SECTION 2
THE P190 PROGRAMMER

This section describes the Modicon P190 Programmer. The P190 Programmer is used to program, and to load or dump data, to or from the Micro 84 PC. The P190 Programmer consists of a Keyboard, CRT Screen, Tape Drive, Memory Protect Switch and two Peripheral Ports. For additional P190 information, not Micro 84 PC specific, consult the Modicon P190 User's Guide.

2.1 KEYBOARD

The P190 keyboard has four sections: alphabetic keys, numeric keys, function keys, and software label keys as shown in Figure 2-1.

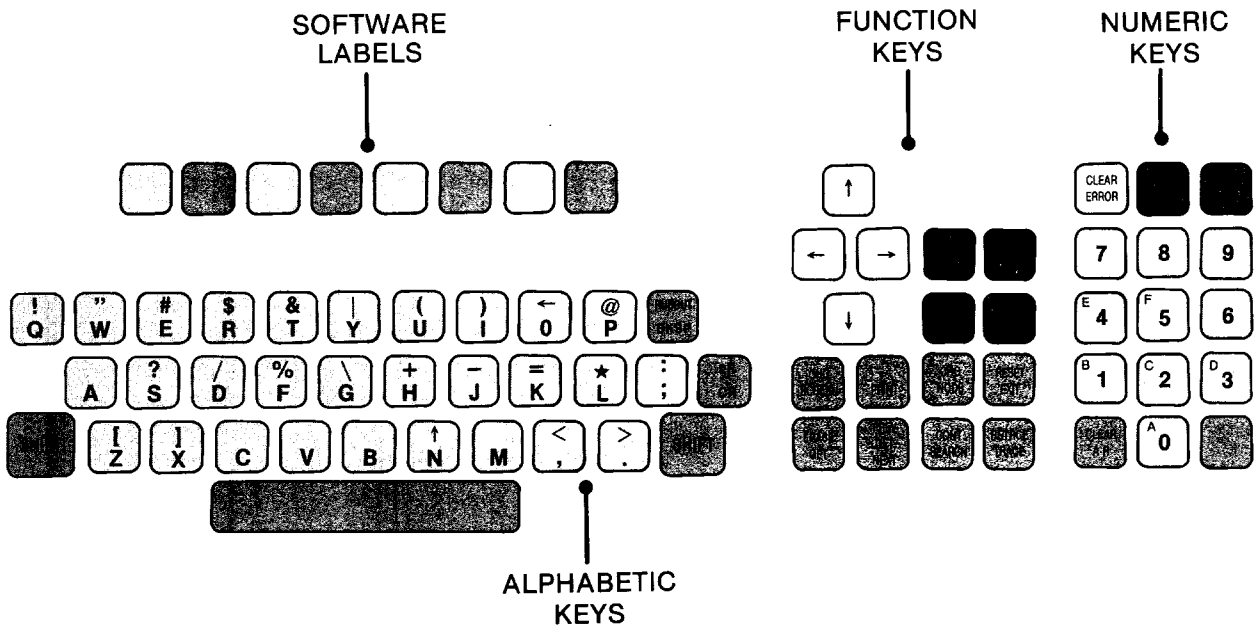


Figure 2-1. P190 Keyboard

2.1.1 Alphabetic Keys

The alphabetic keys (with ASCII) are used to enter all alphabetic data. The SHIFT key, when pressed with an alphabetic key, activates the upper key function. The RUBOUT key is used to erase information at the area where the cursor is placed. Figure 2-2 illustrates the alphabetic keyboard.

Figure 2-2. Alphabetic Keyboard

2.1.2 Numeric Keys

Numeric keys are used to enter numeric data in the Assembly Register (AR) located at the lower right of the CRT screen. Figure 2-3 illustrates the numeric keyboard.

