

SECTION 2 484 PROGRAMMER TAPE

This section describes the use of the 484 Programmer Tape. The two main divisions of the tape are the RESET Level (Section 2.1) and the EXIT Level (Section 2.2). These operation levels are reached by pressing the appropriate key(s) on the P190 Keyboard after the tape is loaded into the P190. Press the RESET/EXIT key and the SHIFT key for the RESET Level; press the RESET/EXIT key for the EXIT Level. When the 484 Programmer Tape is loaded, the first software label menu of the Reset Level is displayed.

2.1 RESET LEVEL

The RESET Level contains commands for supervisory actions such as starting, stopping, and clearing memory in the PC. Also included are commands for setting parameters and choosing ON-Line or OFF-Line programming.

Figure 2-1 shows the available software label keys in the RESET Level — ON-Line mode. Figure 2-2 shows the software label key available in the RESET Level — OFF-Line mode.

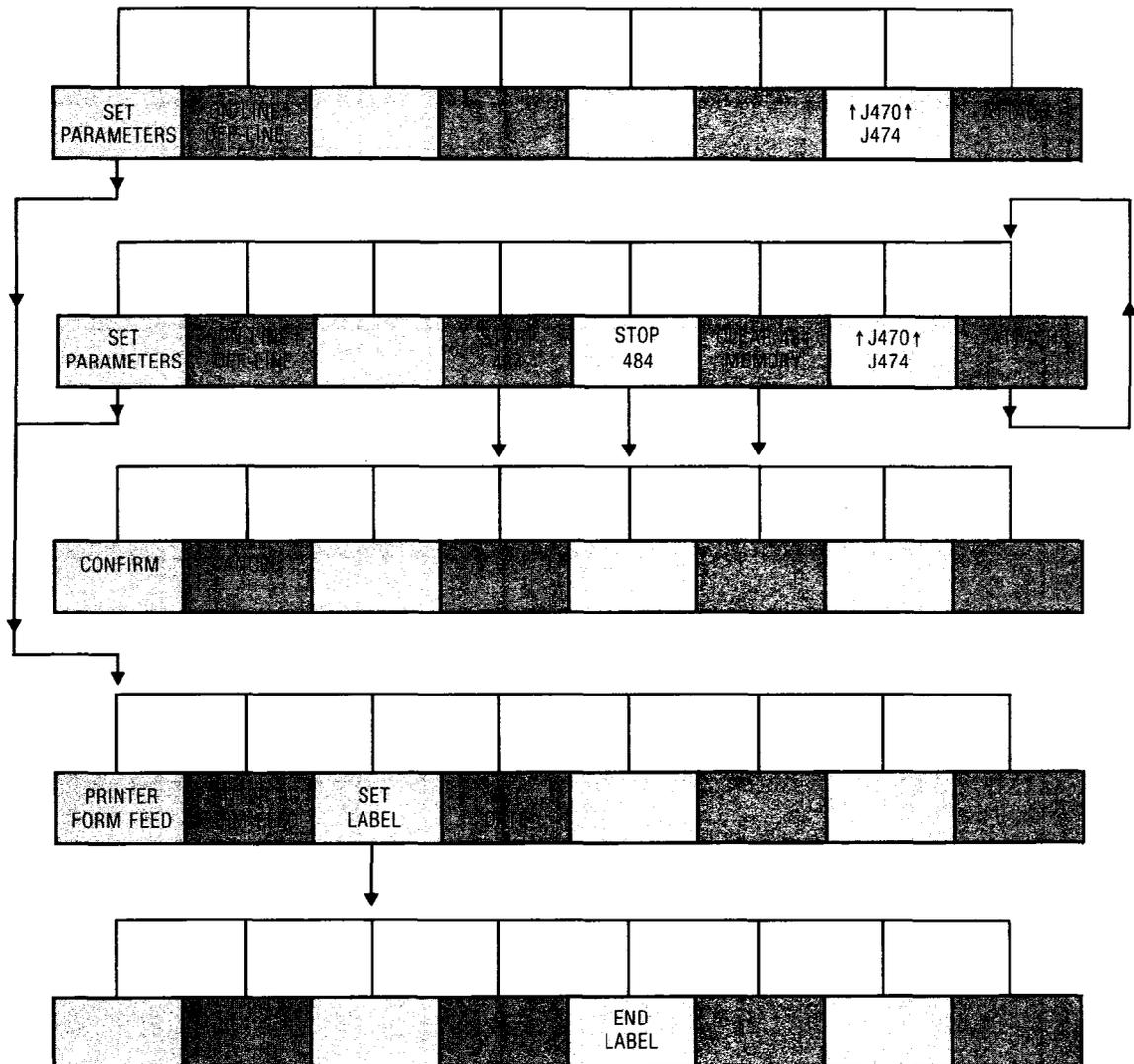


Figure 2-1. RESET Level — ON-Line Mode

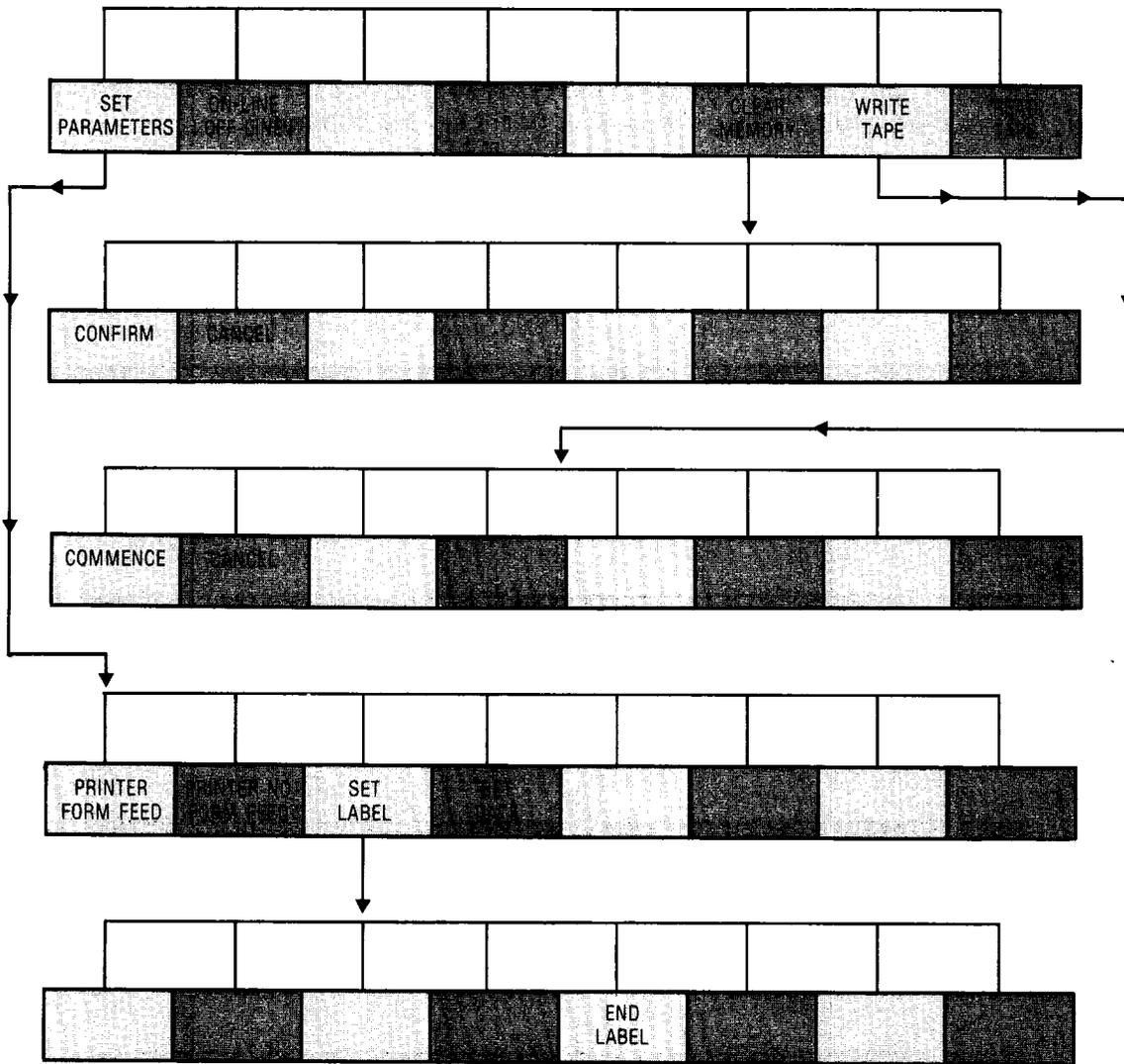


Figure 2-2. RESET Level — OFF-Line Mode

2.1.1 SET PARAMETERS

The functions under SET PARAMETERS are used to indicate the type of printer to be used, if any, and to set labels and dates for use on tapes made OFF-Line. OFF-Line tapes are made using the P190 Programmer with no 484 PC attached.

