

Figure 11-1. The Run/Programming Screen and the Graphic Programming Touchbutton

SECTION 11

GRAPHIC PROGRAMMING

Programs can be prepared for the Orion Control System in two ways. Graphic programming is described in this section. The other method, manual programming, is described in Section 10, Manual Programming.

In graphic programming, programs are prepared in two steps.

First, the profile of the part is drawn on the screen. Necessary dimensional data is entered at this time. Drawing proceeds from one edge of the profile to the other, which is not necessarily the order in which the bends will be made. During this part of the programming process, the system determines the blank size needed for the part.

Next, the bend order is established. During this part of the programming process, the system determines the material handling and tool change requirements.

Changes can be made to a graphic program, either during preparation, or at a later time. They must be made using graphic programming methods. Manual programming techniques will not alter programs developed by graphic programming.

GETTING STARTED

To begin graphic programming, touch the Graphic Programming Touchbutton on the Run/Programming Screen as shown in Figure 11-1. This brings up the Graphic Programming Screen shown in Figure 11-2.

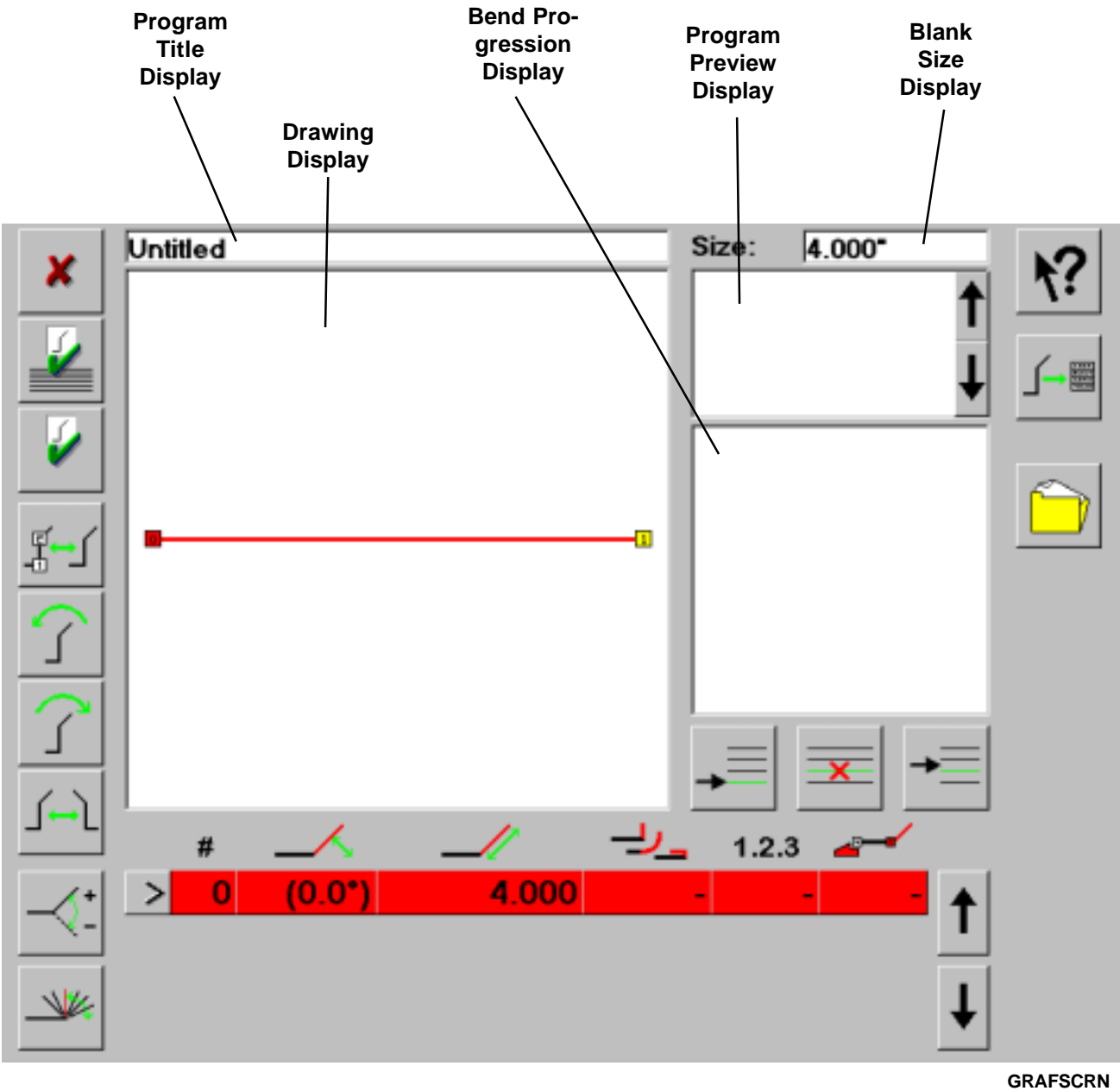


Figure 11-2. Grphic Programming Screen Showing Information Displays

INFORMATION DISPLAYS	The information displays appear as white blocks on the Graphic Programming Screen.
PROGRAM TITLE DISPLAY	The Program Title Display shows the title of the program being worked on. For new programs it reads "Untitled" until the program is named. If an existing program is being modified, it provides the program title.
DRAWING DISPLAY	The Drawing Display shows the part as it is being drawn. It defaults to a single, horizontal line in red. As part segments are added, it always shows the segment being described in red. As segments are added, it modifies its size so that the complete part profile can always be seen. The image in this display can be rotated and manipulated to help the programmer to visualize the part as it is being programmed.
BEND PROGRESSION DISPLAY	The Bend Progression Display shows each segment as it will be positioned in the machine in relation to the backgauge and the bending jaws.
PROGRAM PREVIEW DISPLAY	The ProgramPreview Display enables the programmer to review the final program before it is entered into the system memory. It provides information in an abbreviated form. Scroll Bars enable the programmer to scroll backward and forward through the program if it is too long to fit completely in the window.
BLANK SIZE DISPLAY	The Blank Size Display shows the size of the blank as the program progresses. Each time a segment is added and defined, the system calculates the blank size needed, and updates the Blank Size Display.

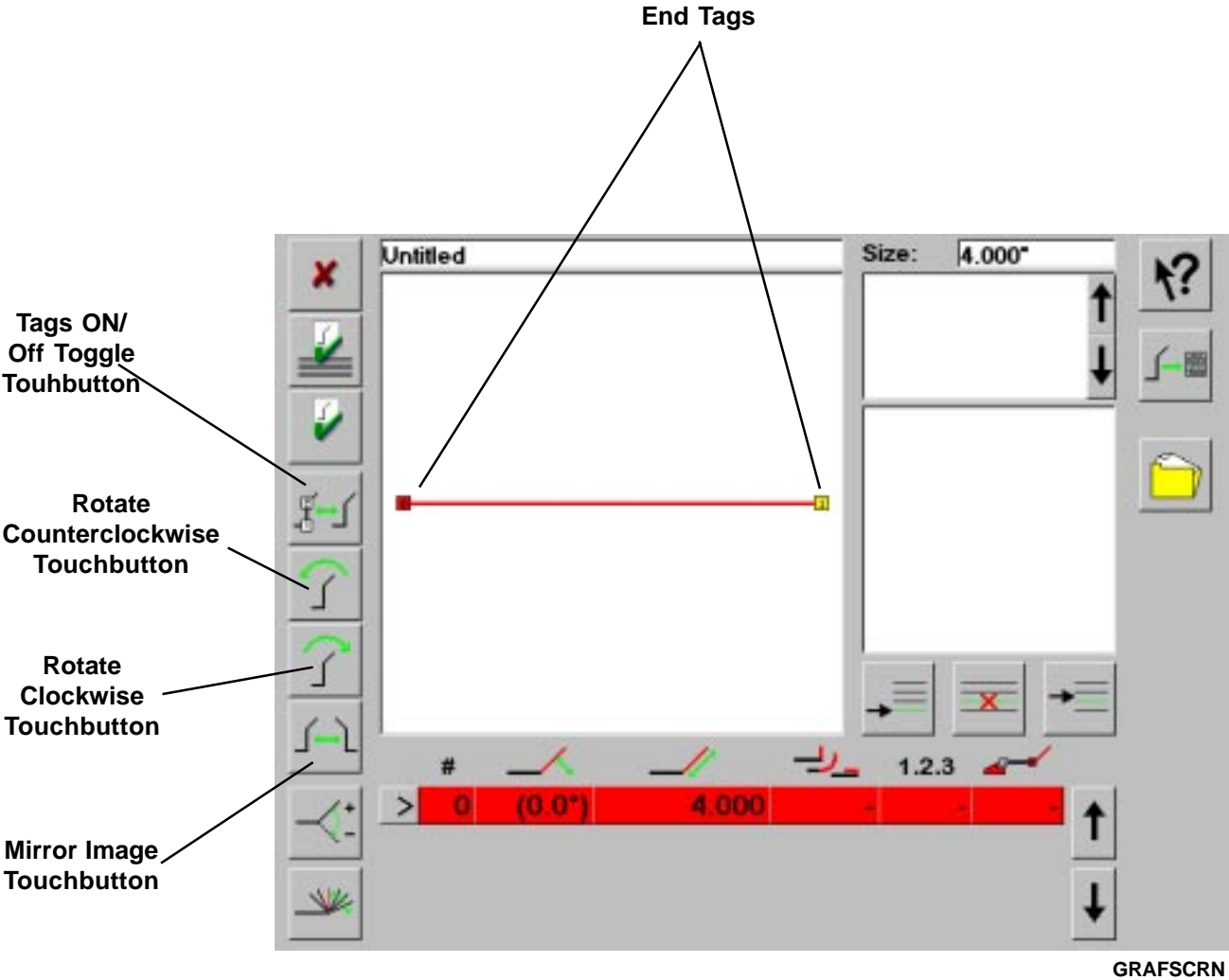


Figure 11-3. Image Control Touchbuttons

**IMAGE
CONTROL
TOUCHBUTTONS**

The image control touchbuttons exist for the convenience of the programmer. They can be used to control the part image in the Drawing Display as the programmer sees fit. They do not affect the part program in any way.

**TAGS ON/OFF
TOGGLE
TOUHBUTTON**

The End Tag On/Off Toggle Touchbutton turns the tags on and off. In most cases, the programmer will want them on, but in views with very short segments, the programmer may find it necessary to turn them off. The End Tags provide numerical identification of each end of the segment during programming.

**ROTATE
COUNTER-
CLOCKWISE
TOUCHBUTTON**

The Rotate Counterclockwise Touchbutton rotates the part view in the Drawing display 45 degrees counterclockwise (left) each time it is touched.

**ROTATE
CLOCKWISE
TOUCHBUTTON**

The Rotate Clockwise Touchbutton rotates the part view in the Drawing Display 45 degrees clockwise (right) each time it is touched.

**MIRROR
IMAGE
TOUCHBUTTON**

The Mirror Image Touchbutton “flips” the drawing from left to right when it is touched.

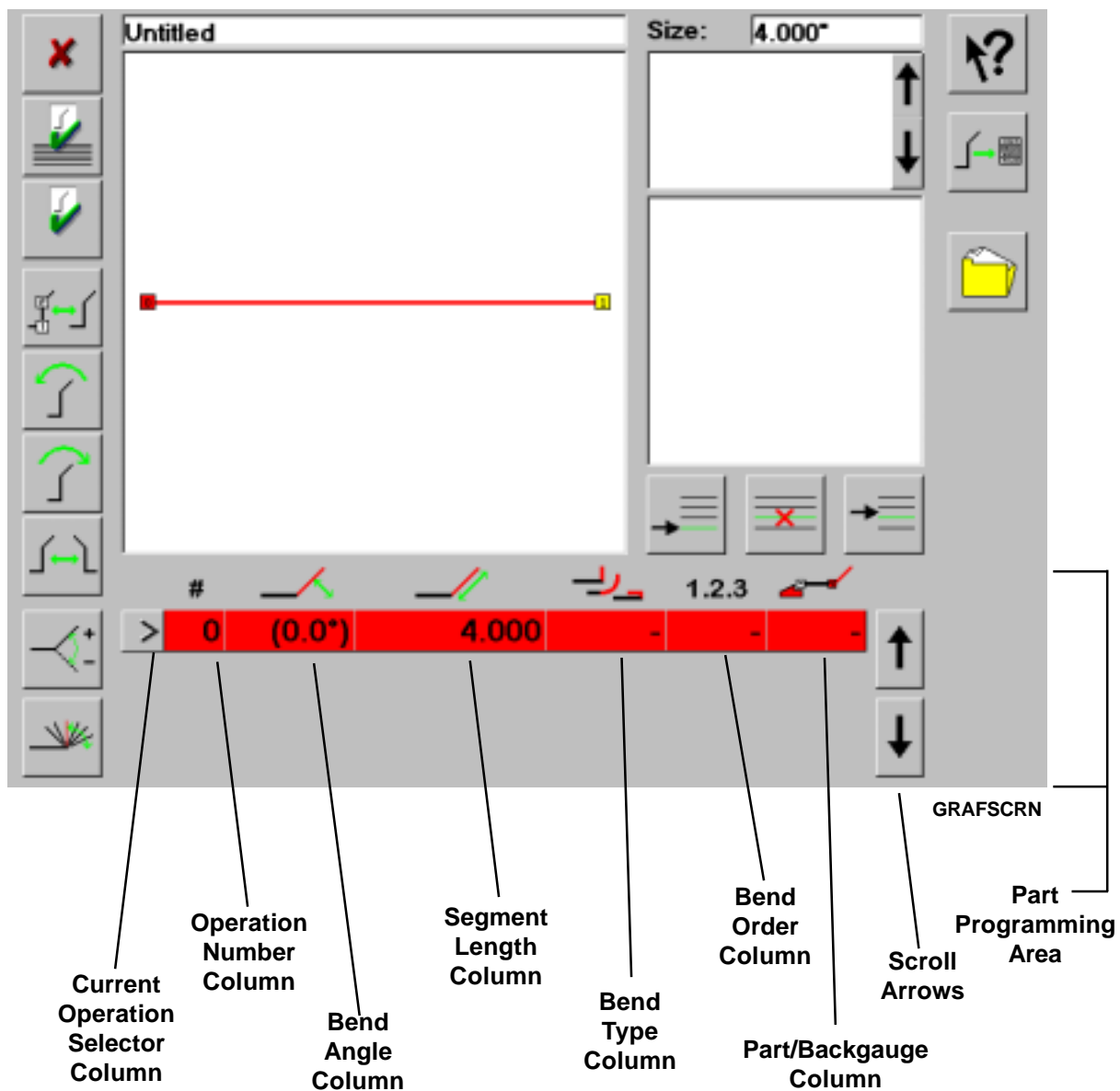


Figure 11-4. Program Definition Area of the Graphic Programming Screen

**PART
PROGRAMMING
AREA**

The Part Programming Area of the Graphic Programming Screen is located along the bottom of the screen. Each operation is defined by a row of entries across the screen. Individual details of each operation are defined in cells arranged in columns within the area. The operation rows appear in white, except for the operation being worked on, which appears in red.

**SCROLL
ARROWS**

The Scroll Arrows enable the programmer to scroll forward and backward through the program as necessary. A maximum of four operations can be seen at one time.

**CURRENT
OPERATION
SELECTOR
COLUMN**

The Current Operation Column enables the programmer to select the operation on which he wishes to work. It is normally used when selecting an operation for review. An operation can also be selected by touching a cell within the desired operation row, but this brings up an entry pop-up screen, which must be cleared before further programming can take place.

