SECTION 1
INTRODUCTION

The Modicon 584M Programmable Controller represents the most powerful controller currently available. As a replacement for relays and solid-state electronics, the controller offers an extensive array of control functions applicable for a variety of industries. Programs, timing, sequencing, and calculations use simple, easily-learned relay ladder logic. All functions are efficiently performed for numerous industrial control applications.

The 584M Programmable Controller is general purpose. Flexibility is unsurpassed; the controller's capability easily expands from the equivalence of 50 to over 8000 relays. The 584M Programmable Control System can provide basic relay replacement, diagnostic monitoring, data collection/storage, and report generation. The system's configuration is defined by the needs of its user.

Figure 1-1. Modicon 584M Programmable Controller

The 584M's benefits include:

- Lower cost than most relay systems.
- Operates faster than most microcomputers.
- Installs easier than all minicomputers and programmable controllers in its class.
- Expandable memory from 4 to 16K words.
- Fast scan rates between 15 and 100 ms.
- Easy installation of field wiring, intermixing a variety of I/O.
- Retentive memory for logic and data storage.
- Peripherals which can connect directly to the controller.
- Real-time programming, providing maximum flexibility.
- Easily programmed to meet the user's needs.

The Modicon 584M Programmable Controller is easy to install and maintain and can operate in harsh industrial environments without the use of fans, air conditioning, or electrical filtering. Its modular design ensures minimum downtime and maximum productivity. The controller is equipped to handle almost any process or industrial control application.

This manual provides the information necessary to install the 584M Controller, as well as provides guidance in planning the 584M Programmable Control System. Requirements for the system's I/O, register/reference configuration, and cold start up procedures are described in detail. Several topic areas are supported by additional Gould documents. References to these documents are indicated where appropriate.

SECTION 2
SYSTEM HARDWARE/COMPONENTS

The 584M Programmable Controller consists of three basic components: the central processing unit, power supply, and input/output processors. These three components are contained within the same unit. The controller supports a wide range of I/O devices. The Modicon P190 Programmer is needed to program the controller. A block diagram of these components appears in Figure 2-1.

2.1 584M PROGRAMMABLE CONTROLLER

The 584M PC is designed for a range of applications from a simple relay replacement to the most advanced programmable control application. The controller uses a CMOS random access memory in the range from 4 to 16K words. Total I/O capacity is up to 2048 discrete I/O points. The mix of inputs and outputs is in 16 point increments. The controller's memory accommodates a 16-bit word size and allows real-time, on-line programming. It is the controller's dual processor architecture that provides the major support for these powerful features.

2.1.1 Controller

The 584M's Controller is a complete, solid-state device, capable of holding three printed circuit boards. These are shown in Figure 2-2. Each circuit board is mounted in its own chamber within the mainframe. The I/O processor board is used to communicate with the I/O portion of the system, the CPU board executes the controller's processing decisions, and the memory board stores system parameters, programmed logic, and numerical data.