2.1.1.1 PRINTER FORM FEED and PRINTER NO FORM FEED

The printer attached to Port 2 of the P190 Programmer may or may not support form feed characters. The type of printer must be indicated using the PRINTER FORM FEED and PRINTER NO FORM FEED software label keys.

PRINTER FORM FEED indicates that the attached printer supports form feed characters. An ASCII form feed character is issued before the CRT screen is printed.

PRINTER NO FORM FEED indicates that the printer does not support form feed characters. The P190 Programmer issues the appropriate number of line-feed (LF) characters to bring the printer to the top of the form.

2.1.1.2 SET LABEL and END LABEL

These software label keys are used to enter a tape label or title. This label can be any mix of alphanumeric and special characters with a maximum length of 64.

Press the SET LABEL software label key and enter the label using the P190 keyboard. When complete, press the END LABEL software label key. This enters the label and returns you to the previous set of software labels.

2.1.1.3 SET DATE

Press the SET DATE software label key and enter six date characters. The interpretation of the characters is up to you: month, day, and year, or day, month, and year. For example, April 5, 1984 could be entered as 040584 (month, day, and year), 050484 (day, month, and year), or as 5APR84 (alphanumeric). The date is inserted automatically once six characters are entered via the P190 keyboard.

2.1.2 ON-LINE/OFF-LINE

The P190 Programmer can program a 484 PC in two modes: ON-Line or OFF-Line. ON-Line programming is used when the P190 Programmer is connected to a 484 PC through an RS-232-C interface, either a J470 or a J474/J475. As a program is entered on the P190 it is entered into the 484.

OFF-Line programming requires only a P190 Programmer and a 484 Programmer Tape (AS-T484-001). In OFF-Line programming a 484 PC's memory is simulated within the P190 Programmer. A program can be developed and stored to be loaded into a 484 Controller at a later date.

The following rules apply to OFF-Line programming:

1. OFF-Line programming is always done on a simulated 484 PC with 8K memory, 256 Input/Output (I/O) points, and an Enhanced II Instruction Set. The simulated controller is stopped. The PC that will eventually use the program can be any memory size or instruction set. However, ensure that the amount of memory and type of logic programmed are compatible.

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2. When the P190 keylock is unlocked, information can be entered via the keyboard or loaded from tape. Information can also be reviewed, changed, and rewritten to tape.
3. When the P190 keylock is locked, the contents of a tape can be reviewed but not changed.
4. Dump tapes are tapes on which a 484 PC's memory has been recorded. Dump tapes can be duplicated by loading the existing dump tape into the P190's memory, then recording on a blank tape (see Section 3, Tape Loader).
5. Dump tapes produced by the tape loader tape (AS-TI90-001) can be loaded, reviewed and altered by the 484 Programmer Tape (AS-T484-001).

ON-Line or OFF-Line is selected by toggling the ON-LINE/OFF-LINE software label key. Arrows in the software label indicate which function has been selected, up for ON-Line and down for OFF-Line. At power-up, ON-Line is selected automatically, default. When OFF-Line is selected, the following software labels are displayed:

NOTE

All OFF-Line user logic in P190 memory is erased if the key is toggled from OFF-LINE to ON-LINE and back to OFF-LINE. Use the WRITE TAPE function to save OFF-Line programs.

2.1.2.1 CLEAR MEMORY (OFF-Line Only)

This software label only appears when the P190 memory protect key is in the unlocked position and OFF-Line programming is selected. Press the CLEAR MEMORY software label key followed by the CONFIRM software label key to erase all user logic that has been entered into the P190 Programmer. The CANCEL software label key is pressed to cancel the request.

All OFF-Line user logic can also be cleared if the ON-LINE/OFF-LINE software label key is toggled from OFF-LINE to ON-LINE and back to OFF-LINE.

2.1.2.2 WRITE TAPE (OFF-Line Only)

The WRITE TAPE function is used to store OFF-Line programs on tape.

To write a tape:

1. Press the WRITE TAPE software label key.
2. Insert a blank or scratch tape into the tape drive.
3. Press the COMMENCE software label key. (Pressing CANCEL cancels the request.)
4. The message "****DUMPING****" appears on the screen while the tape is being written.

2.1.2.3 READ TAPE(OFF-Line Only)

The READ TAPE function is used to load an existing program from a tape into the P190's OFF-Line memory.

To read a tape:

1. Press the READ TAPE software label key.
2. Insert a previously written dump tape into the tape drive.
3. Press the COMMENCE software label key. (Pressing CANCEL cancels the request.)
4. The message "****LOADING****" appears on the screen along with the tape label and date while the tape is being loaded.

2.1.3 START 484 (ON-Line Only)

When this software label key is pressed the software labels CONFIRM and CANCEL appear on the screen. Press CONFIRM to start the 484. Press CANCEL to cancel the request. The START 484 software label is only displayed when ATTACH is successful and ON-Line programming has been selected.

2.1.4 STOP 484 (ON-Line Only)

When this software label key is pressed the software labels CONFIRM and CANCEL appear on the screen. Press CONFIRM to stop the 484. Press CANCEL to cancel the request. The STOP 484 software label is only displayed when ATTACH is successful and ON-Line programming has been selected.

2.1.5 CLEAR 484 MEMORY (ON-Line Only)

To clear the 484's memory, stop the controller, press the CLEAR 484 MEMORY software label key, and press the CONFIRM software label key. The CANCEL software label key is pressed to cancel the request. The CLEAR 484 MEMORY software label is only displayed when ATTACH is successful and ON-Line programming has been selected.

2.1.6 J470/J474

Toggle the J470/J474 software label key to indicate the interface communicating with the 484 PC. The selected interface type is indicated by two arrows, up for J470 Adapter, down for J474 or J475 Interface. At power-up the arrows are up, indicating J470; this is the default option.

If the interface type indicated and the interface type used do not match, either communications are not established, or an error code is returned from the interface. Toggling this key while attached to a 484 PC detaches the P190 Programmer from the controller.

2.1.7 ATTACH

The ATTACH software label key is used to establish communications between the P190 Programmer and the 484 Controller. The ATTACH software label is only present if the On-Line programming mode has been selected. If using a J474 or J475 Interface, a unit number, indicating the location or address of the 484 PC in the data line communicating with the P190, must be entered into the AR before pressing ATTACH. This value can range from 1 to 247.

If a J470 Interface is being used, simply press the ATTACH software label key to attach the 484 PC to the P190.

2.2 EXIT LEVEL

Logic can be entered at the EXIT Level if the P190 keylock is unlocked. The software labels displayed on the screen depend upon the P190 hardware keys pressed and on the position of the cursor. The EXIT Level functions are shown in Figures 2-3 and 2-4 with instructions for reaching the appropriate software labels.

To reach the EXIT Level, press the RESET/EXIT key. At this point there are a number of options open to you. If in the monitor mode, one of three things can be done. If the cursor is on a register reference, either in the reference area or on the alternate screen, the register contents can be displayed in decimal or binary form. However, these values cannot be altered. To display the next programmed network, press the PREV GET NEXT key. A specific network can be displayed by pressing the ERASE/GET key. (See Figure 2-3.)

There are more options available if in the program mode, P190 keylock unlocked. After reaching the EXIT Level, pressing either the PREV GET NEXT key or the START NEXT key displays a network on the screen. At this point, register and discrete references can be called to the screen by moving the cursor to the reference area or going to the alternate screen, entering a reference number into the AR, and pressing the ERASE/GET key.

If the cursor is on a register reference, the contents of the register can either be altered or displayed in decimal or binary form. If the cursor is on a discrete reference, or coil in the logic area, the discrete can be enabled, disabled, or forced on or off. Also when the cursor is in the logic area of a displayed network, pressing the RESET/EXIT key brings up a set of editing software labels. Since programming is done at the EXIT Level, when the cursor is in a network, or in the search area, the programming software labels are available. (See Figure 2-4.)