**OPERATION
NUMBER
COLUMN**

The Operation Number Column represents the order in which operations were entered. Because the entry sequence may vary from the final bend order desired, this sequence will not represent the final bend order of the program.

**BEND ANGLE
COLUMN**

The Bend Angle Column contains the programmed bend angle for each operation. The default value is "0.0 degrees", so a bend angle must be entered for each bend operation.

**SEGMENT
LENGTH
COLUMN**

The Segment Length Column contains the length of the part segment being formed by the bend. The default value is "4.000 inches" (101.6 mm), so a segment length must usually be entered.

**BEND TYPE
COLUMN**

The Bend Type Column is used to specify bends other than routine bends. It will enable the programmer to specify wing or bump radius bends, and hems.

**BEND ORDER
COLUMN**

The Bend Order Column specifies the final bend order for the program.

**PART/
BACKGAUGE
COLUMN**

The Part/Backgauge Column enables the programmer to specify the portion of the part to be located against the backgauge for each bend operation.

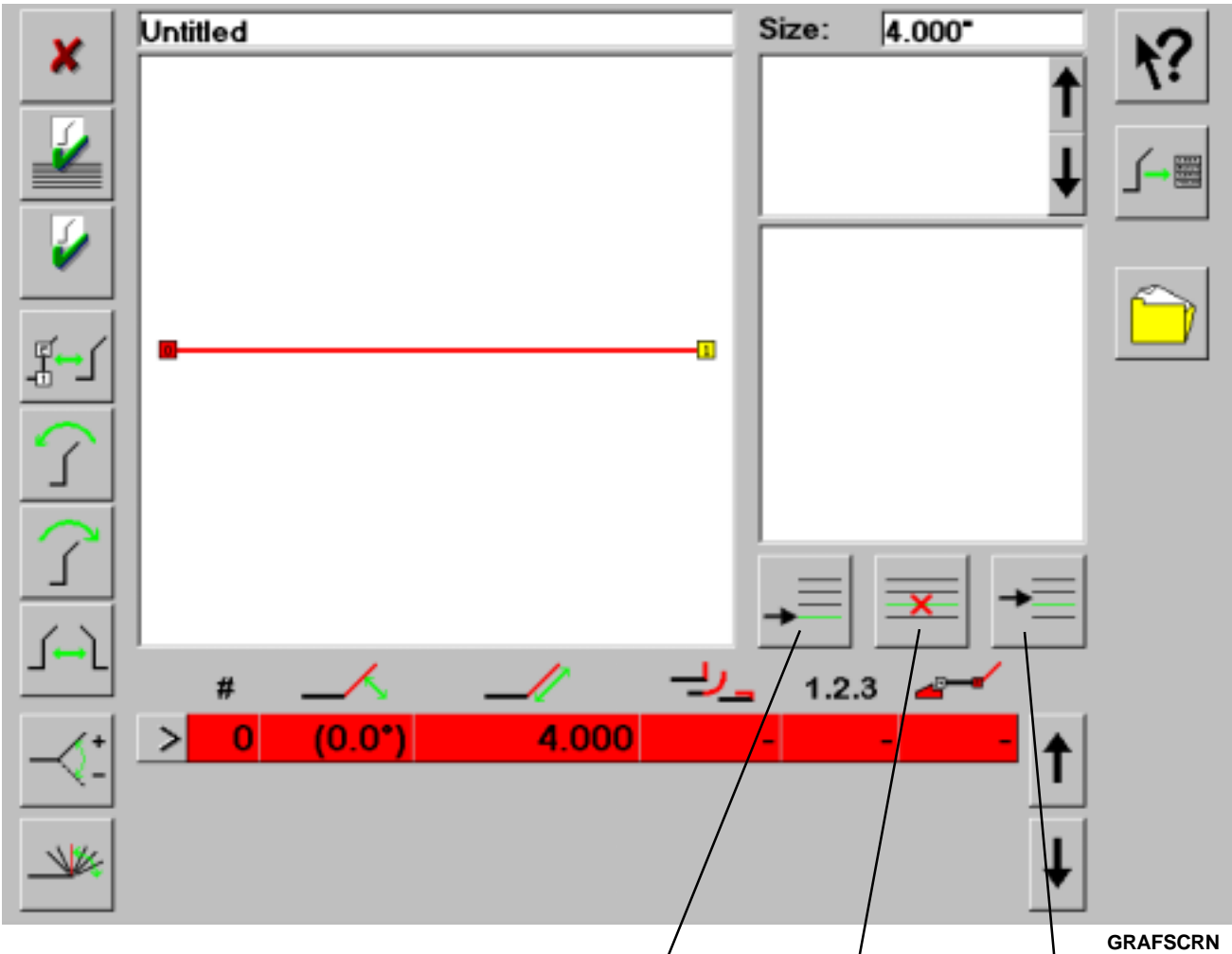


Figure 11-5. Add and Delete Touchbuttons

**ADD AND
DELETE
TOUCHBUTTONS**

Each bend operation uses a separate row in the part Programming Area (see Figure 11-4). The programmer creates new rows or deletes existing rows by touching the appropriate touchbutton.

**ADD
OPERATION
TOUCHBUTTON**

The Add Operation Touchbutton adds a new line segment and a new operation row at the end of the existing program being prepared

**INSERT
OPERATION
TOUCHBUTTON**

The Insert Operation Touchbutton adds a new operation row within the program. It always adds the row above the red highlighted row. When a new operation is inserted, the sequence numbers of the following operations are adjusted to reflect the addition.

**DELETE
OPERATION
TOUCHBUTTON**

The Delete Operation Touchbutton deletes the red highlighted operation row. When an operation is deleted, the sequence numbers of the following operations are adjusted to reflect the deletion.

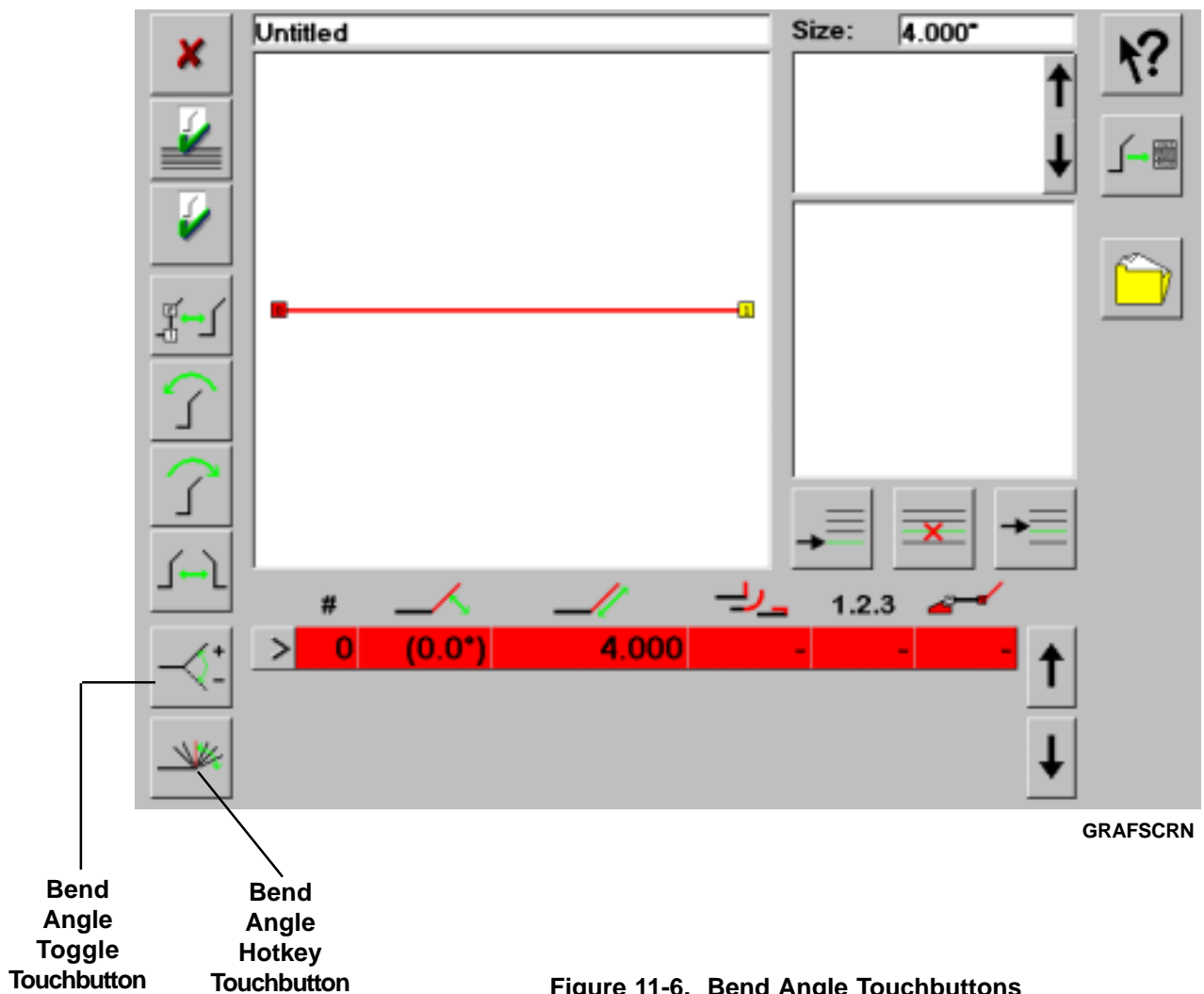


Figure 11-6. Bend Angle Touchbuttons

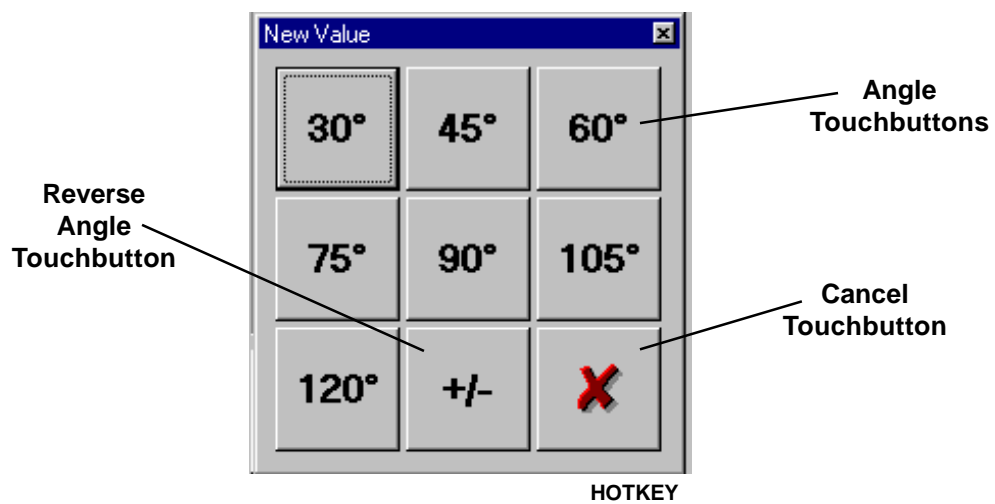


Figure 11-7. Angle Hotkey Pop-Up Display

BEND ANGLE TOUCHBUTTONS	The Bend Angle Touchbuttons are used to enter bend angles during the programming process.
BEND ANGLE TOGGLE TOUCHBUTTON	The Bend Angle Toggle Touchbutton reverses the direction of bend. When an angle is entered, it is always displayed as a “counterclockwise” (to the left) bend. If the bend is to be in the opposite direction, touching the Bend Angle Toggle Touchbutton will change it to the opposite direction. Angles can be changed to the opposite direction at any time. When used in Operation “0”, it rotates the default line 45° counterclockwise.
BEND ANGLE HOTKEY TOUCHBUTTON	The Bend Angle Hotkey Touchbutton calls up the Bend Angle Hotkey Pop-Up Display shown in Figure 10-7. This display enables the programmer to enter common angles quickly. When applied to operations in the Bend Angle Column, it replaces the default value (0.0) from the cell to which it is applied.
ANGLE TOUCHBUTTONS	The Angle Touchbuttons provide seven common angles. When a touchbutton is touched, it enters that angle into the cell in the operation line, and the Pop-Up Display disappears from the screen. Other bend angles are entered using the Numeric Pop-Up Keypad shown in Figure 11-9.
REVERSE ANGLE TOUCHBUTTON	The Reverse Angle Touchbutton is touched before touching an Angle Touchbutton to reverse the default (counterclockwise) bend angle. When touched, it changes all the bend angle Touchbuttons to minus values, and the entered angle will be clockwise.
CANCEL TOUCHBUTTON	The Cancel Touchbutton removes the Pop-Up Display from the screen without entering a bend angle in the Bend Angle Column.

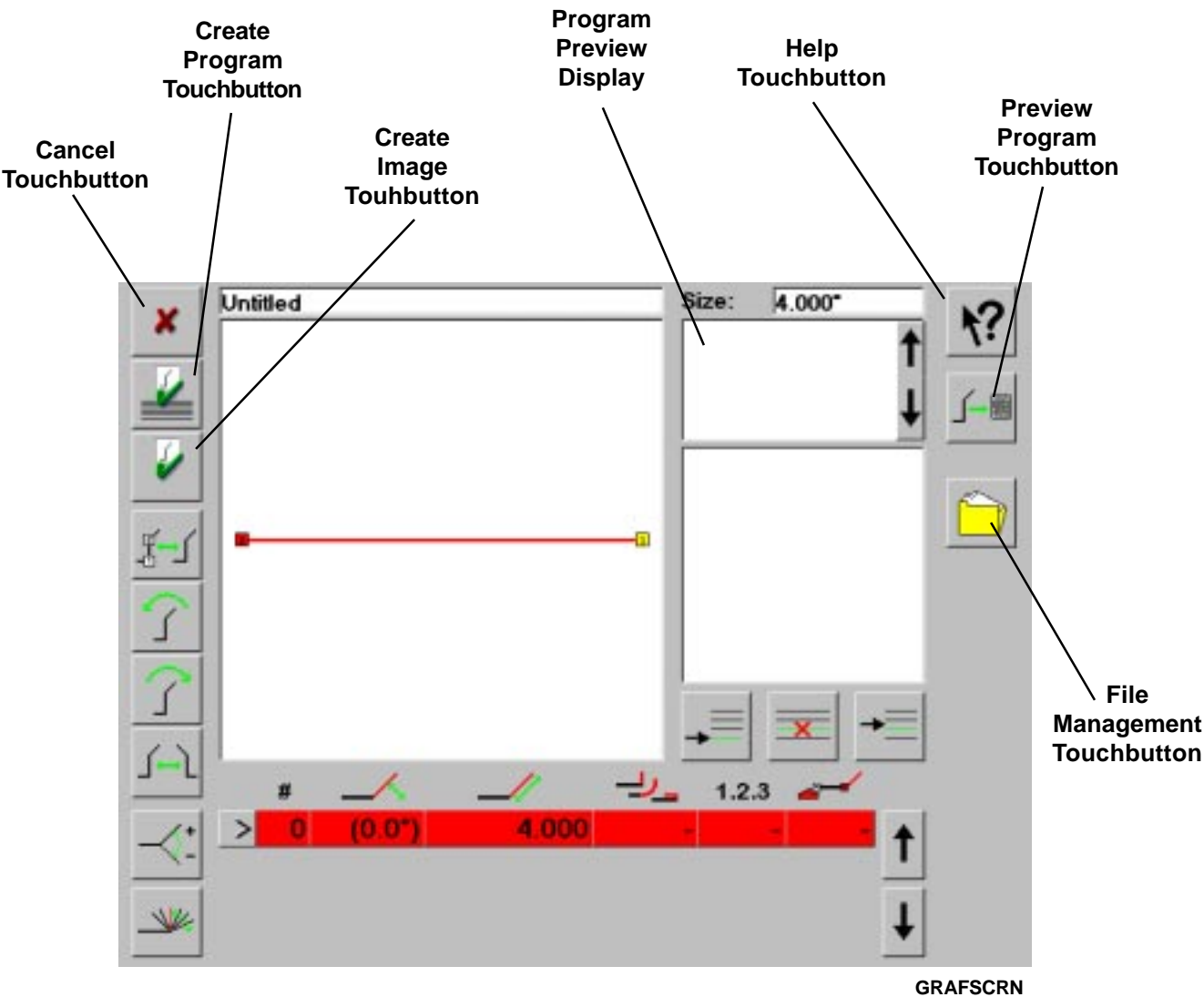


Figure 11-8. Remaining Graphic Programming Screen Touchbuttons

**HELP
TOUCHBUTTON**

The Help Touchbutton is used to provide an explanation of the various touchbuttons on the screen. When the Help Touchbutton is pressed a question mark appears after the cursor arrow. Press the touchbutton for which an explanation is desired. A box explaining the function of the touchbutton will appear.

