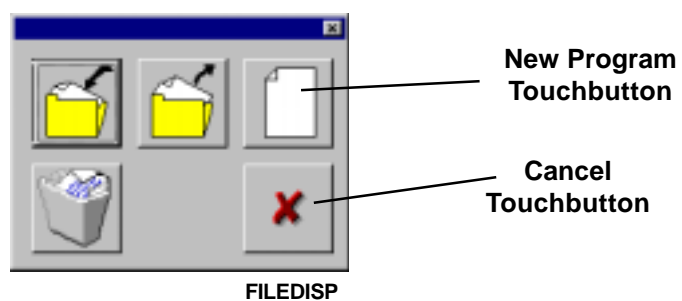


**Figure 10-1. The Run/Programming Screen and the Programming Touchbutton**



**Figure 10-2. The File Management Screen**

---

## SECTION 10

# MANUAL PROGRAMMING

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Programs can be prepared for the Orion Control System in two ways. Manual programming is described in this section. The other method, graphic programming, is described in Section 11, Graphic Programming.

In manual programming, programs are prepared by entering numerically, and by selecting symbols (tooling changes and material handling).

It is not necessary to enter data in the order in which it is presented in this section. The order shown, however, is a systematic approach, and will avoid inadvertently leaving out information which may be needed.

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

### GETTING STARTED

To begin manual programming, touch the File Management Touchbutton to bring up the File Management Pop-up Screen shown in Figure 10-2.

Begin manual programming by touching the New Program Touchbutton shown in Figure 10-2. This alerts the system to the fact that a new program is being prepared. This step is not mandatory, but if it is skipped, saving the file is done somewhat differently (see Section 12, File Management.)

When the New Program Touchbutton is touched, the File Management Pop-up Screen disappears, and programming can begin.

### CANCEL TOUCHBUTTON

If the Cancel Touchbutton is touched, the File Management Pop-up Screen disappears.

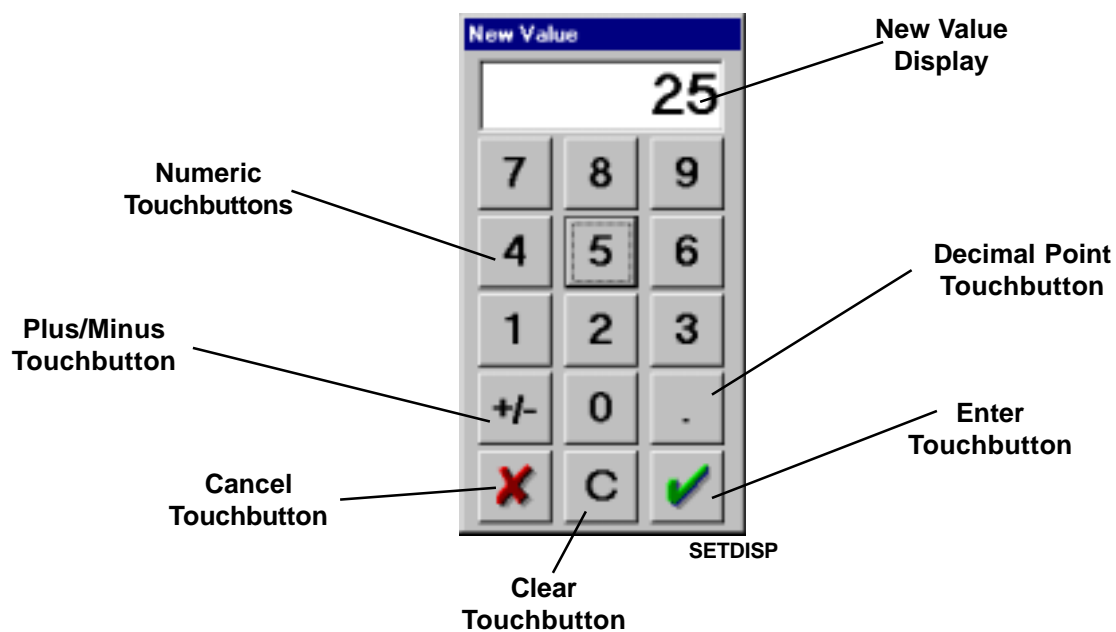


Figure 10-3. The Numeric Pop-Up Keypad

**ENTERING  
PROGRAMMING  
DATA**

There are two means of entering numeric and textual data into a program. Both means are through pop-up keypads which appear in response to an indication that data must be entered.

**NUMERIC  
POP-UP  
KEYPAD**

The Numeric Pop-Up Keypad, shown in Figure 10-3, 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.

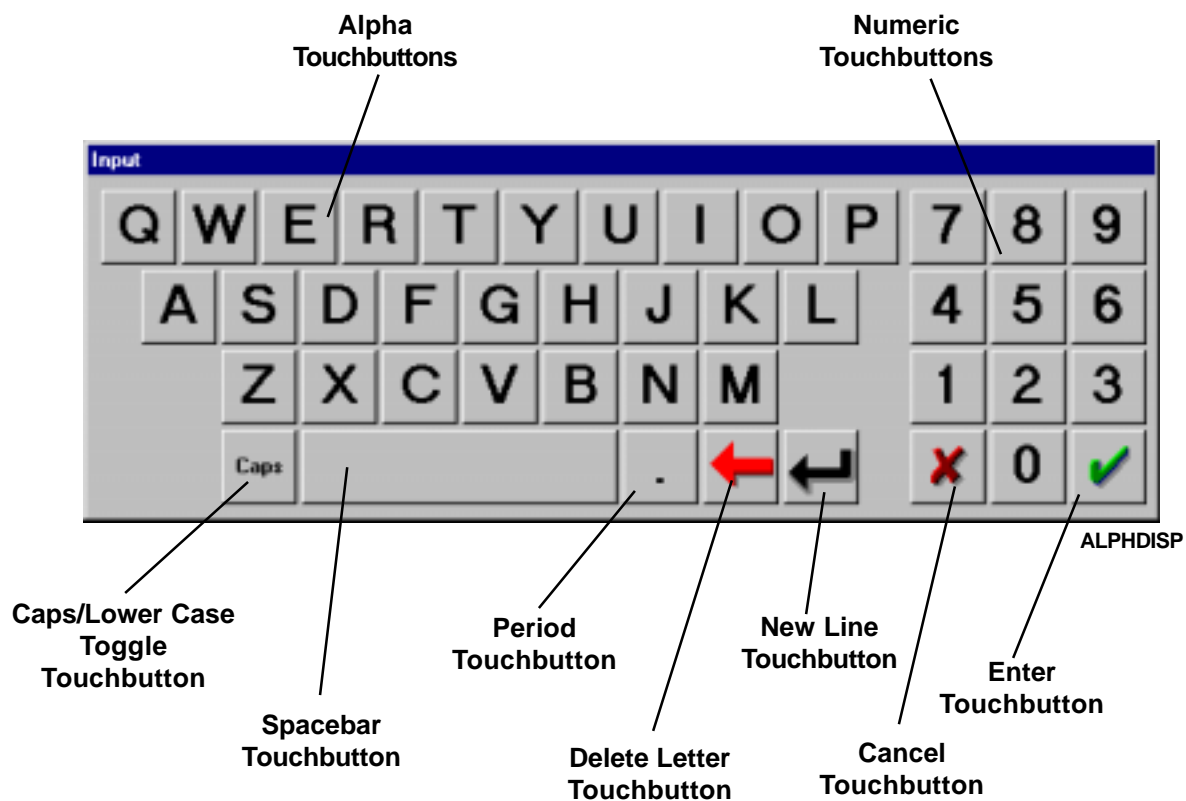


Figure 10-4. The Alpha-Numeric Pop-Up Keypad

**ALPHA-  
NUMERIC  
POP-UP  
KEYPAD**

The Alpha-Numeric Pop-Up Keypad, shown in Figure 10-4, always appears when text-type data must 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 touchpads from one case to the other.

A new line can be started in certain displays by touching the New Line Touchbutton.

It must be remembered that numerals entered from this pop-up keypad contain no mathematical value; they are treated as alphabetical characters instead. This does not preclude the use of numerals for identification or description purposes. For instance, a program title such as "3.500 inch J Channel" can be entered, but the "3.500" portion of the entry carries no mathematical value within the program.

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.

When the entry shown is that desired, the Enter Touchbutton is used to enter it into the program. If the entry is in a pop-up display, it moves to the appropriate display and the pop-up display disappears. The Alpha-Numeric Pop-Up Keypad then disappears from the screen.

