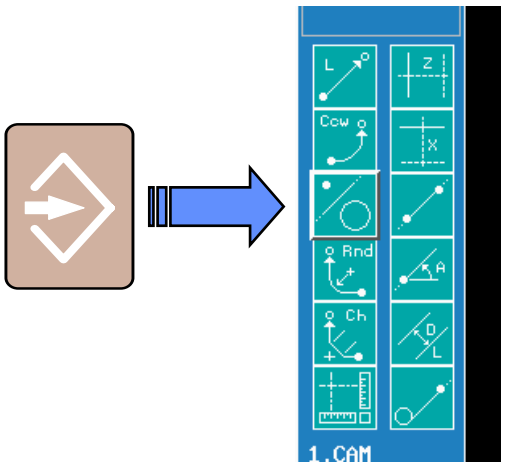
Point at a distance **R** and an angle **A** from a previously defined point

Point at the centre of a circle

Point at an **INTERSECTION** between 2 elements

Point previously defined

Line Definitions



Vertical Line at a distance **Z** from datum

Horizontal Line at a distance **X** from part centreline

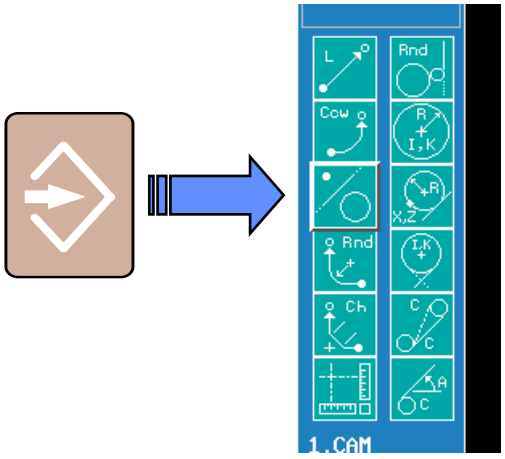
Line passing through 2 points

Line passing through a point at an angle **A**

Line parallel to another line **L** at a distance **D**

Line tangent to a circle passing through a point

Arc Definitions



Circle tangent to 2 geometry elements

Circle defined by a Centre **I & K** with a radius **R**

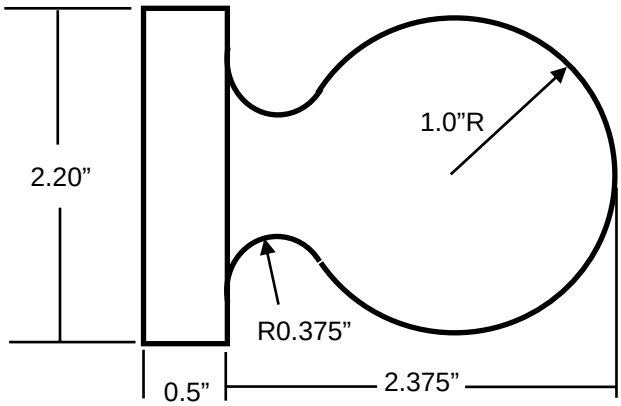
Circle passing through a point **X & Z** with a radius **R**

Circle tangent to a line with a centre **X & Z**

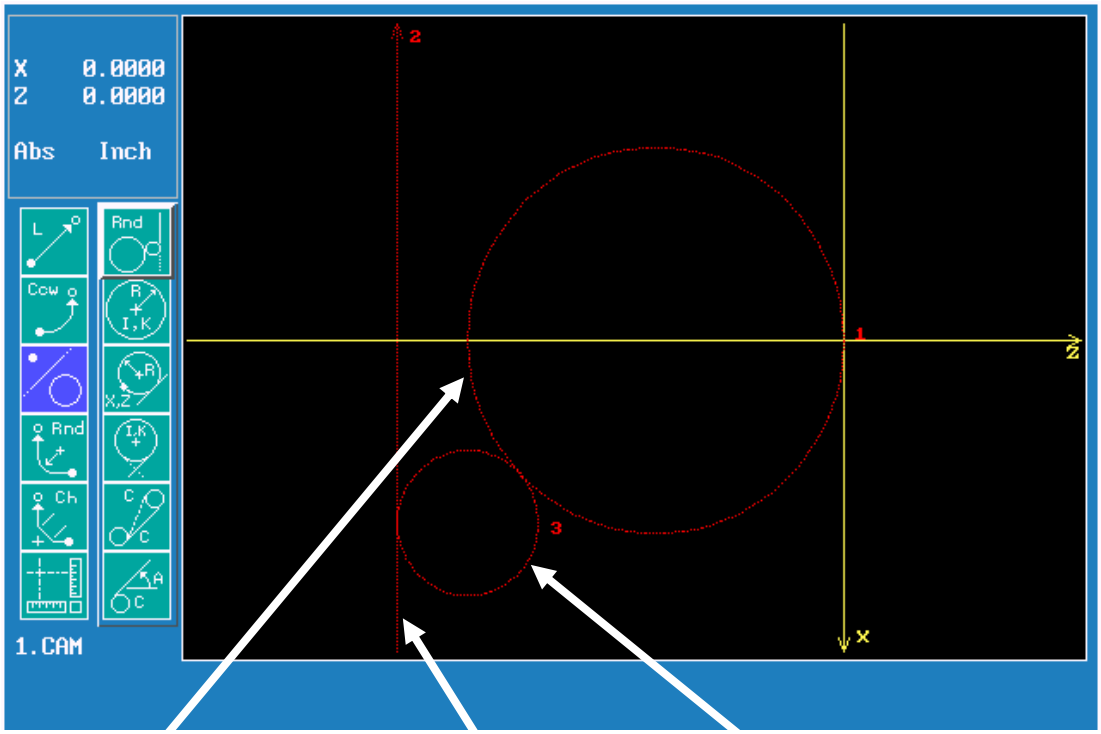
Line Tangent to 2 circles

Line tangent to a circle at an angle **A**

Creating a SHAPE (The Hitch Ball)



Creating the Geometry



ELEMENT 1 = CIRCLE

With Rad I,K Hi-lited press **ENTER**
At prompt Enter R value: 1 **ENTER**
At prompt Select Center Definition: press **ENTER.**
At prompt Enter X value: 0 **ENTER**
At prompt Enter Z value: -1 **ENTER**

ELEMENT 2 = Z LINE

With Z Axis Line Hi-lited press **ENTER**, at prompt Enter Z value: -2.375
Press the **ENTER** key

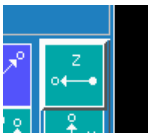
ELEMENT 3 = RADIUS TANGENT WITH 2 ELEMENTS

With Rnd Hi-lited press **ENTER**
At prompt Enter R value: .375 **ENTER**
At prompt Enter number of first element: 1 **ENTER**
At prompt Enter number second element: 2 **ENTER**

Creating the Shape

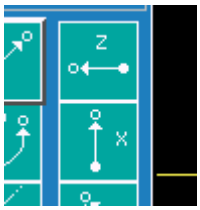
Once the geometry is defined Press F3 **S-Edit**
Next with Create hi-lited press ENTER to create the Shape

At the prompt Select Point Definition: Use the point definition **X,Z** to define a Start Point located at **X0** and **Z0.1**.