To get an explanation for another touchbutton, repeat the process. The Help Touchbutton must be touched each time an explanation is needed.

**PREPARING
TO SAVE THE
PROGRAM**

Several Touchbuttons enable the programmer to prepare for saving the program.

**PREVIEW
PROGRAM
TOUCHBUTTON**

The Program Preview Touchbutton causes the program to appear, in abbreviated form, in the Program Preview Display. The programmer may then scroll through the program while checking it for correctness.

**CREATE
IMAGE
TOUCHBUTTON**

The Create Image Touchbutton is used to create an image for an already existing program. See Figure 11-24 for further information.

**CREATE
PROGRAM
TOUCHBUTTON**

The Create Program Touchbutton is used to create the graphic program from the image which has been drawn. At this point, the Graphic Programming Screen disappears, and the Run/Programming Screen appears, complete with the information available from the creation of the program.

The programmer must then complete the program, entering tooling data, angle compensation data, and any other required data. This data is entered using manual programming techniques.

**FILE
MANAGEMENT
TOUCHBUTTON**

The program must also be named and saved as directed in Section 12, File Management.

**CANCEL
TOUCHBUTTON**

The Cancel Touchbutton removes the Graphic Programming Screen and replaces it with the Run/Programming Screen without creating or saving a graphic image.

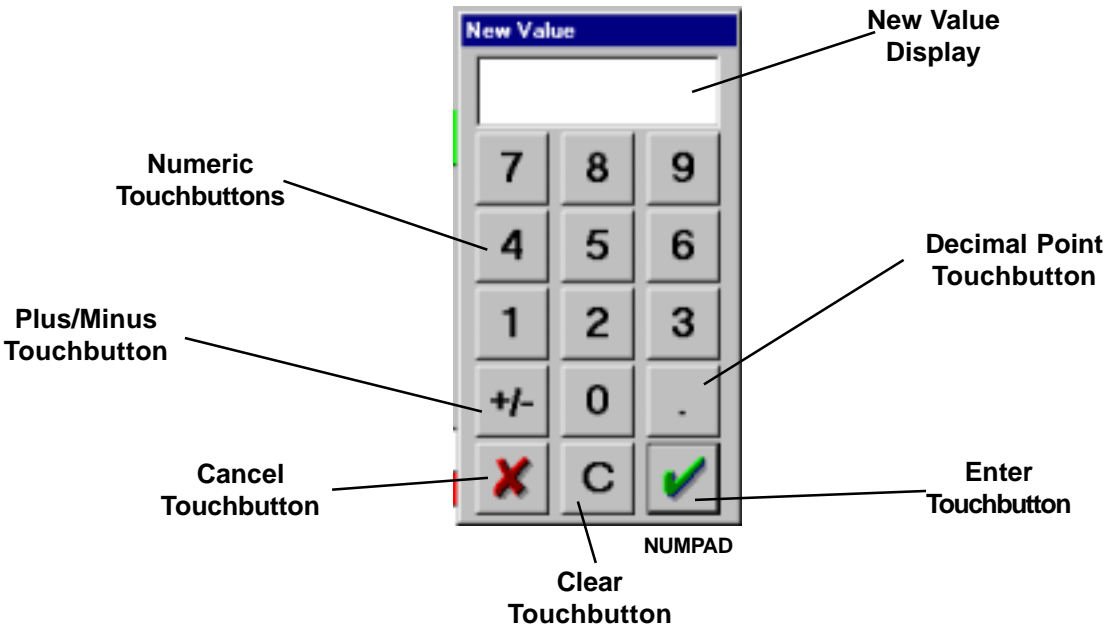


Figure 11-9. The Numeric Pop-Up Keypad

**ENTERING
PROGRAMMING
DATA**

The Numeric Pop-Up Keypad, shown in Figure 11-9, always appears when numeric data must be entered. It is always located at the extreme right-hand side of the screen.

Numeric data is entered by using the Numeric Touchbuttons. As the data is entered, it appears in the New Value Display at the top of the keypad. A decimal point is entered by using the Decimal Point Touchbutton.

Numeric values can be made positive or negative by using the Plus/Minus Touchbutton, which can be used at the beginning of an entry, or at any point after numeric data is entered. The system will convert any negative values to positive in any instance where negative values are not allowed.

A numeral can be removed from the New Value Display by touching the Clear Touchbutton. When this touchbutton is used, it removes one number at a time, starting from the right.

The New Value Display can be cleared completely by touching the Cancel Touchbutton.

When the value shown in the New Value Display is the value desired, the Enter Touchbutton is used to enter it into the program. The value in the New Value Display then moves to the appropriate display, and the Numeric Pop-Up Keypad disappears from the screen.

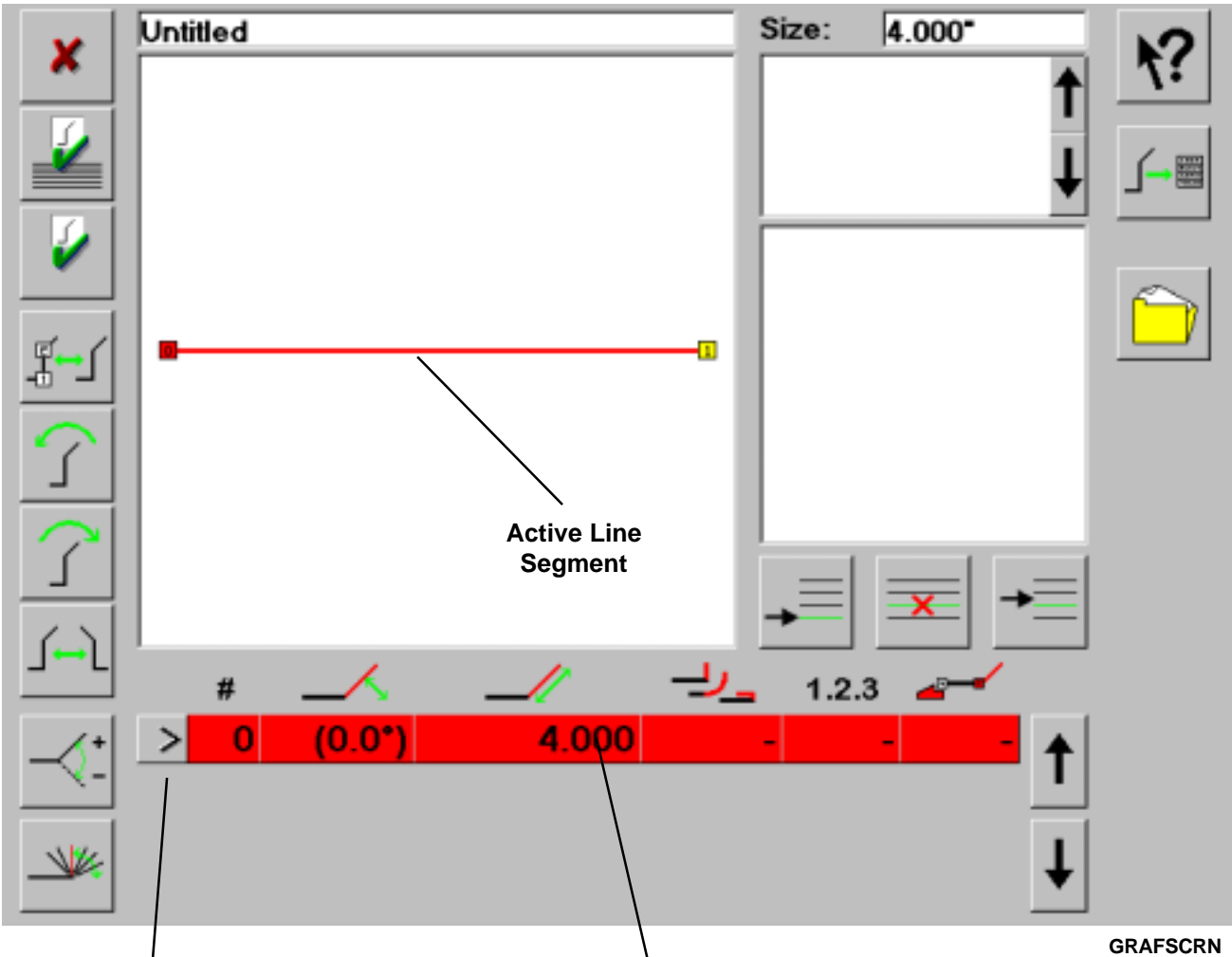


Figure 11-10. Programming Line Segments

**PROGRAMMING
LINE
SEGMENTS**

Line segments represent the portions of the part between bends. Whenever a normal bend operation is added, a new line segment is added beyond the bend, with a default length. The actual required length dimension must be substituted for this default length.

When the Graphic Programming Screen appears for a new program, a line segment is shown in red, and the operation number is designated as "0". This is not a bend operation. This segment length must be defined before the first bend angle (Operation 1) is entered. Entering a bend angle at this point rotates the initial line segment.

Touch the cell immediately below the line segment symbol. The Numeric Keypad Pop-Up Display (Figure 11-9) appears. Enter the line segment dimension on the keypad, and transfer it to the segment length cell by pressing the Enter Touchbutton.

As additional bend operations are added to the program, each contains a segment length cell, which is modified from the default in the same way.

**SELECTING
THE ACTIVE
LINE SEGMENT**

From time to time it may be necessary to modify the segment length of a previously defined segment. In order to do so, you must make that line segment active. Use one of two methods to do so. Either touch the desired line, or touch the block in the Current Operation Selector Column in front of the line operation line representing the desired segment. The selected segment will change to red.

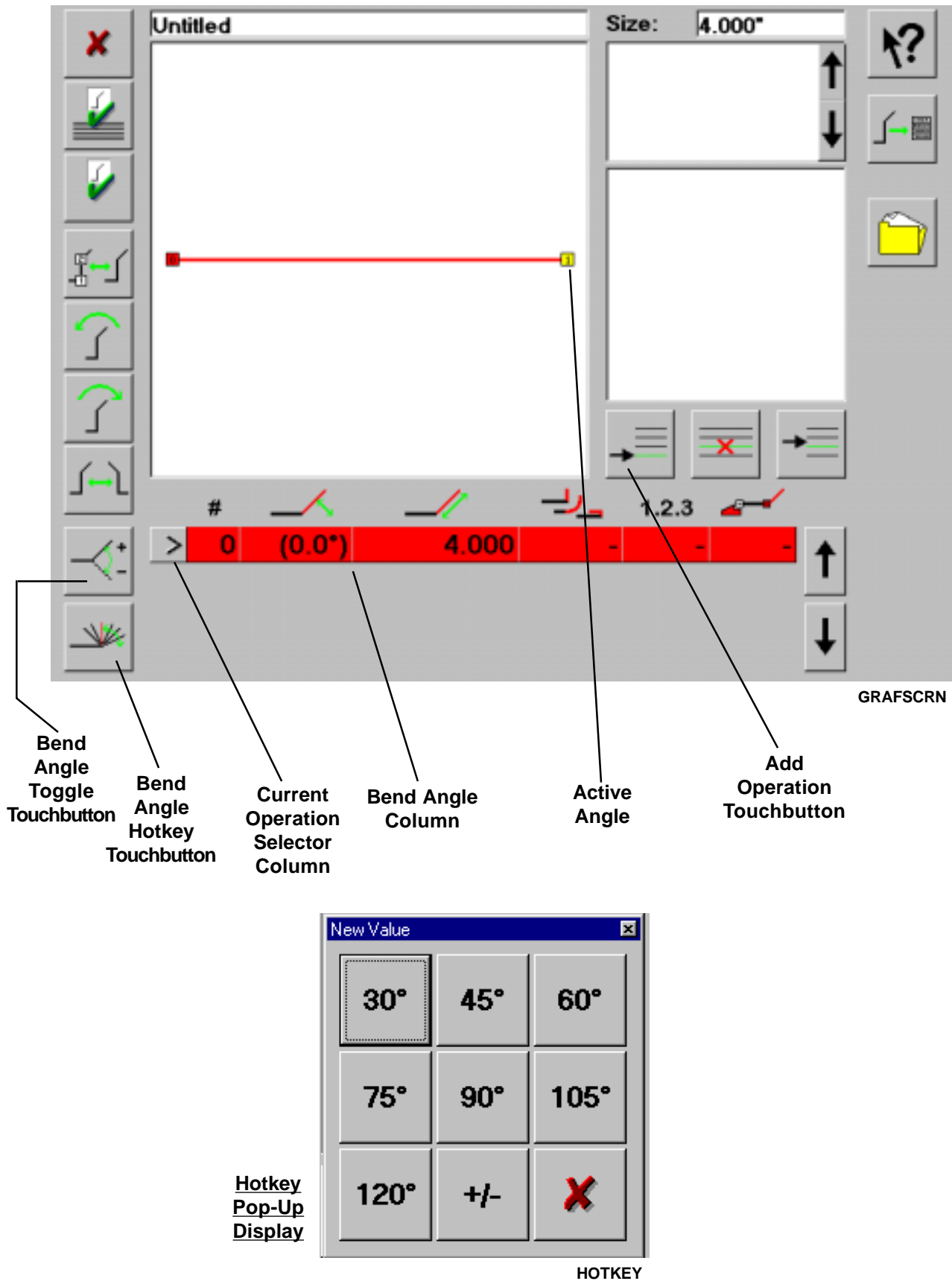


Figure 11-11. Programming Bend Angles

PROGRAMMING ANGLES

When the Graphic Programming Screen appears for a new program, a line segment is shown in red, and the operation number is designated as "0". This segment length must be defined before the first bend angle (Operation 1) is entered. Entering a bend angle at this point merely rotates the initial line segment.

Enter a new operation in the program by touching the Add Operation Touchbutton. A new line segment appears on the screen. The angle at the beginning of the new line segment is the active angle.

USING THE HOTKEY TOUCHBUTTON

Common angular values can be added in one of two ways. If the angle is a common angle, its value can be entered using the Bend Angle Hotkey Touchbutton (see Figure 11-11). Common bend angles entered from this touchbutton are:

30° 45° 60° 75° 90° 105° 120°

These angles are always counterclockwise (to the left). If an angle must be clockwise (to the right), touch the "+/-" Touchbutton to change it.