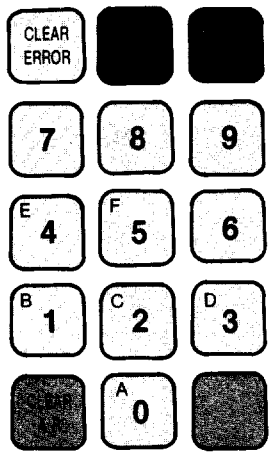


Figure 2-3. Numeric Keyboard

2.1.3 Function Keys

Function keys are used to control screen displays and to enter and edit data. All of the keys are used, except for the CHG NODE and EXIT keys. Figure 2-4 illustrates the function keys. The cursor control keys are located on the function keyboard. Use of these keys move the cursor up or down, or to the left or right. Use of the PRINT key causes the screen display to be copied to an ASCII printing device attached to the second peripheral port of the P190. The first 19 lines are printed when the PRINT key is pressed. To print all 24 lines, press the SHIFT key concurrently. The P190 User's Manual describes the use of the other keys found here.

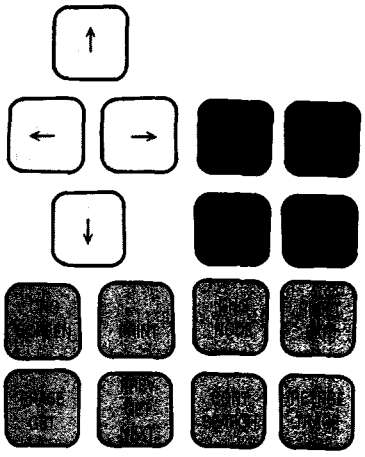


Figure 2-4. Function Keys

2.1.4 Software Label Keys

The P190/Micro 84 PC Programmer/Tape Loader software tape displays software labels on the P190 screen. These software labels tell you what software functions are available from a specific screen display.

There are eight available software labels, alternating white and black blocks at the bottom of the screen. These labels correspond to the eight software label keys on the top row of the P190 keyboard, just below the screen, as shown in Figure 2-5. These are blank keys, alternating dark grey and white, corresponding to the software labels above them. The black software label matches the dark grey software label key beneath it, and the white software label matches the white (or light grey) software label key beneath it. The software label keys change as new functions are selected.

All software labels which use two lines are dual function keys. The bottom function is activated by pressing the corresponding software label key. To activate the top function, the software label key must be pressed simultaneously with one of the SHIFT keys.

Figure 2-5. Software Label Keys

2.1.5 SHIFT

Because it is sometimes difficult to press two keys simultaneously, the P190/Micro 84 PC tape has a special SHIFT function. On the P190 there is a blank orange key between the cursor control keys and the ENTER key. This key is used as a SHIFT key. Its function is similar to a SHIFT LOCK.

When this key is pressed, the whole keyboard is in SHIFT position and the word SHIFT appears in intensified video in the lower left of the P190 screen. Once any other key is pressed, the SHIFT LOCK is released.

If this SHIFT key is pressed and then is not needed, press the key again to return to the normal keyboard.

2.2 CRT SCREEN

The P190's nine-inch CRT screen is located directly above the alphabetic keyboard and software label keys. The CRT screen is divided into three major areas: software labels, error and prompt lines and the main user work area.

The software labels are displayed at the very bottom of the CRT screen, just above the software label keys. These labels represent the software functions available at any given moment. The labels change as new functions are requested or old functions are completed. The software labels are color-coded (black and white) to correspond to the software label keys beneath them on the keyboard.

The error and prompt lines are displayed on the two lines just above the software labels. The prompt line tells you what keyboard entry is expected next, or what operation the P190 is currently performing. The error line is just above the prompt line and displays a flashing "ERROR:", followed by a brief explanation. The error messages are listed in Appendix A. The Assembly Register (AR) appears on this line, when needed. When programming ladder logic, all numbers are entered in the AR.

The remaining part of the CRT screen is the work area. The work area is where you enter, edit and display information. How to enter, edit and display information is described in detail in this manual.

2.3 TAPE DRIVE

The P190 tape drive is located to the right of the CRT screen. See Figure 2-6.

Tapes are used to load software programs into the Micro 84 PC. You can also copy and save software programs using the Tape Loader function. For more about the Tape Loader see Section 8.

NOTE

Before inserting the P190/Micro 84 Programming tape, be sure that the RECORD tab has been snapped to the right or better yet, has been removed. This prevents any possibility of writing over the tape and erasing your programs.

