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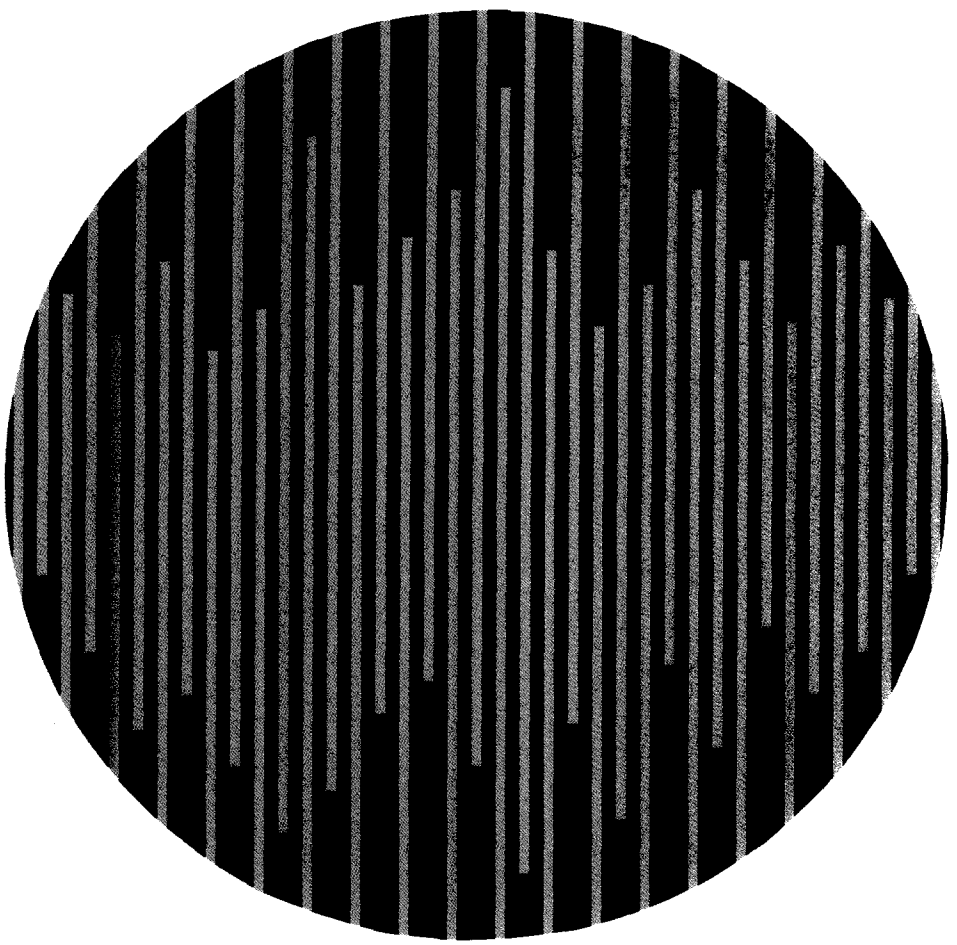
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Modicon
884 Programmable Controller
Maintenance Manual

PI-884A-006 Rev C



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Modicon
884 Maintenance Manual

SUBJECT: Contains the instructions required to perform maintenance on an 884 Programmable Control System.

January, 1990

Modicon Inc.
Industrial Automation Systems
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North Andover, MA 01845

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PREFACE

This guide contains information on the maintenance of the 884 Programmable Controller.

Use the following documents in conjunction with this guide:

PI-884A-001	PC Programmable Guide
PI-884A-002	PC System Planning and Installation Guide
PI-884A-003	PC Programming Reference Card
PI-884A-005	PC Tape Loader User's Guide

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SECTION 1
GENERAL INFORMATION

1.1 SYSTEM DESCRIPTION

The 884 system consists of customer configured modules (field replaceable units) which are the building blocks of the system. The system building blocks consist of:

- Module Housing, 19 inch or 27 inch, with backplane.
- P800 Power supply module
- 884A Controller module with one Modbus® port
- User selected 800 series set of I/O modules
- P190® Programmer
- P190/884 tapes

1.1.1 Optional Equipment

The system optional equipment consists of:

- Extended power cables
- Extended data cables
- Additional Modbus port
- Redundant power supply
- Secondary module housing, 19 inch or 27 inch

1.1.2 Major System Features

The major system features are:

- 2K user logic plus 1K registers
- 256 discrete I/O points, plus additional analog/register capacity
- Advance instructions (sequencer/drum, I/O diagnostic, signed double precision math)
- Integral Modbus port (second port optional)
- Rack or panel mountable
- Simplified self-prompting P190 interface with powerful editing tools
- Remote I/O (optional)
- Report generation capability (optional)
- Complete configuration flexibility (input vs. output, analog vs. register vs. discrete, 8 vs. 16 point discrete)
- High security bus protocol
- Front-accessible fuses
- Integral carrying handles
- Rigid field wiring

1.1.3 Major Diagnostics Features

The major diagnostics features are:

- Internal power up test
- Internal communications test
- P190 Load/Dump/Compare
- I/O data
- Real time confidence test
- Power supply test

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1.2 OVERVIEW

The Modicon® 884 Programmable Controller has three processors in one enclosure. The enclosure is called the 884A Controller. The controller slides into a module housing with backplane which it shares with a power supply, 800 series I/O modules and up to four option cards.

The 884 Controller has one main processor that executes the main body of software in the system and two front-end processors which handle the low-level logic required to drive the Modbus and I/O ports. The main processor is an 8086, and the front ends are each 8051s. The front ends communicate with the main CPU via 1K byte switch RAMs. The switches are controlled by handshake logic.

1.3 POWER SUPPLY

The P800 Power Supply is capable of providing all system DC power to the 884A Controller and up to 256 I/O points.

The P800 Power Supply prime power requirement is 115 or 230 VAC, 50/60 Hz. There are six outputs from the power supply which connect to the housing backplane. All outputs are tightly regulated and can be short circuited without damage to the power supply.

The output connector is the card edge and plugs the power supply into the backplane of the module housing. The power supply module seats in the leftmost slot.

1.4 MODULE HOUSING

Table 1-1 lists the various module housing assemblies that are available.

Table 1-1 Module Housing Assemblies

Part number	Description
AS-H819-000	19 inch housing capable of housing only I/O modules.
AS-H819-003	19 inch housing capable of housing power supply, controller, and I/O modules.
AS-H819-007	19 inch housing capable of housing power supply, controller, I/O modules, and Options.
AS-H827-000	27 inch housing capable of housing only I/O modules.
AS-H827-003	27 inch housing capable of housing power supply, controller, and I/O modules.
AS-H827-007	27 inch housing capable of housing power supply, controller, I/O modules, and Options.

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1.5 CABLES

Table 1-2 lists the cables that are available for interconnecting modules housings.

Table 1-2 Interconnecting Cables

Part number	Description
AS-W801-001	1 foot signal cable
AS-W801-006	6 foot signal cable
AS-W801-012	12 foot signal cable
AS-W802-001	1 foot power cable
AS-W802-006	6 foot power cable
AS-W802-012	12 foot power cable

1.6 I/O MODULES

Table 1-3 lists some of the I/O modules presently available.

Table 1-3 I/O Modules

Part number	Description
AS-B802-008	115 VAC 8 point output module.
AS-B803-008	115 VAC 8 point input module.
AS-B804-016	115 VAC 16 point output module.
AS-B805-016	115 VAC 16 point input module.
AS-B808-016	220 VAC 16 point output module.
AS-B809-016	220 VAC 16 point input module.
AS-B820-008	10 - 60 VDC 8 point output module.
AS-B821-008	10 - 60 VDC 8 point input module.

1.7 884/P190 TAPES AND CABLES

Table 1-4 lists the tapes and cables used with the P190.

Table 1-4 P190 Tapes and Cables

Part number	Description
AS-T884-001	Programmer/Configurator tape.
AS-T884-003	Tape Loader tape.
AS-W806-012	12 foot 884/P190 connecting cable.
AS-W806-025	25 foot 884/P190 connecting cable.
AS-W806-050	50 foot 884/P190 connecting cable.

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SECTION 2
FUNCTIONAL DESCRIPTION

2.1 CONTROLLER MODULE DIAGNOSTIC INDICATORS

The 884A Controller module performs several confidence tests to verify the system's integrity. If it fails any confidence test, it will stop running and extinguish the run LED. The four LED indicators on the front panel of the controller signal the system's status. When the indicators are on, they signal the following:

READY — the Controller's components (processors and CPU) are functioning properly.

RUN — the Controller is running and is solving user logic.

BATTERY OK — the battery voltage is within specification.

MODBUS ACTIVE — the Modbus port has received a valid address. The Modbus active indicator is off at the end of every message transmission.

2.2 CONTROLLER MODULE CONTROLS

Two control switches are located on the controller module: the memory protection key switch and the communication interface switch.

2.2.1 Memory Protect Key Switch

The memory protect switch protects the user memory from unauthorized changes. The memory protect switch is operated with a key. Only personnel with the key can gain access to the user memory. When the memory protection key switch is in the OFF position, the memory can be altered. When the memory protection key switch is in the ON position, the memory cannot be altered, but may be monitored.

2.2.2 Communication Interface Switch

The communication interface switch is located behind the access panel. It is used to select the 884 communication parameters. Two separate sets of port parameters (baud rate, ASCII or RTU mode, parity option, number of stop bits, and slave address number) can be stored in the Controller. The first set is controlled by the DIP switches located inside the Controller module. These DIP switches are arranged at the factory to correspond to the default settings of the P190 Programmer. The second set can be entered by way of the P190 or another Modbus host device, and is stored in the Controller's battery protected RAM memory. When the communication interface switch is positioned to DIP, the default communication parameters are selected, otherwise the parameters are those stored in RAM.