EXIT LEVEL OPERATIONS

THE VARIOUS OPTIONS AVAILABLE WHILE AT THE EXIT LEVEL OF OPERATIONS ARE OUTLINED IN FIGURES 2-3 AND 2-4. FIGURE 2-3 CONTAINS THE OPTIONS AVAILABLE IN THE MONITOR MODE WHILE FIGURE 2-4 CONTAINS THE PROGRAM MODE OPTIONS AND THE AVAILABLE SOFTWARE LABELS.

PRESS



P190 KEYLOCK LOCKED MONITOR MODE

CURSOR ON REGISTER REFERENCE. EITHER ON REFERENCE OR ALTERNATE SCREEN



OR

PRESS



DISPLAYS NEXT PROGRAMMED NETWORK

OR

ENTER NETWORK NUMBER

PRESS



DISPLAYS SELECTED NETWORK

Figure 2-3. EXIT Level — Monitor Mode

PRESS



P190 KEYLOCK UNLOCKED, PROGRAM MODE

PRESS



OR



CURSOR ON REGISTER REFERENCE, EITHER ON REFERENCE OR ALTERNATE SCREEN



OR

CURSOR ON DISCRETE REFERENCE, EITHER ON REFERENCE OR ALTERNATE SCREEN, OR AT COIL ON LOGIC SCREEN



OR

NETWORK DISPLAYED, CURSOR IN LOGIC AREA,

PRESS



OR

CURSOR IN NETWORK OR AT SEARCH AREA

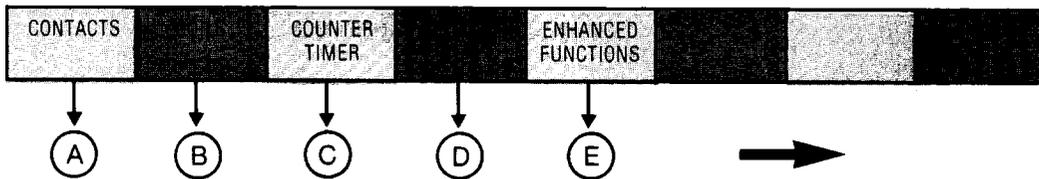


Figure 2-4. EXIT Level — Program Mode

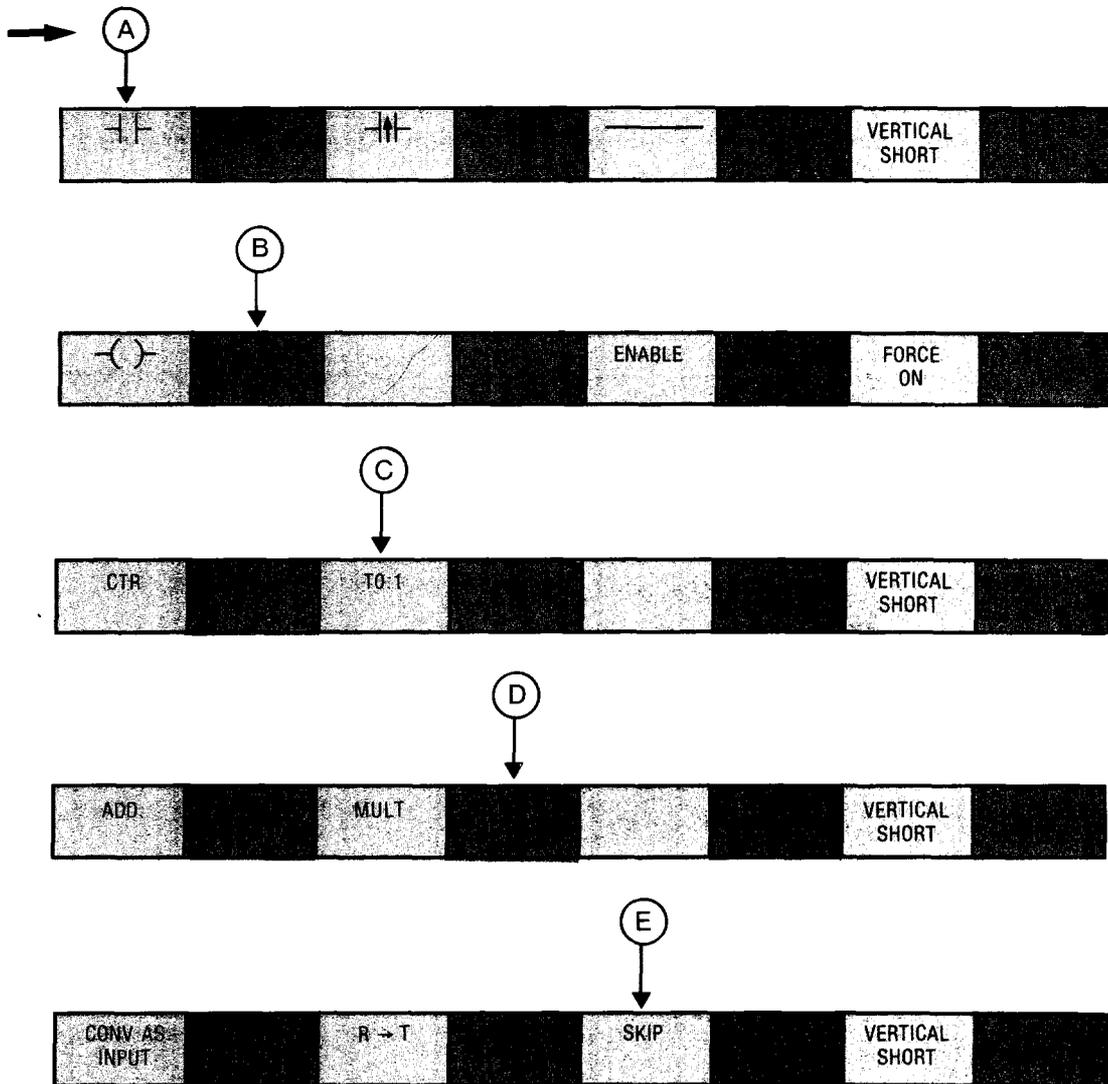


Figure 2-4. EXIT Level — Program Mode (cont.)

2.2.1 Reference Area and Alternate Screen

The reference area is between the logic screen and the status area toward the bottom of the P190 screen and the logic area if on the alternate screen. A total of nine references, three columns of three references each, can be displayed and altered in this area when on the logic screen. To enter the reference area, use the cursor control keys. (See Figure 2-5.)

The alternate screen is an enlarged reference area which replaces the logic screen. The alternate screen is reached from the logic screen by pressing the CHG SCREEN key. A total of 51 references, three columns of 17 references each, can be displayed and altered in this area.