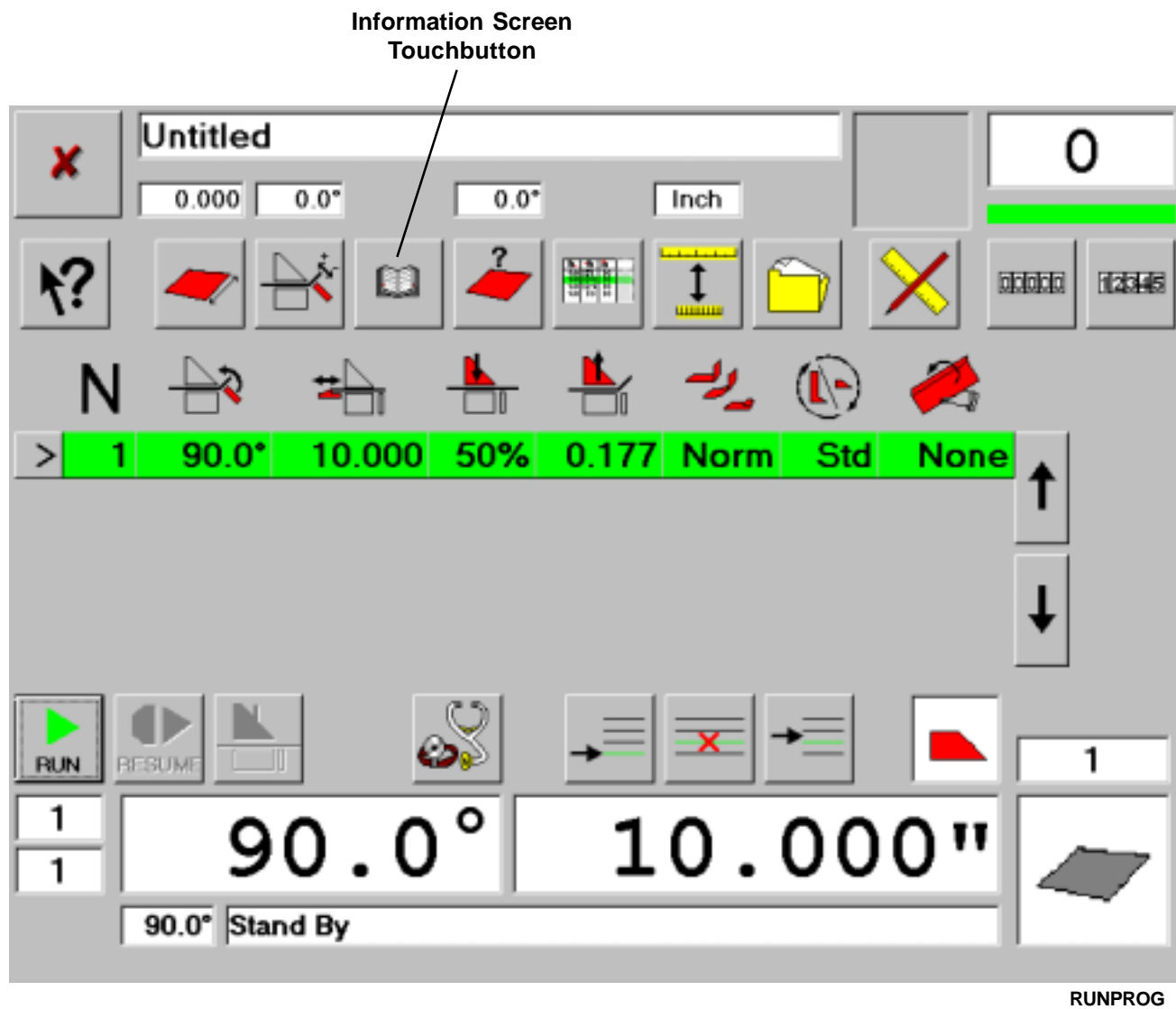


Figure 10-6. Entering General Program Information

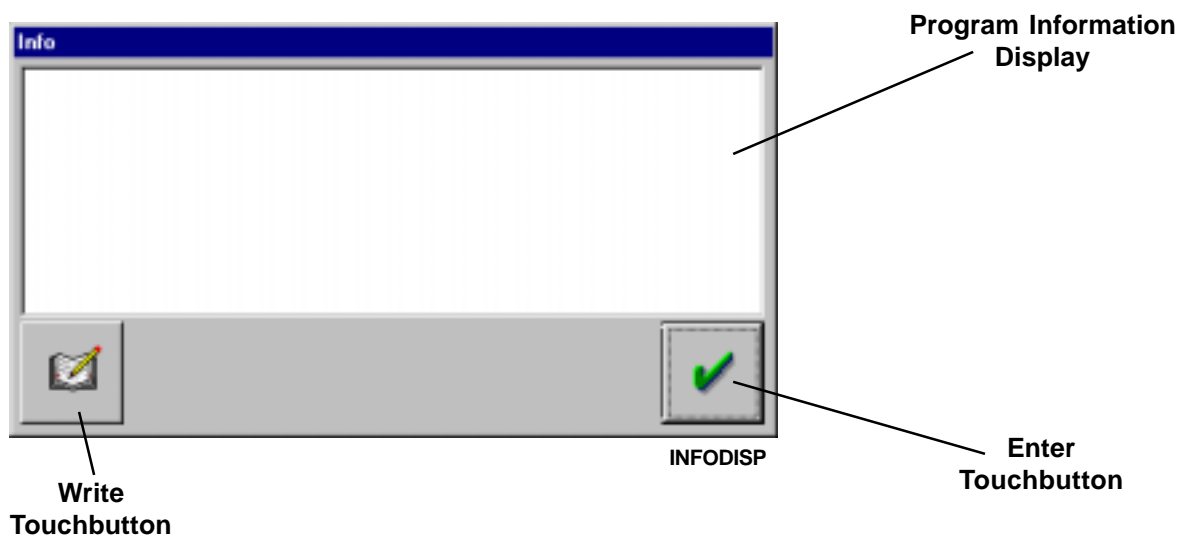


Figure 10-7. The Program Information Display

**ENTERING  
GENERAL  
PROGRAM  
INFORMATION**

General program information consists of such items as material description, material handling tips, and other information which may be of use to the operator. Once entered, it appears on the Program Information Display shown in Figure 10-7. The Information Display has no effect on the program, and, can be left blank.

Information can be added or edited according to the procedures described below.

**ACCESSING  
THE  
INFORMATION  
DISPLAY**

The Information Screen Display is accessed by pressing the Information Screen Touchbutton shown in Figure 10-6. The Program Information Display shown in Figure 10-7 then appears. For new programs, the Display will be blank. Existing programs being modified will show any information previously entered.

**ENTERING  
DATA**

To enter data, touch the Write Touchbutton. The Alpha-Numeric Pop-Up Keypad, shown in Figure 10-4, will appear at the bottom of the display. Enter the desired information. As the entry is made, it will appear in the Program Information Display.

If information is to be modified, touch the Delete Letter Touchbutton and erase the entry up to the point where the new information is to be incorporated. Then enter the new information, followed by any information deleted but still valid.

**CLOSING THE  
DISPLAY**

Once the data entered in the Program Information Display is correct, touch the Enter Touchbutton to incorporate it into the program file. At this point, the Alpha-Numeric Pop-Up Keypad will disappear.

The Program Information Display will remain on the Screen. Press the Enter Touchbutton on the Display to close it.



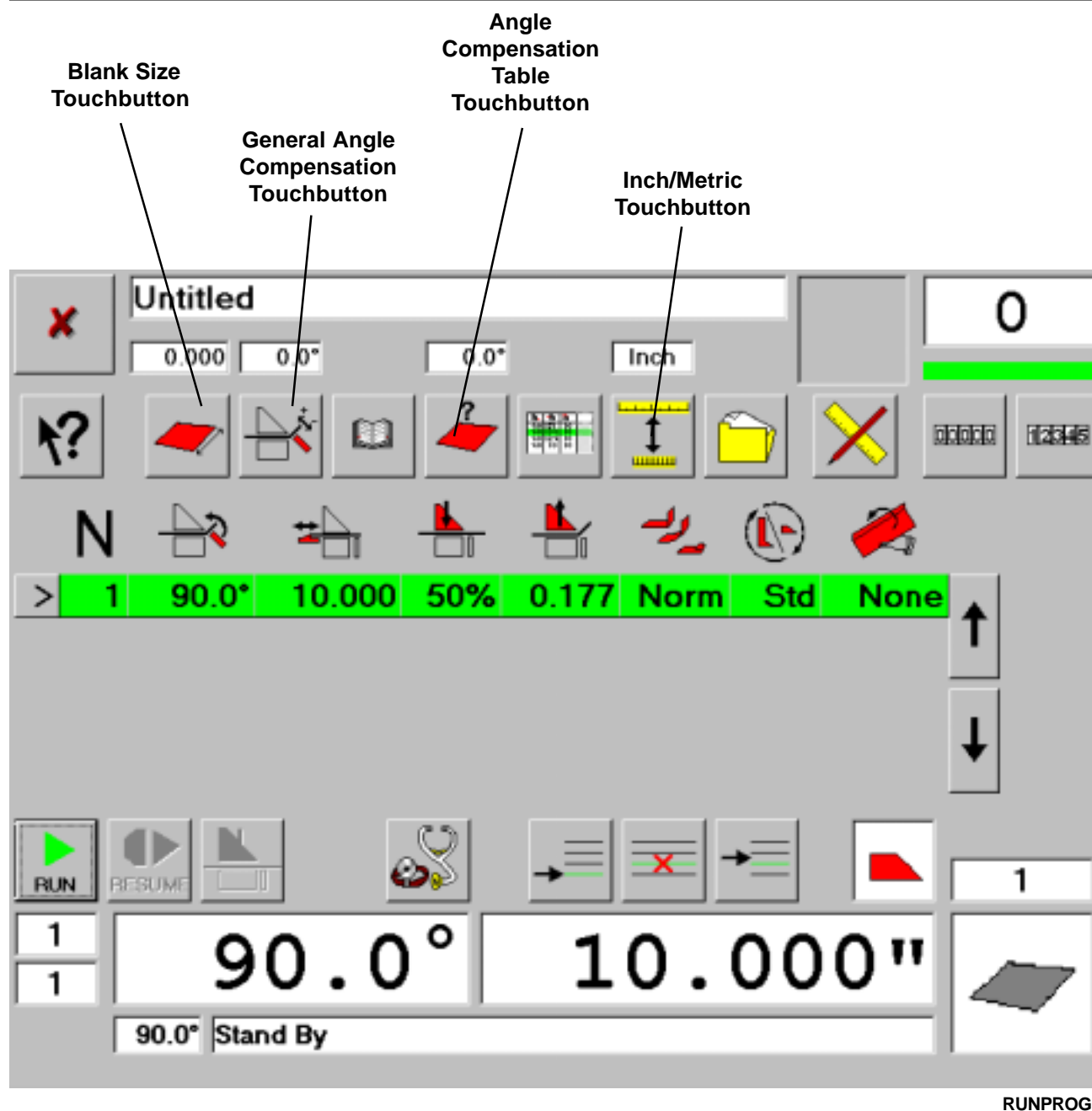


Figure 10-8. Setting General Program Parameters

**ENTERING  
OVERALL  
PROGRAM  
VALUES**

Certain values can be set at the beginning of programming, and they will apply throughout the program. Some of them can be overridden for specific steps in the program. They can all be changed during programming, or later, when a program is called up for use.

**SELECTING  
UNIT OF  
MEASURE**

The first step in programming is selecting the unit of measure, which can be either inch or metric. This is done by using the Inch/Metric Touchbutton to toggle to the desired value.

**ENTERING  
BLANK SIZE**

Touch the Blank Size Touchbutton to enter the size of the blank being used for the program. The Numeric Pop-Up Keypad (shown in Figure 10-3) will be used to enter this value. The value will always be positive. This information is optional.

**ENTERING  
GENERAL  
ANGLE  
COMPENSATION**

Touch the General Angle Compensation Touchbutton to enter a compensation factor which will pertain to all operations within the program. This value is added to the programmed value of the specific bend. The Numeric Pop-Up Keypad will be used to enter this value. The value can be positive or negative to accommodate the characteristics of the material being used. This information is optional.

**ANGLE  
COMPENSATION  
TABLES**

Angle Compensation Tables take the place of general angle compensation values. Like the general angle compensation values, they are added to the programmed value of the specific bend. They are developed by testing various materials, taking into account width and thickness being bent. No Angle Compensation Tables are supplied with the machine; it is left to the owner of the equipment to develop these tables.

Touch the Angle Compensation Table Touchbutton to use values from an Angle Compensation Table. The Pop-Up Selection Screen shown in Figure 10-9 will appear. This information is optional.

**CREATING  
ANGLE  
COMPENSATION  
TABLES**

The procedures used to create Angle Compensation Tables are provided in Appendix B, Machine Parameters.

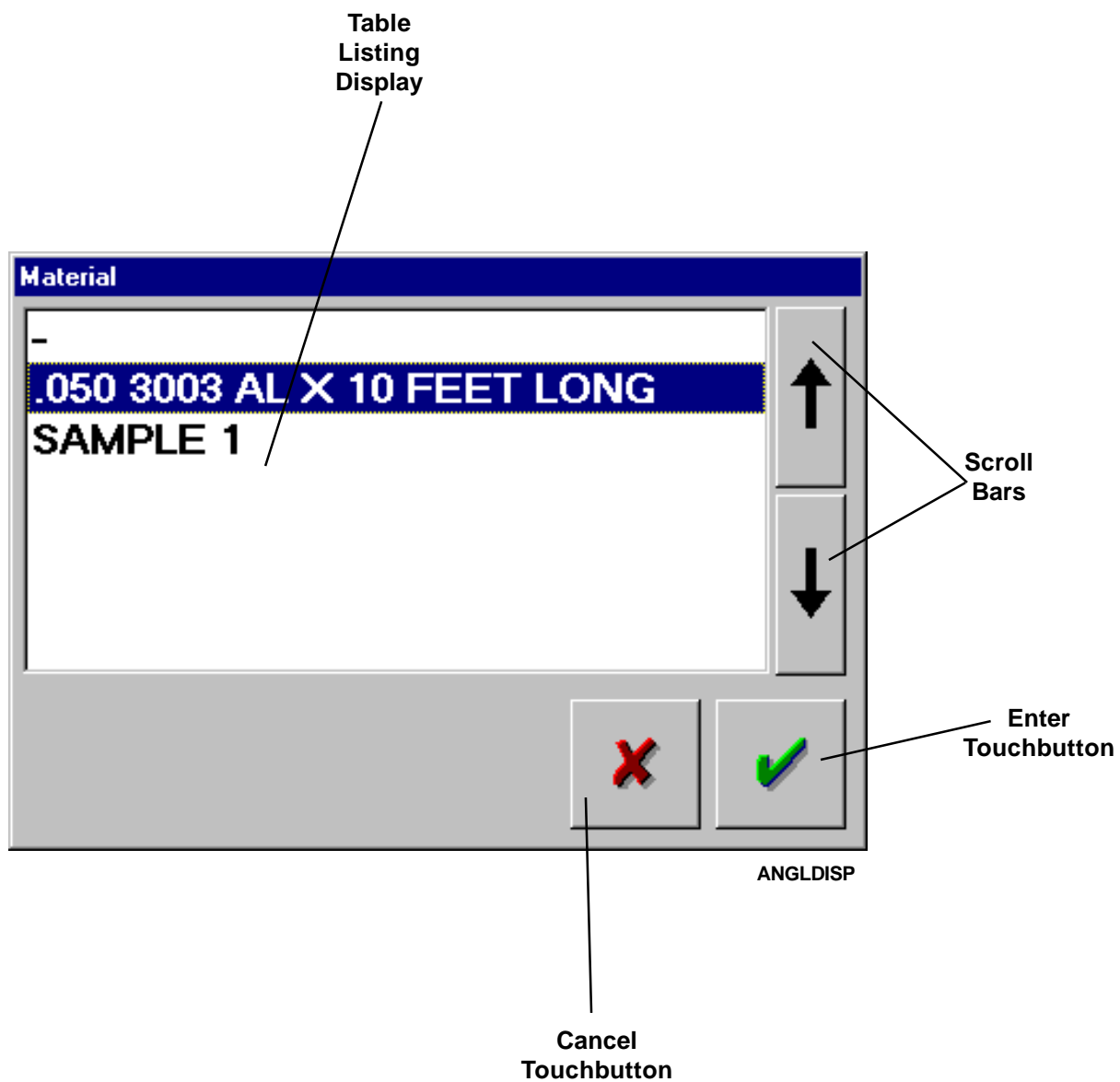


Figure 10-9. Angle Compensation Table Pop-Up Selection Screen

**SELECTING AN ANGLE COMPENSATION TABLE** Existing Angle Compensation Tables will be listed in the Table Listing Display of the Angle Compensation Table Pop-Up Selection Screen shown in Figure 10-9. Based on material, select the table to be used by touching the listing in the display. (If no tables exist, the word "None" will be the only listing shown.)