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2.3 MODBUS CONNECTOR PORT

The Modbus port is a standard RS-232-C port. It is located on the controller front panel (see Figure 2-1). The P190 Programmer or the Modbus Industrial Communications Network connects at this port.

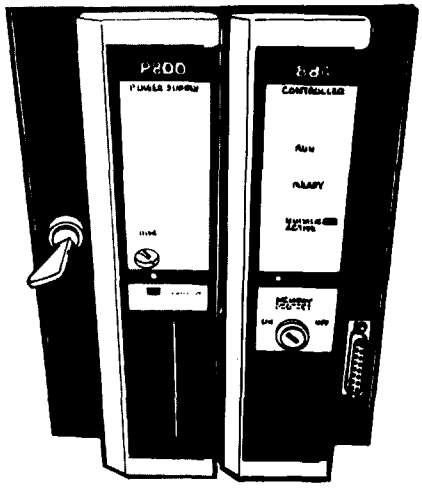


Figure 2-1 884A Controller Module

2.4 POWER SUPPLY DESCRIPTION

2.4.1 P800 Power Supply Module

The P800 Power Supply module installs to the left of the controller, and connects to the backplane. The power supply provides power to the controller module, I/O modules, and controller option modules. Figure 2-2 shows the power supply module.

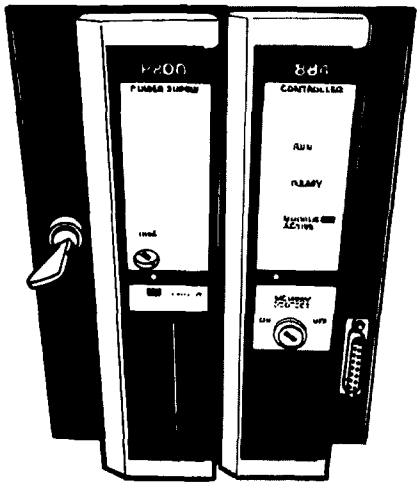


Figure 2-2 Power Supply Module

2.4.2 Power Supply Module Indicators

The LED indicator lights are located on the front panel of the power supply are PWR and OVERLOAD.

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POWER OK — indicates that the power supply is functioning properly.

OVERLOAD — indicates that the configured power output has exceeded the specified limits and that the fuse must be replaced. The P800 power supply requires an 8A 250 volt type fuse.

2.4.3 Power Supply Module Controls

The power key switch on the power supply's front panel, turns the power supply ON and OFF.

CAUTION

The power switch must be OFF when installing or removing the power supply.

2.4.4 Power Supply Module Connections

The AC power connects to the screw terminals on the module terminal block (Figure 2-3). The terminal block has a shield to protect against accidental shock.

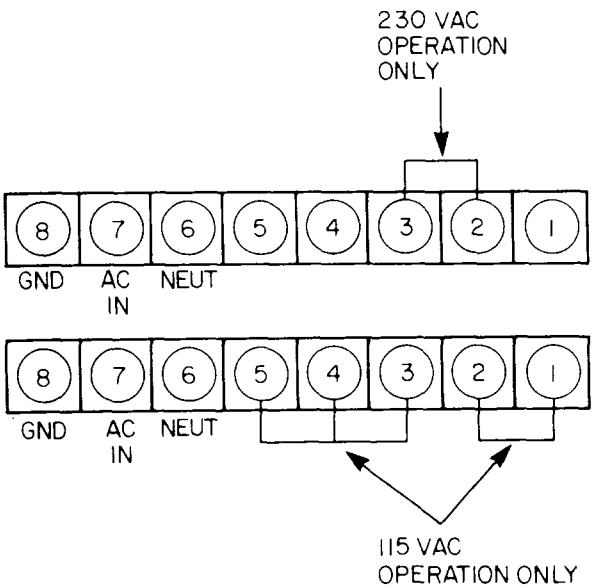


Figure 2-3 Power Supply Terminal Block

Jumpers are used to set the power supply for an input voltage of either 115 or 230 VAC. When jumpers are installed between pins 1 and 2, 3 and 4, and 5, the 884 PC is set for an input voltage of 115 VAC. When a jumper is installed between pins 2 and 3, the 884 PC is set for an input voltage of 230 VAC. The P800 power supply is shipped with jumpers in place for 115 VAC operation.

The power supply output connections are achieved by an edgeboard connector which mates with a connector on the backplane of the module housing.

2.5 I/O DESCRIPTION

User connections are made to terminal strips attached to the front of the housing. These are standard screw-type terminal strips that are mounted vertically on the

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wire trough of the module housing. Terminals are numbered from one at the top to twenty at the bottom. The front accessible terminals can each accept two AWG 14 wires or one AWG 12 wire per point. The I/O module is plugged into the module housing and is secured by two screws. This configuration allows quick replacement of the modules without disturbing field wiring.

The databus connections are made via the standard interface connectors to a shielded backplane at the rear of the housing. The module may be placed in any location in the I/O structure without interfering with any other module operation. When the module is inserted into the housing, it picks up a shield ground by connecting the module shield to the backplane shield ground.

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SECTION 3
INSTALLATION

3.1 MOUNTING

The 884 Programmable Control system consists of plug-in modules (power supply, controller and I/O) and module housings. The housing may be rack mounted in a 19 inch NEMA rack, panel mounted in a 10 inch (depth) NEMA panel, or wall mounted. This section describes the procedure to rack mount, panel mount, or wall mount the 884 system.

NOTE

When rack, panel or wall mounting the housing(s) allow four inches of space between each pair of housings.

CAUTION

The length of each cable connecting the primary housing and its immediate secondary housing must not exceed six feet. The sum of the lengths for each cable type in the local 884 system must not exceed twenty feet.

3.1.1 Wall Mount Procedure

The module housings can be mounted on any surface capable of supporting its weight.

Before beginning this procedure determine the quantity and location of the housing(s). It is suggested that two people perform this procedure.

1. Drill holes for a ¼ inch bolt in the mounting surface. Figure 3-1 shows dimensions for the 19 inch and 27 inch housings.

2. Install housings using ¼ inch bolts to secure housing to surface.

3. Connect the W801 power cable and W802 signal (bus) cable. The cables (W801, W802) connect to the ports located on the front flange of the housing. The female power and signal cable connectors mate with the ports on the lower front flange of the primary housing (the primary housing contains the Controller and Power Supply module). The male power and signal cable connectors mate with the ports on the upper flange of the consecutive housing. Additional housings can be connected in the same manner.

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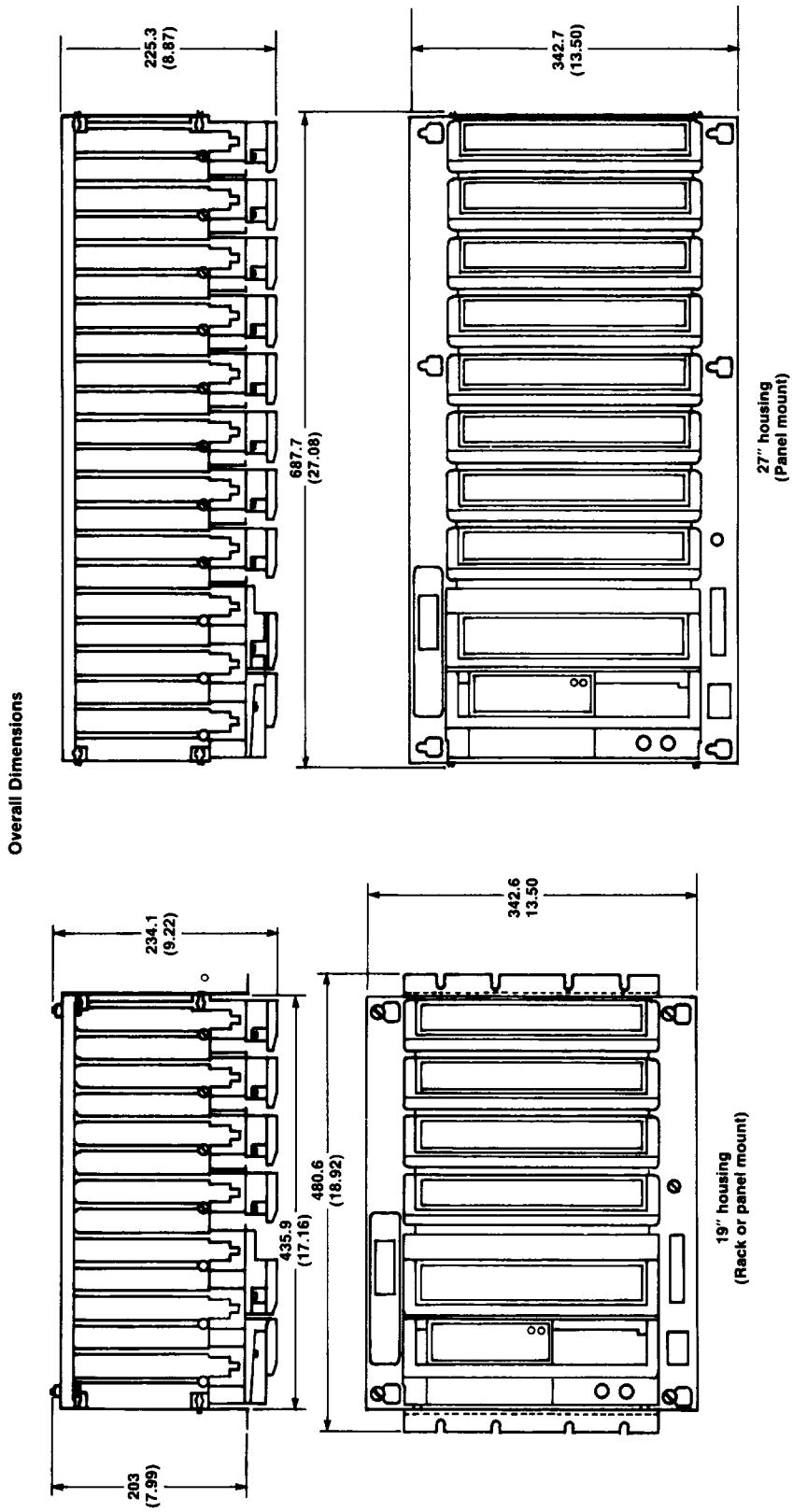


Figure 3-1 H819 and H827 Housing Dimensions

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3.1.2 Rack Mounting Procedure

Table 3-1 contains the list of recommended equipment and tools to perform the rack mount procedure.