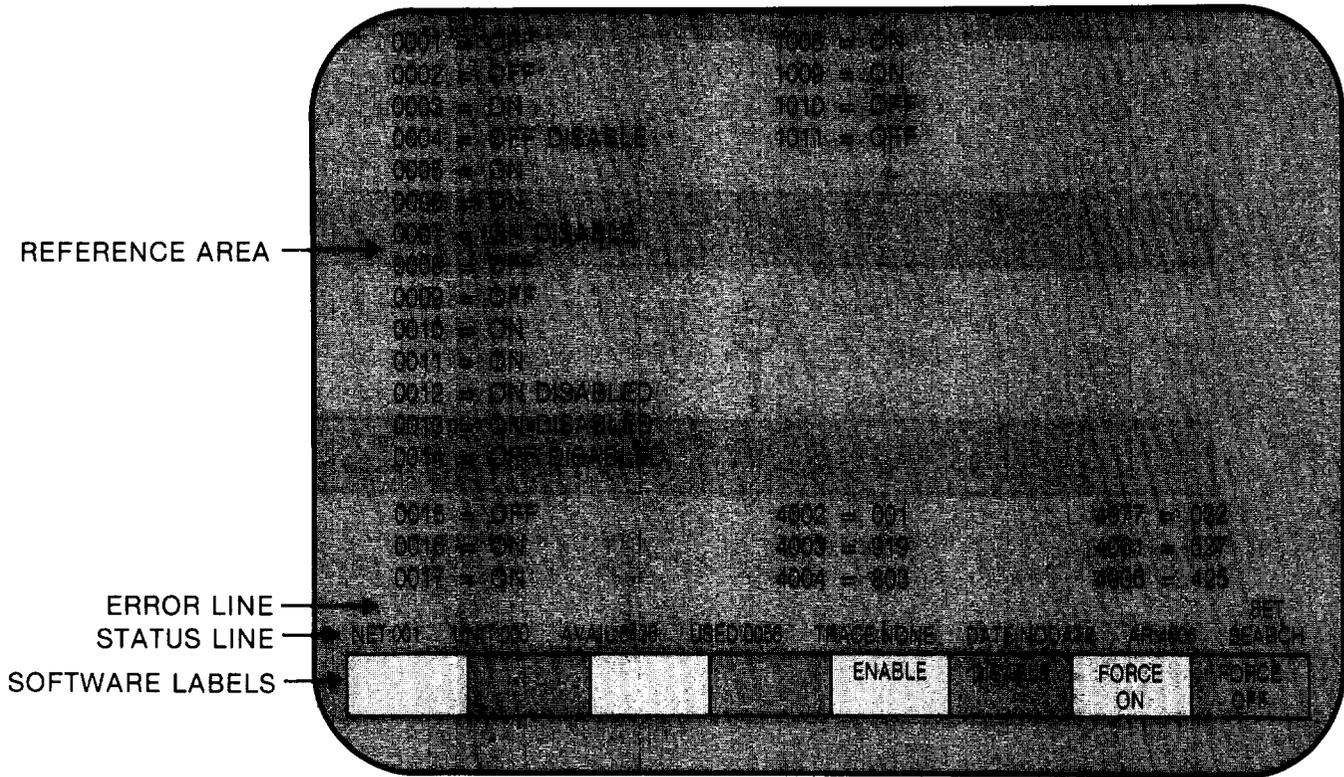


Figure 2-5. Alternate Screen

2.2.1.1 Register Functions

To display a 3XXX input register or a 4XXX output/holding register:

1. Move the cursor to the reference area or press the CHG SCREEN key for the alternate screen.
2. Enter the desired register number into the AR.
3. Press the ERASE/GET key.

The reference number and the register's contents appear in decimal form.

To display in binary form, press the DISPLAY BINARY software label key. To return back to decimal form, press the DISPLAY DECIMAL software label key.

To change the content of a 4XXX register:

1. Position the cursor over the reference.
2. Enter the new value into the AR.
3. Press the ENTER key.

NOTE

If the cursor is not moved to an empty slot before pressing the PREV GET NEXT key, the new reference takes the place of the other.

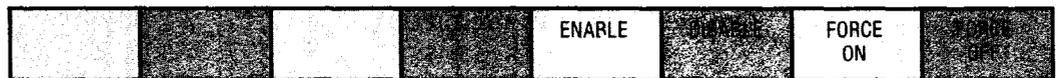
2.2.1.2 Discrete Functions

To display a coil (0XXX), discrete input (1XXX), or sequencer step (2XXX):

1. Move the cursor to the reference area or press the CHG SCREEN key for the alternate screen.
2. Enter the desired discrete number into the AR.
3. Press the ERASE/GET key.

The discrete reference number and its state are displayed.

The following software labels are available when the cursor is positioned over a discrete reference:



Before a discrete can be forced ON or OFF, it must be disabled. To do this, position the cursor over the desired discrete and press the DISABLE software label key. (A coil, 0XXX, must be programmed into 484 memory before it can be disabled.)

Once a discrete is disabled, the FORCE ON and FORCE OFF software label keys can be used to change the discrete's state. Press the ENABLE software label key to re-enable a discrete.

NOTE

If the cursor is not moved to an empty slot before pressing the PREV GET NEXT key, the new reference takes the place of the previous reference.

2.2.2 Programming Elements

Press the CHG NODE key on the P190 Programmer keyboard to reach logic screen operations — programming element software labels. There are six types of programming elements which can be entered on the logic screen: contacts, coils, counters, timers, calculates, and enhanced functions.

2.2.2.1 CONTACTS

Press the CONTACTS software label key to reach the various contact software labels. The following list contains each contact type along with its associated software label symbol:

Normally Open Contact 

Normally Closed Contact 

Transitional Contact (OFF to ON) 

Transitional Contact (ON to OFF) 

Horizontal Short 

Vertical Short (No symbol)

Vertical Open (No symbol)

2.2.2.2 COILS

The following are the available coils and coil function software labels reached by pressing the COILS software label key:



The first two software labels represent coils. The first, $-()-$, is a normal coil and the second, $-(L)-$, is a latched coil which retains its previous state when power is removed and later restored.

When coils are entered in a program, the P190 places them in the eleventh or far right column of the network.

To use any of the coil functions — DISABLE, ENABLE, FORCE ON, and FORCE OFF — position the cursor over the desired coil and then press the appropriate software label key. The FORCE ON and FORCE OFF functions can only be used on disabled coils.

2.2.2.3 COUNTER/TIMERS

The following software labels appear on the screen when the COUNTER/TIMERS software label key is pressed:



COUNTER

The format of a counter is shown in Figure 2-6.

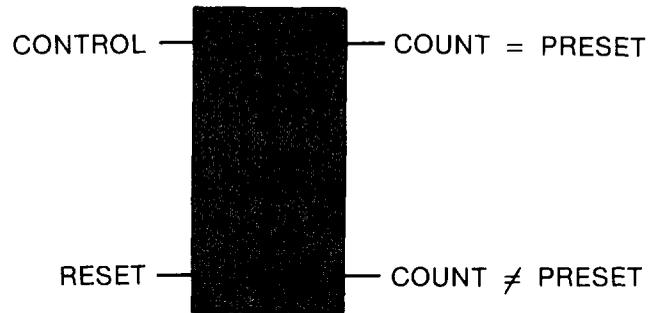


Figure 2-6. Counter

To construct a counter:

1. Enter the maximum desired number of counts, preset value, into the AR if using a fixed numerical value such as 0102 counts, or enter a 3XXX input register reference or a 4XXX holding register reference.

2. Press the CTR software label key.

The cursor is automatically positioned in the top node of the counter, the preset area.

3. Move the cursor down one position.
4. Enter a 4XXX holding register reference into the AR.
5. Press the ENTER key.

This 4XXX register holds the accumulated count value.

TIMER

The format of a timer is shown in Figure 2-7.

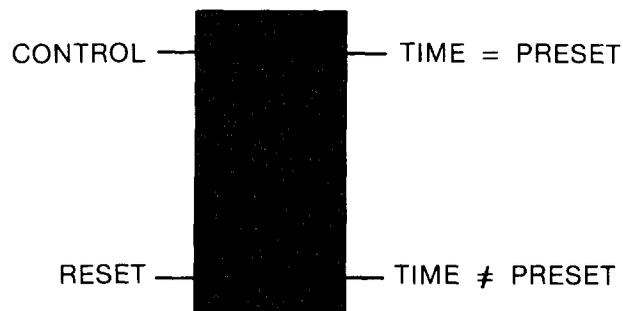


Figure 2-7. Timer

To construct a timer:

1. Enter the maximum desired time, preset value, into the AR if using a fixed numerical value such as 0093 seconds, or enter a 3XXX input register reference or a 4XXX holding register reference.
2. Press one of the timer software label keys: T1.0, T0.1, or T.01.

T1.0 represents seconds where 999 equals 999 seconds; T0.1 represents tenths of seconds where 999 equals 99.9 seconds; and T.01 represents hundredths of seconds where 999 equals 9.99 seconds.

The cursor is automatically positioned in the top node of the timer, the preset area.

3. Move the cursor down one position.
4. Enter a 4XXX holding register reference into the AR.
5. Press the ENTER key.

This 4XXX register holds the accumulated time.

2.2.2.4 CALCULATES

Calculates are the arithmetic functions: addition, subtraction, multiplication, and division. All arithmetic functions have the same structure:

- each occupies three nodes of space in a network.
- each has one input.
- each has two values used to perform the operation and a result.
- each places the result in the bottom node of the function block.

The formats for the arithmetic functions are shown in Figure 2-8.