The angle compensation for the current operation appears in the window above the Angle Compensation Tables button. As you scroll through the program, the compensation value will change according to the angle programmed. This allows for great flexibility when forming materials that have varying angles and springback.

To remove the effects of any compensation table, open the list of tables and select "NONE". This will remove any table-created angle compensation from the part program, and will restore the value of zero to the associated window.

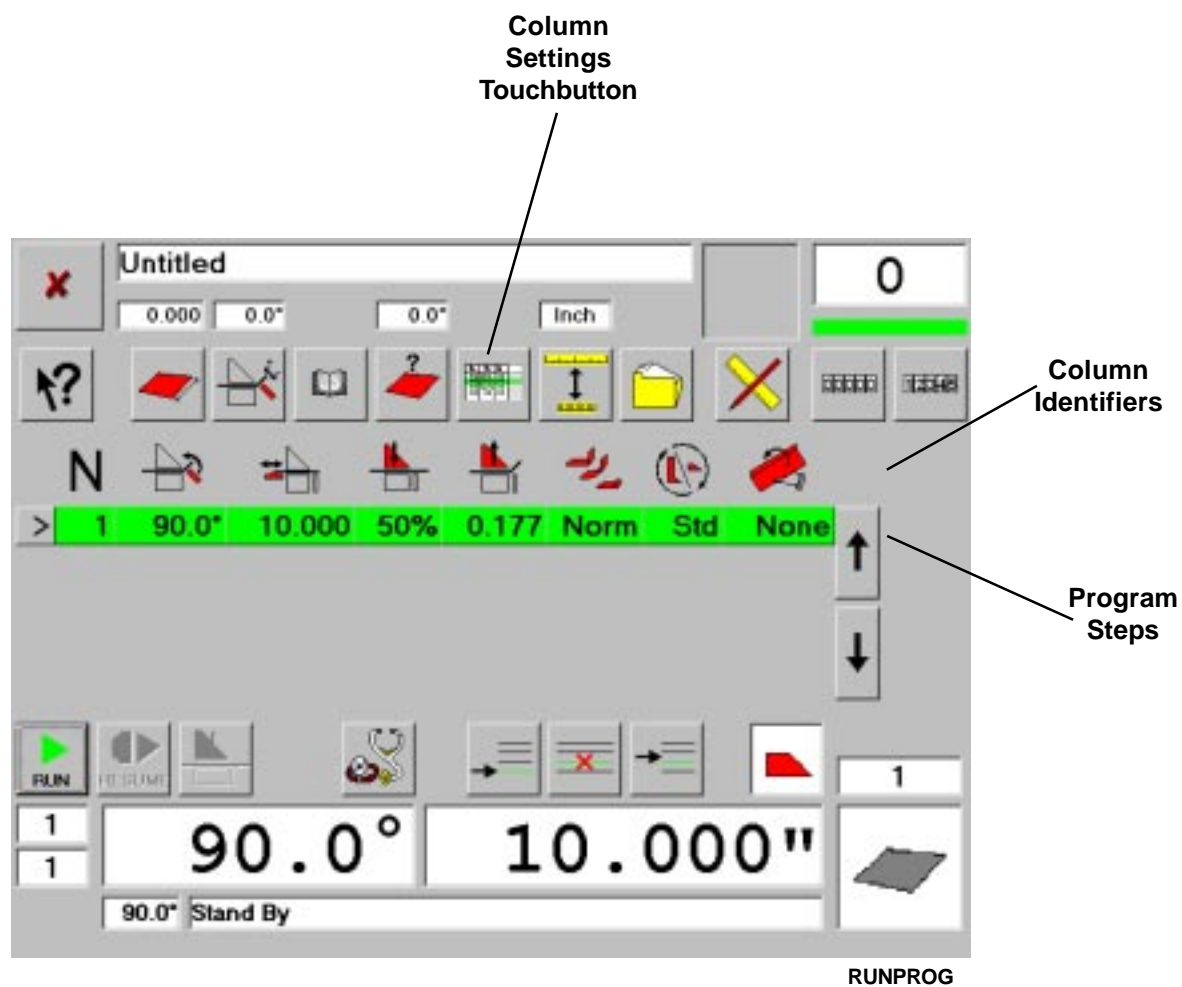


Figure 10-10. Choosing the Programming Columns

## **SELECTING THE PROGRAMMING COLUMNS**

The total number of columns available for the program is greater than the screen can accommodate. Certain columns are always on the screen, and are vital to the program. Others are used only as needed. All the necessary columns can be accommodated on the screen at the same time, but the “as-needed” columns may be hidden. If a column does not appear on the screen, programming data contained in that column will still affect the program. An explanation of the columns available accompanies Figure 10-11.

Columns displayed on the screen are identified by the row of column identifiers across the screen above the program steps.

Before entering program data, it is wise to set the number of columns to suit the program. Touch the Column Settings Touchbutton to bring up the Column Settings Pop-Up Display shown in Figure 10-11.

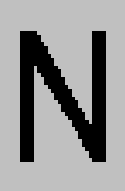
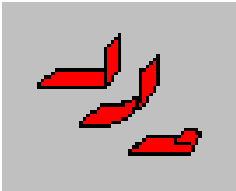
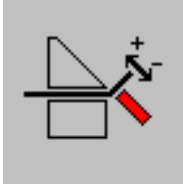
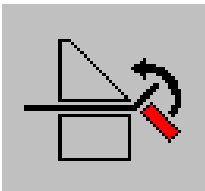
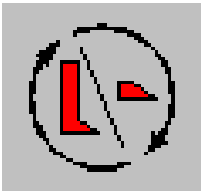
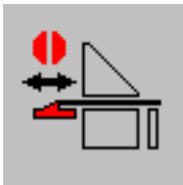
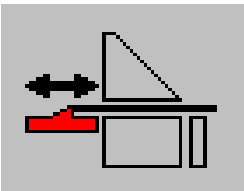
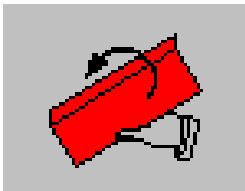
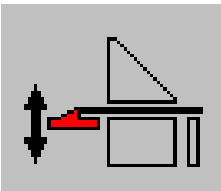
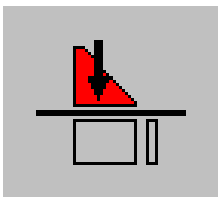
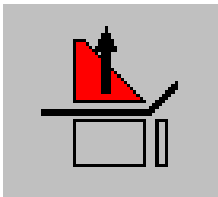

Needed for Each Operation Always Visible on Screen	Needed for Each Operation May Be hidden	Special Values Not Required Usually hidden																		
 <p>Operation Number</p>	 <p>Bend Type</p>	 <p>Angle Compensation</p>																		
 <p>Bend Angle</p>	 <p>Tooling Position</p>	 <p>Backgauge Pause</p>																		
 <p>Backgauge Position</p>	 <p>Material Handling</p>	 <p>Backgauge Height Position</p>																		
 <p>Clamping Pressure</p>	<p><b>Note:</b> Numbers in parentheses indicate the order in which the columns will appear. If a column is not used, it is dropped from the order.</p>																			
 <p>Open Height</p>	<table border="1"> <thead> <tr> <th colspan="3">ARTNOS</th> </tr> </thead> <tbody> <tr> <td>ENN</td> <td>BENDTYPE</td> <td>ANGCOMP</td> </tr> <tr> <td>BENDANG</td> <td>TOOLPOS</td> <td>BACKPSE</td> </tr> <tr> <td>BACKGAGE</td> <td>MATLHAND</td> <td>BACKHT</td> </tr> <tr> <td>CLAMPPSI</td> <td></td> <td></td> </tr> <tr> <td>OPENHT</td> <td></td> <td></td> </tr> </tbody> </table>		ARTNOS			ENN	BENDTYPE	ANGCOMP	BENDANG	TOOLPOS	BACKPSE	BACKGAGE	MATLHAND	BACKHT	CLAMPPSI			OPENHT		
ARTNOS																				
ENN	BENDTYPE	ANGCOMP																		
BENDANG	TOOLPOS	BACKPSE																		
BACKGAGE	MATLHAND	BACKHT																		
CLAMPPSI																				
OPENHT																				
	 <p>Column Setting Pop-Up Display</p> <p>COLDISP</p>																			

Figure 10-11. Selecting Columns and Their Symbols

**SELECTING  
INDIVIDUAL  
COLUMNS**

When the Column Settings Pop-Up Display appears, select the desired columns by touching the appropriate Column Symbols Touchbuttons.

Note that some Column Symbols remain on the screen at all times; these Column Symbols cannot be removed from the screen.

If a Column Identifier appears on the screen, and you wish to remove it, touch the corresponding Column Symbols Touchbutton in the Pop-Up Display. Once removed, touch the Touchbutton again to replace it.

If a Column Symbol is not on the screen, touch the appropriate touchbutton in the Pop-Up Display to place it on the screen. Once on the screen, touch the Touchbutton again to remove it from the screen.

When the desired columns are shown on the screen, touch the Enter Touchbutton to remove the Pop-Up Display from the screen.

.



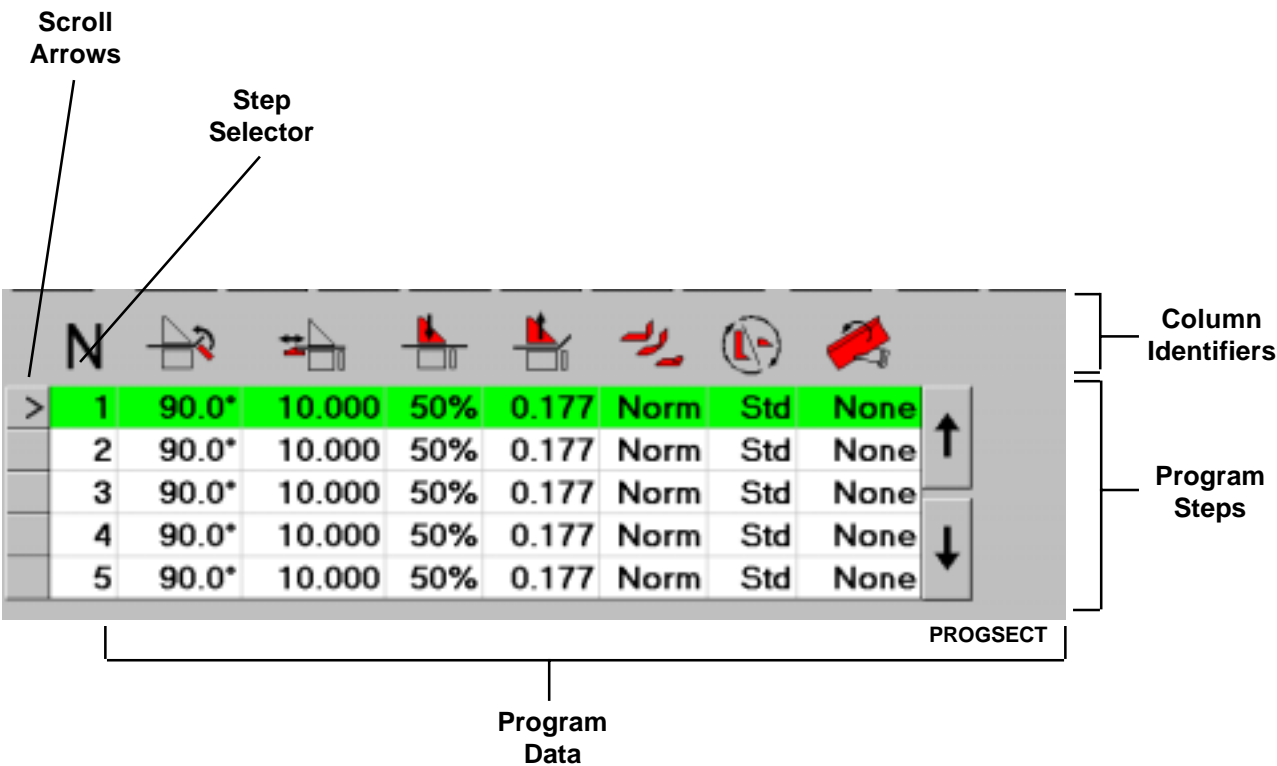


Figure 10-12. The Part Program Section of the Run/Programming Screen

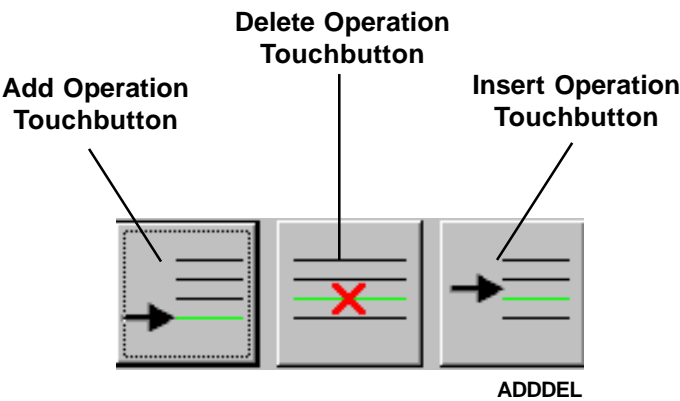


Figure 10-13. Operation Touchbuttons

## PROGRAMMING INDIVIDUAL BENDS

The typical part program contains several bending operations. Each bending operation comprises one step in the program, and is displayed as a single row, or line, in the program steps portion, shown in Figure 10-12, of the Run/Programming Screen.