ENTERING OTHER ANGLES

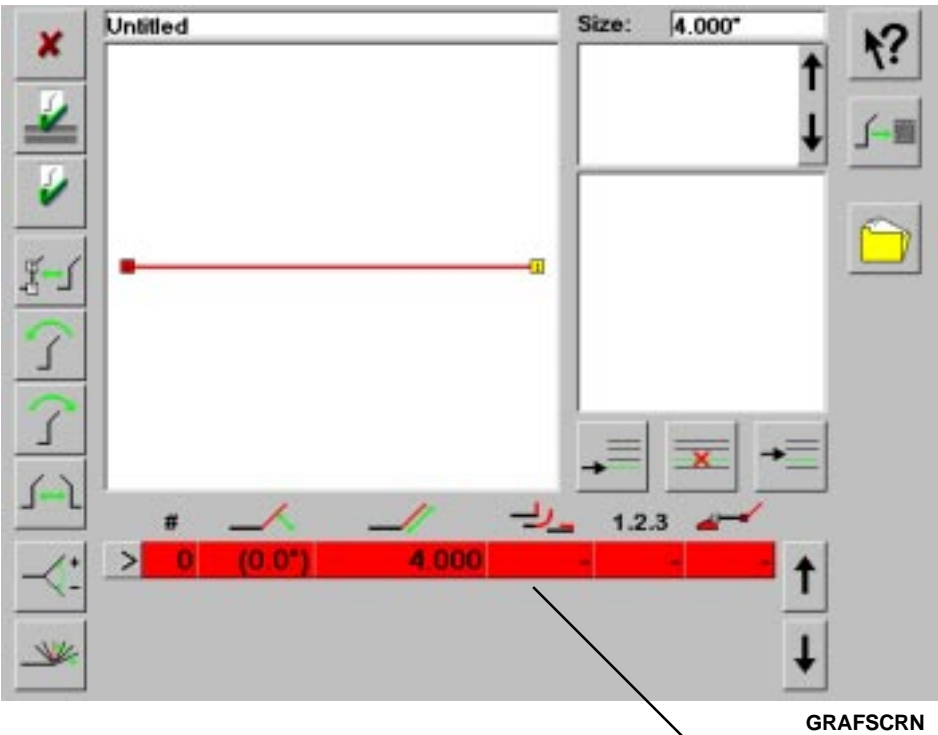
Other angles can be added by using the Numeric Keypad Pop-Up Display (see Figure 11-9). Touch the cell immediately below the line segment symbol. The Pop-Up Display appears. Enter the angle dimension on the keypad, and transfer it to the bend angle cell by pressing the Enter Touchbutton. Angles can be entered in tenths of a degree.

Angles entered from the Pop-Up Display are always counterclockwise (to the left). If the angle must be clockwise (to the right), touch the Bend Angle Toggle Touchbutton to change it.

As additional bend operations are added to the program, each contains a bend angle cell, which is entered in the same way.

SELECTING THE ACTIVE ANGLE

From time to time it may be necessary to modify the bend angle of a previously defined bend. In order to do so, you must make that angle active. Use one of two methods to do so. Either touch the desired angle, or touch the block in the Current Operation Selector Column in front of the line operation line representing the desired angle. The selected angle tag will change to red.



Bend Type
Touchbutton

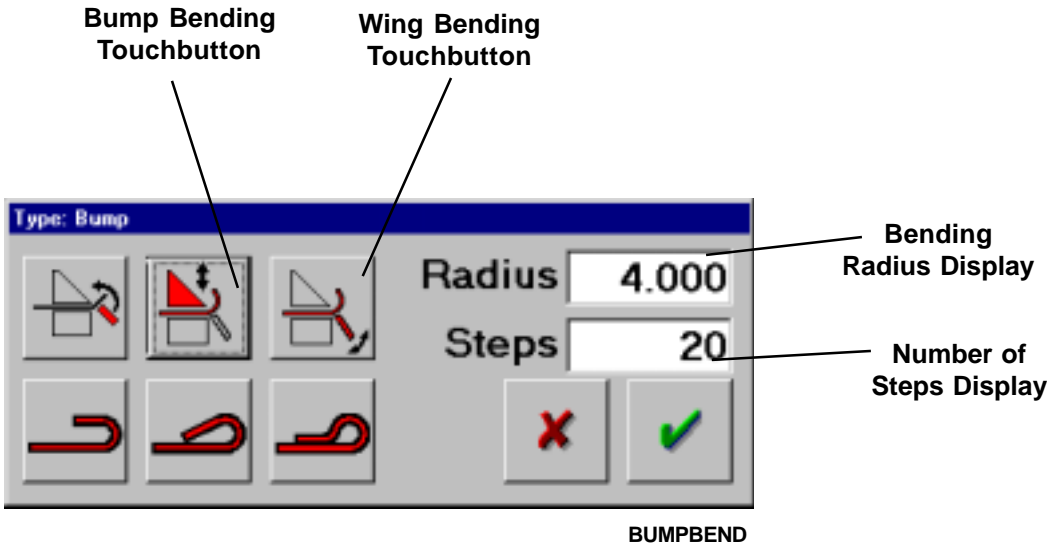


Figure 11-12. Programming a Radius Bend

**PROGRAMMING
A RADIUS
BEND**

In radius bending, the material is formed in a series of steps, each being a fraction of the total programmed bend. Both the desired radius and the desired number of steps must be entered into the bend type selection. When the Display for either value is touched, the Numeric Pop-Up Keypad (Figure 11-9) appears. Enter the numeric value desired (the minimum number of steps for a radius bend is "3"), touch the Enter Touchbutton of the keypad to transfer the value to the Bend Display, repeat the entry steps for the second value, and touch the Enter Touchbutton for the Selection Pop-Up to transfer the data to the program.

The Orion control calculates any required bending beam and backgauge movements from the settings entered above. Additional angle compensation may be required to form the desired radius. Adding specific compensation only for the radius bending operation is recommended when compensating for springback in the work material.

The programmed arc of the radius bend is shown in the large display, and the bend angle increment for each step is shown in the small display.

**BUMP
BENDING**

In Bump Bending, the bend pedal is pressed to begin, and the bending beam rotates to its programmed position. Thereafter, the bending beam remains locked in this position. The clamp pedal is pressed and the upper beam clamps the material, making the first bend step of the radius. The upper beam unclamps automatically and the backgauge automatically feeds the material toward the operator. Then the upper beam reclamps, forming the second step of the bend, and the process repeats itself until the radius is completely formed. (If the clamp pedal is held down, the cycle is automatic, as described. If the clamp pedal is released, it must be depressed again to continue the cycle.) During this process it is necessary for the operator to hold the workpiece firmly against the backgauge because bending takes place during the clamping downstroke, when the material is free to move about.

**WING
BENDING**

In Wing Bending, the upper beam is clamped against the work material before each incremental step of the radius is formed. The bend pedal is then pressed, and the bending beam rotates to the incremental bend position. The process is repeated for each incremental bend until the radius is complete.

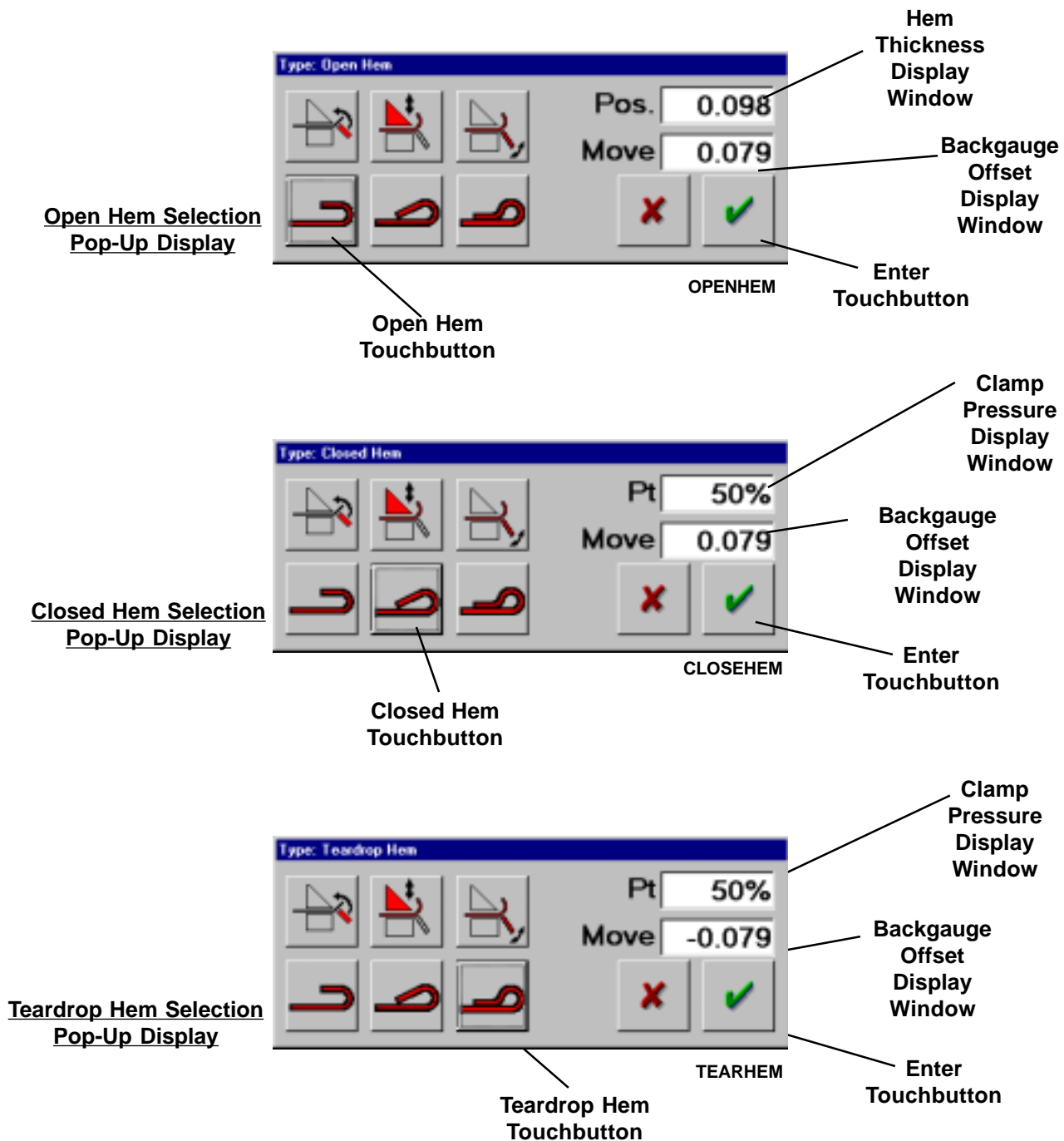


Figure 11-14. Hem Bending

HEM BENDING	<p>Forming a hem is a two-step process. The part is pre-bent to the maximum angle possible. The flange being formed is then placed under the upper jaw, and the clamp jaws are closed to form the hem.</p> <p>The backgauge offset positions the part so that the upper jaws clamp properly on the flange. Offset will vary depending on the size of the flange, and the hem being formed. The thickness and strength of the material may cause hems to be formed more at the end of the flange. Varying the backgauge offset allows some compensation for this.</p>
OPEN HEMS	<p>When an open hem is formed, the flange is bent until it is parallel to the adjacent material, but it is not flattened against the material. The hem is defined by its thickness, measured across the outside of the hem. The upper beam will use up to the maximum clamping power available to reach the desired configuration for the hem because no pressure is given.</p>
CLOSED HEMS	<p>Closed hems are formed by clamping on the edge of the hem. When a closed hem is formed, the material is bent back upon itself so that the edge of the flange touches the material. The hem is influenced by the backgauge offset, which governs clamping position, and the pressure needed to bring the flange edge against the material. When forming thin materials use a pressure appropriate for the material; better results can often be achieved by lowering the pressure.</p>
TEARDROP HEMS	<p>Teardrop hems are formed by clamping behind the edge of the hem. This flattens the edge of the hem against the material. This type of hem requires less pressure than that needed to for a closed hem. Therefore, thicker materials may be closed in a teardrop hem as compared to a closed hem. Also, if short flanges are used in the forming of the hem, bending a teardrop hem may yield more consistent results. When forming thin materials use a pressure appropriate for the material; better results can often be achieved by lowering the pressure.</p>

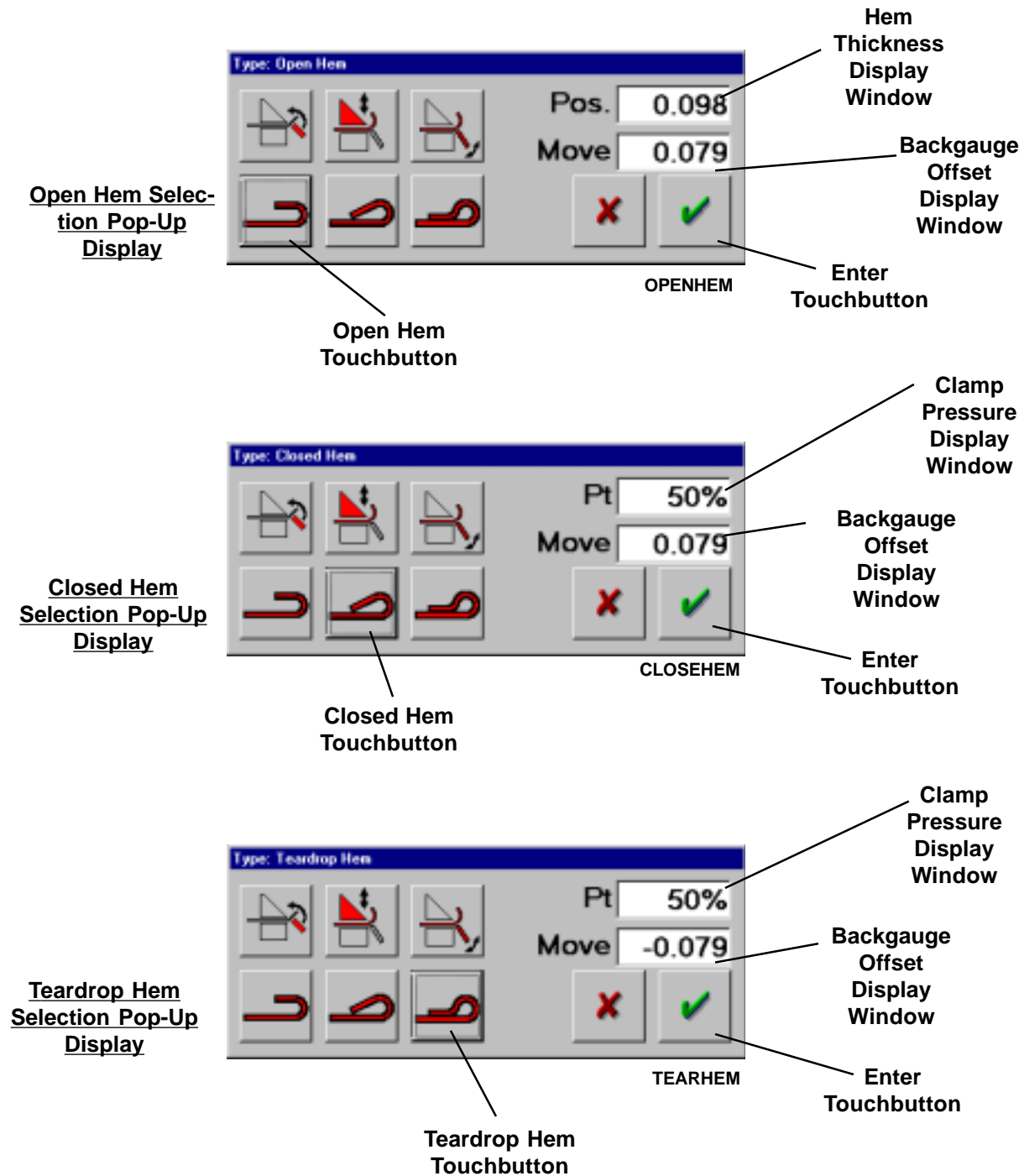


Figure 11-13. Hem Bending (continued)