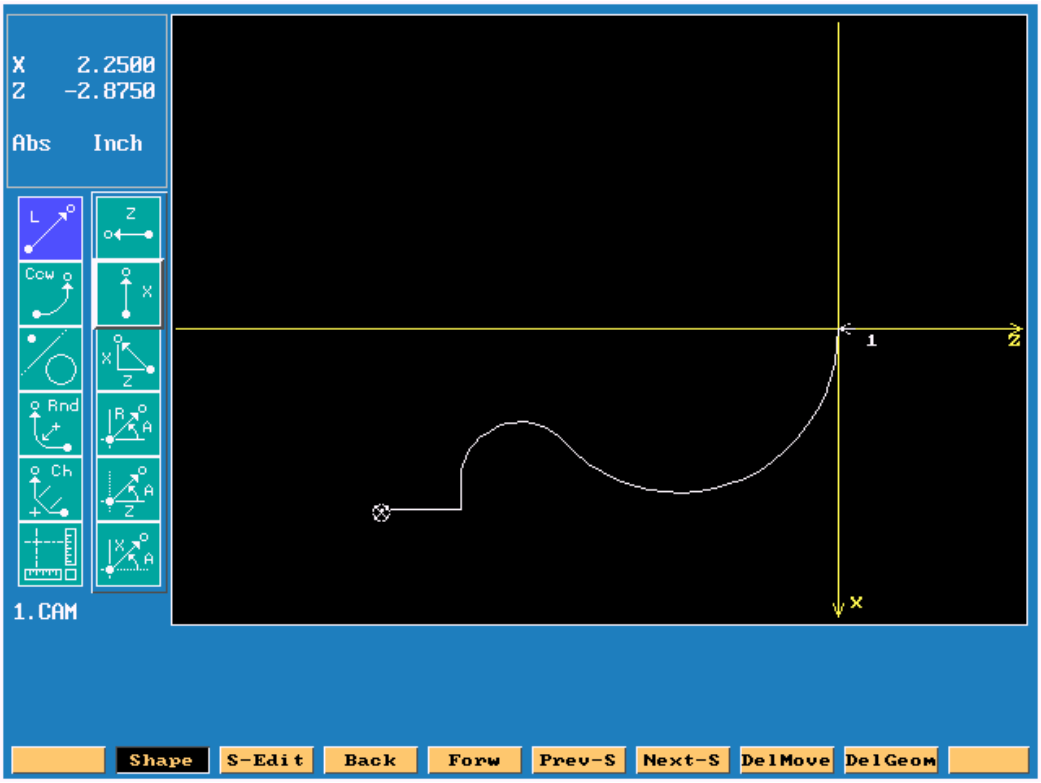


Then use the Z line tool to generate the first movement towards the part located at **Z0** .

Use the CHAIN tool and follow the geometry elements to draw the shape that is based on the drawn geometry. (**-1 3 2**) the Minus sign on 1 allows to reverse the direction of the circle.
Note: A space must be used between element numbers when entering.



With the **Z line** and **X line** tools finish the shape. **X2.2** brings the cursor to the shoulder and **Z-2.625** brings it to the end of the part.
A final line of **X2.25** generates the exit move away from the shape.



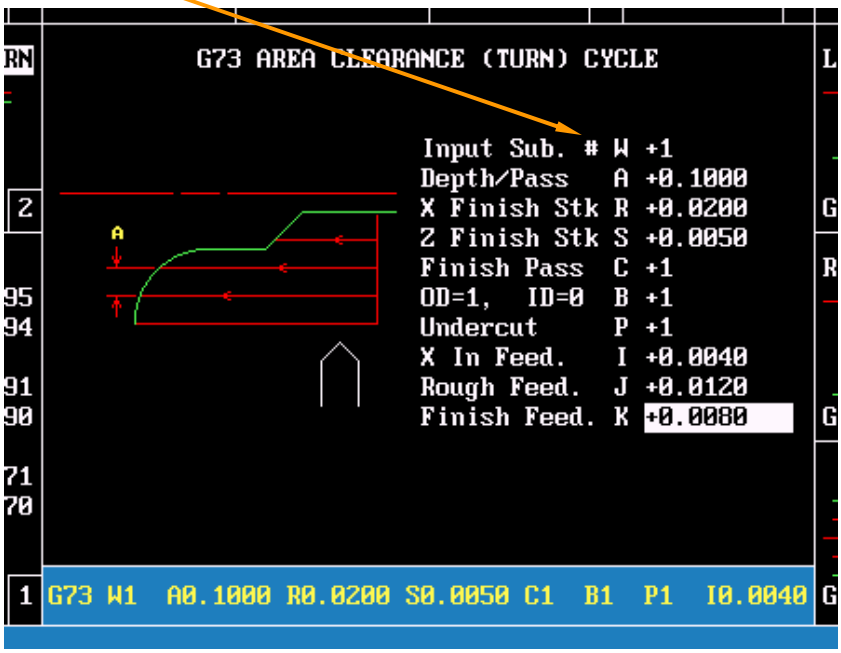
Programming using the shape

When the Shape has been drawn, **EXIT** from the Shape Editor.

The shape is now considered by the system as a **SUBPROGRAM** and the number of the subprogram has to be the same as the number of the **SHAPE**. The first Shape created will be Shape 1 the second Shape will be Shape 2 etc.

To call the contour of the Shape, use **M98 P(number)** inside your main program

To use the Shape in a clearing cycle (**G73** or **G74**), indicate the number of the Shape in the W parameter.



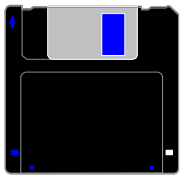
Example of program using a Shape as a subprogram.

G70 G90 G0 X0 Z0 T0
T1
G96 S400
X2.25 Z0.1 M3
G73 **W1** A.1 R.02 S.005 C1 B1 P1 I.004 J.012 K.008 (W1 refers to the Shape Number 1)
G0 X0 Z0 T0 M5
M2

SAVING PROGRAMS TO DISK

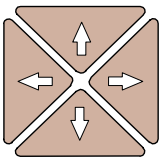
Saving a program onto a disk

Programs will remain in the memory of the control when turned off. However programs MUST BE SAVED on a diskette to safeguard them from misuse and accidental deletion. Follow these steps to save a program onto a diskette (a pre-formatted disk must be used):



Insert the disk into the floppy disk drive (**A:**) on the machine.