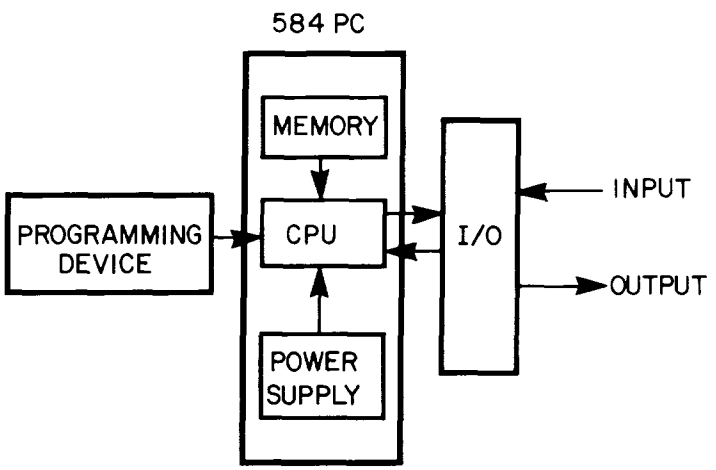

Figure 2-1. 584M PC Block Diagram

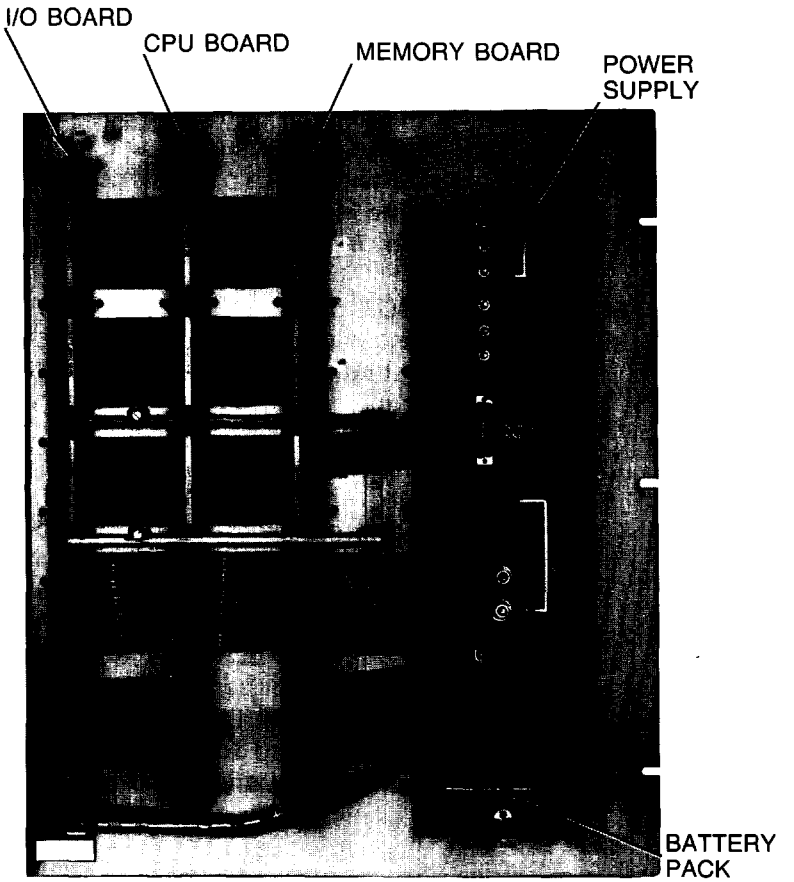

Figure 2-2. 584M Internal Components

The central processor operates on direct current supplied by the controller's power supply. This internal current is also routed through the processor to supply power to the system's I/O. A user's program remains intact within the processor until it is deliberately changed by the user with one of the programming devices. The program also remains unaltered in the event of power failure or a power OFF condition.

The most common method of entering a program into the processor is with the P190 Programmer. One of the two access ports on the controller permits connection to the programmer. The programmer can also be used for entering instructions and data or monitoring previously entered information. Other devices that can be connected to this port are a tape loader, a computer, or a telephone interface. A second access port, with the same capabilities, is located on the I/O processor. By using both ports, two external devices can communicate with the 584M at the same time.

A summary of the 584M Controller's specifications is provided in Table 2-1.

Table 2-1. 584M Programmable Controller Specifications

Electrical Characteristics		
Surge Withstand Voltage	ANSI-C37 90 A, 1000 volts for 500 microseconds IEEE-472 Tesla - Coil, 50,000 volts	
Radiated Susceptability Test	(RS03) per MIL-STD-U61B	
Voltage	115 VAC or 220 VAC ± 15% (jumper selectable)	
Frequency	47-63 Hz	
Max. Load	450 Volt amps	
Peak Transient	8 amps at 115 VAC 4 amps at 220 VAC	
Environment		
Vibration		
Sinusoidal	0.6 G, 5 Hz to 500 Hz with 30 min dwells at up to three resonant points in three axes	
Random Shock	0.29 G^2, 5 Hz to 500 Hz	
Handheld	20 G, 6-11 ms	
Mounted	10 G, 11 ms	
Ambient Temperature		
Operation	0 to 60°C	
Storage	-40 to 80°C	
Relative Humidity	0% to 95%, non-condensing	
Dimensions (W x H x D)		
Mainframe (incl. Power Supply)	19 in x 22 in x 16 in (485 mm x 559 mm x 410 mm)	
200 Series I/O Channel	20 in x 41 in x 13.5 in (510 mm x 1045 mm x 345 mm)	
Weight		
584M PC Mainframe (incl. power supply)	60 lbs	(27 kg)
200 Series I/O (1 Channel)	176 lbs	(79.2 kg)

Table 2-1. 584M Programmable Controller Specifications (cont.)