Table 3-1. Recommended Equipment and Tools for Rack Mounting

Quantity	Item
1	19 inch Standard (NEMA) Rack
8	#10-32 Pan Head Screws
8	#10-32 Flat Lock Nuts (optional)
8	#10-32 Flat Head Screws
8	1/4 inch Screwdriver

Before beginning this procedure determine the quantity and location of the rack(s) and housing(s). It is suggested that two people perform the mounting procedure.

1. Remove the side plates on the H819 module housing. Unscrew the connecting screws. See Figure 3-2.

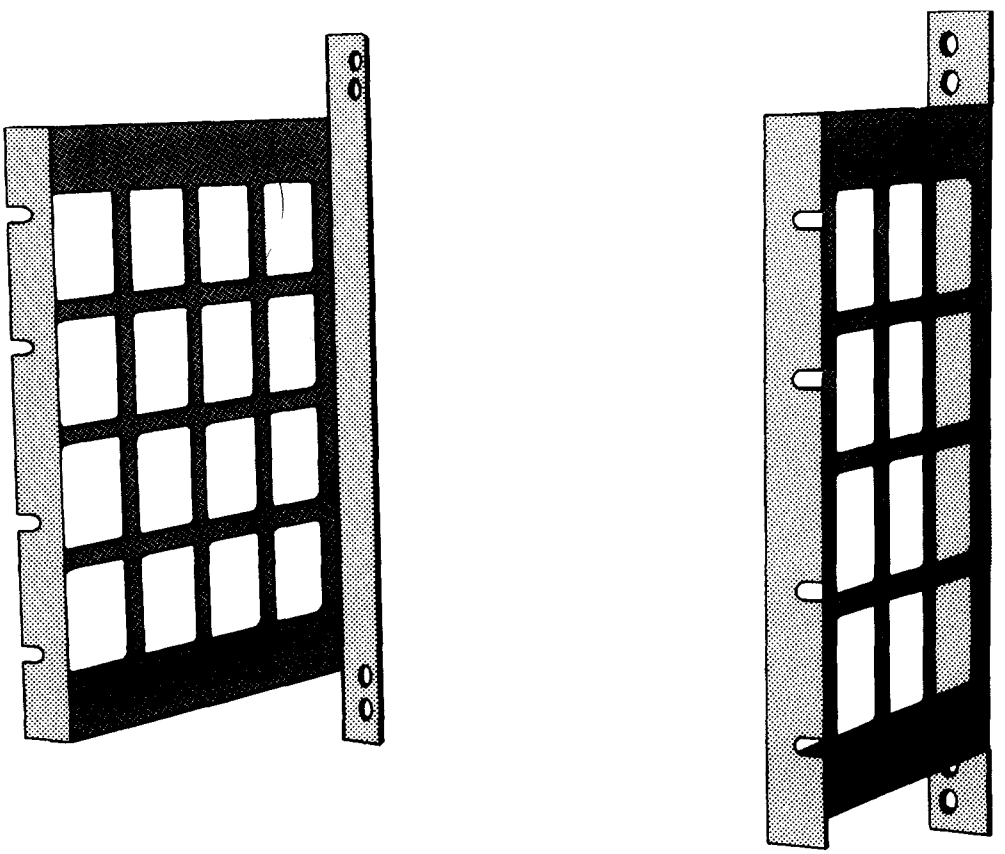


Figure 3-2 Connecting Side Plates

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2. Attach the mounting side plates to the module housing using four #10-32 flat head screws for each mounting flange side plate.

3. Attach the module housing to the rack. Lift the module housing to its mount position and insert the mounting screws. Use #10-32 pan head screws to attach the module housing. The screws insert into the mounting flange. If the rack does not have threads, use the flat lock nut to hold the screws in place. See Figure 3-3.

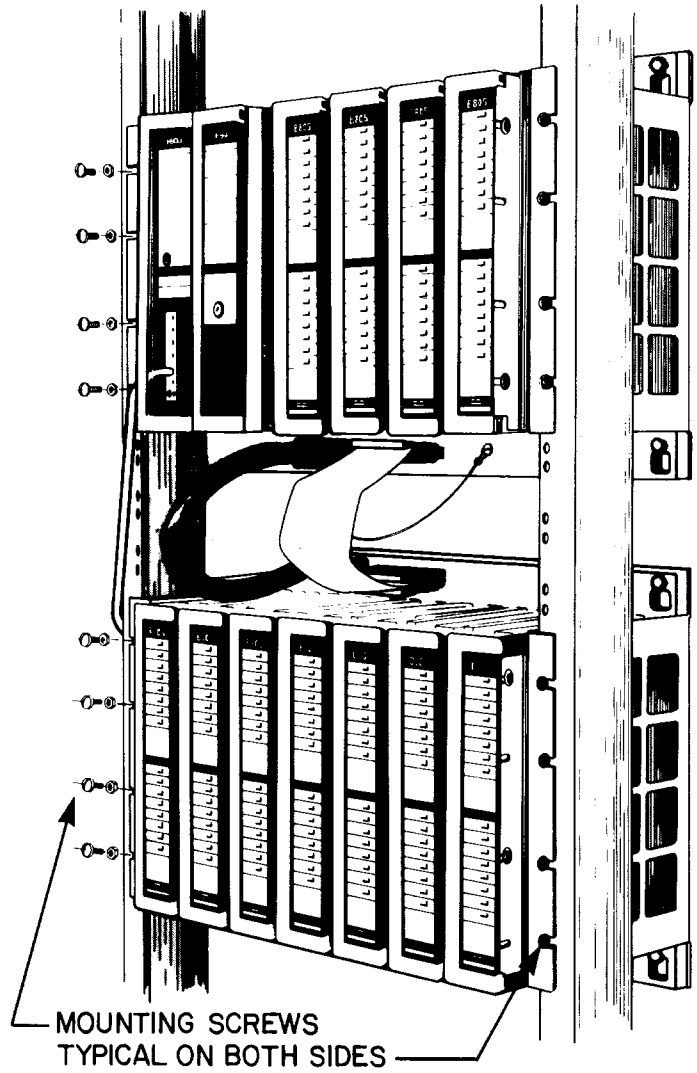


Figure 3-3 Rack Mounting Housing

4. Connect the W801 power cable and W802 signal cable. The cables (W801, W802) connect to the ports located on the front flange of the housing. The female power and signal cable connectors mate with the ports on the lower front flange of the primary housing (the primary housing contains the Controller and Power Supply module). The male power and signal cable connectors mate with the ports on the upper flange of the next housing. Additional housing can be connected in the same manner.