### SCROLLING THROUGH THE PROGRAM

Many programs will contain more steps than can be shown on the screen at one time. The Scroll Arrows are used to scroll up or down within the program to examine, change, or program the various steps.

### DEFAULT VALUES

At the beginning of the programming activity involving individual bends, a single row, or line, is shown on the screen. Each column in this row contains a default value, which must often be modified to suit the bend being programmed. Default values can be modified to match your need more closely according to the procedure in Section 13, Machine Parameters.

As more bends are added to the program, more rows are added. When each row is added, the new row contains the default values, and these values must also be modified, as required.

### ADDING AND DELETING PROGRAM STEPS

Rows for operational steps are added or deleted using the Operation Touchbuttons shown in Figure 10-13. It is recommended that operational steps be entered in the order in which they occur.

Touching the Add Operation Touchbutton always adds a row at the end of the program. When this row is added, it is also highlighted in green.

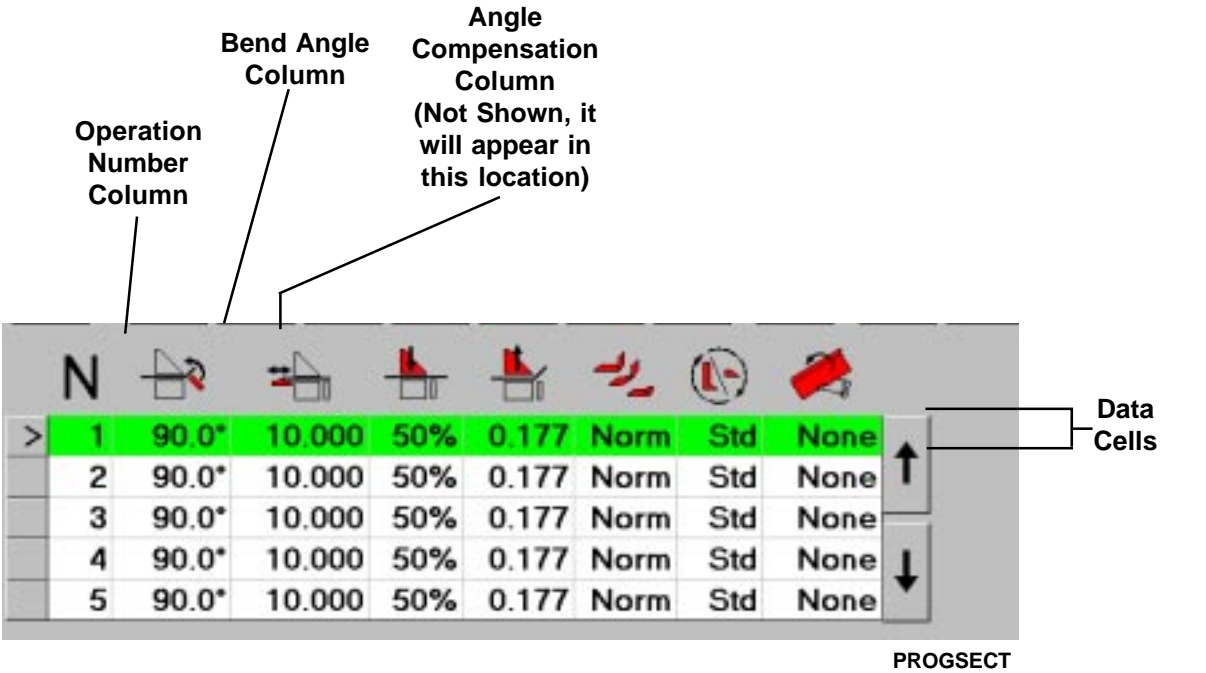
To delete a row, select it by touching the small square in the Step Indicator Column to highlight the row. Touch the Delete Operation Touchbutton and the highlighted row disappears from the screen. The steps following the deleted step are renumbered so they are consecutive with those preceding the deleted row.

### **CAUTION**

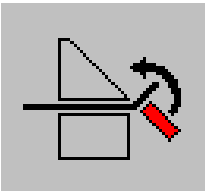
#### **DELETION OF A ROW IS PERMANENT.**

If a row is unintentionally deleted, a new row must be created, and the information must be re-entered.

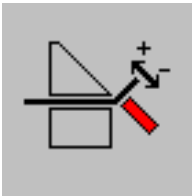
To add a step, or row, between two existing steps, touch the Square in the Step Indicator Column below the point where the new step is to be added. Touch the Insert Operation Touchbutton and a new row, containing the default values, appears. The new row is highlighted in green. The steps following the added step are renumbered so step numbers remain sequential.



ENN  
Operation Number Column



BENDANG  
Bend Angle Column



ANGCOMP  
Angle Compensation Column

Figure 10-14. Entering the Operation Number, Bend Angle, and Specific Angle Compensation

## ENTERING PROGRAM DATA

Data may be entered in any order desired, but it is recommended that it be entered systematically, with all the data for an operational step entered before the next step is begun. If changes to any operation are necessary, they can be made at any point in the programming process.

To enter data in any "data cell" (see Figure 10-14) of a program step, simply touch the cell. The row in which the cell is situated will highlight in green, and the cell itself will highlight in red. At the same time, the appropriate Pop-Up Display will appear.

Enter a numerical value, or select from the choices presented. Because various Pop-Up Displays react differently upon data entry, each is identified by data type.

### **CAUTION**

**DO NOT HIGHLIGHT A "CELL" BY TOUCHING THE COLUMN SYMBOL .**

This highlights the entire column, and the data entered in the desired cell is also entered in all cells in that column.

## ENTERING THE OPERATION NUMBER

The Operation Number is entered and maintained automatically by the system as the program is developed. The programmer does nothing to enter this number.

## ENTERING THE BEND ANGLE

For each bend which does not match the default value shown, the programmer must enter the desired bend angle in the Bend Angle Column. When the cell in the bend angle column is selected, the Numeric Pop-Up Keypad (Figure 10-3) appears. The operator enters the bend angle, which appears in the New Value Display of the Keypad. The programmer transfers the new value to the selected cell by touching the Enter Touchbutton, and the Keypad disappears.

### GENERAL ANGLE COMPENSATION

During operation, the system adjusts the programmed bend angle, using the General Angle Compensation value entered in the system, or the value selected with an Angle Compensation Table. These compensation values are cumulative, that is, they are added to the programmed bend angle (negative values reduce the bend angle).

### ANGLE COMPENSATION FOR SPECIFIC BENDS

From time to time, a specific bend may require angle compensation different from the General Angle Compensation. To apply such specific compensation, it is necessary to include the Angle Compensation Column (see Figure 10-11) in the program, and enter the specific compensation in the appropriate cell in this column. Once the program is completed, the Angle Compensation Column can be hidden once again. During operation, its value will be added to the programmed bend angle in addition to the general angle compensation selected for the program. When the Angle Compensation cell is selected, the Numeric Pop-up Keypad appears, the specific value is entered, and the Enter Touchbutton is used to transfer the value to the program.

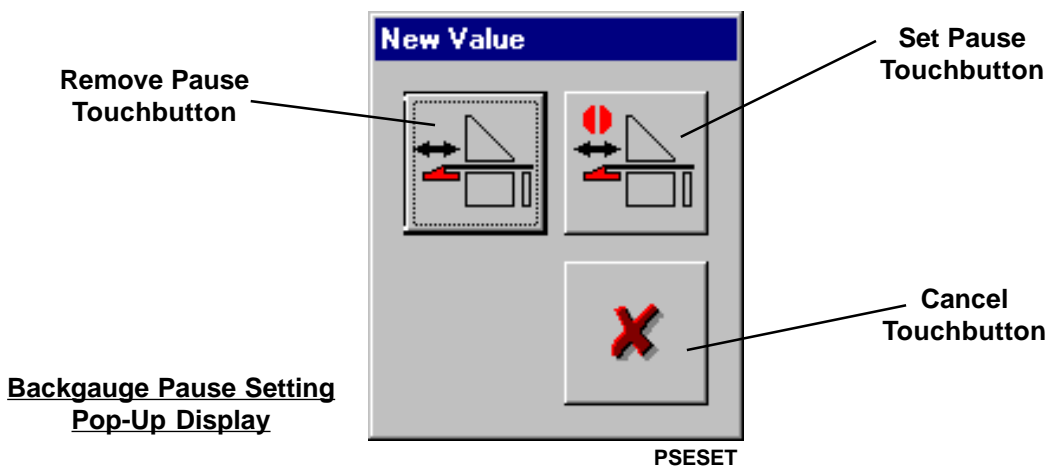
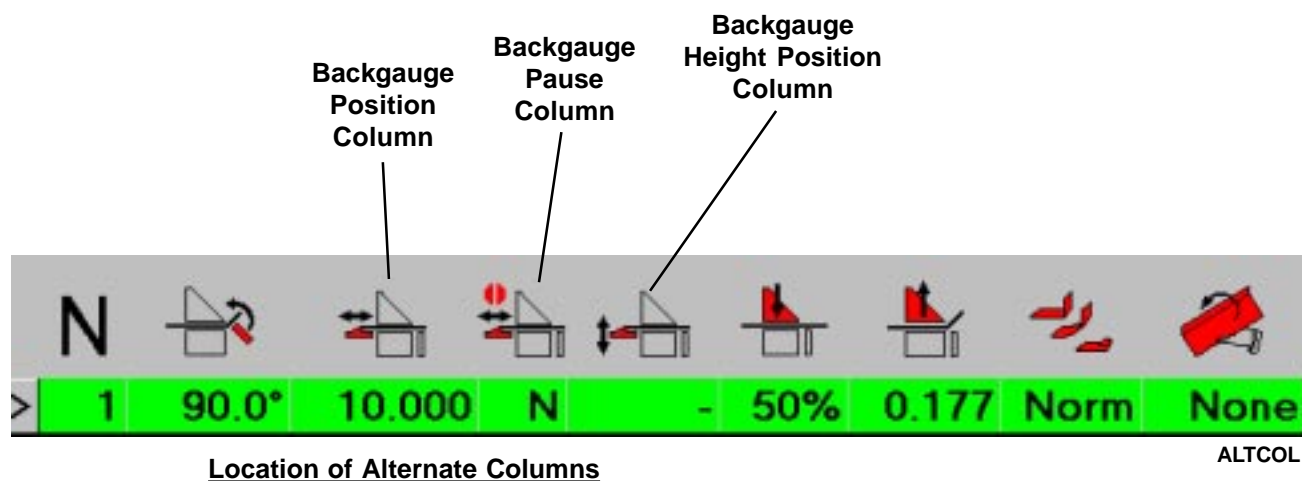


Figure 10-15. Entering Backgauge Program Data

## **ENTERING BACKGAUGE DATA**

The Backgauge Position Column lists the programmed location of the backgauge stop as measured from the nose of the upper tooling. This dimension is required by the machine, and the Backgauge Position Column is always visible.

### **ENTERING THE BACKGAUGE DIMENSION**

For each bend whose backgauge position dimension does not match the default value shown, the programmer must enter the backgauge dimension in the Backgauge Position Column. When the cell in the column is selected, the Numeric Pop-Up Keypad (Figure 10-3) appears. The operator enters the backgauge dimension, which appears in the New Value Display of the Keypad. The programmer transfers the new value to the selected cell by touching the Enter Touchbutton, and the Keypad disappears.

### **ENTERING A BACKGAUGE PAUSE FUNCTION**

The Backgauge Pause Column provides a means to halt the motion of the backgauge and lower the backgauge fingers during any operation. The column is not required in a program unless the function is desired.

The value is programmed as “Yes” (backgauge paused) or “No” (normal backgauge function). The default is “No”. If the Backgauge Pause is set to “Yes”, then the backgauge will not move to the programmed position of the current operation until either the clamp or unclamp foot pedal is pressed. This gives the operator time to position or rotate the work material on the backgauge table without scratching it on the backgauge fingers.