Memory	
CMOS	4, 8, 12, or 16K words with 9 months battery backup
Word Size	16 bits
Communications	
Modbus	Two ports; capable of up to 19.2 kbps, up to 15,000 ft. from the master
EIA RS-232-C	Up to 32 ports; capable of 19.2 kbps
I/O Capacity	
No. of I/O	2048
No. of Channels	32 per controller (max)
I/O pts per channel	128 in/128 out discrete.
I/O pts per module	8 or 16

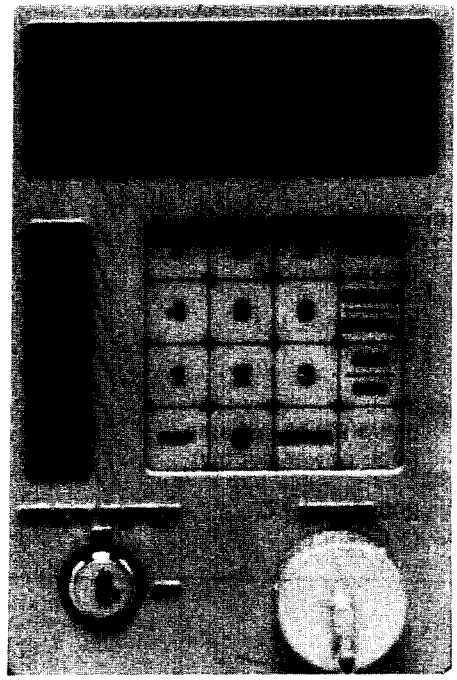

Figure 2-3. 584M Register Access Panel

2.1.2 Register Access Panel

The 584M's register access panel, shown in Figure 2-3, is used to display maintenance information, as well as the status of discrete inputs and outputs, register content, and system data. Functions of the panel include:

- Allows the user to monitor the state of any logic coil or discrete input, as well as the contents of any input or holding register.
- Permits access to diagnostic registers within the controller.
- If memory protect is OFF, the user can enter register values or enable/disable inputs and coils.
- Indicates whether the controller is running or stopped.
- Indicates the power state of the controller's reserve batteries.
- Displays if power to the controller is ON or OFF.

2.1.3 Power Supply

The largest, right most chamber inside the 584M contains the controller's power supply. External AC current is converted to internal DC current which is required for the controller's internal operation. No major configuration changes are required other than a jumper adjustment to convert operation from 115 V, 60 Hz to 220 V, 50 Hz.

Adjustments or routine maintenance to the 584M's power supply is not required. Indication of a power ready status is provided on the controller itself. No external cooling is required; however, free air circulation around the controller should be provided. The power supply has sufficient capacity to operate the controller and two channels of local I/O, a maximum of total 256 inputs and 256 outputs. Additional power supplies must be added to the control system if more than two channels of I/O are required or if remote I/O is used.

2.2 584M INPUT/OUTPUT

The controller's I/O is the main interface to user supplied field devices, e.g., pushbuttons, limit switches, motor starters, solenoid valves, thumbwheels, numerical displays, and analog signals. The 584M Controller offers unsurpassed flexibility in allowing users to choose from a vast array of existing I/O devices. Two types of I/O systems are available. A brief description of each I/O series follows. Specific details on each system are provided in Section 3 of this manual.

The 200 Series I/O has maintained wide acceptance throughout the PC industry. The 200 Series modules provide either 16 input or 16 output circuits per module. Full error checking by redundant transmissions and echo checks ensures maximum system integration from the controller to the I/O modules. The 200 Series I/O requires a 14 inch deep NEMA enclosure when cabinet installation is utilized.

A second type of I/O system, the 500 I/O Series provides four input or four output circuits per module. Communication between an auxiliary power supply and the 500 Series I/O is made via the J540 interface. To provide maximum data integrity, sensors are contained within the local bus communications from the interface to the modules, to detect hardware bus faults. The 500 Series I/O can be installed in an 8 inch deep NEMA enclosure.

NOTE

Only discrete I/O modules from the 500 Series may be used with a 584M PC. Register modules from the 500 Series may not be used.