To insert a tape, hold it so that the metal plate is on the underside and the exposed tape is toward the tape drive. Open the tape drive door and insert the tape. Press firmly until the tape clicks into place. To remove the tape, open the door to the tape drive and press the eject button.

NOTE

P190/Micro 84 PC Programming tapes use software overlays, that is, only a portion of the tape is read into the P190 at any given time. Leave the tape in the drive, because the P190 will be rereading it from time-to-time.

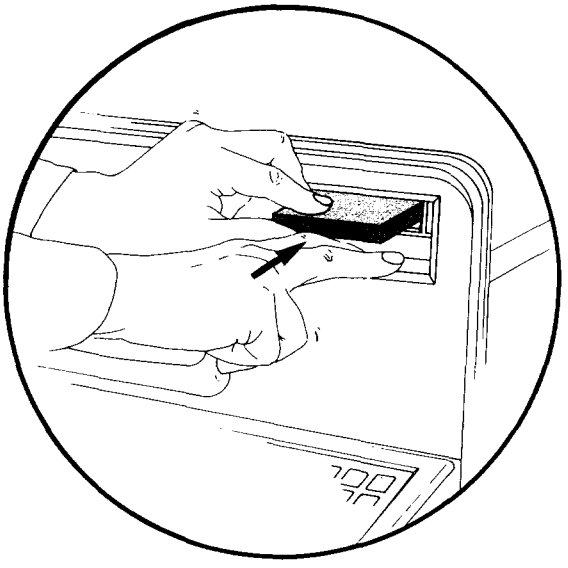


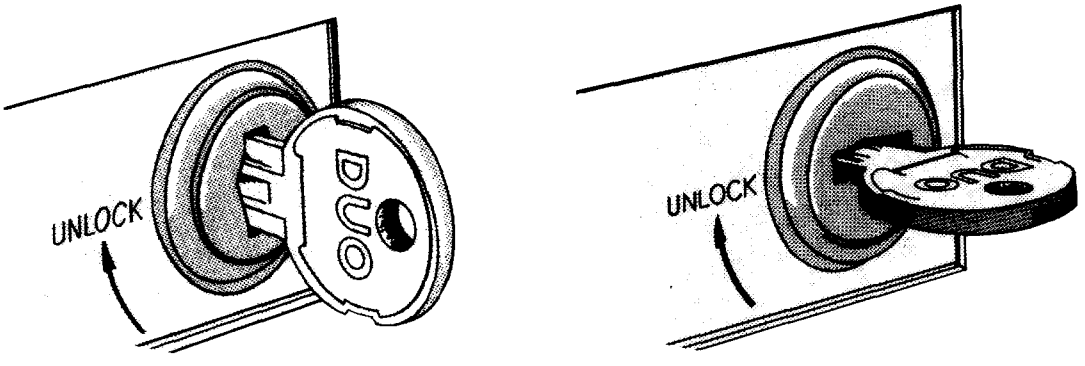
Figure 2-6. Inserting a Tape Into the Tape Drive

2.4 MEMORY PROTECT

The Memory Protect key on the P190 panel determines the status, Monitor or Program mode, of the P190. If this key is in the Lock position (see Figure 2-7a), the P190 is in Monitor mode. In Monitor mode you can examine any information in the PC, but you cannot change any portion of the PC's memory, or start or stop the PC.

If the key is in Unlock position (see Figure 2-7b), the P190 is in Program mode. In Program mode you can examine and change any information in the PC's memory, and START or STOP the PC.

If the key switch changes during an operation, the system will return to the Power-up, ATTACH, level.



2-7a. Lock or MONITOR Mode *2-7b. Unlock or PROGRAM Mode*

Figure 2-7. Memory Protect Key

2.5 PERIPHERAL PORT SETTING

On the rear of the P190, behind a screw-on plate, are two sets of dip switches used to set the peripheral port parameters. By using these switches, you can control the mode of communications used for each of the two RS-232-C type ports. The five selections are:

BAUD RATE
PARITY/NO PARITY
EVEN/ODD PARITY
7/8 BITS PER CHARACTER
1/2 STOP BITS

NOTE

These switches should only be changed when the power to the P190 is OFF, because the P190 reads switch settings only during its Power-Up cycle.