ENTERING HEM DATA	<p>Pressing a Hem Selection Touchbutton opens two display windows in the appropriate Selection Pop-Up Display, shown in Figure 11-14. To enter a value other than the default value shown, touch the display window which must be changed.</p> <p>The Numeric Pop-Up Keypad (Figure 11-9) appears. Enter the appropriate data using the keypad, and then touch the Numeric Keypad Enter Touchbutton to transfer the value to the Display Window. The Numeric keypad will close. Repeat for the second Display Window.</p> <p>When the Display Windows contain the correct data, touch the Enter Touchbutton to enter the data into the program. The Selection Display will disappear, and the appropriate code will appear in the cell of the Bend Type Column.</p>
OPEN HEM BENDING	<p>When Open Hem is selected as the bend type, the Bend Angle Column changes to show the maximum angle allowed in the Machine Parameters. In addition to the backgauge offset position (bottom window), the hem dimension across the outside of the material at the hem (top window) must be entered.</p> <p>When the hem data is entered into the program, the code "OHem" appears in the cell in the Bend Type Column.</p>
CLOSED HEM BENDING	<p>When Closed Hem is selected as the bend type, the Bend Angle Column changes to show the maximum angle allowed in the Machine Parameters. In addition to the backgauge offset position (bottom window), the hem pressure to be used to close the hem (top window) must be entered.</p> <p>When the hem data is entered into the program, the code "CHem" appears in the cell in the Bend Type Column.</p>
TEARDROP HEM BENDING	<p>When Teardrop Hem is selected as the bend type, the Bend Angle Column changes to show the maximum angle allowed in the Machine Parameters. The backgauge offset position (bottom window) will always be negative; if you enter a positive number, the machine will convert it to a negative number. The hem pressure to be used to close the hem (top window) must also be entered.</p> <p>When the hem data is entered into the program, the code "THem" appears in the cell in the Bend Type Column.</p>

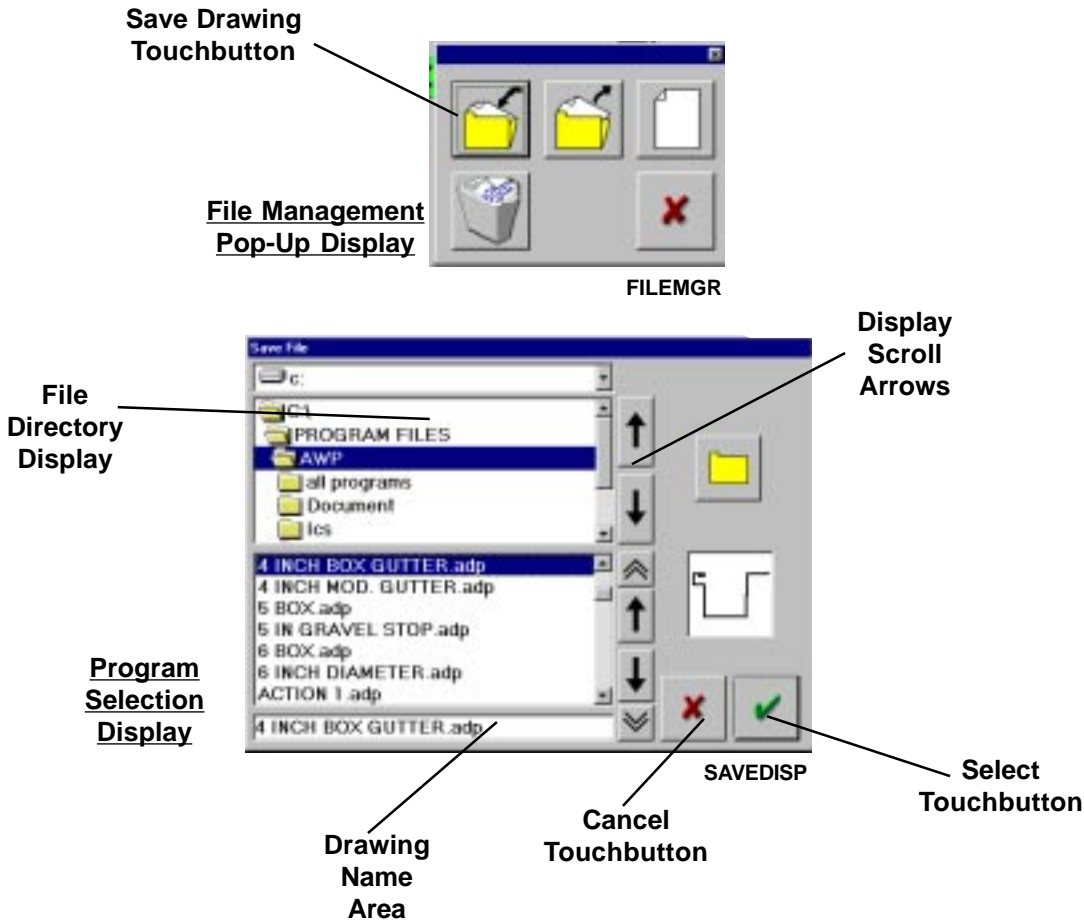
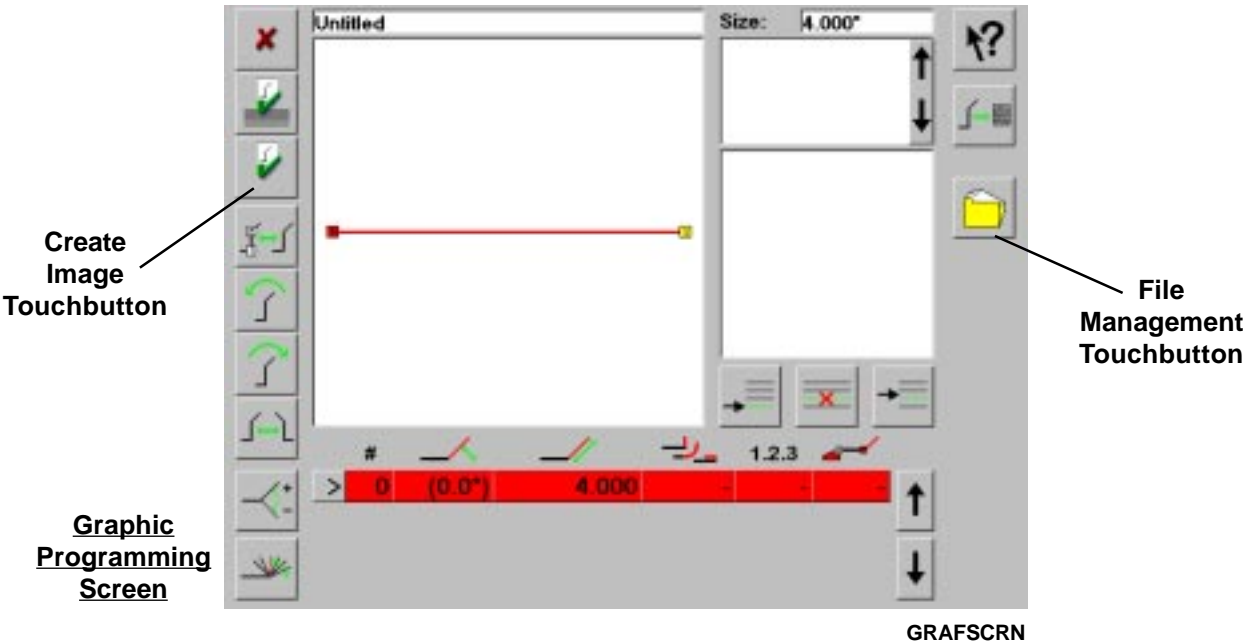


Figure 11-14. Saving a Drawing

SAVING A DRAWING

Drawings may be saved under several circumstances. They may be saved when incomplete, and worked on at a later time. They may be saved when complete without using them to produce a program. A completed drawing may later be attached to a manual program, or it may be used to produce a new program.

Drawings can be identified within the directory in which they are saved by the **.adp** extension after the drawing name.

Begin the save procedure by touching the File Management Touchbutton on the Graphic Programming Screen. This will bring up the File Management Pop-Up Display

Touch the Save Drawing Touchbutton. This will bring up the Program Selection Display.

Select the directory in which the drawing is to be stored. Directory names will appear in the File Directory Display. If there are many directories, scroll through the list using the display scroll arrows until the desired directory is found. Touch the directory name to select it.

Touch the Drawing Name Area. This will bring up the Alpha-Numeric Pop-up Keypad shown in Figure 11-15.

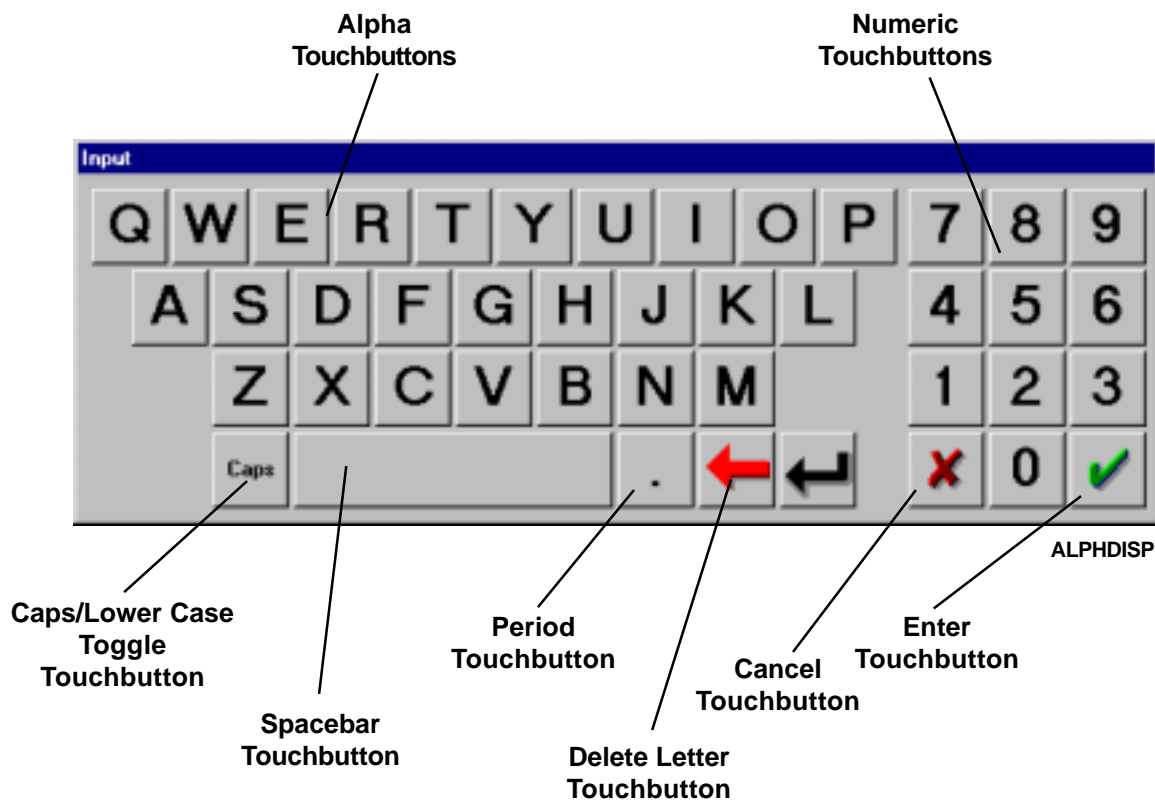


Figure 11-15. The Alpha-Numeric Pop-Up Keypad

**ENTERING THE
DRAWING
NAME**

The Alpha/Numeric Pop-Up Keypad, shown in Figure 11-15, always is used when file names are to be entered. It is always located at the bottom of the screen.

Textual data is entered by using the Alpha Touchbuttons. Numbers are entered by using the Numeric Touchbuttons. The Period Touchbutton is used to enter a period in the text. Spaces between words are added by using the Spacebar Touchbutton. Use the Upper/Lower Case Toggle Touchbutton to change from upper to lower case and back again. When this toggle is used, it automatically changes the Alpha-Touchbuttons from one case to the other. As the data is entered, it appears in the Program Title Area of the Program Selection display.

A character or space can be removed by touching the Delete Letter Touchbutton. When this touchbutton is used, it removes one character at a time, starting from the right.

The entry can be cleared completely by touching the Cancel Touchbutton.

**COMPLETING
THE SAVE
FUNCTION**

When the entry shown is that desired, touch the Enter Touchbutton on the Program Selection display. The display disappears, leaving the File Management Pop-Up Display on the screen. Touch the Enter Touchbutton on this Display to save the new program with the **.awp** extension to the system hard drive. At this point, the File Management Pop-Up Display will disappear.

It is not necessary to save the program to run it. However, if it is not saved, it will disappear when the Run/Programming Screen is closed and the machine is shut down.

Once a program is saved, it can be run immediately from the Run/Programming Screen without being called up from the system memory.

The system can also be shut down with no further action after the program is saved.

**MODIFYING OR
COMPLETING
AN EXISTING
DRAWING**

Drawings can easily be modified or completed. This section describes how to make modifications to such drawings. Begin the modification process by opening the drawing to be modified.

Touch the Graphic Programming Touchbutton on the Run/Programming Screen. This brings up the Graphic Programming Screen.

Touch the File Management Touchbutton on the Graphic Programming Screen to bring up the File Management Pop-Up Display.