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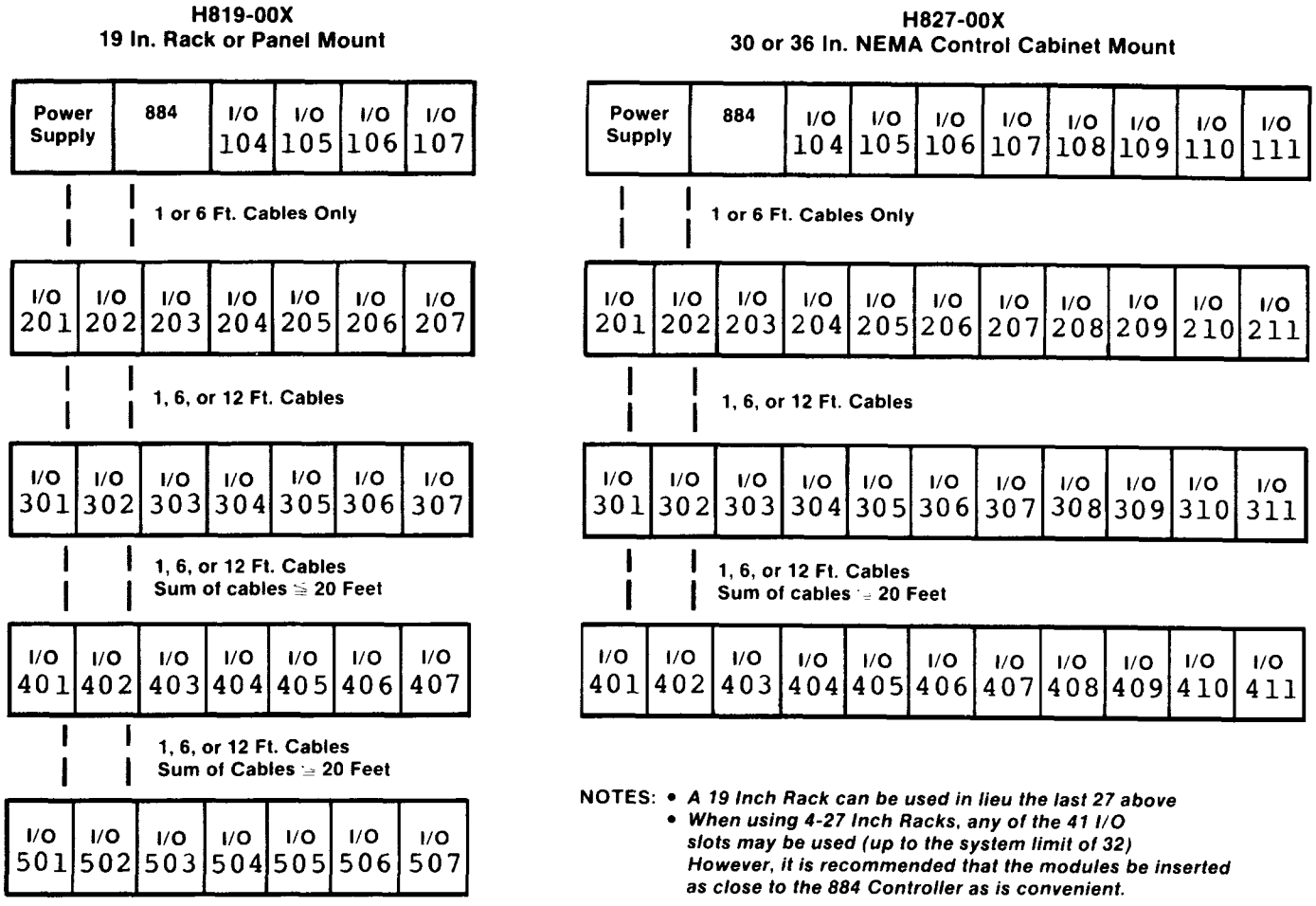


Figure 3-4 System Configuration

3.1.3 Sample Configuration

Figure 3-4 shows the possible configurations of the system.

3.2 FIELD WIRING

User field wiring should be connected before the I/O modules are inserted. Wiring is routed through the wire trough to the terminal block.

There are 20 terminal screws on each terminal block. User field wiring crosses from the left side into the wire connectors. Each terminal is capable of receiving two #14 AWG, or a single #12 AWG wire per point (solid and/or stranded). The smallest recommended wire is #22 AWG.

To connect field wiring:

1. Open the wire connectors. Turn the recessed terminal screw counterclockwise to open the wire connectors. Use a standard flat blade screwdriver with a .200 inch blade.

2. Insert the field wires into the wire connectors.

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3. Tighten the wire connectors. Turn the terminal screws clockwise.

3.3 MODULE INSERTION

All modules connect to the bull pin and electrical connectors on the backplane of the housing. In addition to the backplane connections, two retaining screws secure each module to the housing. Figure 3-5 shows the location of the modules.

3.3.1 Power Supply Module Insertion

The P800 Power Supply module inserts into the leftmost slot of the primary housing. It attaches to the housing by way of the backplane connectors and is fastened to the housing by two retaining screws.

3.3.2 Controller Module Insertion

The 884A Controller module inserts into the slot adjacent to the power supply. It attaches to the housing by way of the backplane connectors and two retaining screws.

3.3.3 I/O Module Insertion

The I/O modules insert into the remaining slots. The I/O modules connect to the housing slots by way of the backplane connectors, terminal block connectors, and two holding screws. The mounted connectors on the I/O modules mate with the female terminal block connectors.

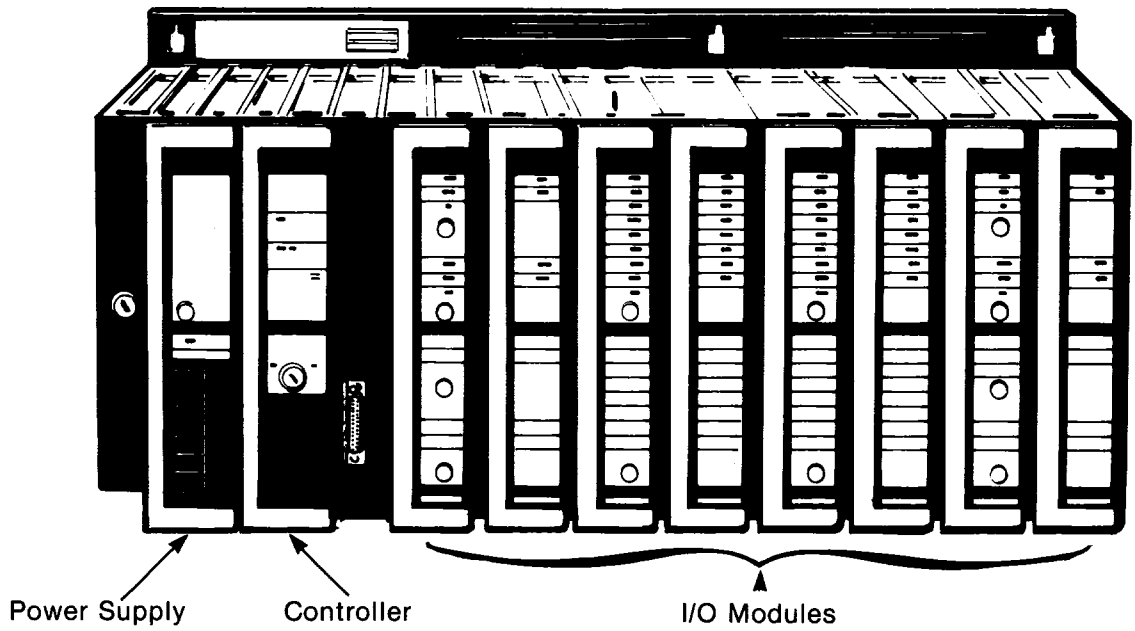


Figure 3-5 Location of Modules

3.4 CONFIGURATION

3.4.1 Configuration Procedure

The information presented here is presented as a troubleshooting aid only. Refer to the 884 PC Programming Guide for detailed programming instructions.

1. Connect the P190 to the 884A Controller using P190/884 cable AS-W806-0XX.

2. Check the P190 baud rate to ensure that it is set to 9600 baud. The 884

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communication port Dip Switch (located on the IOP PCB) is set to 9600 baud from the factory.

3. Ensure that the DIP/MEM Switch (located under the battery access panel) is in the DIP position. The Memory Protect switch must be in the off position.

4. Set the power switch on the back panel of the P190 to ON. The P190 now begins a series of power up confidence tests. After these tests, the P190 screen displays INSERT P190 PROGRAM TAPE. If the test fails, call the Modicon Service Center.

5. Insert the 884 Program/Configuration Tape (AS-T884-001). When the Tape is loaded, the P190/884 PC OPERATIONS - ATTACH Screen is displayed.

6. Put the proper unit number into the P190 AR register using the keyboard. If no number is entered the value is 1. Press the ATTACH software label button.

7. If the 884 is password protected, the P190/884 PC OPERATIONS - PASSWORD OPERATIONS screen is now displayed. Press the PASSWORD button, type in the level 3 password, and press the END PASSWORD button.

8. The P190/884 OPERATIONS - PC OPERATIONS screen is now displayed. Ensure that the PC is not running. If it is press the STOP PC software label key and then the PROCEED KEY. Now press the CONFIG button and the PROCEED key.

9. The P190/884 CONFIGURATOR MENU screen is displayed. Press the I/O CONFIG button.

10. The message TOTAL NUMBER OF DESIRED I/O CHANNELS FOR THE SYSTEM IS :01 is displayed on the screen. If more than one I/O channel is used, type in the number and press the ENTER key of the P190.

11. Press the TRAF COP button.

12. The 884A I/O CHANNEL TRAFFIC COP screen is now displayed.

3.4.2 I/O Slot Configuration Procedure

1. Figure 3-6 shows the 884A I/O CHANNEL TRAFFIC COP screen. The 884A I/O CHANNEL TRAFFIC COP screen contains the following fields.