The left set of switches are dedicated to PORT 1 and are used to communicate with the designated controller. The right set of switches are dedicated to PORT 2 and are generally used for output communications to a printer. The settings for each of these ports are as follows:

1 = UP and 0 = DOWN.

Port Settings:

	S1	S2	S3	S4	S5	S6	S7	S8
Baud Rate								
Parity Ena/Dis								
Parity Select								
Stop Bits								
Data Bits								

NOTE: The baud rates supported by the P190 are noted with an *.

Baud Rate:		S1	S2	S3	S4
19200	-	1	1	1	1
9600*	-	1	1	1	0
7200*	-	1	1	0	1
4800*	-	1	1	0	0
3600*	-	1	0	1	1
2400*	-	1	0	1	0
2000*	-	1	0	0	1
1800*	-	1	0	0	0
1200*	-	0	1	1	1
600*	-	0	1	1	0
300*	-	0	1	0	1
150*	-	0	1	0	0
134.5*	-	0	0	1	1
110*	-	0	0	1	0
75	-	0	0	0	1
50	-	0	0	0	0

Parity ENA/DIS:		S5
parity enable	-	1
parity disable	-	0

Parity Select:		S6
even parity	-	1
odd parity	-	0

Stop Bits:		S7
1 stop bit	-	1
2 stop bits	-	0

Data Bits:		S8
8 data bits	-	1
7 data bits	-	0

SECTION 3
THEORY OF OPERATION

This section describes the way the P190 Programmer and the Micro 84 Programmable Controller work. The MICRO 84 system controls your equipment by means of a program stored in memory and by communication with the I/O section as illustrated in Figure 3-1.

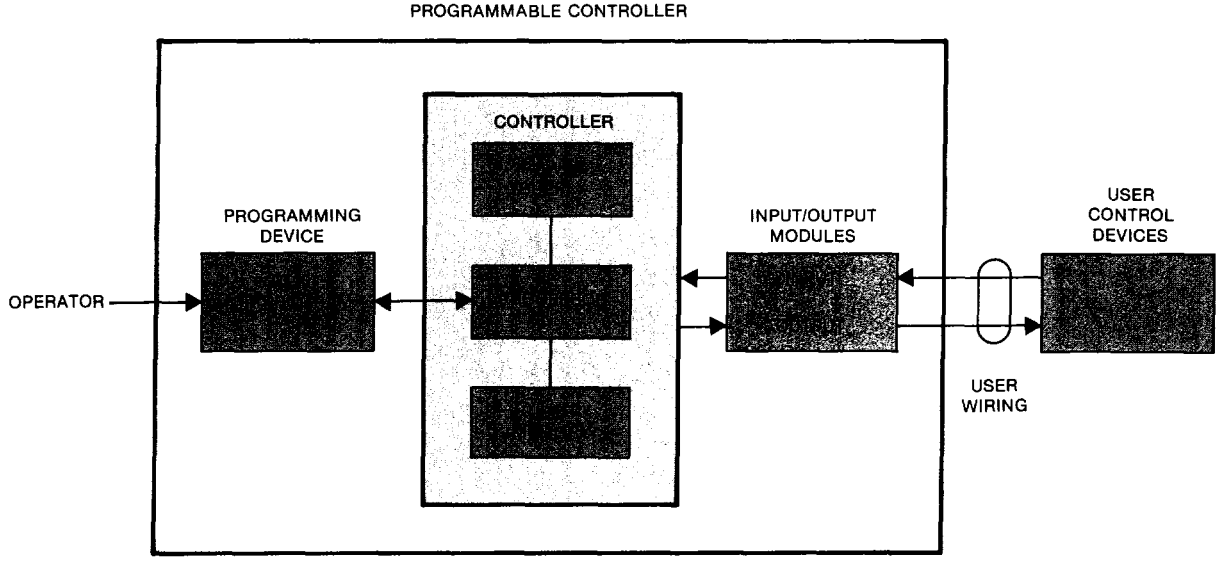


Figure 3-1. System Block Diagram

3 1 CONTROLLER SCAN

The Micro 84 PC scans the networks in your program to solve the logic. The scan starts at the top left of the first network and goes from top to bottom in each column working from the left column towards the right column as shown in Figure 3-2.