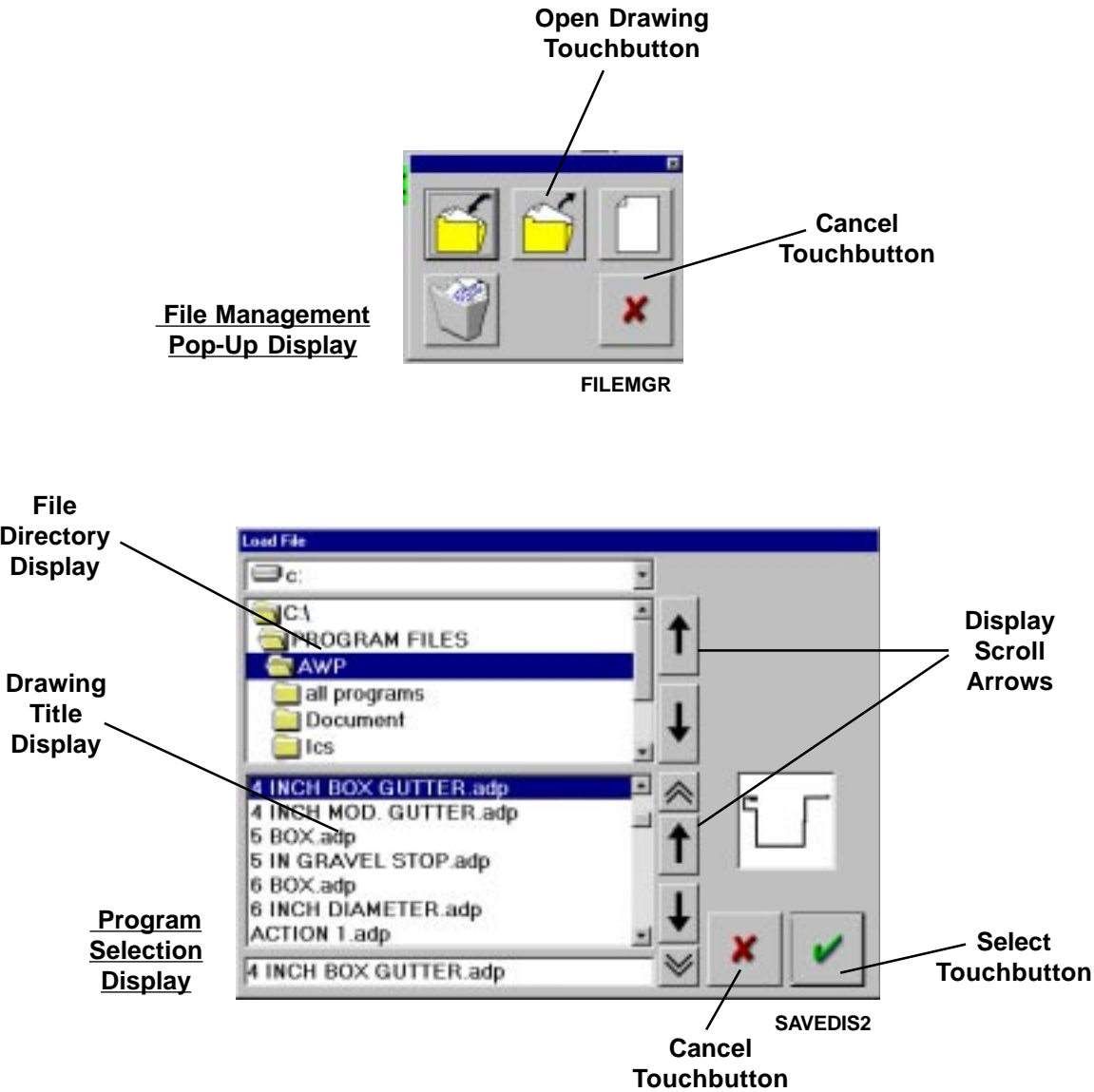


Figure 11-16. Opening a Drawing Prior to Modification (continued)

OPENING A DRAWING	Touch the File Management Touchbutton to bring up the File Management Pop-up Screen shown in Figure 11-16. Touch the open Program Touchbutton to bring up the Program Selection Pop-Up Display.
FILE DIRECTORY DISPLAY	<p>The File Directory Display shows the file structure on the computer hard drive. This is a WINDOWS-type file structure, and functions in the same way. Use the Display Scroll Arrows to move up and down within the file structure to locate the desired directory.</p> <p>When the desired directory is located, touch its screen entry to highlight it in blue.</p>
PROGRAM TITLE DISPLAY	<p>The Program Title Display shows the programs and drawings located in the highlighted directory. Drawings are identified by the .adp extension. Use the Display Scroll Arrows to move up and down through the program names to locate the desired program.</p> <p>When the desired drawing is located, touch its screen entry to highlight it in blue.</p>
SELECT TOUCHBUTTON	The Select Touchbutton calls up the drawing identified by the blue highlights. Touch it to load the drawing. The Graphic Programming Screen will reappear on the monitor.
CANCEL TOUCHBUTTON	If an incorrect drawing has been selected, touch the Cancel Touchbutton to start over.
COMPLETING THE MODIFICATION	Use the graphic drawing techniques described earlier to modify or complete the drawing.

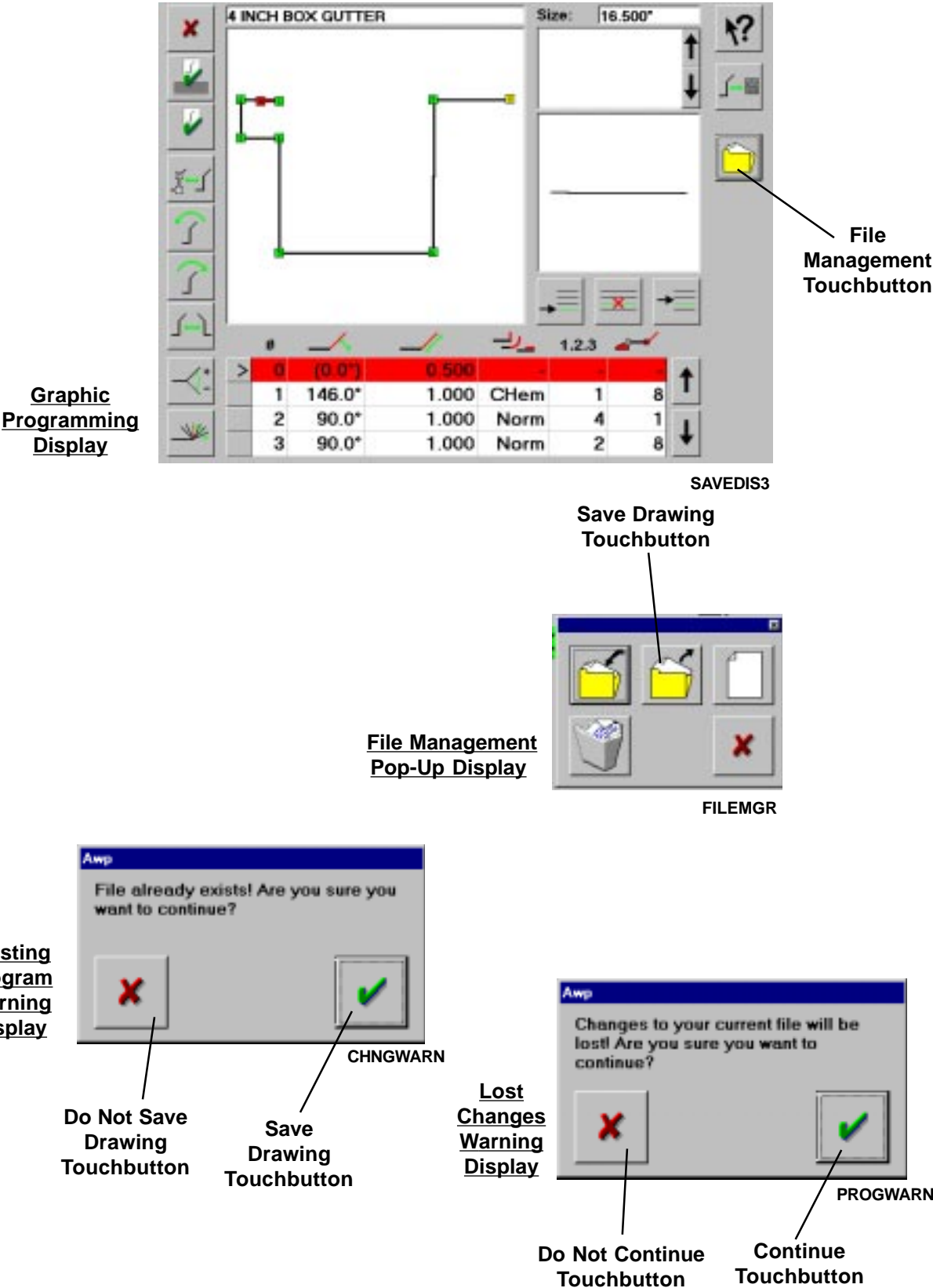


Figure 11-17. Saving a Modified Program

**SAVING A
MODIFIED
DRAWING**

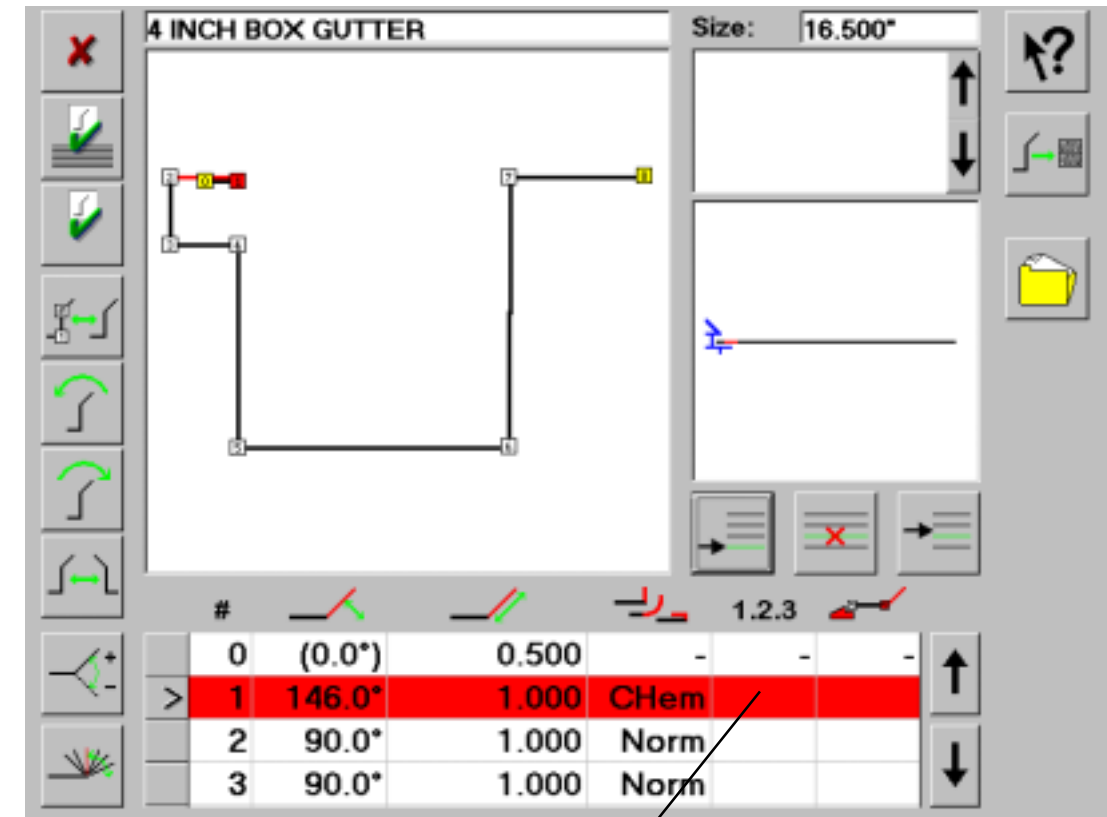
The procedure for saving a modified drawing is the same as that used to save a new drawing. However, a modified drawing can also be saved as a new drawing with a different name.

To save a modified drawing with a different name, follow the procedure used to save a new drawing. When you arrive at the point where a name must be entered, provide a new name using the same procedure as that used to provide a name to a new drawing.

If you wish to save a modified drawing using the same name, touch the Save Touchbutton on the Program Selection Screen without changing the program name. The Existing Program Warning Display will appear. Touch the Save Program Touchbutton on this display to save the modified drawing.

If you touch the Do Not Save Drawing Touchbutton, the Warning Display disappears, and you are given the opportunity to start the save process again from the File Management Pop-up Display.

After making changes, if you try to close the drawing without saving it, the Lost Changes Warning Display will appear. If you do not wish to lose the changes (you wish to save them), touch the Do Not Continue Touchbutton, and proceed with the save process. If you do not wish to save the changes, touch the Continue Touchbutton, and the changes to the program will be cancelled.



Bend
Order
Column

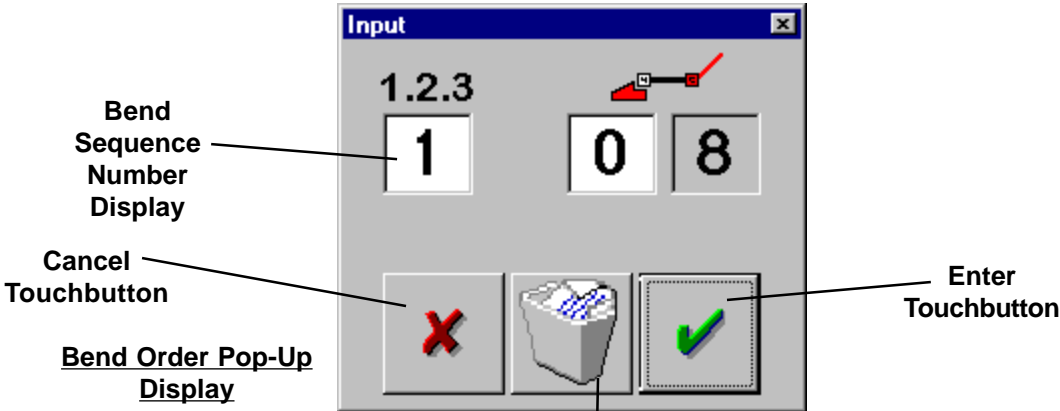


Figure 11-18. Setting the Bend Sequence

**CREATING A
PROGRAM
FROM A
DRAWING**

The system will create a “program” directly from a drawing. This can be done after a drawing is created, without saving the drawing, or it can be done from an existing drawing.

Three steps are involved. The bend order must be established, the backgauge location must be established, and the details not related to the drawing must be added.

**SETTING BEND
ORDER**

Set the bend order if it differs from the order in which the operations were entered. The bend order is entered in the Bend Order Column.

Bends must be entered in the order in which they will be formed. Touch the cell in the bend order column and in the operation which will become the first bend. The Bend Order Pop-Up Display will appear, and the bend order number “1” will appear in the Bend Sequence Number Display.

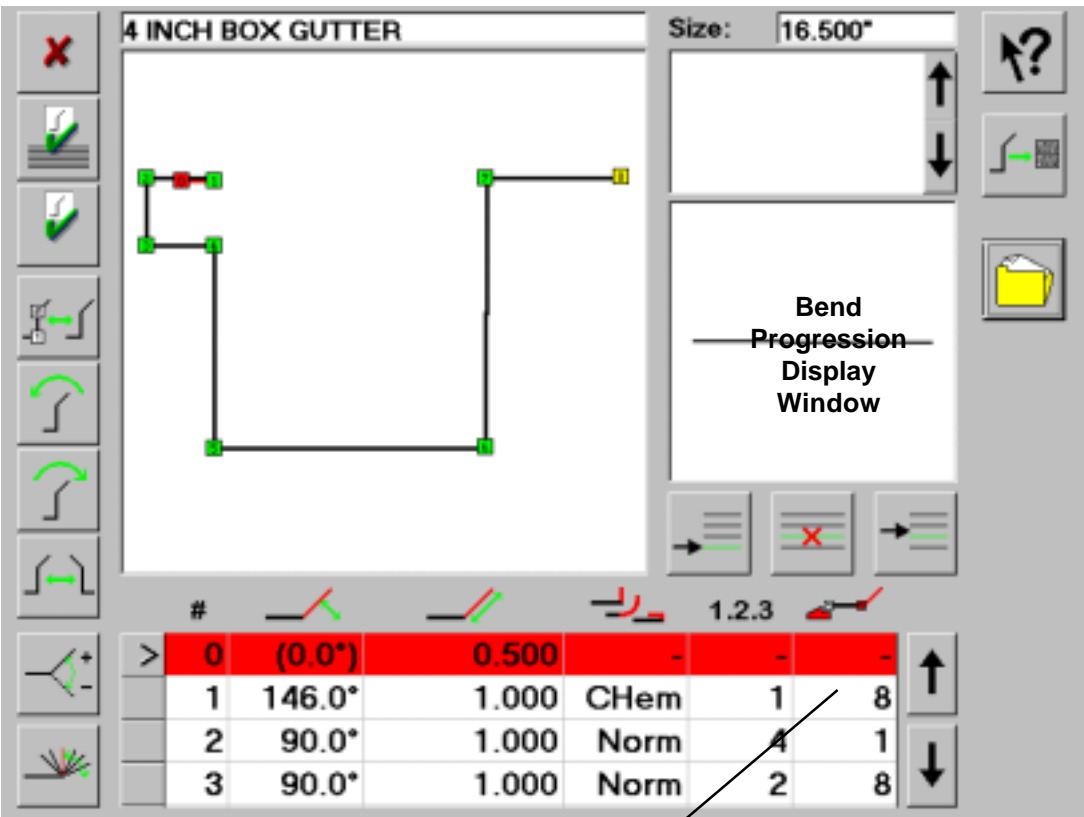
Repeat the process for the second bend operation. The number “2” will appear in the Bend Sequence Number Display. Repeat the process for each subsequent bend.