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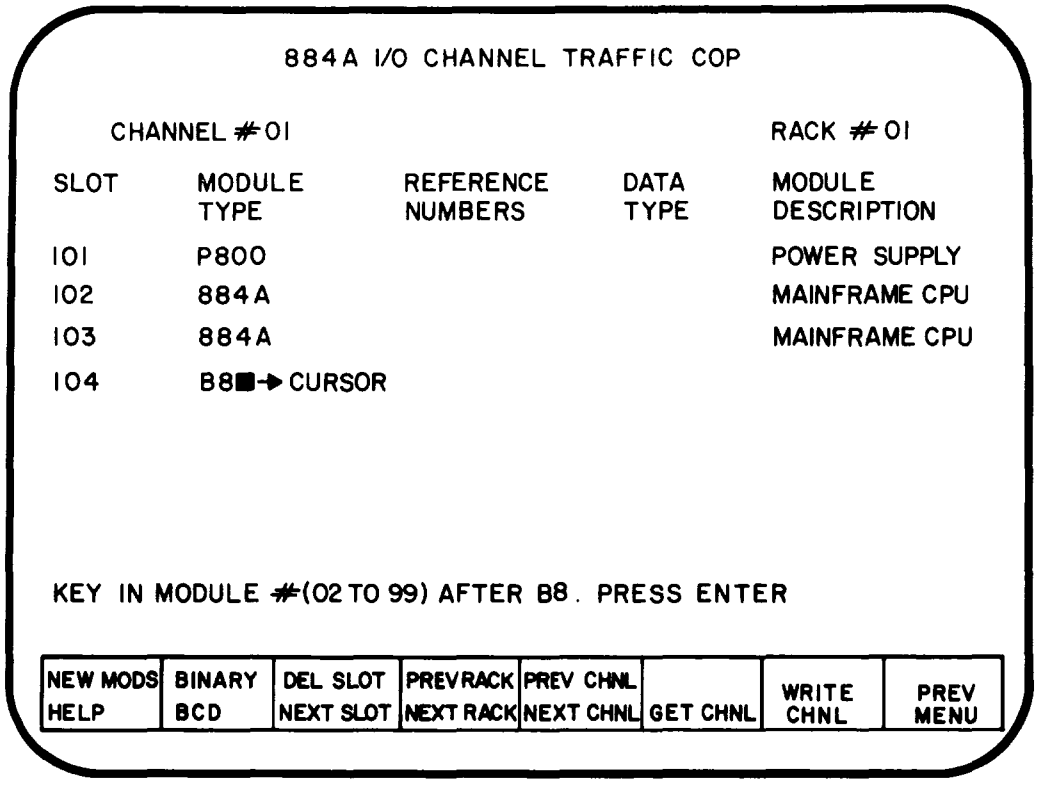


Figure 3-6 884A I/O CHANNEL TRAFFIC COP screen.

MODULE TYPE — This field identifies the I/O module type in the slot indicated on the screen. No other fields can be programmed until the configured module type is entered. The module type field format is as follows: B8XX

XX — indicates the module type. Odd numbers indicate input modules and even numbers indicate output numbers (01 to 99).

If a module is in the slot, the system will read the type and automatically enter this information. If a module is not in place, the information may be programmed in manually.

To manually program the MODULE TYPE:

1. Place the cursor in the MODULE TYPE field. Enter the module type using the numeric keyboard.

2. Press the ENTER key. The cursor moves to the next entry position.

REFERENCE NUMBERS — To program the reference field:

1. Place the cursor on the field. The screen prompts: KEY IN APPROPRIATE REFERENCE FOR MODULE.

2. Enter the reference numbers by way of the numeric keyboard.

3. Press the ENTER key.

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DATA TYPE — This field specifies the data as BCD, or binary. To program this field:

1. Press the SHIFT key and the BINARY/BCD software label key simultaneously to select BCD data.
2. Press the BINARY/BCD software label key to select BCD data.

3.4.3 Writing the Configuration

When the channel has been configured, the data must be written to PC memory. Press the WRITE CHNL button and then the PROCEED button to accomplish this.

3.4.4 MODBUS Port Configuration (RS-232-C)

The Modbus port is located on the front panel of the Controller module and consists of an EIA-RS-232-C standard connector. This port functions as a Modbus slave port. The P190 Programmer, a Modbus host device, or a modem can connect to this port. Table 3-3 describes the RS-232-C signals used for 884 communications.

Table 3-2 RS-232-C Pin Assignments

Signal Name	Pin	Use
Transmit Data	2	Outgoing data path from terminal's viewpoint.
Received Data	3	Incoming data path from terminal's viewpoint.
Request to Send	4	This signal is activated by the terminal. It tells the modem to prepare to receive data.
Clear to Send	5	This signal is activated by the modem. It tells the terminal that the modem is redy to receive and re-transmit data from the terminal.
Data Set Ready	6	This signal is activated by the modem. It tells the terminal that the modem is operational.
Signal Ground	7	Common ground reference for all signal lines.
Receive Line Signal Detect	8	This signal is activated by the modem. It tells the terminal that the modem has detected the data carrier from another modem and received data will arrive soon.
Data Terminal	20	This signal tells the modem that the terminal is connected, powered-up and ready.

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SECTION 4
OPERATION

4.1 P190 Operation

4.1.1 Connecting the P190 Programmer

1. Connect the AS-W806-0XX Cable to the programmer port of the 884, and Port one of the P190.

2. Ensure that P190 is set for 9600 baud. The 884 communication port dip switch (located on the IOP PCB) is set to 9600 baud from the factory.

3. Ensure that the DIP/MEM Switch (located under the battery access panel) is in the DIP position.

4. Ensure the left set of communication parameter switches on rear of P190 are set properly (from left to right - 1, 1, 1, 0, 1, 1, 1, 1, where 1 = up and 0 = down).

5. Connect a P190 to an AC power source and set the ON/OFF switch on the P190's rear panel to the ON position.

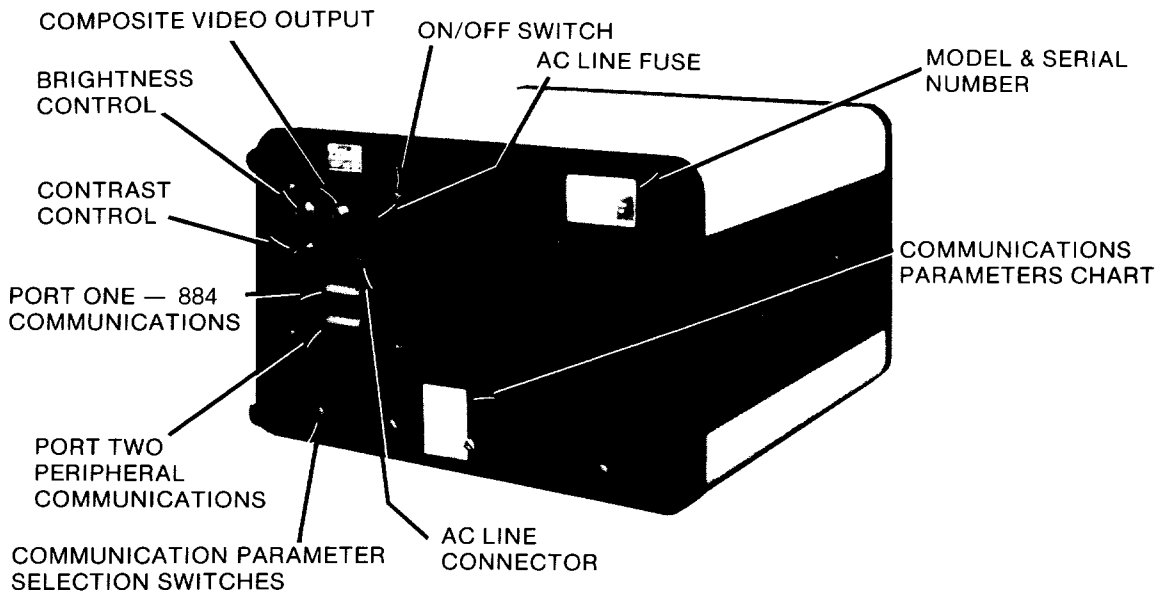


Figure 4-1 Rear View of P190

4.1.2 884/P190 Tapes

AS-T884-001 884 Programmer/Configurator Tape - Provides monitoring and programming operations; Configures PC for lines, I/O, register space.

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AS-T884-003 P190 Tape Loader Tape - Provides data tape load, record, and compare operations.

AS-T190-000 Blank Tape - Used to create data tapes.

4.1.3 Loading a Tape into the P190

1. Insert the selected tape into the P190 tape transport. If the tape does not load automatically, press the keys INIT and INIT LOCK simultaneously to start the load opertion.

4.1.4 Monitoring or Programming an 884 with the P190

1. Load the 884 Programmer/Configurator Tape into the P190.

2. If programming operations are desired, ensure the 884 and P190 memory protect locks in the OFF or UNLOCKED position.

3. When the load is complete enter the correct 884 device number in AR, and press the software label key ATTACH.

4. Press the following software label keys in order:

   - PROGRAM
   - READ NET

5. Locate the desired network to be monitored or programmed.

   If the network number is known, enter the number into the AR and press GET.

   Press the software label key EDIT NET.

   If a coil number is known, but the network number is not known:

   - Move the screen cursor to the search area of the CRT screen (lower right).

   - Press the software label key R/T/C followed by the correct coil symbol, and a coil symbol will move to the search area.

   - Enter the desired coil number in AR, and press ENTER. The coil number will move to the search area.

   - Press SEARCH and the network containing the coil element will appear on the CRT screen.

4.1.5 Loading a 884 with a User Program Tape

1. Load the 884/P190 Tape Loader tape into the P190 tape transport.

2. Wait until the tape loading operation is completed (about one minute). After the load is completed assure that the 884 and the P190 are set at the same baud rate.

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3. Enter the correct 884 device number into the P190 AR. Press the software label key ATTACH.

4. Press the software label key TAPE LDR.

5. Press the software label key LOAD PC.

6. Press the ALL MEMORY software label key.

7. Remove the Tape Loader tape cartridge. Insert the cartridge containing the user program.

8. Press the software label key PROCEED. This will start the user program tape loading operation.

9. Wait until the tape loading operation is completed, at which time the P190 screen will display further key selections.

10. After the user program load is complete, press software label keys START PC, then PROCEED. The 884 should now begin running the user program, and the RUN light will be lit on the controller.

4.1.6 Recording and Comparing a 884 User Program

1. Load a P190 Tape Loader tape into the P190 tape transport.

2. Wait until the tape loading operation is completed (about one minute). Enter the correct 884 device number in the P190 AR and press the software label key ATTACH.