When this column is to be used, the programmer touches the appropriate cell in the column. The Backgauge Pause Setting Pop-Up Display (Figure 10-15) appears centered in the lower portion of the screen.

The programmer touches the Set Pause Touchbutton to enable the function. “Yes” appears in the appropriate cell, and the display disappears. The programmer touches the Remove Pause Touchbutton to disable the function. “No” appears in the appropriate cell, and the display disappears. The Cancel Touchbutton removes the display without changing the setting.

After the pause function has been set, the Backgauge Pause Column can be hidden without removing the function.

### **SETTING THE BACKGAUGE HEIGHT POSITION**

The Backgauge Height Position column contains the programmed vertical position of the backgauge table on those machines equipped with the Multifold feature. When a cell in this column is touched, the Numeric Pop-Up Keypad (Figure 10-3) appears. The operator enters the desired backgauge height, which appears in the New Value Display of the Keypad. The programmer transfers the new value to the selected cell by touching the Enter Touchbutton, and the Keypad disappears. If the feature is not included on the machine, the keypad will not appear.

After the height position has been set, the Backgauge Height Position Column can be hidden without removing the programmed value.

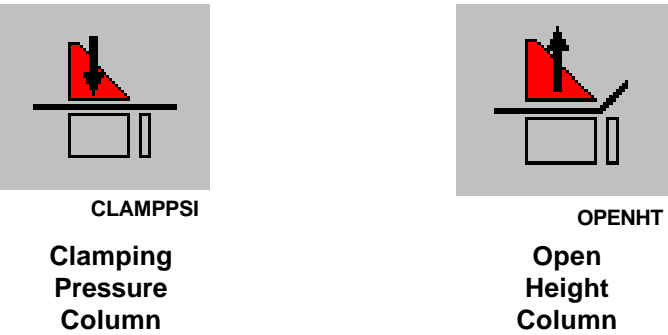
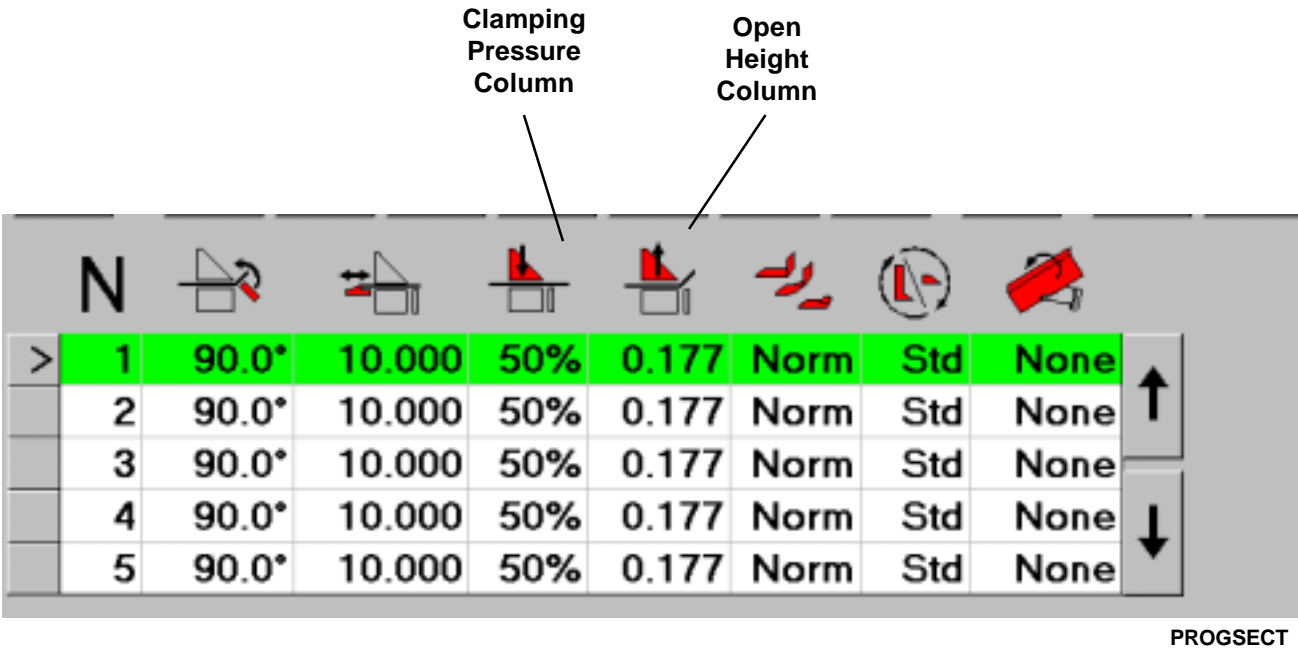


Figure 10-16. Entering Clamping Beam Data

**ENTERING THE  
CLAMPING  
PRESSURE**

The Clamping Pressure Column provides the programmed clamp pressure the upper tooling places against the work material. The pressure is expressed as a percentage of the maximum available, and applies to the current operation only. Therefore, each operation may have a different clamping pressure if desired. This pressure is required by the machine, and the Clamping Pressure Column is always visible.

For each bend where the required clamping pressure does not match the default value shown, the programmer must enter the clamping pressure in the Clamping Pressure Column. When the cell in the column is selected, the Numeric Pop-Up Keypad (Figure 10-3) appears. The operator enters the clamping pressure, which appears in the New Value Display of the Keypad. The programmer transfers the new value to the selected cell by touching the Enter Touchbutton, and the Keypad disappears.

**ENTERING THE  
CLAMPING  
BEAM OPEN  
HEIGHT**

The Open Height column provides the programmed distance the upper beam will move upward after the current operation is complete. The upper beam will also move to this height prior to flattening a hem. If the programmed Open Height in the first operation is greater than the position of the beam when the machine is started, then the upper beam will raise until it reaches this position. This value is required by the machine, and the Open Height Column is always visible.

For each bend where the required Open Height does not match the default value shown, the programmer must enter the open height in the Open Height Column. When the cell in the column is selected, the Numeric Pop-Up Keypad (Figure 10-3) appears. The operator enters the open height, which appears in the New Value Display of the Keypad. The programmer transfers the new value to the selected cell by touching the Enter Touchbutton, and the Keypad disappears.



Bend Type Column

	N								
>	1	90.0°	10.000	50%	0.177	Norm	Std	None	↑ ↓
	2	90.0°	10.000	50%	0.177	Norm	Std	None	
	3	90.0°	10.000	50%	0.177	Norm	Std	None	
	4	90.0°	10.000	50%	0.177	Norm	Std	None	
	5	90.0°	10.000	50%	0.177	Norm	Std	None	

PROGSECT

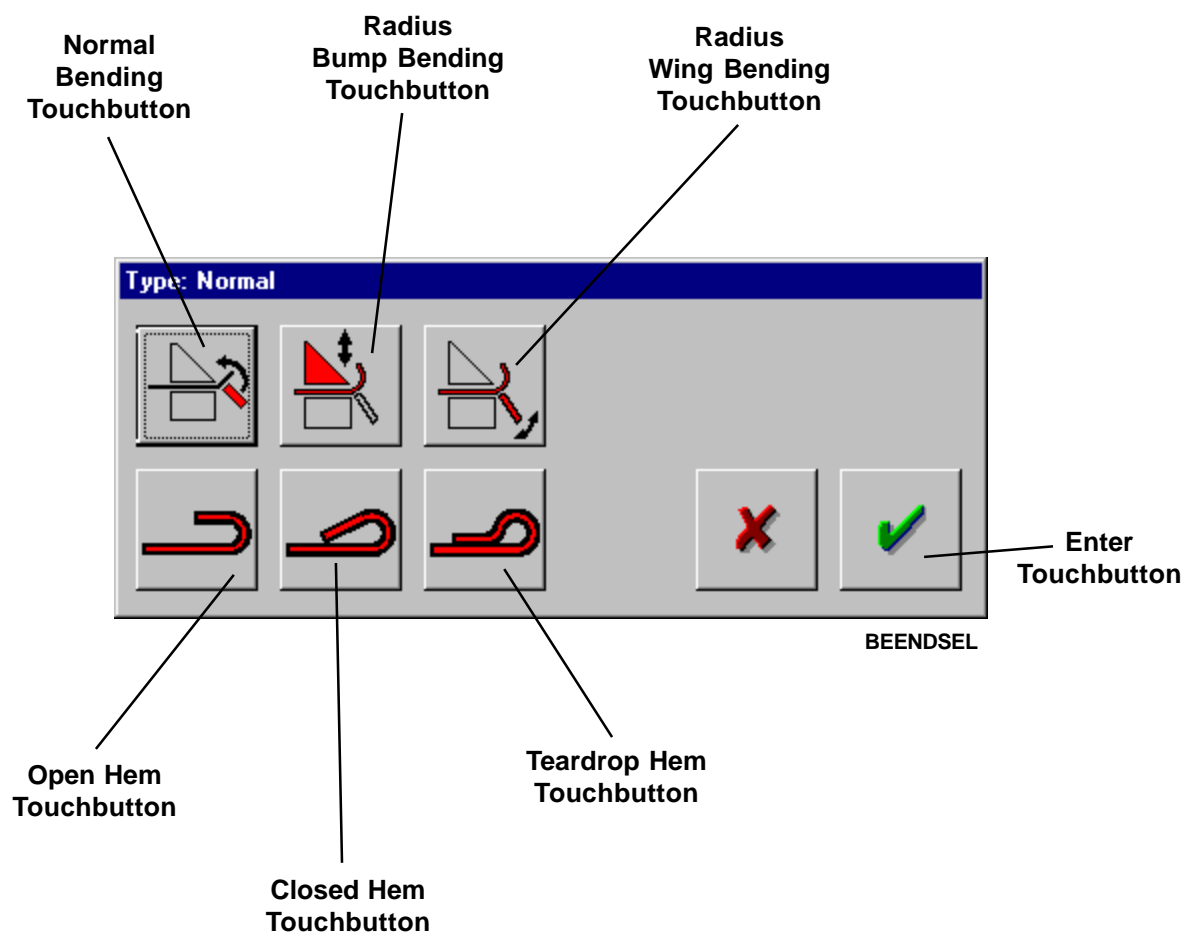


Figure 10-17. Selecting the Type of Bend

**DEFINING THE TYPE OF BEND**

It is necessary to identify the type of bend desired in each operation. Several bend types are available in the system. This information is contained in the Bend Type Column. The default value is "NORM", which requires no additional dimensional data.

The available types of bends are listed below, with their identifying codes and corresponding descriptions.

Code	Description
"NORM"	Normal bending
"Bump"	Radius Bump bending
"Wing"	Radius Wing bending
"OHem"	Open Hem
"CHem"	Closed Hem
"THem"	Teardrop Hem

**SELECTING BEND TYPE**

Touch the cell in the Bend Type Column to open the Bend Selection Pop-Up Display shown in Figure 10-17. Touch the desired bend type to be used in the current operation. When the type of bend has been selected and any necessary values have been entered, touch the Enter Touchbutton. The Bending Code appears in the Bend Type Column, and the Pop-Up Display disappears.

Additional Information on bending types appears below.

**NORMAL BENDING**

With Normal Bending, the material is clamped, and the bending beam moves to a position including the programmed bend angle plus any bending compensation. The bending beam returns to the home position, the clamping beam unclamps the part and moves to its upward position, and the next bending operation can commence.