Regardless of which I/O system is selected, several useful features are standard in both. User wiring is connected to heavy-duty housings in which the modules are installed. This enables modules to be removed without interrupting field wiring or the controller's scan. Maintenance and downtime are minimized. It is not required that the system be shut down to replace the modules. The bare-wire clamp terminals on the I/O housing will accommodate one AWG No. 12 or two AWG No. 14 wires.

I/O generally consists of two types, discrete or register. Discrete I/O consists of signals which are either ON or OFF. Typical examples of discrete signals include pushbuttons, indicator lamps, motor starters, relay contacts, solenoid valves, limit switches, and relay coils. Register consists of signals which can vary over a range of values. These numerical values are generated by such control devices as thumbwheels, numerical displays, punched card readers, high speed counters, and rotational shaft encoders. Register signals frequently utilize more I/O capacity than discrete signals since more information is required than just an ON or OFF status.

2.2.1 Local and Remote I/O

The input/output portion of the 584M Programmable Control System can be installed "locally" at a distance of up to 6 feet, "remotely" from 2000 to 5000 feet, or it can be distributed in a multidrop network over a distance of 15,000 feet.

I/O channels one and two of the 584M are powered by the controller's internal power supply and are most cost-effective when used in local I/O installations. The P421 auxiliary power supply, shown in Figure 2-4, may be used for additional installations of up to 75 feet. (I/O channels three and four.) The P421 powers one full channel of I/O.

Table 2-2. P421 Auxiliary Power Supply Specifications

Voltage	
Standard	115 V RMS ± 15% (100-130 V RMS)
Optional (Jumper Selectable)	220 V RMS ± 15% (187-253 V RMS)
Transient Voltage	
Max. 10 Seconds	115 V RMS ± 30% (80-150 V RMS) or 220 V RMS ± 30% (155-285 V RMS)
Max. 17 ms	115 V RMS ± 100% (0-230 V RMS) or 220 V RMS ± 100% (0-440 V RMS)
Line Spike	1000 V max. (500 microsecond duration, 0.5% max duty cycle)
Frequency	60 Hz ± 5% (57 - 63 Hz) 50 Hz ± 5% (47.5 - 52.5 Hz)
Normal Load	10 Volt amps (min) 100 Volt amps (max) 4 amps peak on transient (2 amps at 220 VAC)

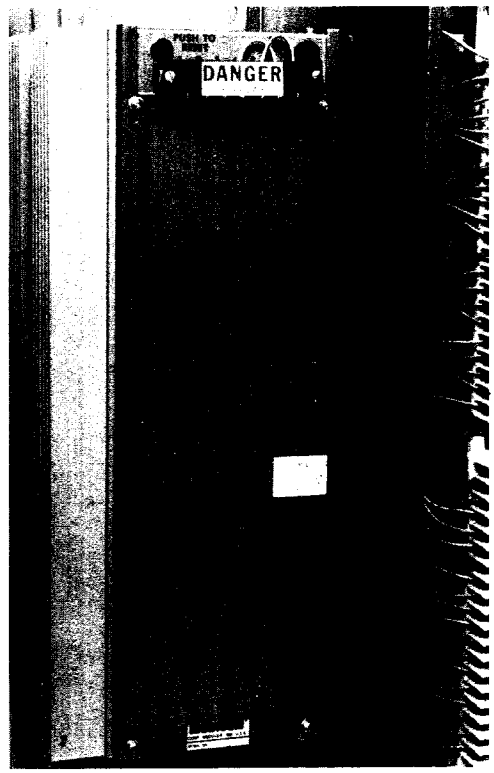

Figure 2-4. P421 Auxiliary Power Supply

Using remote I/O in the 584M system requires the addition of a J200 interface and appropriate power supplies. The 584M PC, through the J200 interface (shown in Figure 2-5) is capable of driving up to 28 channels of remote I/O with a total capacity of 2048 discrete I/O points. Remote I/O can be connected at a distance of 15,000 feet from the J200. The 28 remote channels can be placed at 14 distinct locations with a maximum of two channels at each site.