3. Press the software label key TAPE LDR.

4. Press the software label key RECORD PC. Remove the Tape Loader tape. Select a blank tape and set its record tab all the way toward the outside of the case. Insert the blank tape in the P190 tape transport.

5. Set the user program title, date, and serial number using the software label keys SET TITLE, SET DATE, SET SER# and the alphabetic and numeric keypads. Press software label key PROCEED. The user program will now be recorded on the blank tape.

6. When the user program has been recorded press the software label keys COMPARE PC and ALL MEMORY. Press the PROCEED software label key. The information on the user program tape will be compared with the user program in the 884. Any discrepancies will be reported as miscompares.

7. If any miscompares are found, the verifying operation will halt. To continue, press the software label key PAUSE/CONTINUE to toggle it to CONTINUE, then PROCEED. To leave this operation before it is done, press software label keys STOP and ABORT.

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4.2 MODBUS OPERATION

All Modbus functions are done via the Modbus port, located on the front panel of the controller.

The controller always acts as a slave to a Modbus device and the Modbus device always acts as a Modbus Master.

4.2.1 Interface to MODBUS Master

The Modbus master could be a P190 programmer or any host computer which provides an RS-232-C interface, and implements Asynchronous Bus protocol.

4.2.2 MODBUS Communication Interface Switch

The communication interface switch is located behind the access panel. It is used to select the 884 communication parameters. Two separate sets of port parameters (baud rate, ASCII or RTU mode, parity option, number of stop bits, and slave address number) can be stored in the controller.

The first set is controlled by the DIP switches located inside the controller module. These DIP switches are arranged at the factory to correspond to the default settings of the P190 Programmer. The second set can be entered by way of the P190 or another Modbus host device, and is stored in the controller's battery protected RAM memory. When the communication interface switch is positioned to DIP, the default communication parameters are selected, otherwise the parameters are those stored in RAM.

4.2.3 Communication Parameters

This location holds current communication parameters. The very first time the 884 is running, the Modbus IOP loads DIP switches values into this location. If there is any reset link command issued from the master, the CPU will update changes according to reset link command.

4.2.4 MODBUS Port Pin Assignments

Table 4-1 shows the Modbus port pin assignments and describes its use. These pins may be used by any Master modbus compatible device.

Table 4-1 Modbus Port Pin Assignments

Signal Name	Pin	Use
Transmit Data	2	Outgoing data path from terminal's viewpoint.
Received Data	3	Incoming data path from terminal's viewpoint.
Request to Send	4	This signal is activated by the terminal. It tells the modem to prepare to receive data.
Clear to Send	5	This signal is activated by the modem. It tells the terminal that the modem is ready to receive and re-transmit data from the terminal.
Data Set Ready	6	This signal is activated by the modem. It tells the terminal that the modem is operational.
Signal Ground	7	Common ground reference for all signal lines.

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Receive Line Signal Detect	8	This signal is activated by the modem. It tells the terminal that the modem has detected the data carrier from another modem and received data will arrive soon.
Data Terminal Ready	20	This signal tells the modem that the terminal is connected, powered-up and ready.

4.2.5 MODBUS Active LED

Whenever the Modbus master is communicating with the controller, the Modbus Active LED will flash.

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SECTION 5
TROUBLESHOOTING AND REPAIR

5.1 ERROR CLASSIFICATION

The P190 CRT display includes an error line for reporting various P190/884 or Modbus communications error conditions. This section describes the organization and interpretation of the messages which may appear on the error line.

The P190 reports three distinct classes of errors to the user: Panel, PCL, and PCC.

5.1.1 Panel Errors

Modbus communications errors detected by the P190 software. Both transmitted and received Modbus communications packets are examined. In some cases, the communication attempt is repeated several times before an error is declared. The format of the error code is:

Error: Panel = XXX - COMMUNICATION ERROR DETECTED

where XXX is the error code. Table 5-1 lists these errors and their meanings.

Table 5-1 Panel Error Codes

Error Code	Meaning
000	Recovery has failed, the PC is no longer attached.
001	Loss of DSR on port 1.
002	Packet length exceeds maximum allowed to send.
003	No response from PC after retries count exhausted.
004	No valid response received from PC due to CRC error after retry count exhausted.
005	No valid response received from PC due to transmission of framing error after retry count exhausted.
006	I/O command is not valid to send to PC.
007	The response from PC was legal but not valid for the current I/O command.
008	PC response to command was busy after retry count exhausted.
009	PC response was not legal for the current I/O command.
010	PC data received greater than panel memory allocated for receive buffer.
011	PC response is busy to a poll command after retry count exhausted.
012	PC response to a poll is not valid.
013	PC sequence byte incorrect, reset link, error recovery accomplished.
014	Message size to send to PC is greater than PC maximum.
015	PC packet number not in sequence or not equal to expected value for current I/O operation.

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5.1.2 PCL Errors

The PCL (PC Link) errors are Modbus communications errors reported by the 884 to the P190. The format of the error code is:

Error: PCL = XXX - COMMUNICATION ERROR REPORTED

where XXX is the error code. The errors and their meanings are listed in Table 5-2.

Table 5-2 PCL Error Codes

Error Code	Meaning
001	Command function not supported by PC.
002-003	These error codes not used at this time.
004	PC CPU is not operating.
005-010	These error codes not used at this time.
011	Message size is greater than PC receive maximum.
012	New message started before previous message completed, previous command aborted.
013	PC reports current packet not next in sequence, message aborted.
014	Sequence error detected, error recovery successful.
015	PC response message is greater than maximum message. Message aborted.

5.1.3 PCC Errors

The PCC (PC Command) errors are command processing errors reported by the 884. This error class reflects the state of the command being processed and the current condition of the PC itself. The format of the error code is:

Error: PCC = XXX - PC INDICATES USER ERROR

where XXX is the error code. Table 5-3 lists these error and their meanings.

Table 5-3 PCC Error Codes

Error Code	Meaning
001	Another user is logged in.
002	Invalid passcode received.
003	Search failed.
004	Not on running PC.
005	Memory is protected.
006	Running PC.
007	PC not running.

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Table 5-3 (Continued)

Error Code	Meaning
008	Cannot start from state.
009	User is not logged in.
010	PC cannot support function.
011	Coil is already used.
012	Latch already used.
013	Network out of range.
014	User logic overflow.
015	User logic overflow on replace.
016	Network skipped.
017	Not 884 network.
018	PC is corrupt.
019	PC boundary violation.
020	Scan interval too large.
021	Feature not implemented.
022 - 068	These error codes not used at this time.
069	Function not supported.
070	Access denied.
071	Max number of references exceeded.
072	Invalid reference type.
073	Invalid reference.
074	Discrete not disabled.
075	Data is illegal.
076	Cannot write input registers.
077	PPE not even.
078	PPE invalid row.
079	No SON node.
080	Invalid opcode.
081	Too many columns.
082	Missing nodes.
083	Unexpected elements.

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Table 5-3 (Continued)

Error Code	Meaning
084	Row contact mismatch.
085	Embedded coil.
086	PPE - embedded coil.
087	Illegal constant.
088	Must be a 16 boundary.
089	Data length mismatch.
090	Hook not configured.
091	Not configurible.
092	Read only table.
093	Invalid table offset.
094	Invalid table.
095	Bad table data.
096	Bad memory type.
097	Bad memory address.
098	Comm parameters invalid.
099	Zero references requested.
100	Invalid IOP.
101	Invalid drop.
102	Invalid rack.
103	Invalid data.
104	Illegal data.
105 - 125	These error codes not used at this time.
126	Invalid constant index.

5.2 TROUBLESHOOTING FLOW CHARTS

The Troubleshooting Flow Charts are intended to provide a step by step method of isolating a failed Field Replaceable Unit (FRU) in a 884 system. The troubleshooter must start at the beginning of the flow chart and work up to the problem, rather than jump into the middle of the flow chart.

In a device as complex as 884 it is not practical to have Troubleshooting Flow Charts in such detail that all possible problems are specifically identified. For that reason the following standard troubleshooting procedures are listed and should be used when appropriate.

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1. When replacing any part of 884, the replacement parts revision level and options (if any) must match the part being replaced.

2. Check that all modules are fully seated and secured in the housing.

3. When replacing a Field Replaceable Unit, inspect all electrical connections to that unit for bent or pushed out pins, loose or broken wires, missing or broken components, etc.

4. If the Troubleshooting Flow Chart identifies the cause of a problem to be either one of two Field Replaceable Units, inspect whatever interconnects those two units (cable harness, backplane, etc.) as this could cause the problem.

5. Wholesale replacement of Field Replaceable Units is generally a poor practice. Not only does it fail to identify the exact cause of the original problem, it can introduce new problems which makes troubleshooting that much harder.

6. If several Field Replaceable Units are being replaced, either one at a time or simultaneously, mark all units in such a way that later identification of original/replaced parts will be possible.

CAUTION

The 884A Controller or the P800 Power Supply must never be "hot swapped". Turn off the P800 Power Supply before removing or installing either unit.

When reading the flow chart from page to page the circled number (i.e. 2) at the bottom of one page should be followed to the same number at the top of the next page.