**CHANGING AN
INCORRECT
ENTRY**

If you enter an incorrect operation for a bend, touch the cancel touchbutton and the pop-up display will disappear without establishing that bend in the bend order.

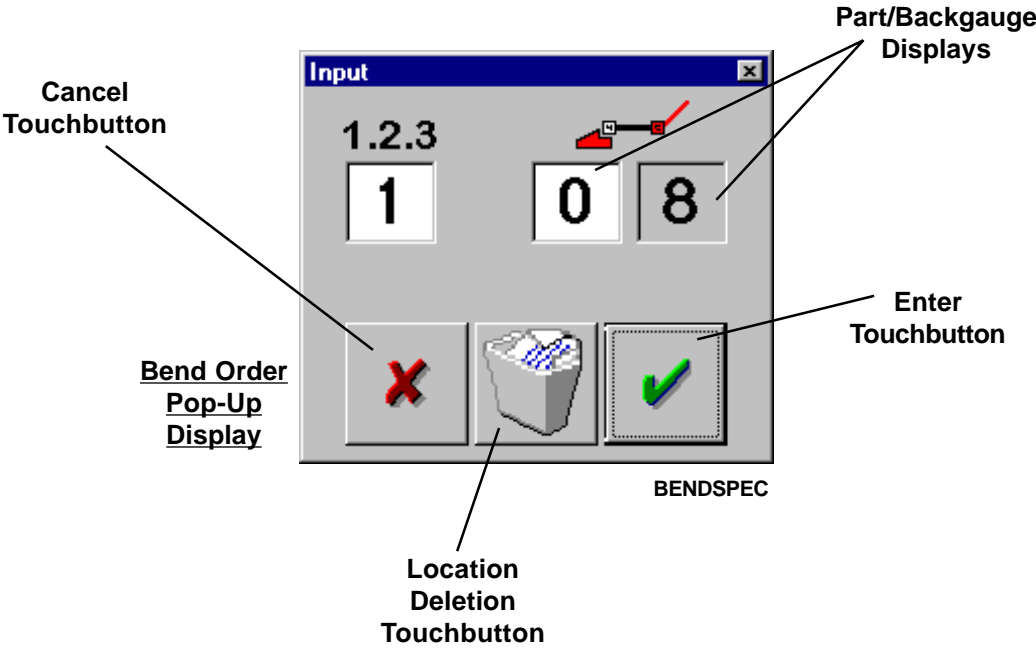
**MODIFYING
THE BEND
ORDER**

Should you wish to modify the bend order after it has been established, touch the order number cell in the first operation you wish to change. When the pop-up display appears, touch the Delete Touchbutton. The pop-up display will disappear, and all order numbers after the number to be changed will be removed from the program. Then re-enter the bend order in the correct sequence, starting from the number to be changed.



BENDSEQ2

Part/Backgauge Column



BENDSPEC

Figure 11-219. Setting the Part Location

**ESTABLISHING
PART
LOCATION**

Part location is normally established while the bend order is being established. When the Bend Order Pop-Up Display appears, Two choices for part location are provided for locating the part. The default choice is shown in white, and the alternate choice is shown “greyed out”. Each contains a number corresponding to the tag number identifying the bend. Touching the “greyed out” display will change the part location to the alternate choice.

The choice is automatically entered as part of the program when the bend sequence number is entered, and the tag number appears in the cell in the Part /Backgauge Column.

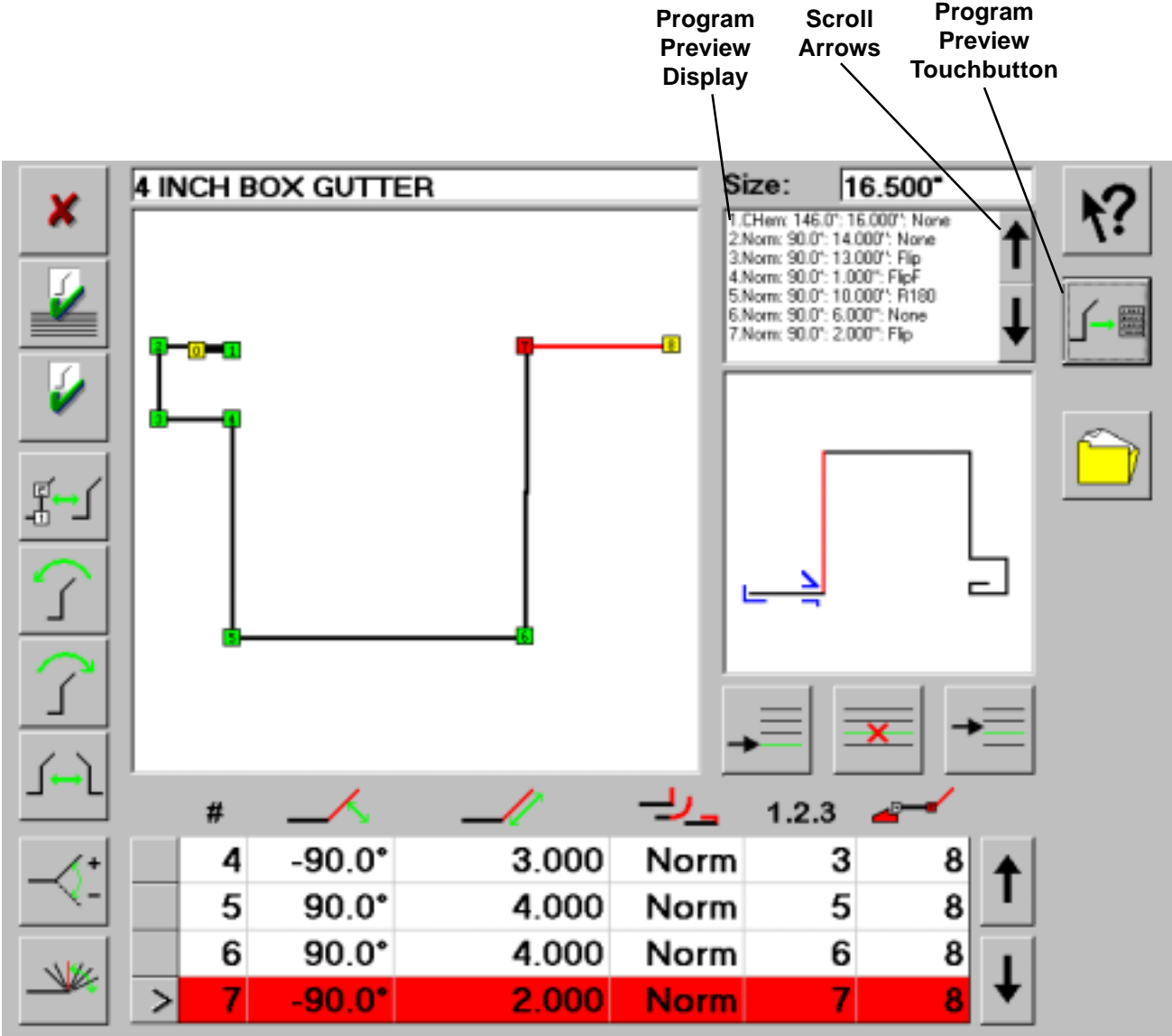
The Bend Progression Display Window shows the location of the clamp jaws and the backgauge in relation to the part. This enables the programmer to visualize the part in relation to the clamp jaws and the backgauge.

The system calculates material handling requirements from this information, and automatically includes them in the finished program.

**ESTABLISHING
ALTERNATE
PART
LOCATIONS**

The bend location provided by the system is not always the bend location desired. If a different part location is required, enter the bend sequence, and, when the pop-up display disappears, touch the cell containing the part location tag number you wish to change. The Numeric Keypad Pop-Up Display (Figure 10-9) will appear. Enter the number of the tag where you wish the part to be located. and transfer it from the keypad to the cell by pressing the Enter Touchbutton. Then continue entering the bend sequence.

Part locations can be modified at any time during the programming process by using the pop-up display.



PREVSCRN

Figure 11-20. Previewing the Completed Program

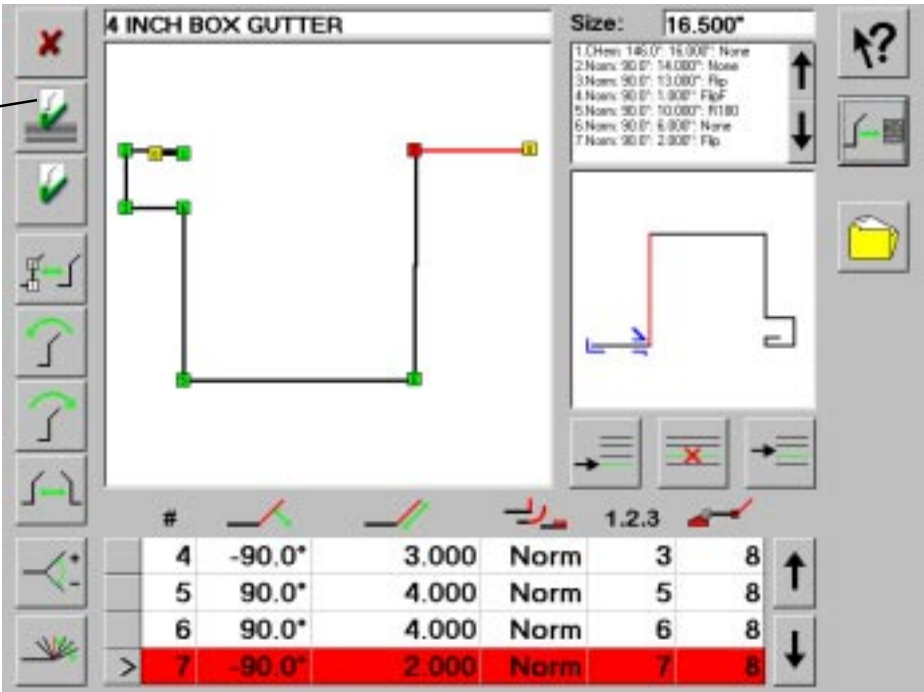
**PREVIEWING
THE PART
PROGRAM**

Although not necessary, it is wise to preview the program when the drawing is completed, and before it is saved. Touch the Program Preview Touchbutton, and the program will appear in abbreviated form, in the Program Preview Display. If necessary, use the Scroll Arrows to scroll through the program.

The drawing or the bend order can be changed at this time, and then previewed again, until the programmer is satisfied that it is correct.

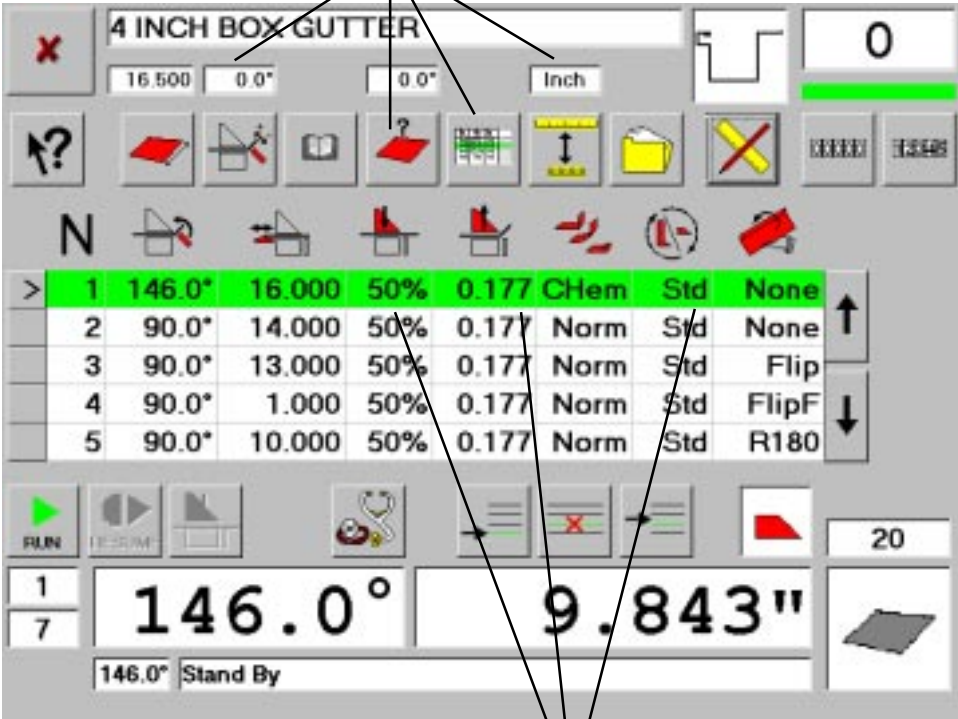
Create
Program
Touchbutton

Graphic
Programming
Screen



PREVSCRN

Areas Which May Need
Modification



MODLOCS

Areas Which May
Need Modification

Figure 11-21. Completing the Program

**ENTERING
DATA NOT
RELATED TO
THE DRAWING**

The program is still not ready for use. Certain portions of the program must be completed using manual programming techniques.

Touch the Create Program Touchbutton. This converts the data from the drawing process into a program which can be saved to system files. At the same time, the Graphic Programming Screen disappears and is replaced by the Run/Programming Screen.

**FINALIZING
THE PROGRAM**

Complete as necessary the portions of the program which have not yet been addressed. These are labelled "Areas Which May Need Modification" in Figure 11-21. Use Manual programming techniques to complete the programming process; these areas are listed and indexed (by figure number) below:

General Program Information (see Figure 10-6)

Selecting a Unit of Measure (see Figure 10-8)

General Angle Compensation (see Figure 10-8)

Angle Compensation Tables (see Figure 10-8)

Selecting Columns (see Figures 10-10 and 10-11)

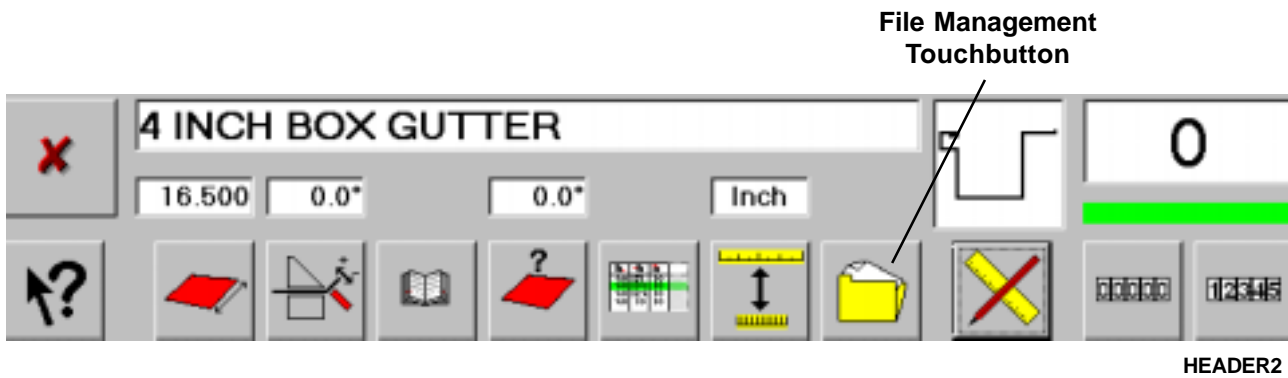
Angle Compensation for Specific Bends (see Figure 10-14)

Setting Backgauge Pause and height (see Figure 10-15)

Setting Clamping Pressure (see Figure 10-16)

Entering Tooling Data (see Figure 10-20)

The program still has not been saved to the hard drive memory. However the program can be run at this point. If the program is to be retained for future use, see Figure 11-22.