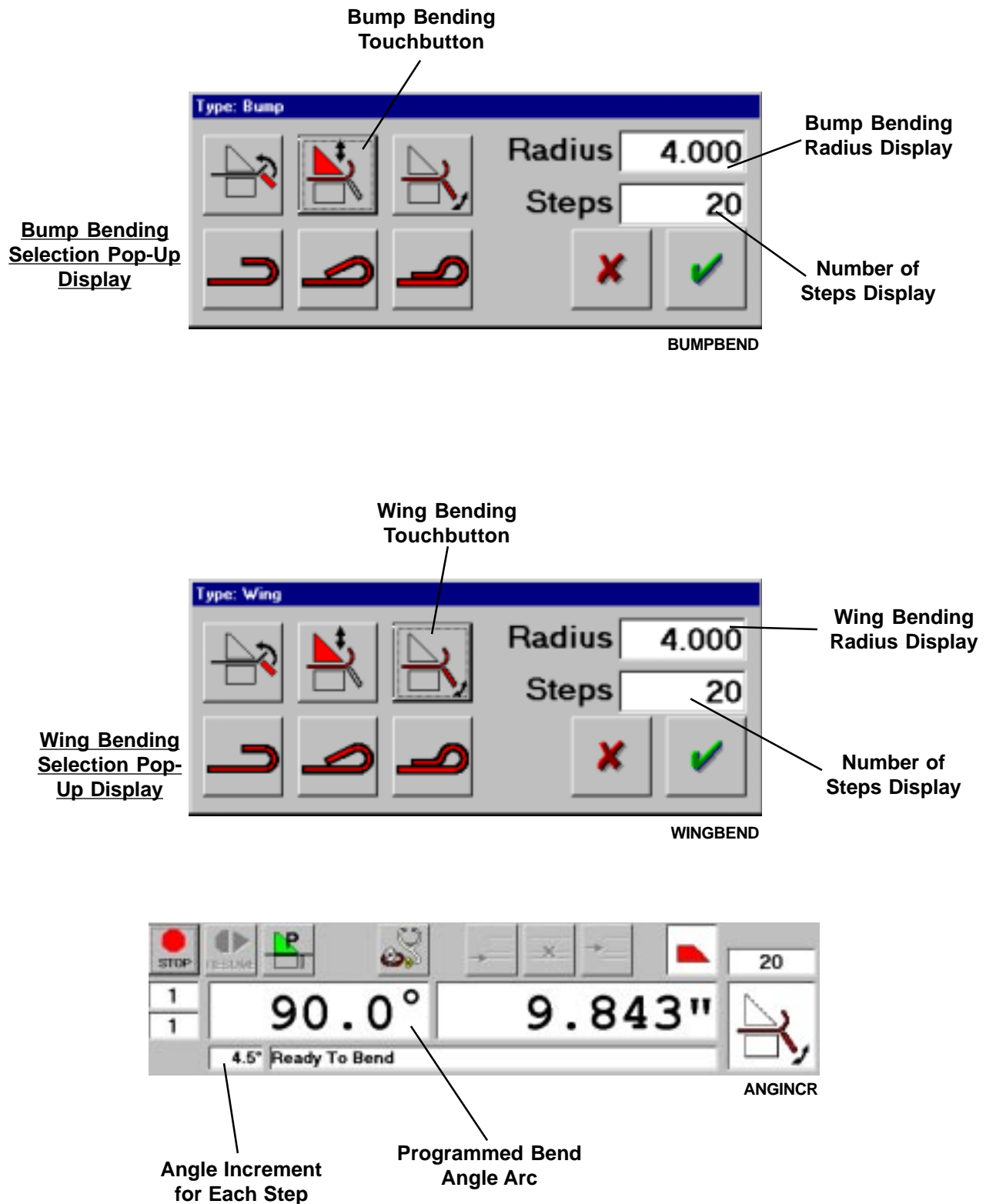


Figure 10-18. Radius Bending

**RADIUS  
BENDING**

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 10-3) 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.

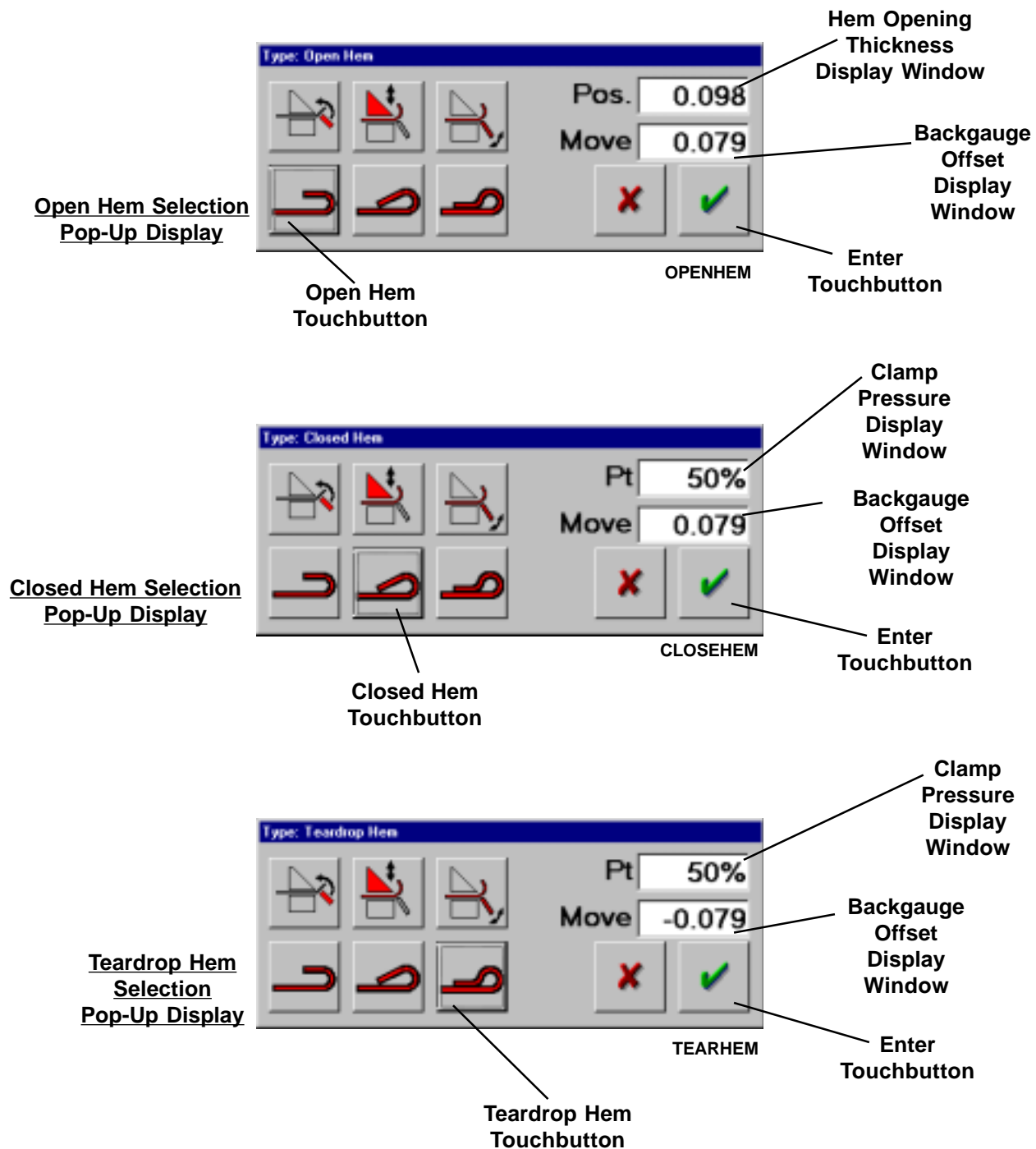


Figure 10-19. Hem Bending

**HEM BENDING**

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.

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.

**OPEN HEMS**

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.

**CLOSED  
HEMS**

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.

**TEARDROP  
HEMS**

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.

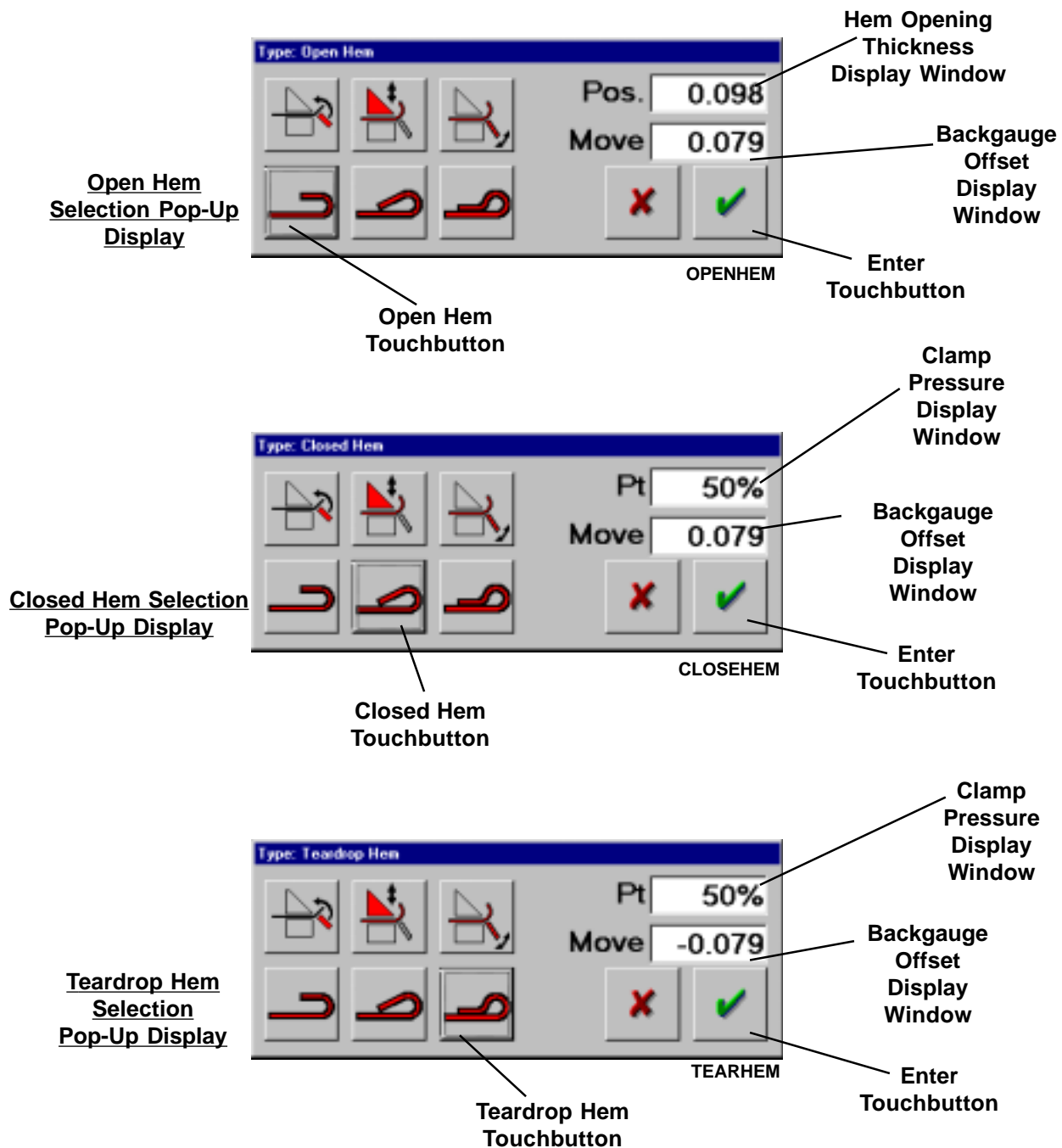


Figure 10-19. Hem Bending (Continued)

<b>ENTERING HEM DATA</b>	<p>Pressing a Hem Selection Touchbutton opens two display windows in the appropriate Selection Pop-Up Display, shown in Figure 10-19. 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 10-3) 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>
<b>OPEN HEM BENDING</b>	<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>
<b>CLOSED HEM BENDING</b>	<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>
<b>TEARDROP HEM BENDING</b>	<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>



Tooling Type Column

The screenshot shows a toolbar at the top with icons for various tooling functions. Below it is a table with 9 columns and 5 rows of data. The first row is highlighted in green. To the right of the table are up and down arrow buttons. The label 'Tooling Type Column' points to the 7th column of the table. The label 'PROGSECT' is located at the bottom right of the screenshot.

>	1	90.0°	10.000	50%	0.177	Norm	Std	None
	2	90.0°	10.000	50%	0.177	Norm	Std	None
	3	90.0°	10.000	50%	0.177	Norm	Std	None
	4	90.0°	10.000	50%	0.177	Norm	Std	None
	5	90.0°	10.000	50%	0.177	Norm	Std	None

PROGSECT

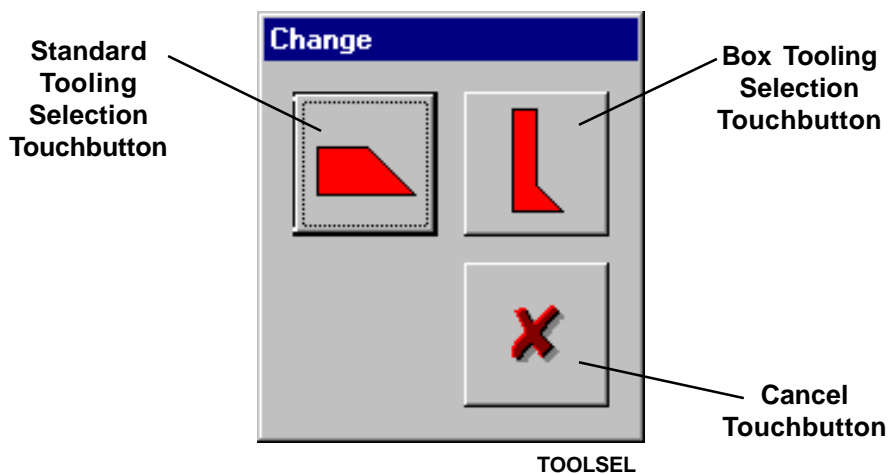


Figure 10-20. Tooling Selection Pop-Up Display

**ENTERING  
TOOLING  
DATA**

Machines equipped with Kombi beams can be programmed to switch between standard and box tooling within a program. During operation, rotation of the Kombi beam is not automatic, but is controlled by the operator's foot pedals. The tooling indicator symbols are shown on the touchbuttons in Figure 10-20. The codes used in the cells of the column are "Std" for standard tooling and "Box" for box tooling. The default in the Tooling Type Column is always "Std".