Auxiliary power supplies for remote I/O include the P451 and P453. The P451 auxiliary power supply provides power for two full channels of remote I/O*. An expansion connector is also provided for the attachment of an additional channel of I/O. The P453 auxiliary power supply drives two channels of I/O and can support up to four ports of ASCII communication when no I/O channels are connected. The P453 auxiliary power supply as part of the 584M control system is illustrated in Figure 2-6.

*Subject to some restrictions.

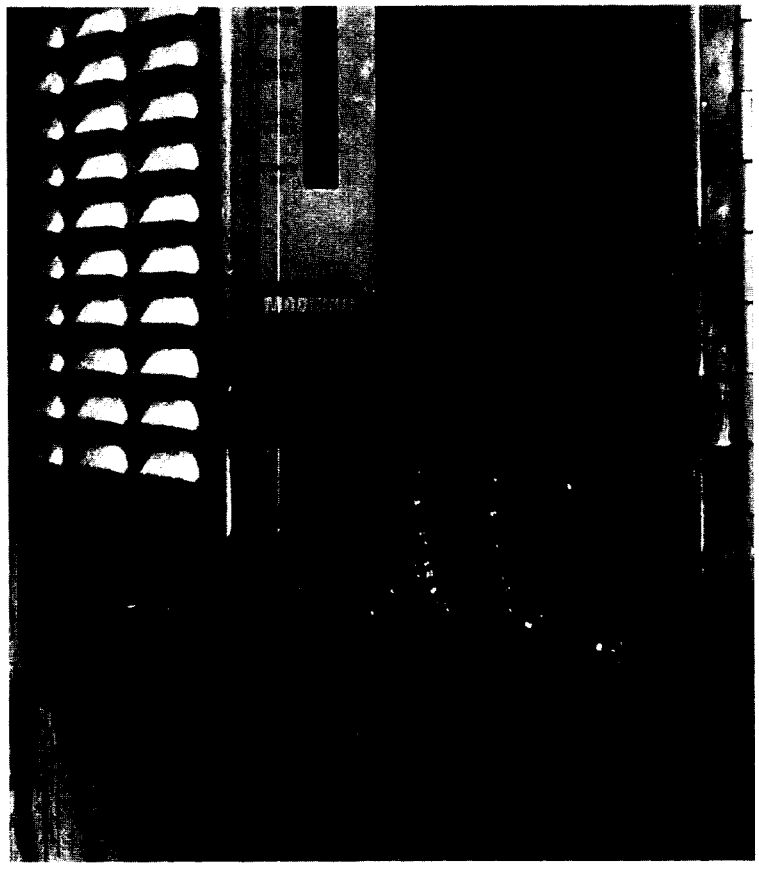

Figure 2-5. J200 Interface for Remote I/O

Table 2-3. P451 Auxiliary Power Supply Specifications

Voltage	
Standard	115 V RMS ± 15% (100-130 V RMS)
Optional (Jumper Selectable)	220 V RMS ± 15% (187-253 V RMS)
Transient Voltage	
Max. 10 Seconds	115 V RMS ± 30% (80-150 V RMS) or 220 V RMS ± 30% (155-285 V RMS)
Max. 17 ms	115 V RMS ± 100% (0-230 V RMS) or 220 V RMS ± 100% (0-440 V RMS)
Line Spike	1000V max (500 microseconds duration, 0.5% max duty cycle.)
Frequency	
Standard	60 Hz ± 5 % (57 - 63 Hz)
Optional	50 Hz ± 5 % (47.5 - 52.5 Hz)
Normal Load	300 Volt amps (130 VAC max) 2.7 amps peak at 130 VAC (2.0 amps at 253 VAC)