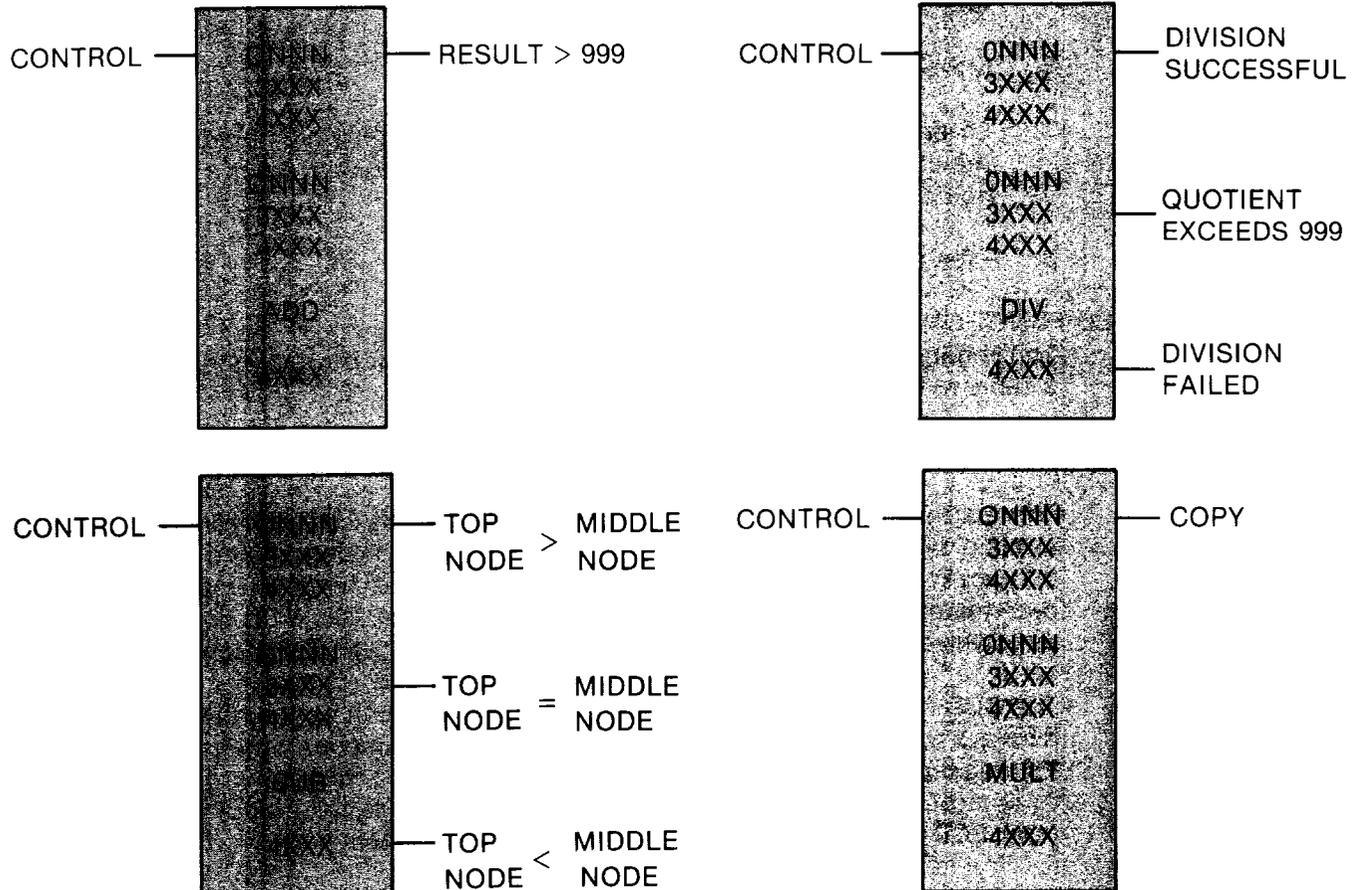


Figure 2-8. Arithmetic Functions

In the ADD block the top and middle values are added together. In the SUB block the middle value is subtracted from the top value. In the MULT block the top and middle values are multiplied by each other. In the DIV block the top value is divided by the middle value.

To construct an arithmetic function block:

1. Enter the top value into the AR. This value can be a fixed numerical value such as 0123, a 3XXX input register reference, or a 4XXX holding register reference. (In the divide function block, the next input or holding register, 3XXX + 1 or 4XXX + 1, is implied; it holds the low order portion of the divisor.)
2. Press the software label key desired: ADD, SUB, MULT, or DIV.

The cursor is automatically positioned in the top node of the block.

3. Move the cursor down one position to enter the middle value. This value can be a fixed numerical value such as 0345, a 3XXX input register reference, or a 4XXX holding register reference.
4. Enter the value into the AR.

5. Press the ENTER key.
6. Move the cursor down one position.
7. Enter the reference for the 4XXX holding register which holds the result. (In the multiply function block, the next holding register, 4XXX + 1, is implied; it holds the low order portion of the result.)
8. Press the ENTER key.

2.2.2.5 ENHANCED FUNCTIONS

The enhanced functions include BCD and binary converts, a register-to-table move, a table-to-register move, and a skip function.

CONVERTS

There are two types of convert functions, BCD (binary coded decimal) and binary. Keep in mind that the type of convert, BCD or binary, is determined by whether one or two inputs are used. Also, the reference types inserted into the function determine whether the convert is an input or output. The BCD convert functions use twelve discrete references; the binary converts use ten discrete references.

The BCD convert functions allow register devices such as thumbwheels and LED displays to be connected to discrete I/O modules. Numerical values are taken from holding registers, converted from binary to BCD, and sent out via logic output coils to control output devices. A BCD convert can also handle input data, convert it from BCD to binary, and place it in a holding register.

The binary convert function converts individual discrete inputs to a binary value and places the binary value in a holding register in the controller. A binary convert can also convert a binary value, taken from a holding register, to individual discrete outputs which are sent out to control an output device. A binary convert is only performed if both the top and bottom inputs on the function block are receiving power.

Each convert function, BCD and binary, can input data or output data. To handle input data, the top value in the convert function block must be a 1XXX discrete input reference and the bottom value must be a 4XXX holding register reference. To handle output data, the top value in the function block must be a 4XXX holding register reference and the bottom value must be a 0XXX discrete output reference.

The convert function block has two inputs and one output. When the top input only receives power, a BCD convert is performed. When the top input and the bottom input are receiving power, a binary convert is performed. The top output passes power when the conversion is done.

The structure of the convert function blocks is shown in Figure 2-9.

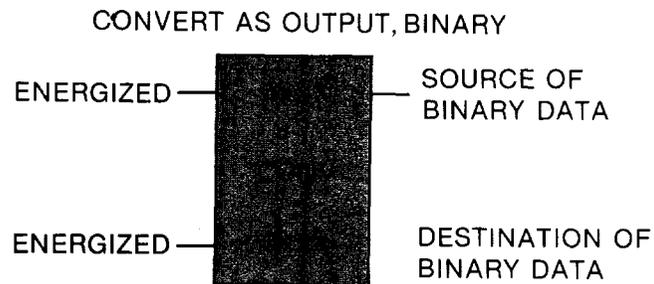
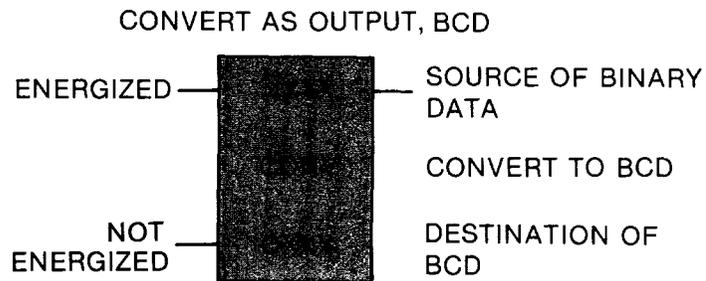
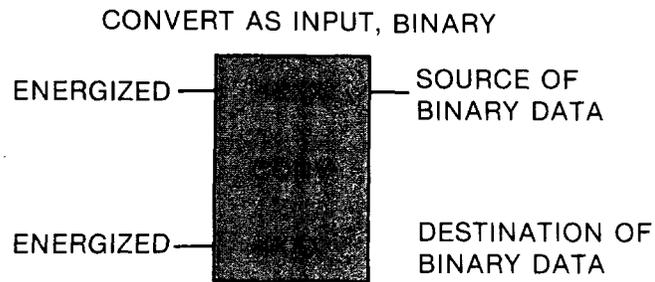
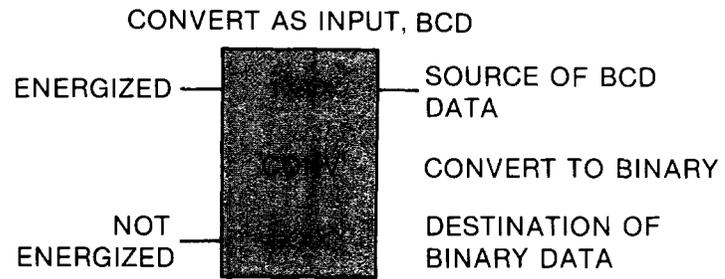


Figure 2-9. Convert Function Blocks

To construct a convert to input data:

1. Enter a 1XXX discrete input reference into the AR.
2. Press the CONV AS INPUT software label key.

The cursor is automatically positioned in the top node of the convert block.