From the MANUAL mode press **Program**

Use the ARROW keys  to highlight the program(s) that must be saved

then press ENTER 

Utility then press ENTER  Twice to select **COPY** and then **A:**

this saves the program in the disk.

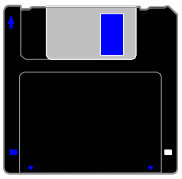
WARNING

Remove the diskette when complete and store in a safe place. Do not leave the diskette in the machine, the control will not start correctly with a disk in the drive.

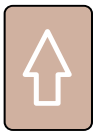
RETREIVING PROGRAMS FROM DISK

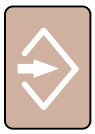
Transferring a program from a disk into the control

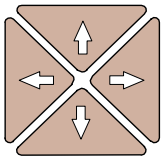
Programs can be restored into the control if they have been previously saved on a disk.



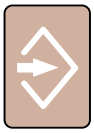
Insert the disk into the floppy disk drive (**A:**) on the machine.

From the MANUAL mode press **Program** then press **SHIFT** 

Next, press **Log** select "**A:**" and press **ENTER** 

Using the arrow keys  hi-lite the program(s) to be restored

and press 

Next press **Utility** then press  twice to select **COPY** and then **C:**

this copies the program(s) form the **A:** drive (floppy disk) to the hard drive **C:**

WARNING

Remove the diskette when complete and store in a safe place. Do not leave the diskette in the machine, the control will not start correctly with a disk in the drive.

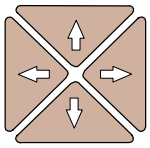
4200T CNC Control

Program Management

ANILAM

CNC KEYBOARD - COMPUTER KEYBOARD KEYSTRIKE EQUIVALENTS

This presentation can be used either on Machine installed software or Offline software.
The chart below shows the machine keyboard keys and also the standard computer keyboard keys.

FUNCTION	CNC KEYBOARD	COMPUTER KEYBOARD
X Axis Command		X Key
Z Axis Command		Z Key
Preparity G Code		G Key
Machine Function Code		M Key
Spindle Function Code		S Key
Tool Command		T Key
ENTER		ENTER Key
SHIFT		SHIFT Key
Cycle HOLD Key		Alt + H Key
Cycle START Key		Alt + S Key
Cursor UP, DOWN, LEFT and RIGHT		ARROW Keys
CLEAR Key		Alt + C Key
FUNCTION Keys F1 - F10 Definitions of Function keys are given on screen		F1 - F10 Keys

INTRODUCTION

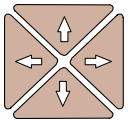
The Program Directory provides access to all the program management and disk utilities. These functions include Creating, Selecting, Deleting, Undeleting and Copying programs.
The Program Directory also provides access to the Floppy Drive utilities.

Accessing PROGRAM DIRECTORY page.

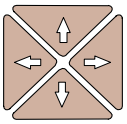
(1) From the MANUAL mode press: **Program** The Program files are listed in alphabetical order.

To access a PROGRAM file from the Program page.

There are 2 methods to access a particular Program File:

(1) Using the  keys move the Hi-Lite to the desired program and Press: **Edit**

or

(2) Press the first letter of the desired program name, this will move the Hi-Lite to the first program name with that letter, then use the  keys to move the Hi-Lite to the desired program and Press: **Edit**

To CREATE a new Program.

NOTE: There are 2 methods of creating a program file, both are shown below.

Method No.1 Creating a new program file. From the PROGRAM page:

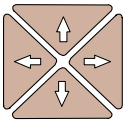
(1) Press: **Create** At the prompt 

type in the new program name

and Press: 

NOTE: Program names can be up to 8 characters in length, but may not include spaces or periods.

Method No.2 Copying and using an existing program.
If a similar program to that required already exists, it may be copied and given a new name.
This allows similarly formatted programs to be used without having to re-type the information.

(1) Using the  keys Hi-lite the existing program to be copied 

Press: **Utility** this brings up a menu, 

with Copy Hi-lited

Press  This will display a second menu 

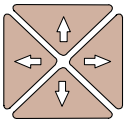
Hi-lite Other and Press 

This will bring up a third menu 

type in the new program name

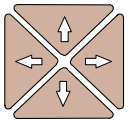
"EXAMPLE" and Press  this will create a new program named EXAMPLE and also leave the original program "SAMPLE1.G" intact. This copied program can now be edited to suit the new part. It is not necessary to type the file extension (.G) as this is completed automatically.

<u>To change or EDIT an existing program.</u>

(1) Hi-Lite the program to be changed / edited using the  keys.

(2) Press: **Edit** to enter the file editor .

<u>To DELETE an existing program.</u>

(1) Hi-Lite the program to be DELTED using the  keys. Press **F3** **Delete**

(2) To avoid accidental deletion of programs the system requests verification of deletion

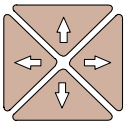
To delete the program Press **F1** **Yes**

To UNDELETE / RESTORE a deleted program.

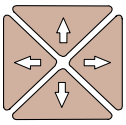
Should a program become accidentally deleted the following method can be used to restore the program.

NOTE: The restore capability of the system is determined by the space available on the drive. If the space on the drive where the program was stored has been reused restore will not be an available function.

(1) From the PROGRAM page Press: **Utility**

(2) Using the  keys, Hi-lite Restore 

Press 

(3) The system will list any and all programs that are available to be restored. Using the  keys Hi-lite the program to be restored.

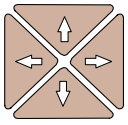
(4) Type in the first letter of the program to be restored (the first letter of the program name is lost when a program is deleted).

(5) Press **Cont** if the program can be restored the system will place the program file in its alphabetical location.

NOTE: ALWAYS CHECK THE VALIDITY OF A PROGRAM AFTER RESTORING. SOME OF THE INFORMATION WITHIN THE PROGRAM MAY HAVE CHANGED.

To SELECT a program to run in the AUTO mode.

Once a program has been created and verified to be correct the operator must SELECT the program to run when in the Auto or Single Step mode.

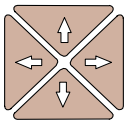
(1) From the PROGRAM page using the  keys Hi-lite the program name.

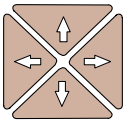
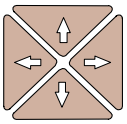
(2) Press **Select** the selected program to be run will now be displayed in the lower right corner of the screen. 

To COPY a program to the A: Drive (Floppy Disk).

The 4200T control uses the C:\ drive and the USER directory to store programs within the system. When in the PROGRAM directory the drive and directory are displayed in the lower left corner of the screen. 

The 4200T uses the A:/ drive for the Floppy Disk Drive. Programs may be copied to or copied from the Floppy Drive individually or in multiples.