The scan starts in network 1, goes to network 2 and continues until the scan reaches the end of the program. Within each network, logic elements are solved from top to bottom, column by column. This means that when a column of logic is solved, its solutions are available for use in the next column. The outputs are serviced and the cycle starts over again.

The numeric contents of a register, once updated, can be used by all subsequent logic elements in a network (in the same or next column). All inputs and outputs are updated at the end of each scan.

Scan time varies depending upon the amount and type of logic entered.

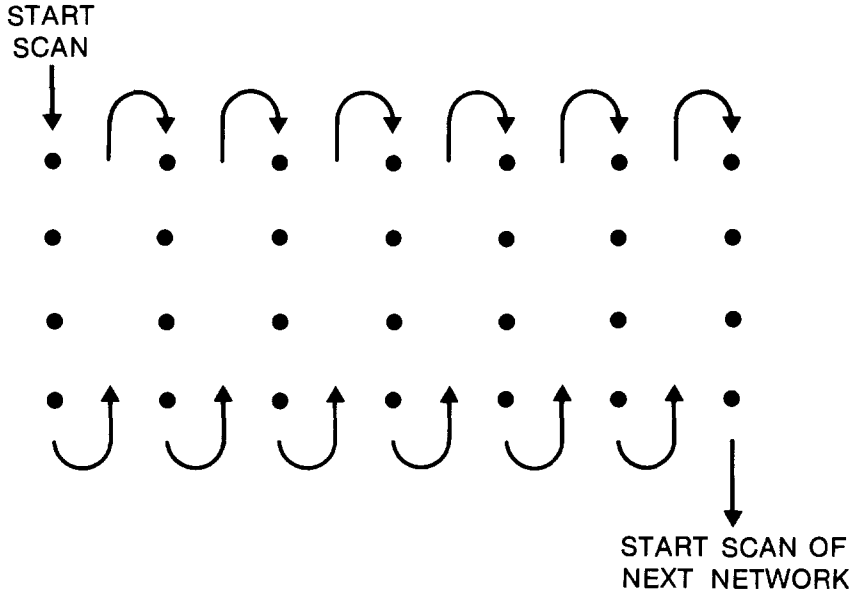


Figure 3-2. Scan

3.2 INPUT/OUTPUT (I/O) MODULES

The MICRO 84 input/output modules isolate the internal processor from the external user-supplied devices. This isolation prevents electrical noise from affecting processor operation. The processor responds to the condition of an external device (on, off, or numeric value). There are two major groupings of I/O modules:

- Discrete I/O
- Register I/O

3.2.1 Discrete I/O Modules

Each discrete I/O module can be connected to a maximum of 8 discrete devices. A discrete device is one that can be either ON or OFF.

Type of Device	Reference Numbers	Processor
Input (Pushbutton switches, Limit switches, etc.)	1001-1032 1001-1064	(M84A-001) (M84A-002)
Output (Lights, motor starters, etc.)	0001-0032 0001-0064	(M84A-001) (M84A-002)

3.2.2 Register Modules

Register modules provide the capability of handling numeric values (000-999) within the Micro 84 Programmable Controller. The values are represented in binary coded decimal (BCD) or as an analog voltage or current. They can be received from an external device or sent to an external device.

The following list describes the type of register module and its associated reference numbers:

Type of Device	Reference Numbers	Processor
Input, (Thumbwheel, panel meter, temperature, pressure, and flow transducers, etc.)	3001-3004	Both
Output, (Digital display, valves, positioning devices, etc.)	4010, 4012, 4014, 4016	M84A-001
	4010, 4012, 4014, 4016, 4018, 4020, 4022, 4024	M84A-002

3.3 MODBUS COMMUNICATIONS

The addition of the J375 Modbus Adapter to a Micro 84 PC allows the P190 Programmer (or any other Modbus function code 18 compatible equipment) to communicate with the controller. The J375 allows the communication parameters to be set and Micro 84 unit numbers to be specified so that a network of up to 247 controllers can be linked together.