To change a cell from one type of tooling to another, touch the cell to be changed. This brings up the Tooling Selection Pop-Up Display shown in Figure 10-20.

Select the desired tooling for the operation by touching the appropriate Tooling Touchbutton. The Pop-Up Display disappears from the machine, and the appropriate code appears in the cell in the Tooling Type Column.

If you bring up the Tooling Selection Pop-Up Display by mistake, remove it from the screen by touching its Cancel Touchbutton.

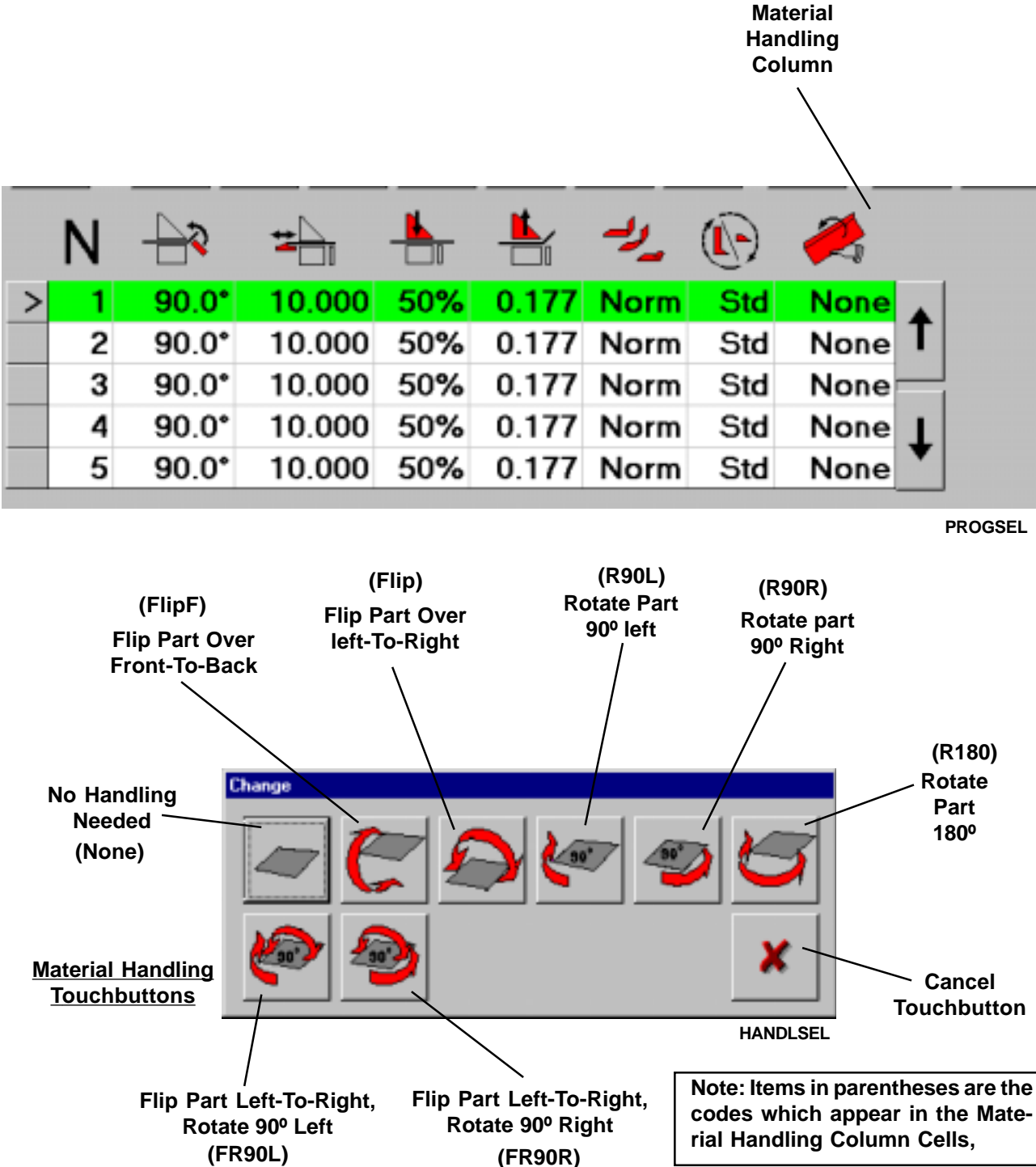


Figure 10-21. Material Handling Selection Pop-Up Display

**DEFINING  
MATERIAL  
HANDLING**

It is often necessary to reposition the part blank between steps during the forming process. During operation, the program tells the operator what handling action is required through the Material Handling Display on the Run/Programming Screen. Codes representing the required action also appear in the Material Handling column on the screen.

The codes are as follow (they also appear in parentheses in Figure 10-21):

---

None - No material handling.

FlipF - Flip part over Front-to-Back.

Flip - Flip part over Left-to-Right.

R90L - Rotate part 90° to the Left.

R90R - Rotate part 90° to the Right.

R180 - Rotate part 180°.

FR90L - Flip part Left-to-Right and Rotate 90° to the Left.

FR90R - Flip part Left-to-Right and Rotate 90° to the Right.

---

To enter the proper material handling instruction in a cell , touch the cell to be changed. This brings up the Material Handling Selection Pop-Up Display shown in Figure 10-21.

Select the desired material handling for the operation by touching the appropriate Material Handling Selection Touchbutton. The Pop-Up Display disappears from the machine, and the appropriate code appears in the cell in the Material Handling Column.

If you bring up the Material Handling Selection Pop-Up Display by mistake, remove it from the screen by touching its Cancel Touchbutton.

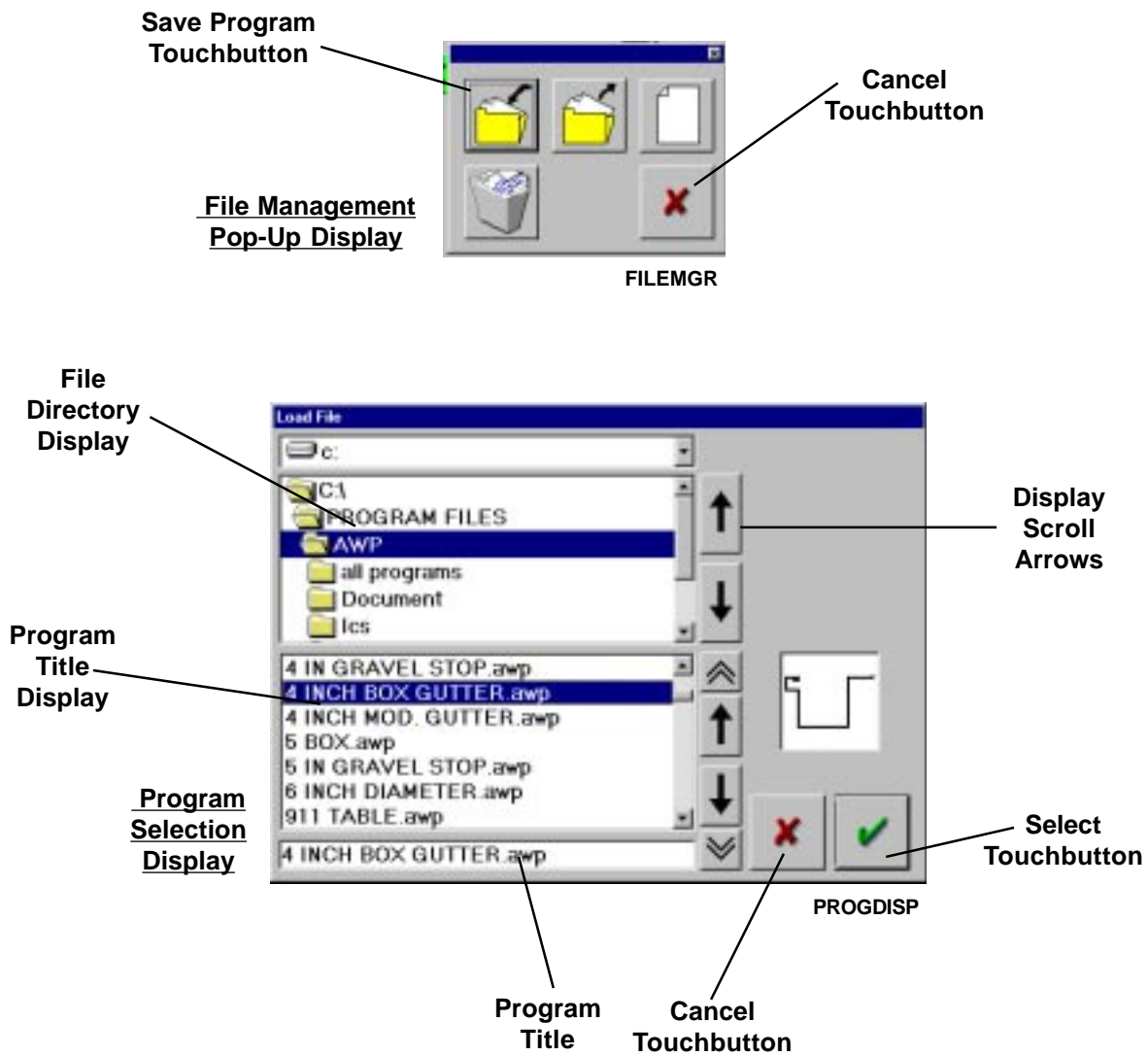
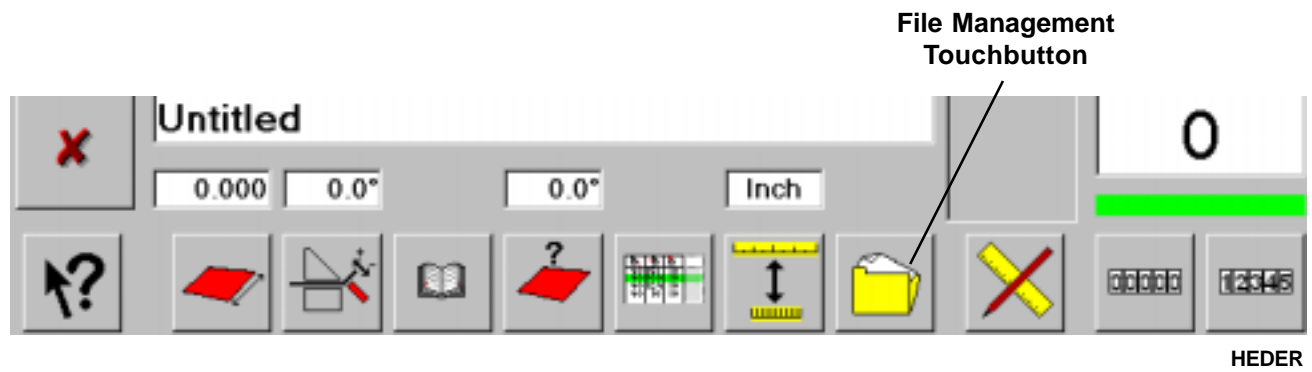


Figure 10-22. Saving a Program

**SAVING A  
PROGRAM**

Once a manual 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 10-22.

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"

**SELECTING  
THE DIRETORY**

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 10-23, will appear.