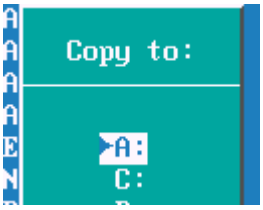
(1) From the PROGRAM directory use the  keys to Hi-lite the program to be copied to the A:\ (Floppy Disk) drive. (Place a floppy disk in the A:\ floppy disk drive unit).

(2) If multiple programs are to be copied Hi-lite the first program to be copied using the  keys and Press  Then using the  keys again Hi-lite the next program to be copied and Press  Continue until all programs to be copied are Hi-lited.

(3) When all programs to be copied are Hi-lited Press 

(4) With Copy Hi-lited 

Press 

(5) This brings up a menu 

With A: Hi-lited Press 

The lower left corner of the screen displays COPYING…. while the program is copied. The procedure is complete when COPYING…. is no longer displayed.

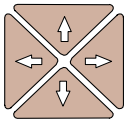
To COPY a program from the A: Drive (Floppy Disk) to the Program Directory C:\USER

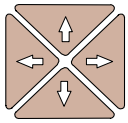
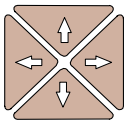
The 4200T uses the A:/ drive for the Floppy Disk Drive. Programs may be copied to or copied from the Floppy Drive individually or in multiples. To view or copy the programs on a Floppy Disk, the operator must first LOG to the Floppy disk Drive (A:\)

(1) From the PROGRAM directory Press  (Shift) this will change the descriptions of the F keys, Press **Log** This shows a menu of the drives that the operator can view on screen.

(2) 

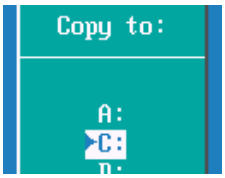
Hi-lite A: and Press  the programs on the Floppy Dive (A:\) will now be displayed.

(3) Use the  keys to Hi-lite the program(s) to be copied to the Program Directory (C:\)

If multiple programs are to be copied Hi-lite the first program to be copied using the  keys and Press  Then using the  keys again Hi-lite the next program to be copied and Press  Continue until all programs to be copied are Hi-lited.

(4) When all programs to be copied are Hi-lited Press **Utility**

(5) With Copy Hi-lited 

Press  A menu is shown 

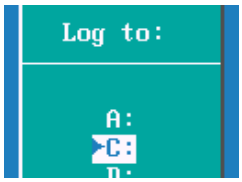
With C: Hi-lited Press  The lower left corner of the screen displays COPYING…. while the program(s) are copied. The procedure is complete when COPYING…. is no longer displayed.

Continued….

To return to the Program Directory the LOG back to C:\

(1) Press  (Shift) this will change the descriptions of the F keys,

(2) Press **Log** This shows a menu of the drives that the operator can view on screen.

(2) 

Hi-lite C: and Press  the C:\USER (lower left corner of the screen)

will now be displayed.

To COPY program files to the A: (Floppy Disk) when using the SHAPE EDITOR

When using the Shape Editor to write programs the 4200T system will create additional program files, and ALL these files MUST BE COPIED to ensure correct operation of the program.
The program name to which the Shape is to be associated MUST be Hi-lited prior to entering the Shape Editor (F4 from the Program Directory). this program will have extension of **.G**
The correct program must be hi-lited because upon entering the Shape Editor, the system creates a file with the same name as the program but with an extension of **.CAM** and also a file with the extension of **.GEO**
These files are used to record the CAM (.CAM file) settings inside the Shape Editor and also to record the GEOMETRICAL ELEMENTS created (.GEO file).

Once a Shape has been created a 3rd file is also created, this file will have an extension of **.1**
NOTE: If more than one Shape is created the shape files will have extensions of **.2** **.3** etc. assigned in the order in which they were created.

Example:	original program	PROGRAM.G
	file created by shape editor	PROGRAM.CAM
	file created by shape editor	PROGRAM.GEO
	first shape file created	PROGRAM.1
	second shape file created	PROGRAM.2
	third shape file created	PROGRAM.3 etc…..

To COPY all the program files to the A: (Floppy Disk) when using the Shape Editor continued…..

The 4200T uses the C:/USER drive in the Program Directory. Upon entering the Program Directory the programs displayed will all have an extension of **.G**
To view all the program files described on the previous page the operator must first LOG to the the root of C:\USER directory (this is where all program files with any extension can be viewed). This is achieved by using wildcard symbols. These symbols are *** . *** (any program name with any extension).

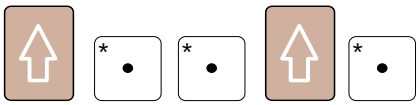
(1) From the PROGRAM directory Press  (Shift) this will change the descriptions of the F keys,

Press **Log** This shows a menu of the drives that the operator can view on screen.

(2) Hi-lite Other: 