3. Move the cursor down one position.
4. Enter a 4XXX holding register reference into the AR.
5. Press the ENTER key.

To construct a convert to output data:

1. Enter a 4XXX holding register reference into the AR.
2. Press the CONV AS OUTPUT software label key.

The cursor is automatically positioned in the top node of the convert function block.

3. Move the cursor down one position.
4. Enter a 0XXX discrete output reference into the AR.
5. Press the ENTER key.

MOVES

There are two types of move functions: register-to-table (R→T) and table-to-register (T→R). The register-to-table move takes a value from a register and places it in a specified register location in a table. The table-to-register move takes a value from a specified register in a table and places it in another register. The structure of the move function blocks is shown in Figure 2-10.

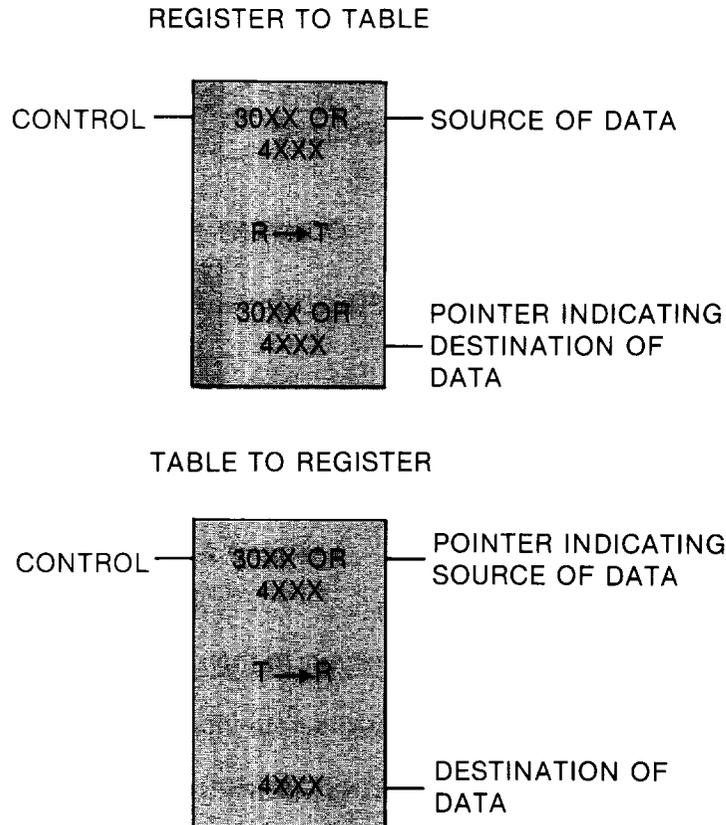


Figure 2-10. Move Function Blocks

To construct a move:

1. Enter a 3XXX input register reference or a 4XXX output/holding register reference into the AR.
2. Press either the R→T or the T→R software label key.
3. Move the cursor down one position.
4. For a register-to-table move enter either a 3XXX or a 4XXX reference. For a table-to-register move, enter a 4XXX reference.
5. Press the ENTER key.

SKIP

A skip function block occupies only one node of space in a network. It uses one input and no output.

To construct a skip:

1. Enter into the AR a fixed numerical value such as 0007, a 3XXX input register reference, or a 4XXX holding register reference.

This value indicates the number of networks to be skipped starting with the remainder of the current network. A zero indicates that all remaining networks are to be skipped.

2. Press the SKIP software label key.

2.2.3 Editing Logic Area (RESET/EXIT)

When the cursor is in the logic area of the screen and the P190 keylock is unlocked, network editing functions can be reached by pressing the RESET/EXIT key on the P190 keyboard.

The following are the available editing function software labels:

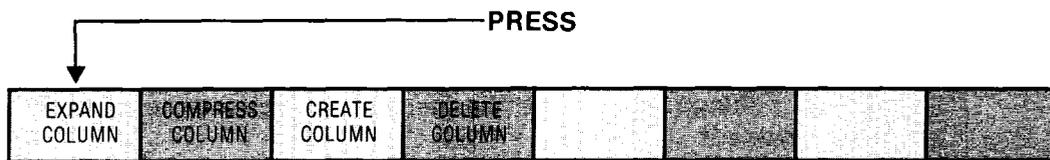
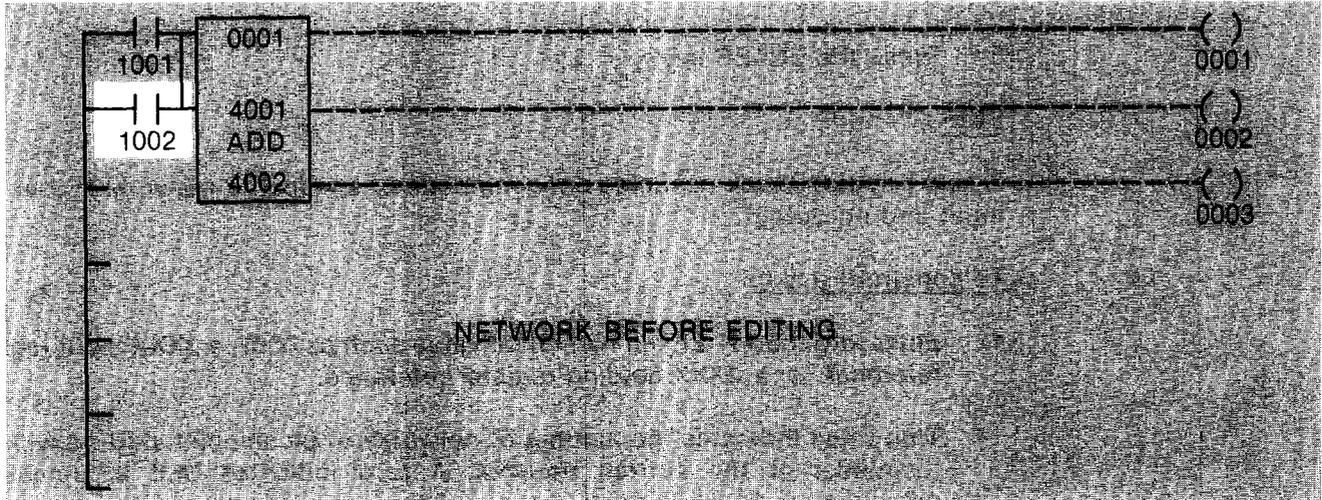
EXPAND COLUMN	COMPRESS COLUMN	CREATE COLUMN	DELETE COLUMN				
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2.2.3.1 EXPAND COLUMN

This function is used to move elements in a column down. Only the elements at and below the cursor in the selected column are moved (see Figure 2-11).