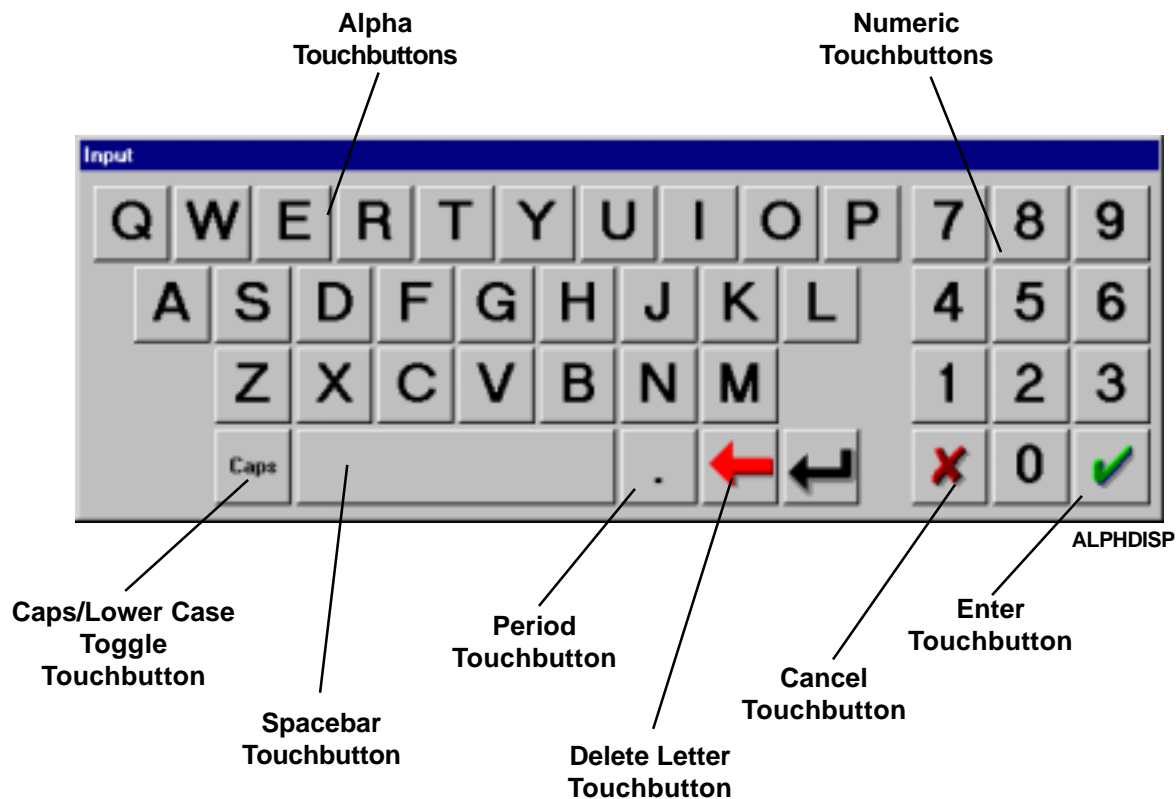


Figure 10-23. The Alpha-Numeric Pop-Up Keypad

<b>ENTERING THE PROGRAM NAME</b>	<p>The Alpha/Numeric Pop-Up Keypad, shown in Figure 10-23, 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>
<b>COMPLETING THE SAVE FUNCTION</b>	<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 <b>.awp</b> extension to the system hard drive. At this point, the File Management Pop-Up Display will disappear.</p>
<b>OPTIONS</b>	<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> <p>The system can also be shut down with no further action after the program is saved.</p>



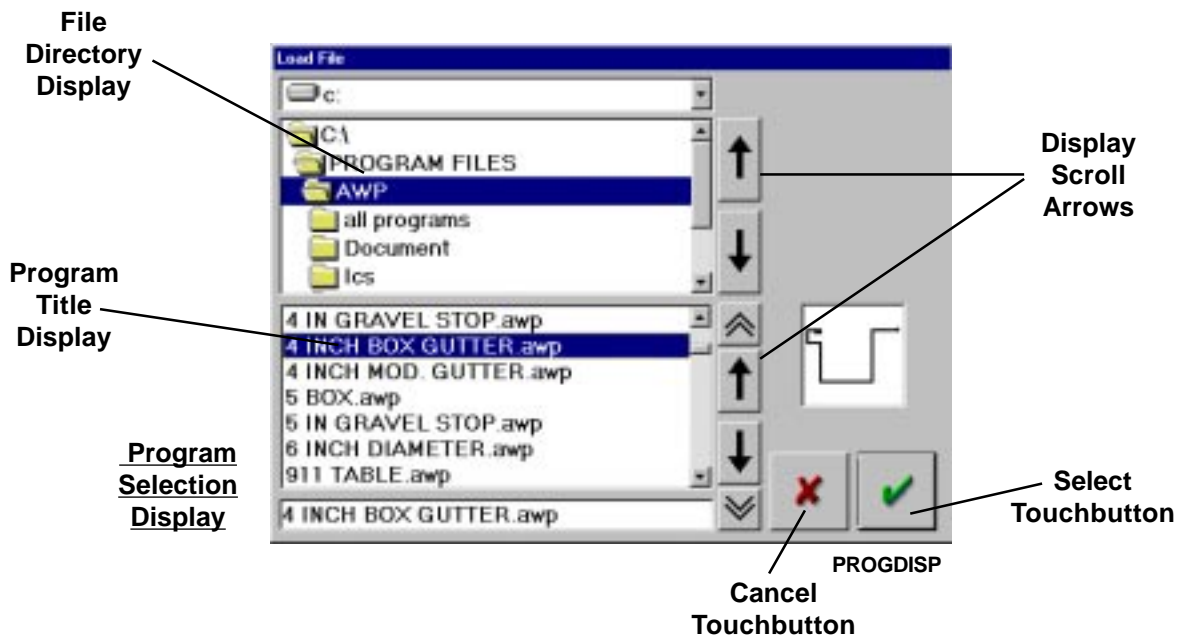
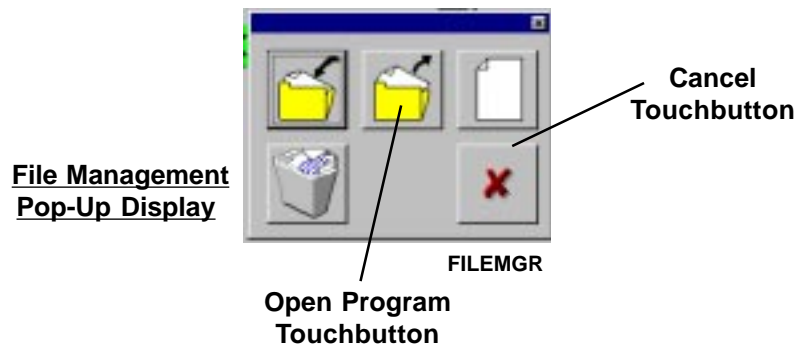
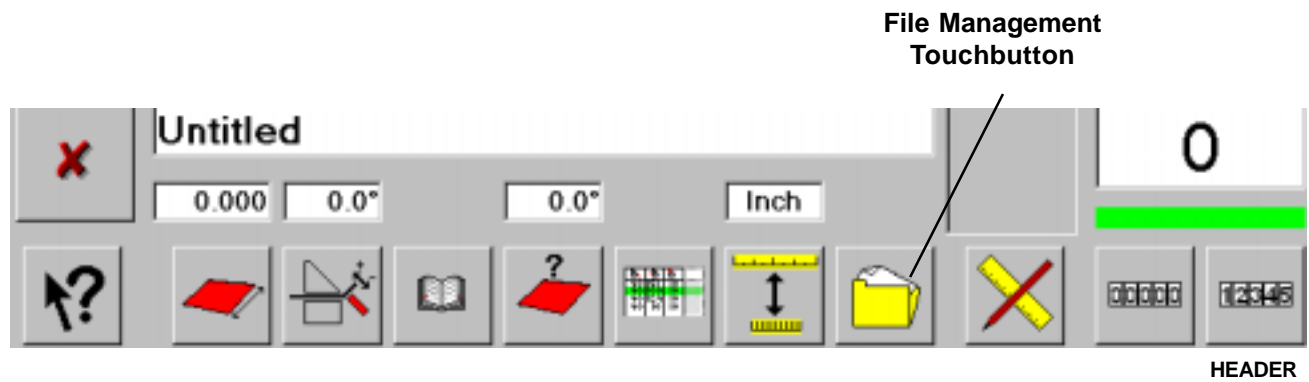


Figure 10-24. Opening a Program Prior to Modification

**MODIFYING AN  
EXISTING  
MANUAL  
PROGRAM**

Programs prepared using manual programming procedures can easily be modified. This section describes how to make modifications to such programs. Begin the modification process by opening the program to be modified.

**OPENING A  
PROGRAM**

Touch the File Management Touchbutton to bring up the File Management Pop-up Screen shown in Figure 10-22. Touch the Open Program Touchbutton to bring up the Program Selection Pop-Up Display.

**FILE  
DIRECTORY  
DISPLAY**

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.

When the desired directory is located, touch its screen entry to highlight it in blue.

**PROGRAM  
TITLE DISPLAY**

The Program Title Display shows the programs located in the highlighted directory. Programs are identified by the **.awp** extension. Use the Display Scroll Arrows to move up and down through the program names to locate the desired program.

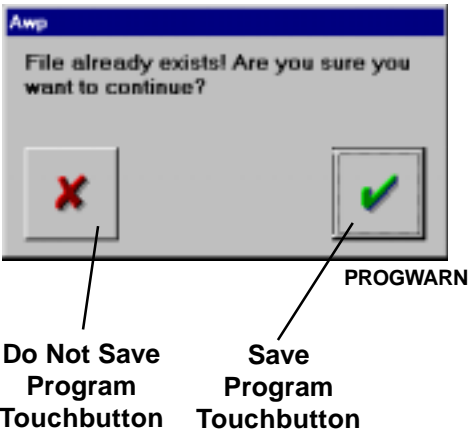
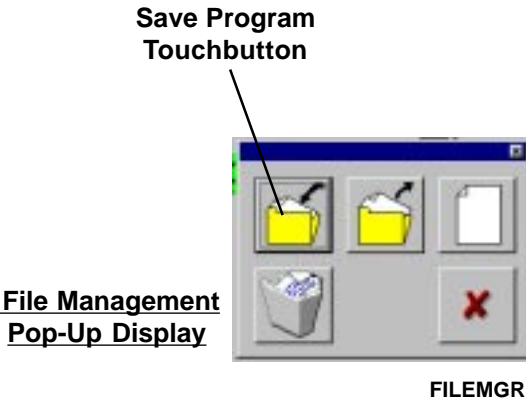
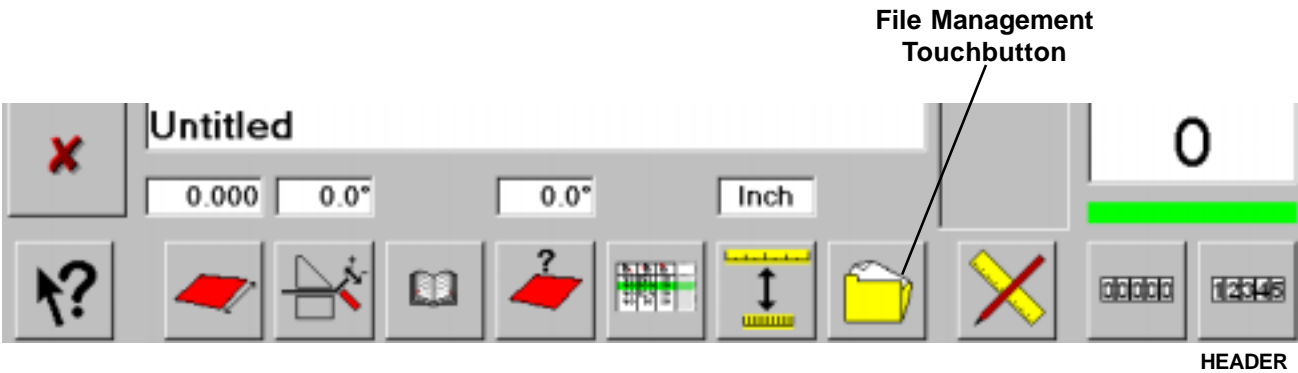
When the desired program is located, touch its screen entry to highlight it in blue.

**SELECT  
TOUCHBUTTON**

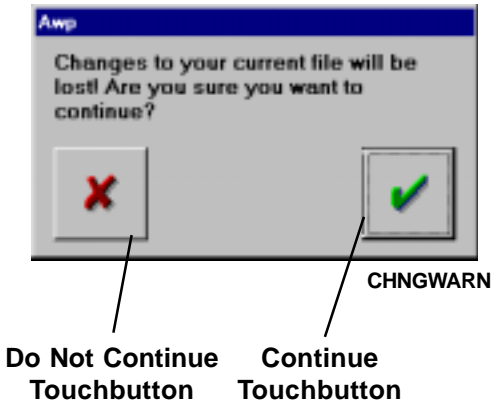
The Select Touchbutton calls up the program identified by the blue highlights. Touch it to load the program. The Run/Programming screen will reappear on the monitor.

**CANCEL  
TOUCHBUTTON**

If an incorrect program has been selected, touch the Cancel Touchbutton to start over.



Existing Program Warning Display



Lost Changes Warning Display

Figure 10-25. Saving a Modified Program

## **SAVING A MODIFIED PROGRAM**

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

To save a modified program with a different name, follow the procedure used to save a new program. 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 program.

If you wish to save a modified program 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 program.

If you touch the Do Not Save Program 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 program without saving it, the Lost Changes Warning Display will appear. If you do not wish to lose the changes, 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.