and Press 

(3) At the next menu 

type ***.*** Press 

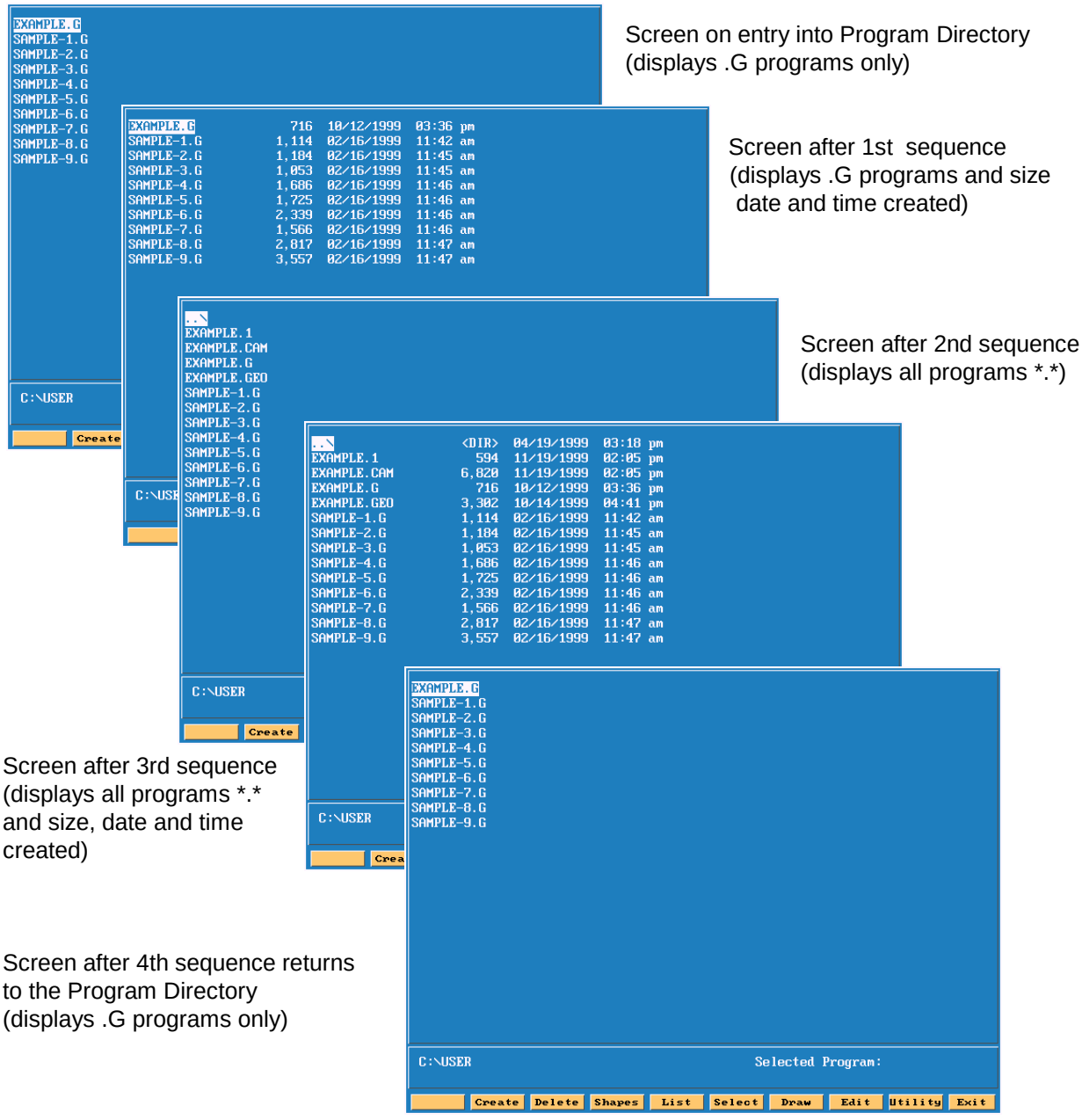
(4) Press  The screen will now display all programs with all extensions.

To COPY all the program files to the A: (Floppy Disk) when using the Shape Editor continued…..

An alternative method is also provided to obtain the screen showing all programs with all extensions Directory.

This method is completed using the ⇧ and **Display** keys.

This sequence of key strikes toggles the Program Directory display through the following screens. The key strikes are repeated to toggle through the screens shown below.



Screen on entry into Program Directory (displays .G programs only)

Screen after 1st sequence (displays .G programs and size date and time created)

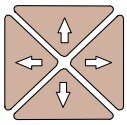
Screen after 2nd sequence (displays all programs *.*)

Screen after 3rd sequence (displays all programs *.* and size, date and time created)

Screen after 4th sequence returns to the Program Directory (displays .G programs only)

To COPY all the program files to the A: (Floppy Disk) when using the Shape Editor continued…..

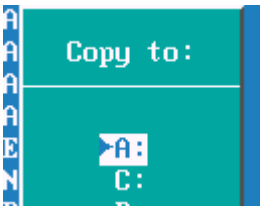
To COPY all the EXAMPLE program files shown below complete the following:

(1) Use the  keys to Hi-lite the first program to be copied (EXAMPLE.1) to the Floppy Drive

(2) Using the  key Hi-lite the remaining EXAMPLE program files 

(3) Press **Utility** and with Copy Hi-lited 

Press 

a menu is displayed 

with A: Hi-lited Press  The lower left corner of the screen displays 

Press 

COPYING…. will be displayed while the programs are copied. The procedure is complete when

COPYING…. is no longer displayed.

To COPY program files (all extensions) from the A: (Floppy Disk) to the C:\USER directory.

(1) From the Program Directory (C:\USER) use either method described previously to display the programs with all the extensions.

(2) Insert the Floppy Disk into the Drive

(3) LOG to the A: Drive

(4) Hi-lite the program files to Copy to C:\USER Press ENTER

(5) LOG back to the C: Drive

4200T CNC Control

Shape Editor Programming Example

STEP BY STEP CREATION OF A PROGRAM USING THE SHAPE EDITOR

The following presentation shows a step by step procedure of how to create a part program using the Anilam 4200T Lathe Control.
This procedure details the use of the interactive Shape Editor that creates the part profile through simple entry of geometrical elements (points, lines and circles) without having to calculate intersections, tangency points etc. These elements are then connected or "chained" to complete the tool path.

Creating the Part Program File in the PROGRAM page.

(1) From the MANUAL mode press: **Program**

NOTE: There are 2 methods of creating a program file, both are shown below.

Method No.1 Creating a new program file.

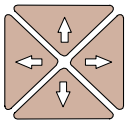
(2) Press: **Create** At the prompt 

type in the program name

and press 

NOTE: Program names can be up to 8 characters in length, but may not include spaces or periods.

Method No.2 Copying and using an existing program.
If a similar program to that required already exists, it may be copied and given a new name. This allows similarly formatted programs to be used without having to re-type the information.

(2a) Using the  keys hi-lite the existing program to be copied 

Press: **Utility** this brings up a menu, 

with Copy hi-lited

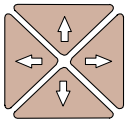
press  This will display a second menu 

Hi-lite Other and press 

This will bring up a third menu 

type in the new program name

"EXAMPLE" and press  this will create a new program named EXAMPLE and also leave the original program "SAMPLE1.G" intact. This copied program can now be edited to suit the new part.
It is not necessary to type the file extension (.G) as this is completed automatically.

(3) To Edit the EXAMPLE program use the  keys to hi-lite the program name.

(4) Press: **Edit** to enter the file editor.

NOTE: Using Method 1 type in the program data shown below, or
Using Method 2 edit the copied program to give the program data shown below.
The comments (all data to the right of the * asterisk) need not be entered, this is only shown to explain the program data and is ignored by the system when the program is run.

```
G70 G90 G0 X0 Z0 T0          *INCH, ABSOLUTE, RAPID X Z, TOOL 0
```

```
G70 G90 G0 X0 Z0 T0          *INCH, ABSOLUTE, RAPID X Z, TOOL 0
M43                          *HIGH-SPINDLE RANGE
G24 S1600                    *RPM LIMIT WITH CONSTANT SURFACE SPEED
T1                           *CALL TOOL No.1 (ROUGH/FINISH FACE/TURN TOOL)
G96 S400                     *400 SURFACE FEET PER MINUTE
X2.2 Z0 M3                   *RAPID TO START POSITION TO FACE OFF, SPINDLE FWD
G1 X-.065 F.007              *FACE OFF PART AT 0.007 INCHES PER REVOLUTION
G0 X2 Z.1                    *RAPID TO START OF AREA CLEAR CYCLE
G73 W1 A0.1 R0.025 S0.005 C1 B1 P1 I0.004 J0.01 K.007 *AREA CLEARENCE CYCLE
G0 X0 Z0 T0 M5               *RAPID TO TOOL CHANGE POSITION, SPINDLE STOP
M2                           *END OF MAIN PROGRAM
_

Program: EXAMPLE.G                                              12:1
Help | Del | Ins | DelBlk | PgUp | PgDn | Move | Editing | Misc | Exit
```