TO EXPAND A COLUMN

POSITION CURSOR OVER THE TOP ELEMENT TO BE MOVED DOWN



TO MOVE DOWN MORE THAN ONE ROW, HOLD THE KEY DOWN

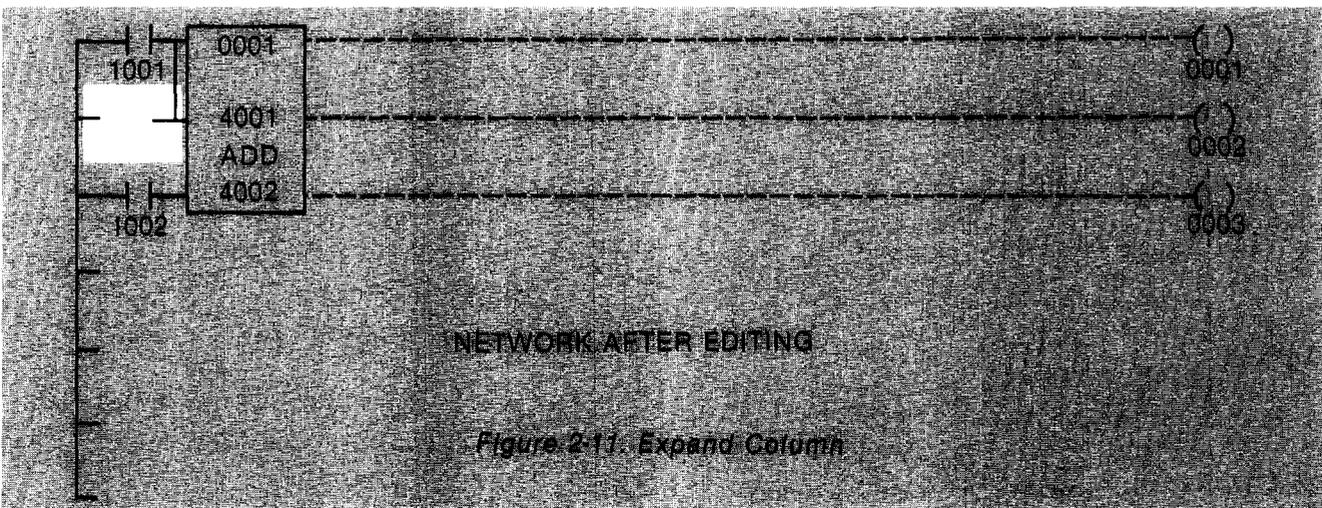


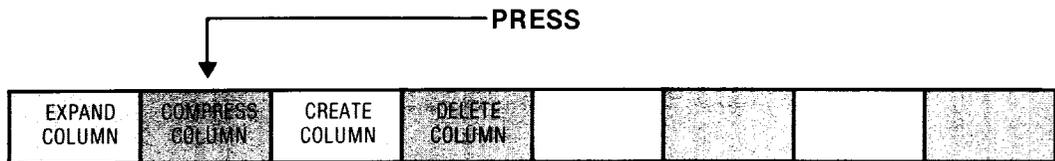
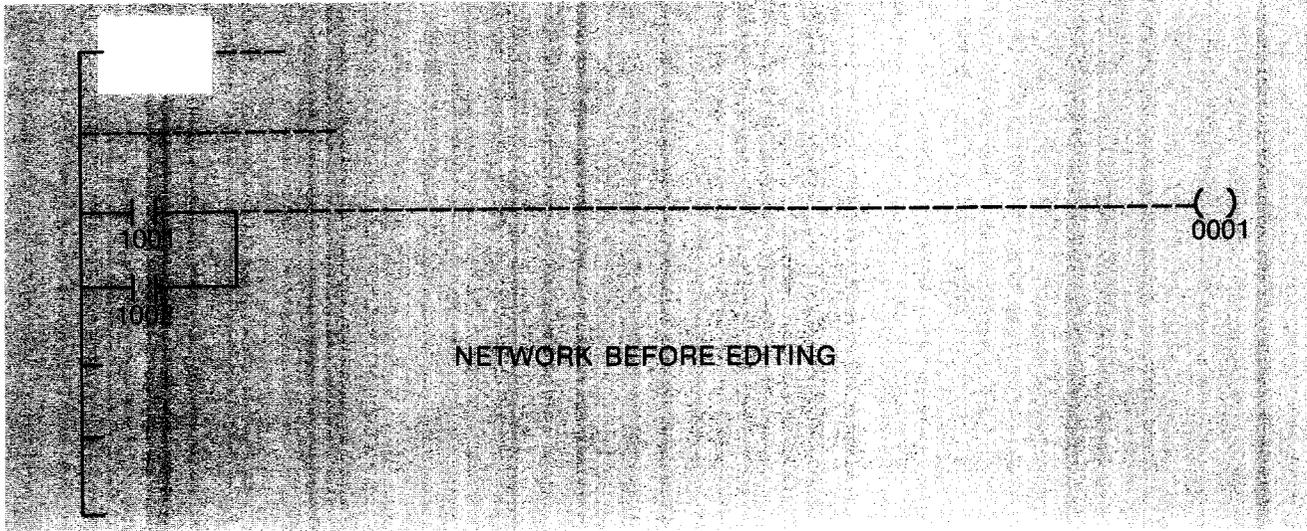
Figure 2-11. Expand Column

2.2.3.2 COMPRESS COLUMN

This function is used to move elements in a column up. Only elements below the cursor in the selected column are moved (see Figure 2-12).

TO COMPRESS A COLUMN

POSITION CURSOR OVER THE SPACE THAT TOP ELEMENT IS TO BE MOVED TO



TO MOVE UP MORE THAN ONE ROW, HOLD THE KEY DOWN

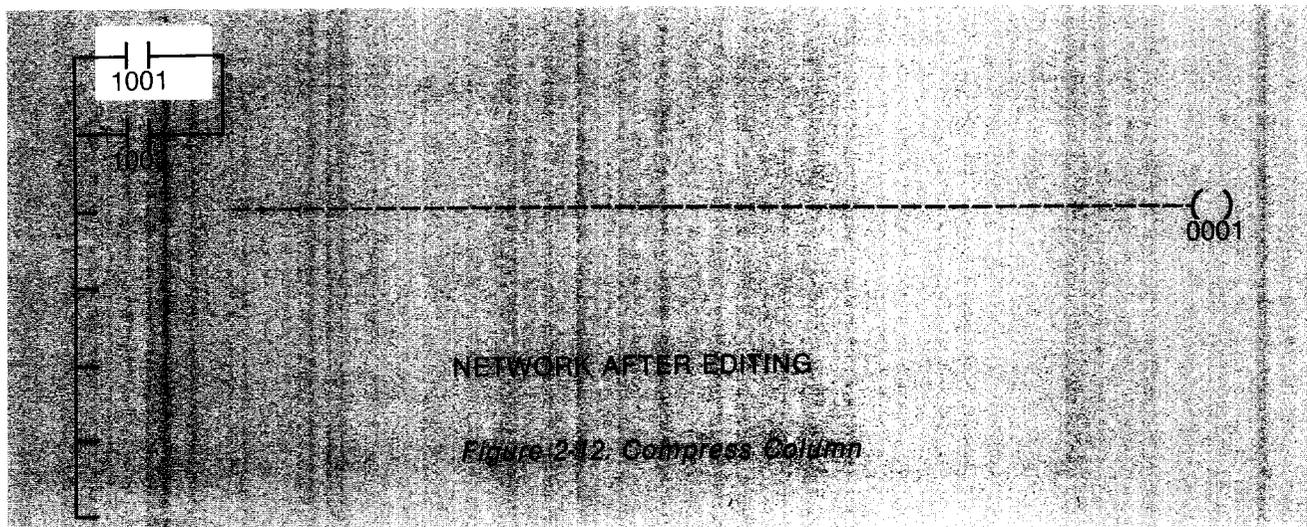


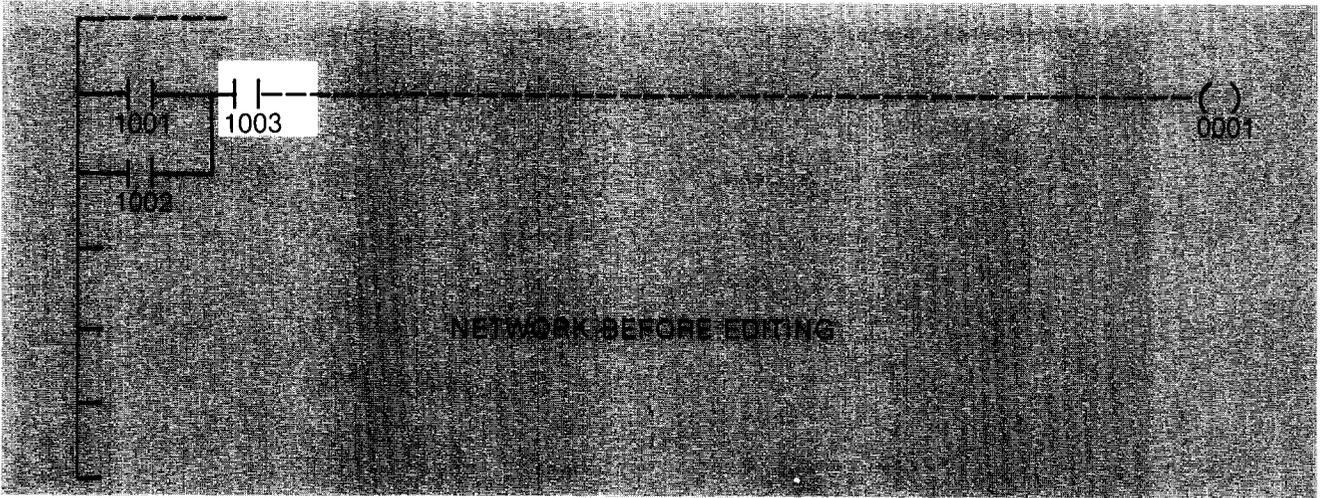
Figure 2-12. Compress Column

2.2.3.3 CREATE COLUMN

This function allows a new, blank, column to be inserted into a network. All logic in the selected column and to the right of the cursor is moved to the right (see Figure 2-13).