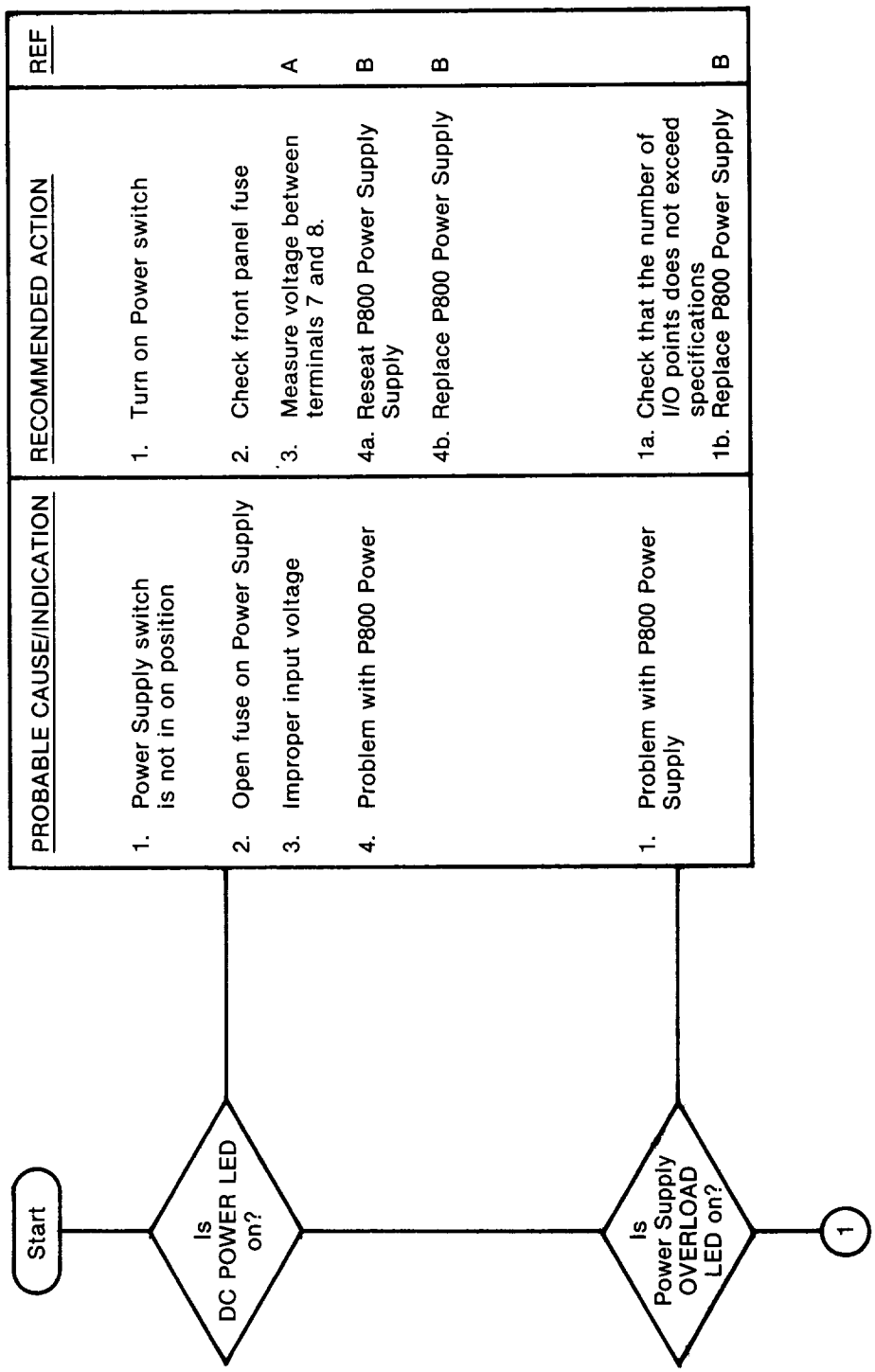
Each page of the Troubleshooting Flow Chart is divided into three columns: Possible Cause/Indication, Recommended Action, and Ref. They are defined as follows:

Possible Cause/Indication — This column lists one or more possible causes for the problem that is observed. If more than one possible causes are listed, they will be in the order of their probability.

Recommended Action — This column suggests an action to be performed according to the entry in the possible cause column.

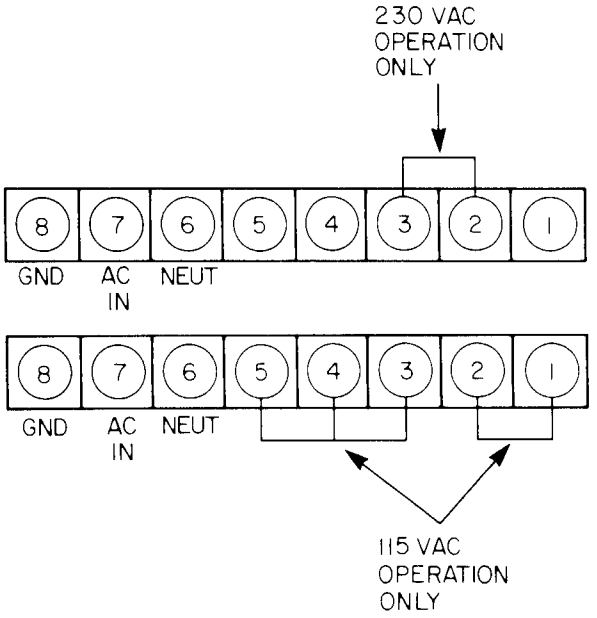
Ref — This column identifies where further information regarding the entries in the other columns may be found.

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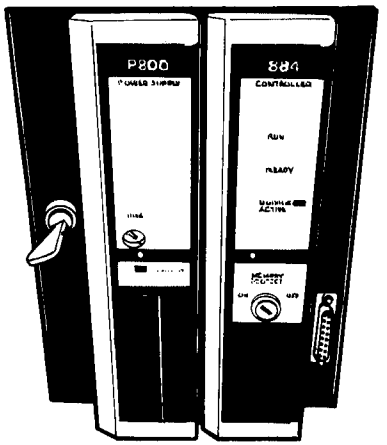
A



Reseating Power Supply

1. Turn power supply switch to OFF position.
2. Unscrew top and bottom power supply screws (located under handle).
3. Using power supply's handle, pull power supply out of housing.
4. With handle closed, push power supply back into its slot.
5. Open handle and screw top and bottom screws securely.

B



Replacing Power Supply

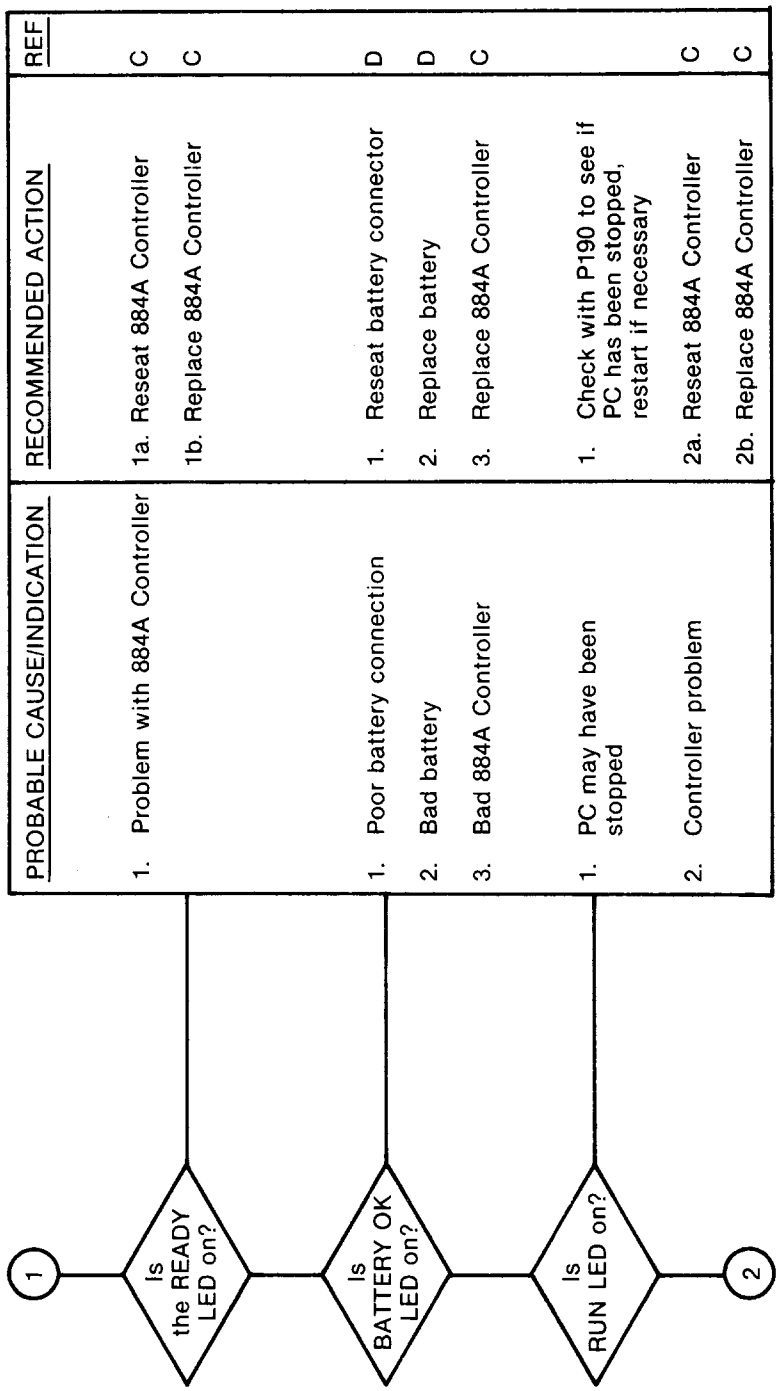
To remove AS-P800-00X power supply:

1. Turn power supply switch to the OFF position.
2. Turn circuit breaker (main power to 884) to the OFF position.
3. Disconnect primary power wiring at power supply terminal block.
4. Using power supply handle, pull power supply out of housing.