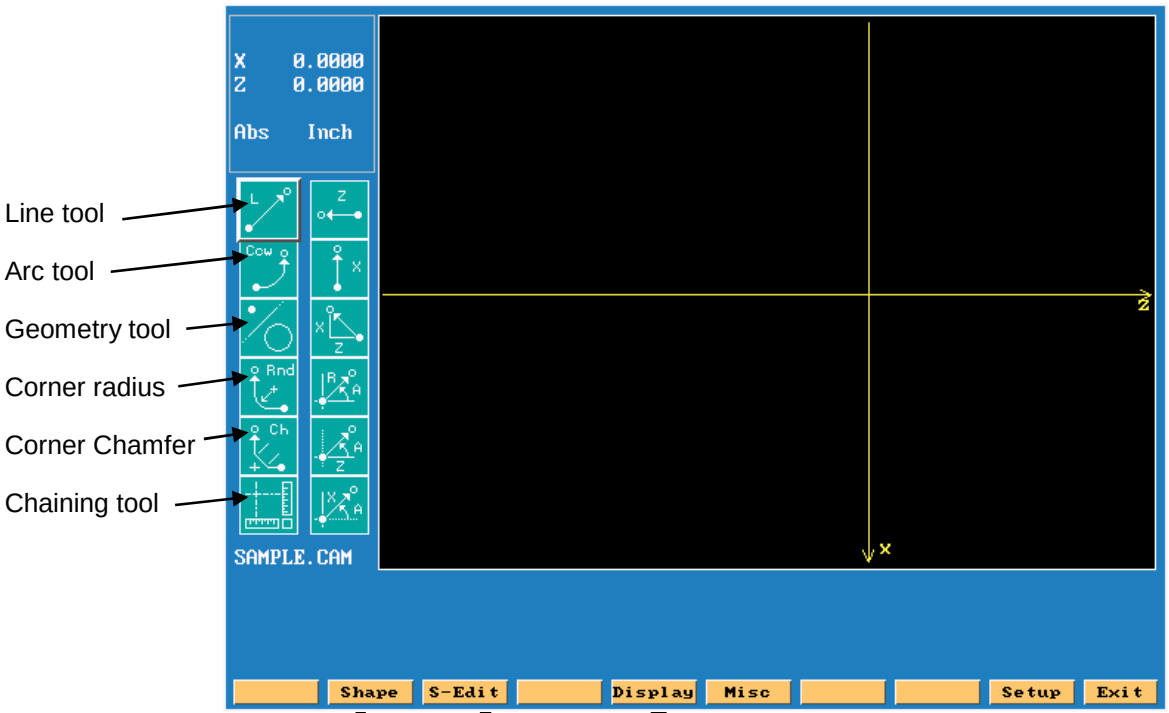
(5) With the above program entered press **Exit** to leave the editor and save the program.

(6) Press **Shape** to access the Shape editor.

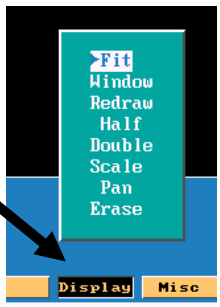
NOTE: The program name must be hi-lited on the program page prior to entering the SHAPE editor.

THE SHAPE EDITOR OVERVIEW

- The Shape Editor is used to create subprograms (tool paths) that can be used in the main program
- A main program must be created before using the Shape Editor.
- Hi-Lite the created program prior to entering the Shape Editor.
- Geometry tool can be used to assist in the creation of the a shape. With the Geometry tool hi-lited, pressing the ENTER key will toggle between LINE, POINT or ARC definitions.

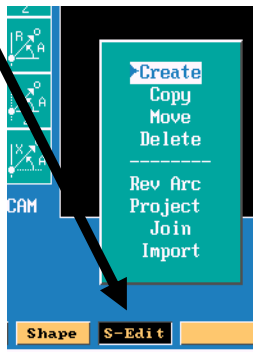


Used to size the display



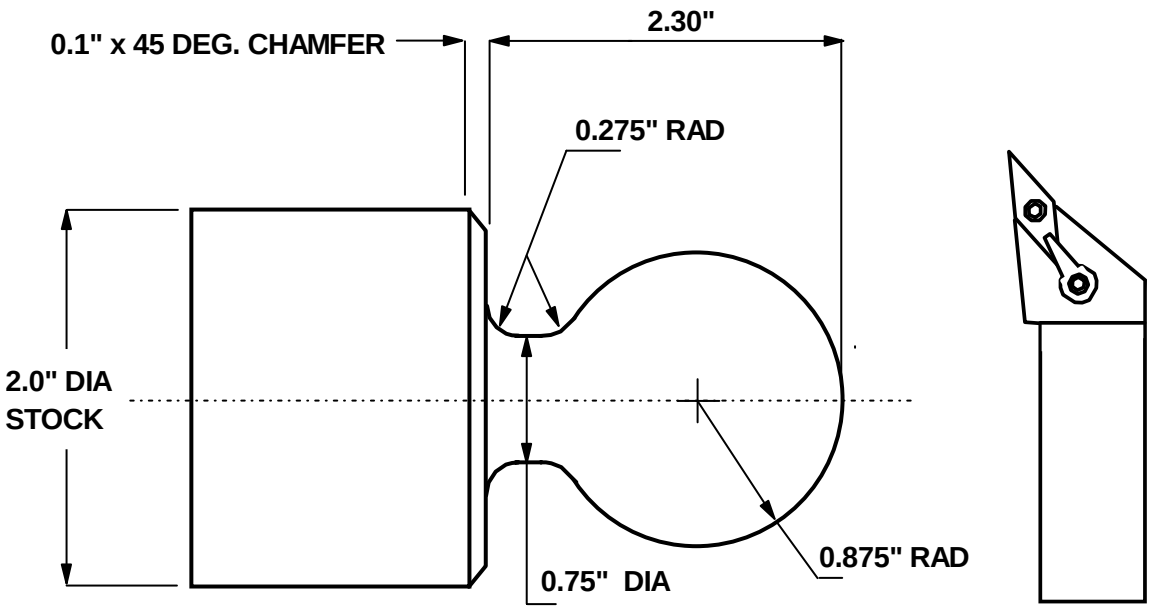
Once a Shape has been created, Back / Forw allows moving the shape cursor to places where it needs to be modified (Chamfers, Radii).