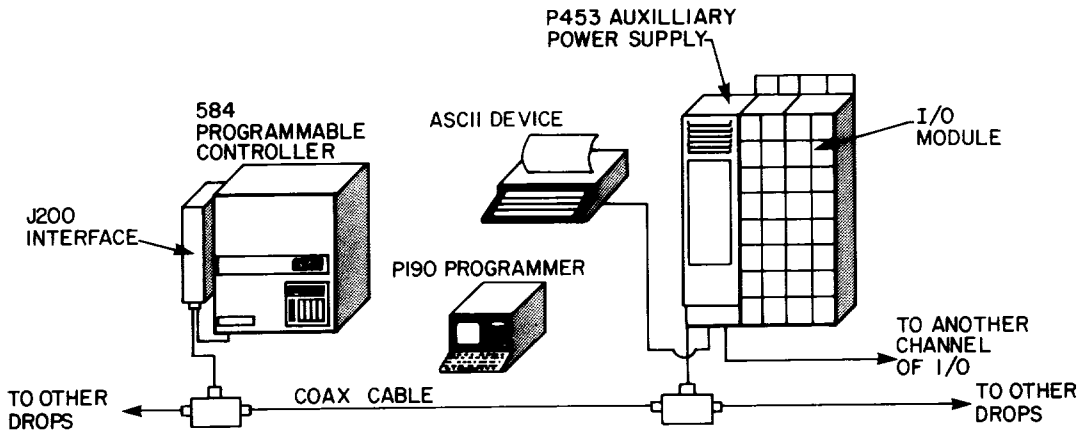

Figure 2-6. 584M PC Remote I/O Using a P453 Power Supply

For applications that require only a few remote I/O channels and not a complete, multi-drop remote I/O network, a more cost-effective method is to use an I/O driver. A driver can be connected to channels I or II of the I/O providing one remote drop per channel. These drivers include:

1425 - Drives one remote channel for up to 2000 feet from I/O ports I or II

1427 - Drives one remote channel for up to 5000 feet from I/O ports I or II

For further details on remote I/O as part of the 584M Programmable Control System, consult the 584 Programmable Controller Remote I/O Processing Manual.

Table 2-4. P453 Auxiliary Power Supply Specifications

Normal Voltage	
Standard	120 V RMS ± 15% (100-130 V RMS)
Optional (Jumper Selectable)	220 V RMS ± 15% (187-253 V RMS)
Transient Voltage	
Max. 10 seconds	115 V RMS ± 30% (80-150 V RMS) or 220 V RMS ± 30% (155-285 V RMS)
Max. 17 ms	115 V RMS ± 100% (0-230 V RMS) or 220 V RMS ± 100% (0-440 V RMS)
Line Spike	1000V max (500 microseconds duration, 0.5% max duty cycle)
Frequency	
Standard	60 Hz ± 5% (57 - 63 Hz)
Optional	220 Hz ± 5% (47.5 - 52.5 Hz)
Normal Load	450 Volt amps; 90 watts (min) 130 Watts (max). Amps peak on transient (amps at 220 VAC).

2.3 P190 PROGRAMMER

The Modicon P190 Programmer can be used to program the 584M Programmable Controller. Shown in Figure 2-7, the unit is capable of programming other PC's such as the 184/384 and 484 Controllers. A 9 inch CRT screen and unique character generator is designed specifically for relay ladder diagram displays. A tape drive at the programmer's top right provides the flexibility to program a variety of controller functions. Besides using the CRT screen for on-line programming, the screen can also be used as a diagnostic tool for rapid and easy system checks and maintenance. A listing of the 584M support tapes is provided in Table 2-5.

The programmer's keyboard is color-coded to assist in identifying the key's function. A row of unlabeled, software label keys stretch across the top of the keyboard. The function of these keys change as the associated software labels change on the display screen. Thus, by simply loading a different tape into the programmer, the P190 can support a variety of Modicon controllers.

Figure 2-7. P190 Programmer

Table 2-5. 584 PC Support Tapes

TAPE NO	TAPE	FUNCTION
T584-001	584 Programmer Tape	The Programmer tape contains the instructions required to create the user logic programs.
T584-002	584 Utility and Configuration Tape Package	The Configurator tape configures the 584 Controller for its application, specifying such items as number of I/O registers, I/O channels, RS-232-C ports and programming parameters. The Utility tape allows listing of 584 programs.
T584-003	584 Message Editing Tape (ASCII)	Edits ASCII messages within the 584.
T584-004	Configuration Tape	Configures the 584 Controller. (For programming see T584-002).
T584-005	Utility Tape	Provides the 584's ladder lister.
T584-101	584 PID Tape	Implements the proportional integral and derivative, a mathematical function useful for process control.
T584-102	584 Modbus Master Pack	Configures the 584 Controller for use as a Modbus master.
T190-001	Tape Loader Tape	Implements tape loading functions with the P190 Programmer.