Save Program
Touchbutton

Cancel
Touchbutton

File Management
Pop-Up Display



FILEMGR

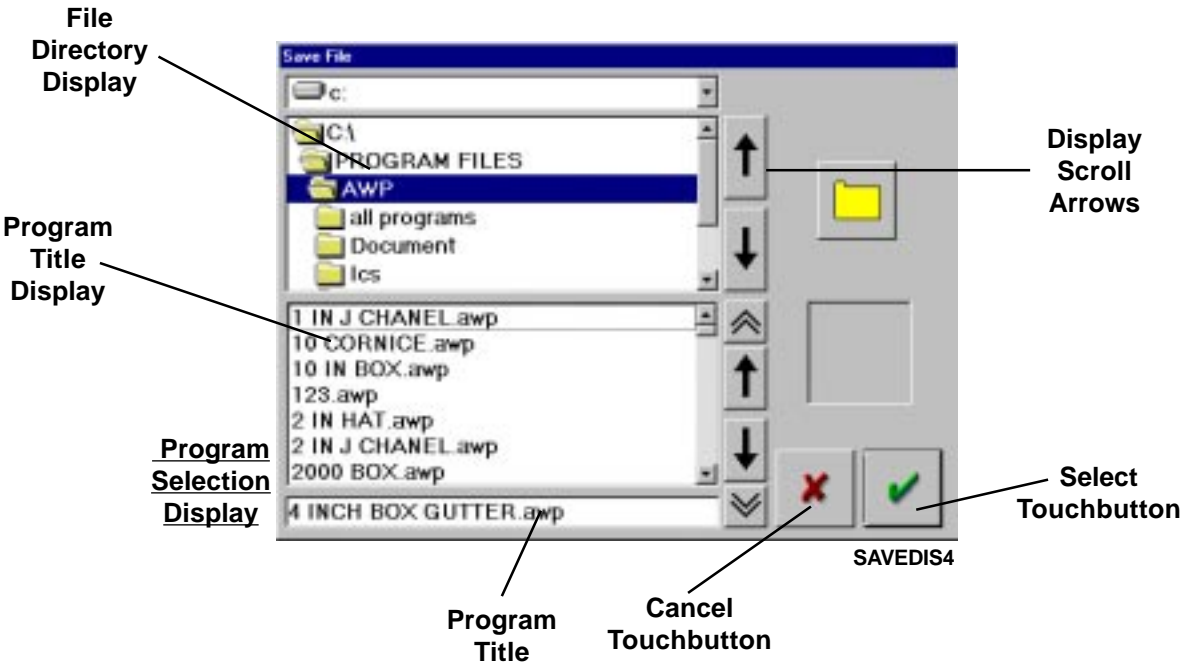


Figure 11-22. Saving a Program

**SAVING A
GRAPHIC PART
PROGRAM**

Once a graphic part program has been prepared, it can be saved to the hard drive. This involves selecting the directory in which it is to be saved on the hard drive, naming the program, and then saving it to the hard drive. See Figure 11-22.

Touch the File Management Touchbutton on the Run/Programming Screen. The File Management Pop-up Display will appear.

Touch the Save Program Touchbutton on the File Management Pop-up Display. The Program Selection Display will appear. At this point the Program Title will be "Untitled", unless the program has already been named. If so, the program name will appear.

**SELECTING
THE
DIRECTORY**

Select the directory in which the program is to be stored. Directory names will appear in the File Directory Display. If there are many directories, scroll through the list using the display scroll arrows until the desired directory is found. Touch the directory name to select it.

Touch the Program Title area in the Program Title Display. The Alpha-Numeric Pop-up Keypad, shown in Figure 11-23, will appear.

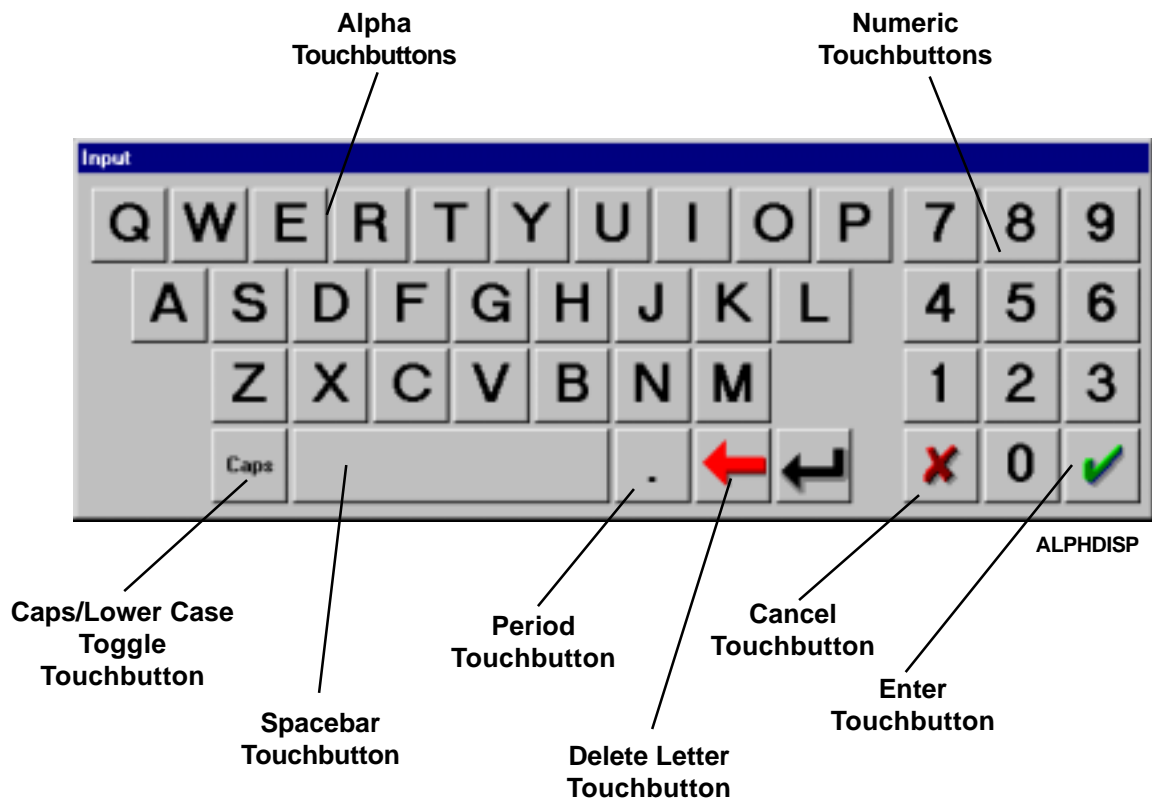


Figure 11-23. The Alpha Pop-Up Keypad

ENTERING THE PROGRAM NAME	<p>The Alpha/Numeric Pop-Up Keypad, shown in Figure 11-23, always is used when file names are to be entered. It is always located at the bottom of the screen.</p> <p>Textual data is entered by using the Alpha Touchbuttons. Numbers are entered by using the Numeric Touchbuttons. The Period Touchbutton is used to enter a period in the text. Spaces between words are added by using the Spacebar Touchbutton. Use the Upper/Lower Case Toggle Touchbutton to change from upper to lower case and back again. When this toggle is used, it automatically changes the Alpha-Touchbuttons from one case to the other. As the data is entered, it appears in the Program Title Area of the Program Selection display.</p> <p>A character or space can be removed by touching the Delete Letter Touchbutton. When this touchbutton is used, it removes one character at a time, starting from the right.</p> <p>The entry can be cleared completely by touching the Cancel Touchbutton.</p>
COMPLETING THE SAVE FUNCTION	<p>When the entry shown is that desired, touch the Enter Touchbutton on the Program Selection display. The display disappears, leaving the File Management Pop-Up Display on the screen. Touch the Enter Touchbutton on this Display to save the new program with the .awp extension to the system hard drive. At this point, the File Management Pop-Up Display will disappear.</p> <p>It is not necessary to save the program to run it. However, if it is not saved, it will disappear when the Run/Programming Screen is closed and the machine is shut down.</p> <p>Once a program is saved, it can be run immediately from the Run/Programming Screen without being called up from the system memory.</p>
OPTIONS	<p>The system can also be shut down with no further action after the program is saved.</p>

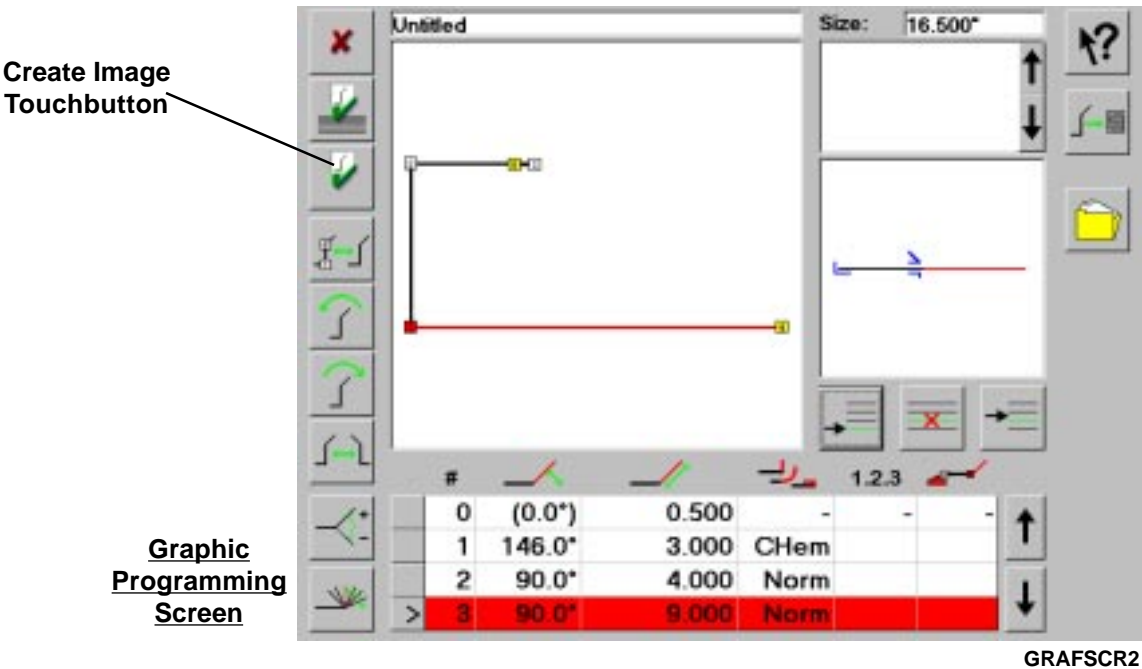
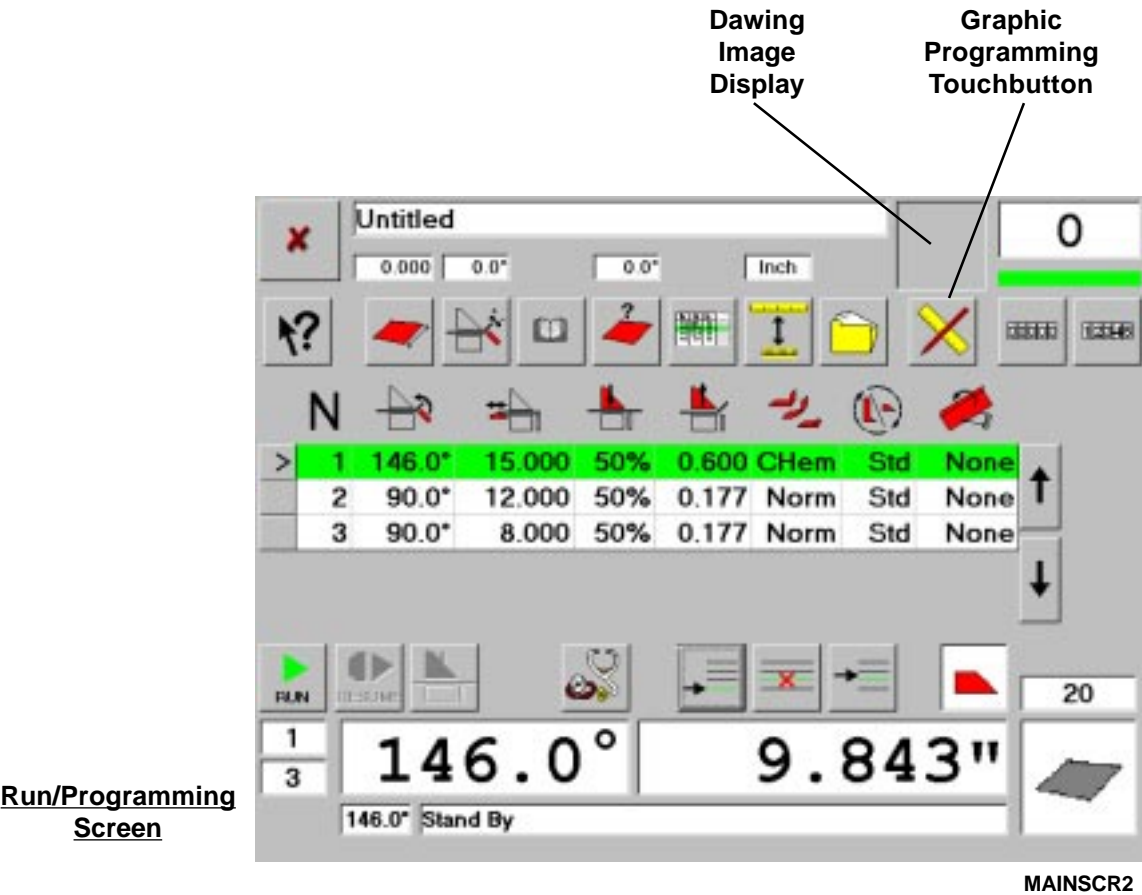


Figure 11-24. Attaching a Drawing to a Manual Program

**ATTACHING A
DRAWING TO
AN EXISTING
PROGRAM**

A drawing can be attached to an existing manually prepared program.

Open the manual program according to the instructions accompanying Figure 10-24 in Section 10, Manual Programming

When the program is open, touch the Graphic Programming Touchbutton. This will bring up the Graphic Programming Screen shown in Figure 11-24.

If the desired drawing already exists, open it according to the instructions accompanying Figure 11-16. If it does not exist, create it at this time.

Touch the Create Image Touchbutton on the Graphic Programming Screen. The Pop-Up Displays and the Graphic Programming Screen will disappear, and the drawing image will appear in the Drawing Image Display on the Run/Programming Screen.

Save the program according to the instructions accompanying Figure 10-25 in Section 10, Manual Programming.