Allows the creation of a shape (press ENTER to define a starting point).
Also allows a shape to be copied (Copy).
A shape to be moved (Move).
A shape to be deleted (Delete).
An arc to be reversed (Rev Arc).
Remove a blend radius and restore sharp corners (Project).
Allows co-liner elements to be joined (Join)
A shape to be imported from another program (Import).



PART PROGRAM EXAMPLE

The part drawing below shows the component that will be used for the example program using the Shape Editor.



WARNING

Read the following notes if you intend to use this presentation and program to machine parts.

NOTES:

(1) The Tool required to machine the above component is shown (right) R/H 35 degree insert.

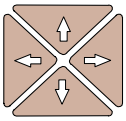
(2) The material used is 2.0” Diameter x 4.5” Long (Free Machining Steel or Aluminium)

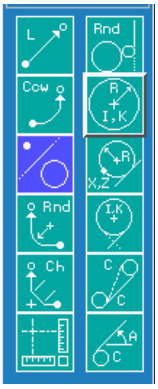
(3) The material should be extended a minimum of 2.6” from the face of the chuck jaws.

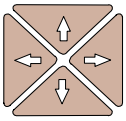
(4) Set Tool Offsets to the center line of the machine (X Axis) and the front face of the part (Z Axis).

ENTERING THE SHAPE GEOMETRY

Describing the Arc Definition

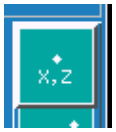
(7) Use the  keys to hi-lite the Geometry tool  press  to toggle to Arc definitions.



(8) Use the  keys to hi-lite the Radius / Center point definition. 

(9) Press  At the prompt type in 

press 

(10) With the 

hi-lited (automatically selected by the editor) press 

(11) At the prompt type in 

press 

(12) At the prompt type in 

press 

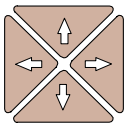
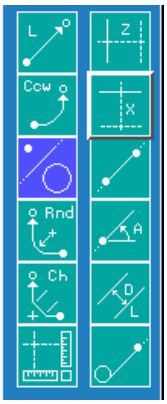
(13) To fit (size) the element to the screen press **Display** and with Fit hi-lited press 

NOTE: There are 3 “Hot” keys that also allow sizing the drawing to the screen:

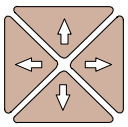
H = Half Size, **D** = Double Size and **R** = Re-Draw.

These sizing keys may be used at any time while entering geometry.

Describing the Line Definitions

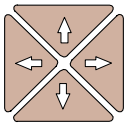
(14) Use the  keys to hi-lite the Geometry tool  press  

to toggle to Line definitions.

(15) Use the  keys to hi-lite the X Line definition. 

(16) Press  At the prompt type in  press 

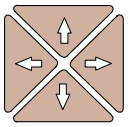
(17) Press  At the prompt type in  press 

(18) Use the  keys to hi-lite the Z Line definition. 

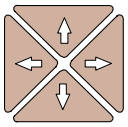
(19) Press  At the prompt type in  press 

(20) Press  At the prompt type in  press 

Describing the Point Definition

(21) Use the  keys to hi-lite the Geometry tool  press  to 

toggle to Point definitions

(22) Use the  keys to hi-lite the X,Z Point definition. 

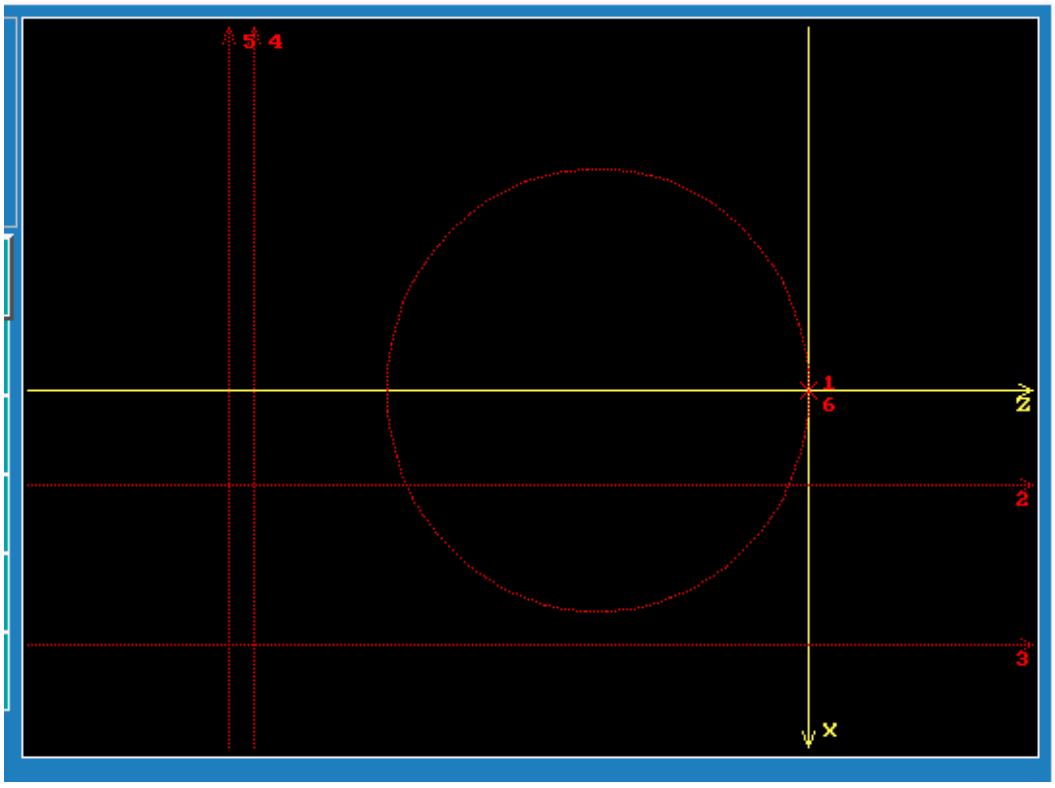
Describing the Point Definitions continued

(23) Press  At the prompt type in  press 

(24) Press  At the prompt type in  press 

The screen below shows the 6 elements that make up the required geometry.

Element No.1 = 0.875” radius circle, with center points of X0 and Z-.875
Element No.2 = X Axis line at 0.75” Diameter
Element No.3 = X Axis line at 2.00” Diameter
Element No.4 = Z Axis line at -2.3
Element No.5 = Z Axis line at -2.4
Element No.6 = Point at X0 and Z0



CREATING THE SHAPE

Defining the start point for the Tool Path

(32) Press the **S-Edit** key, this brings up a menu, with Create hi-lited

Press 

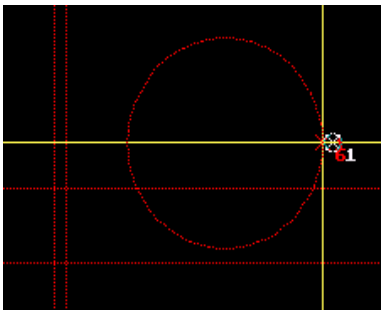
(26) At the prompt 

and with the X,Z point 

definition hi-lited, Press 

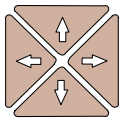
(27) At the prompt type in 

Press 



(28) At the next prompt type 

Press 

(29) Using the  keys hi-lite the “chaining” icon  Press 

(30) At the prompt type in the following 

Press 

NOTE: A space must be used between the element numbers.