Figure 2-8. Inserting Tape Into P190

A tape is loaded into the programmer's tape drive as shown in Figure 2-8. In addition to the tape drive, the P190 features an ASCII keyboard, thirty-one fixed function keys, and eight software keys. The programmer's rugged case is easily moved to the work site or placed in a centralized location to accommodate several controllers. Ideally suited for an industrial environment, the programmer withstands electromagnetic noise, high temperatures, humidity, and mechanical shock. Table 2-6 lists the P190's environmental specifications.

For a full description of the Modicon P190 Programmer and its capabilities, refer to the Modicon P190 CRT Programming User's Manual.

Table 2-6. Specifications for P190 Programmer

Physical	
Dimensions (W x H x D)	17.5 in x 11.0 in x 24.0 in (444.5 mm x 279 mm x 609.6 mm)
Weight	30.0 lbs (13.6 kg)
Environmental	
Operating Temperature	5 to 40°C (41 to 104° F)
Storage Temperature	20 to 60°C (-41 to 140°F)
Operating Humidity	20-80% relative humidity, non-condensing
Storage Humidity	0-95% relative humidity, non-condensing
Power	
P190-112	95-130 VAC, 47-63 Hz, 100 W
P190-122	190-260 VAC, 47-63 Hz, 100 W
Fuse	5 amp., Modicon No. 57-0041-000 57-0041-000
Tape Transport	
Capacity	at the maximum record size (1/3K byte), 96K bytes per tape
Tape	DC100A minicartridge (3M)

2.4 SUPPORT PERIPHERALS

A number of standard Modicon support units are available for use with the 584M Controller. These units provide a wide variety of functions, ensuring that complete system support is always available.

The 584M features two Modbus communications ports, one on the front of the controller and the other on the bottom of the controller. These allow an intelligent device to talk to the 584M as a Modbus slave controller. Either port can be used to connect the P190 or other intelligent peripheral devices. A maximum of two devices can be communicating with the 584M at one time.

Included in this support equipment are the T160 and T161 Telephone Interfaces for communication with Modicon's Service Center and a computer using Modicon's Modbus protocol. These devices plug directly into either peripheral port without interrupting the controller's scan. Previous models of telephone interfaces such as the T151, T152, T154 and T158 can also be used with the 584M Controller by purchasing Modicon cable, Modicon No. W192.

The 584M Controller can also interface to ASCII devices such as CRT terminals, line printers, teletypes, and disk storage using a P453 auxiliary power supply.

2.4.1 Model 160 Telephone Interface & Service Center Support

The Modicon 160 Telephone Interface allows the 584M Programmable Controller to be linked to the Modicon Service Center over standard voice grade telephone lines. It consists of an accoustical data coupler which mates with a standard telephone hand-set and an electronics package that interfaces with the controller. Both of these are housed in a rugged case for portability and safe storage.

The telephone interface is connected to the controller in the same manner as the programming panel and other peripherals:

1. Plug the cable (military end) into the Modbus port at the front (Port 2) or bottom (Port 1). The opposite end (EIA type connector) is plugged directly into the Interface's EIA connector.

2. Connect the telephone interface to 115 VAC and turn its power switch ON.

3. Place the telephone coupler selector switch in the full position.

4. Set communications port to proper parameters.

The IDLE lamp on the interface and the POWER lamp on the acoustic coupler should be illuminated. You can now place your call to the Modicon Service Center operator (603) 893-0400. You will be asked for:

1. Your name and company.

2. Serial number and type of controller to which you are connected.

3. What service you desire.

The Service Center will ask you to switch to Data. This requires switching from voice to data network communications. If you are still listening, you will hear an audible tone. To make the data connection, place the handset firmly into the rubber cups of the acoustic coupler. One of the cups is lettered CORD; this cup seats the CORD end of the handset.

Figure 2.9. Model 160 Telephone Interface

After you have seated the handset correctly and the circuit has switched the red carrier lamp on, your acoustic coupler will light. When the carrier lamp goes off, the operator has switched to voice and is waiting for you to pick up the handset.

Since communication cannot occur while the controller is operating, you will note that shortly after switching to a data link, a short communication will occur which will turn the controller's "Run" light OFF.

It is good practice when placing your call through your company switchboard to explain to the operator that you are making a data call. Operators may disconnect the circuit when they hear a tone rather than voices.