TO CREATE A COLUMN

POSITION CURSOR IN AN EXISTING COLUMN, ANY ROW



PRESS



TO CREATE MORE THAN ONE COLUMN, IF THERE IS ENOUGH ROOM IN THE NETWORK, KEEP THE KEY PRESSED

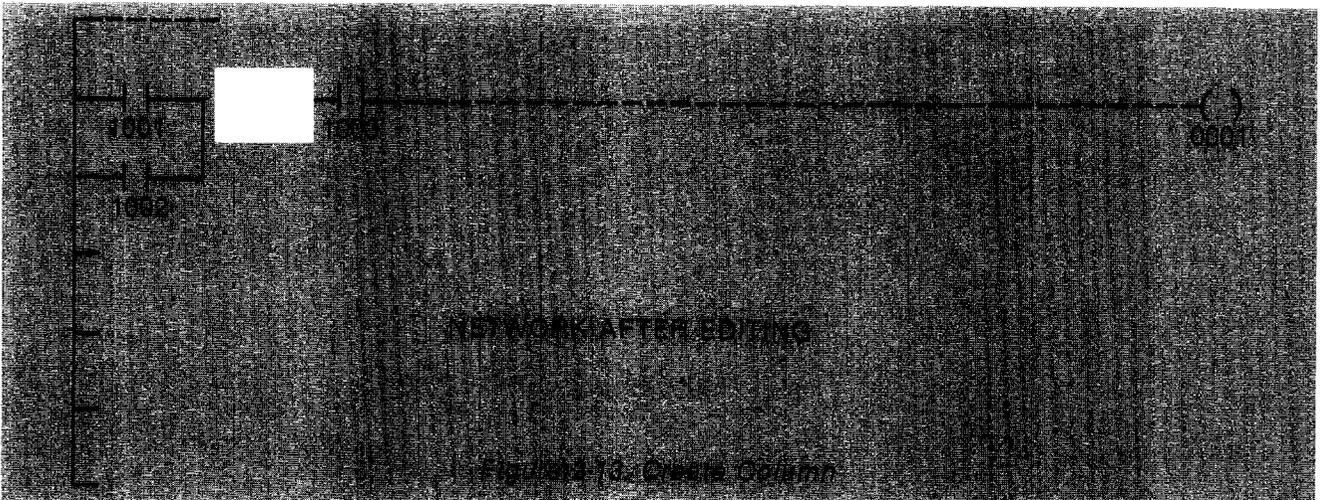


Fig. 2-13. Create Column

2.2.3.4 DELETE COLUMN

This function allows empty columns in a network to be deleted. All the logic to the right of the deleted column is moved to the left (see Figure 2-14).

TO DELETE A COLUMN

POSITION CURSOR IN AN EMPTY COLUMN

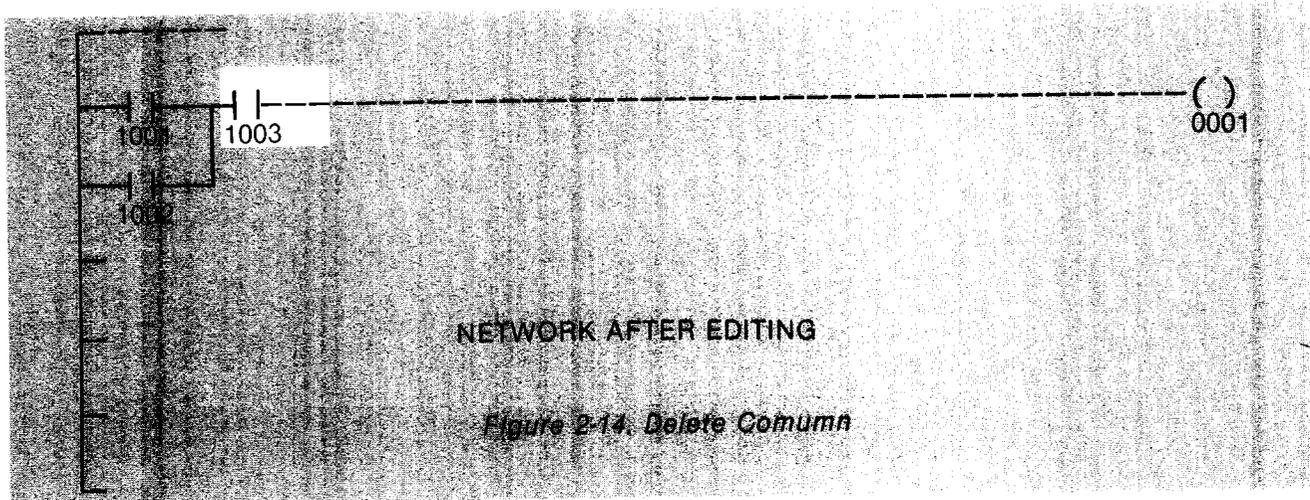
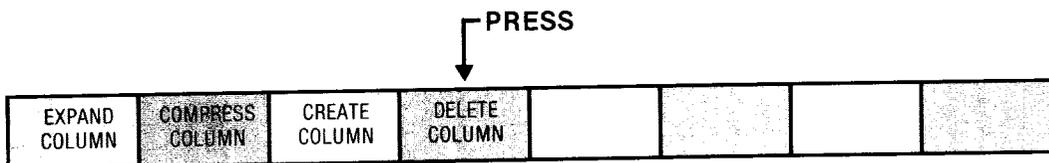
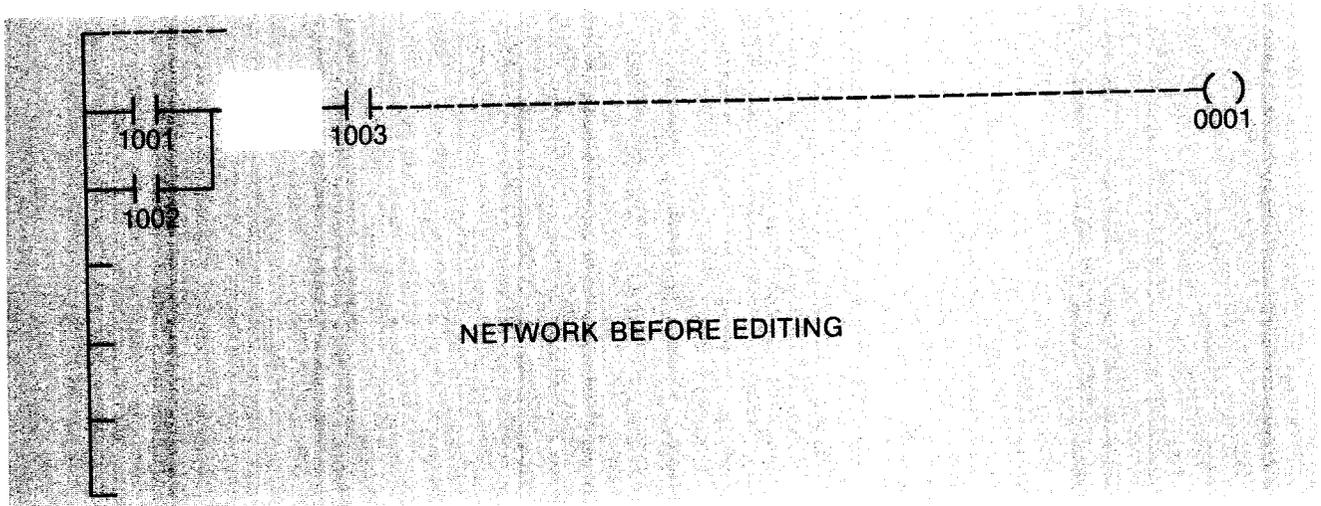


Figure 2-14. Delete Column