When pressing Enter the system will display a selection of 2 points. This is because the circle intersects Line 2 in 2 places and the required intersection must be specified.

(31) At the prompt Select 1-2: type in 

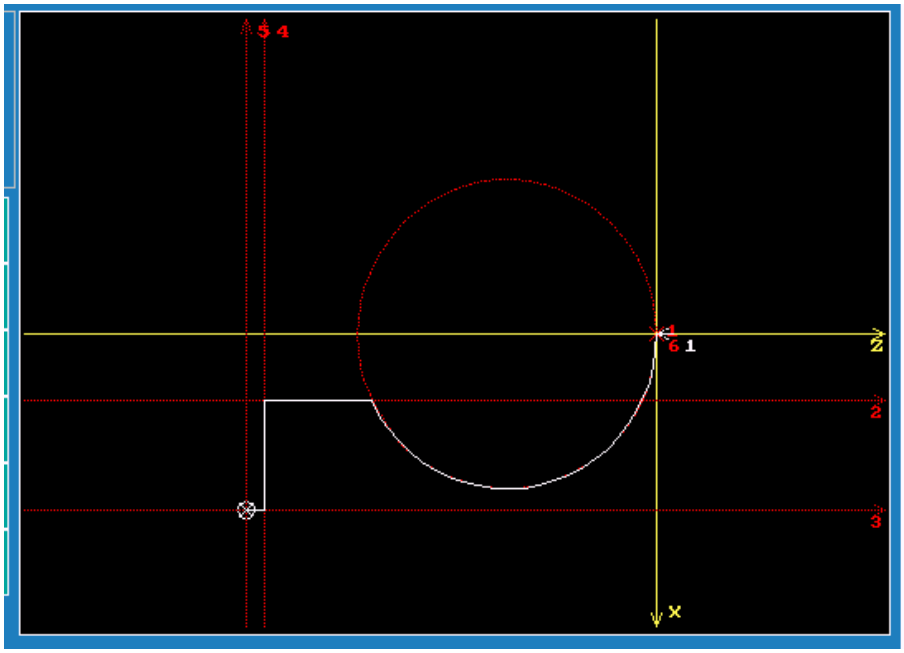
Press  then **F9**

The Tool Path will follow the numbered Elements shown above:
Move to Point 6 at X0 and Z0
Move around Circle 1 (Direction is given by sign - =CW + =CCW)
Move across Line 2
Move out along Line 4
Move across Line 3
Stop at Line 5

CUSTOMIZING THE SHAPE

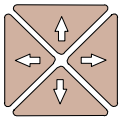
Generating the intersecting chamfers and radii.

The screen below displays the shape (shown in white)



(32) Press the **Shape** key, this brings up Function keys that allow the shape cursor to be moved around the shape (Back, Forw).

(33) Using the **Back** key, position the cursor at the intersection where the chamfer is required.

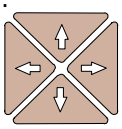
(34) Using the  keys hi-lite the “chamfer” icon 

Press 

(35) At the prompt type in the size of chamfer 

Press 

(36) Using the **Back** key position the cursor at the intersection where the first radius is required.

(37) Using the  keys hi-lite the “Radius” icon 

Press 

Generating the intersecting chamfers and radii cont….

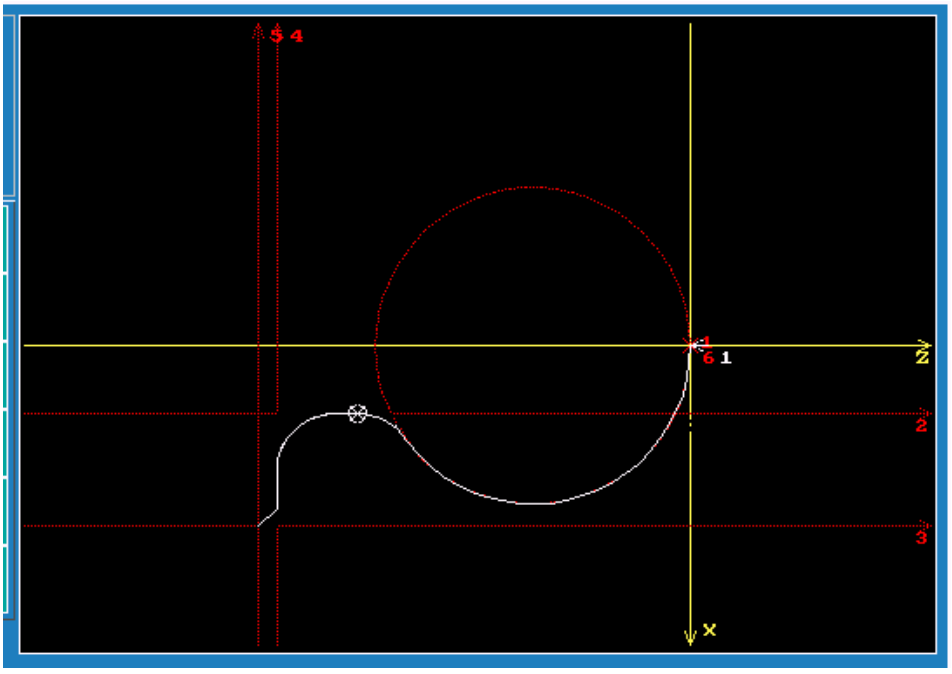
(38) At the prompt type in the size of radius `Enter blend radius: .275_` Press 

(39) Using the **Back** key position the cursor at the intersection for the second radius

(40) With the “radius” icon 

remaining hi-lited, Press 

(41) At the prompt type in the size of radius `Enter blend radius: .275_` Press 



This completes the creation of the Shape. The Shape now represents the Tool Path that the G73 Area Clearance Cycle will utilise to both Rough and Finish Turn.

The Shape Editor can now be exited and the Draw mode activated to graphically verify all program

(42) To exit the Shape Editor Press **Shape** then Press **Exit**

VERIFYING THE PROGRAM AND SHAPE USING DRAW GRAPHICS

(43) With the program hi-lited 

Press **Draw**

(44) To fit (size) the graphic program display to the screen, Press **Display**

(45) With Fit hi-lited, 

Press  This will both size the graphic to the screen and show ALL movements within the program.