To replace power supply:

1. Make sure power supply switch is in the OFF position.
2. Insert power supply into slot provided (leftmost slot).
3. Ensure power supply module is flush with other modules.
4. Screw top and bottom power supply module screws.
5. Connect primary wiring.
6. Turn circuit breaker (main power to 884) to the ON position.
7. Return to Troubleshooting Flow Chart, sheet 1.

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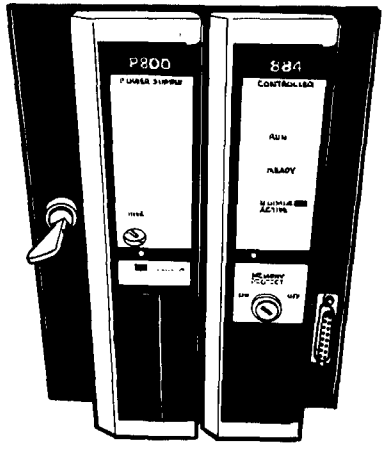
PROBABLE CAUSE/INDICATION	RECOMMENDED ACTION	REF
1. Problem with 884A Controller	1a. Reseat 884A Controller	C
	1b. Replace 884A Controller	C
1. Poor battery connection	1. Reseat battery connector	D
2. Bad battery	2. Replace battery	D
3. Bad 884A Controller	3. Replace 884A Controller	C
1. PC may have been stopped	1. Check with P190 to see if PC has been stopped, restart if necessary	
2. Controller problem	2a. Reseat 884A Controller	C
	2b. Replace 884A Controller	C

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C

Reseating Controller

1. Turn power supply switch to the OFF position.
2. Unscrew top and bottom controller screws (located under handle).
3. Using controller's handle, pull controller out of housing.
4. With the handle closed, push controller back into its slot.
5. Open handle and screw top and bottom screws securely.



Replacing 884 Controller Module

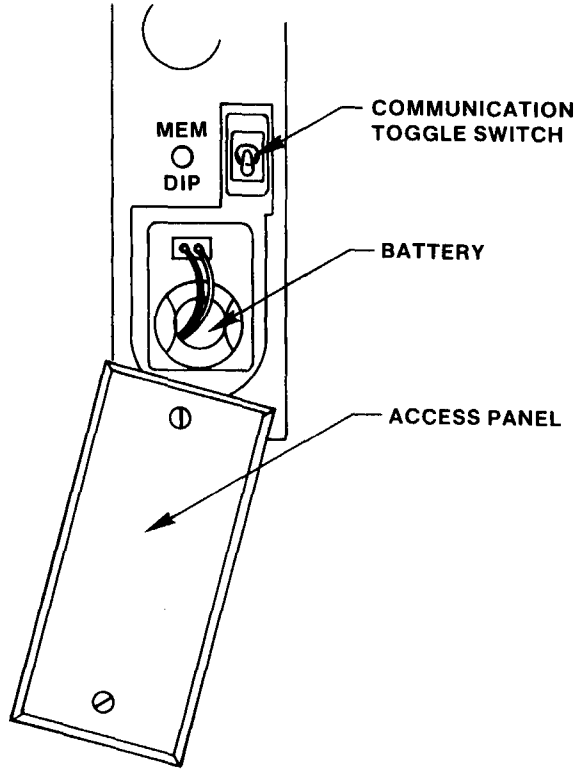
To remove controller:

1. Turn power supply switch to the OFF position.
2. Unscrew top and bottom controller screw (located under handle).
3. Using controller handle pull controller out of housing.

To replace controller

1. Make sure power supply is in the OFF position.
2. Insert controller module into the slot to the right of the power supply.
3. Make sure the controller module is flush with the power supply module.
4. Screw top and bottom controller screws securely and close handle.

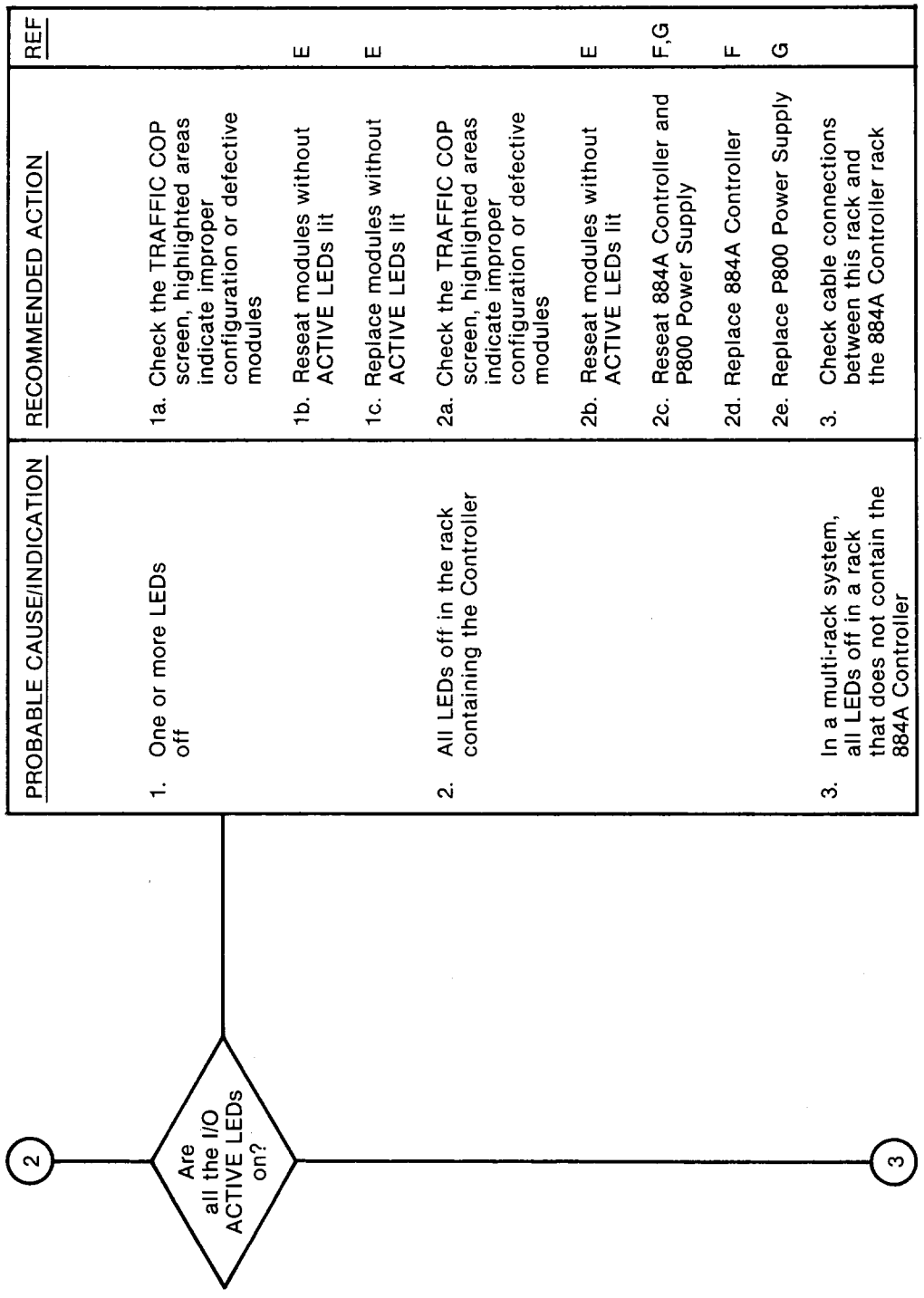
D



Battery Replacement

1. Unscrew access panel.
2. Pull battery (by its service loop) out of battery compartment.
3. Push new battery into its compartment.
4. Plug battery into its connector.

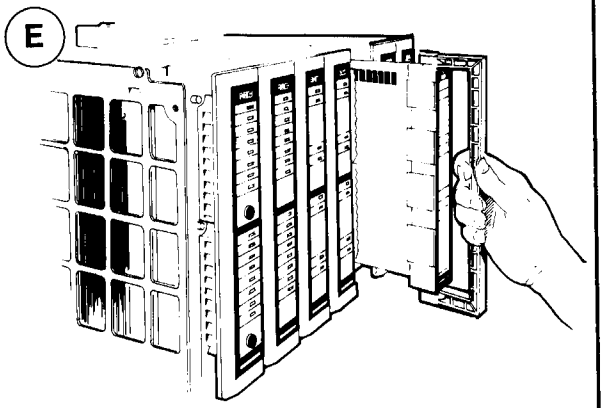
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PROBABLE CAUSE/INDICATION	RECOMMENDED ACTION	REF
1. One or more LEDs off	1a. Check the TRAFFIC COP screen, highlighted areas indicate improper configuration or defective modules	
	1b. Reseat modules without ACTIVE LEDs lit	E
	1c. Replace modules without ACTIVE LEDs lit	E
2. All LEDs off in the rack containing the Controller	2a. Check the TRAFFIC COP screen, highlighted areas indicate improper configuration or defective modules	
	2b. Reseat modules without ACTIVE LEDs lit	E
	2c. Reseat 884A Controller and P800 Power Supply	F,G
	2d. Replace 884A Controller	F
	2e. Replace P800 Power Supply	G
3. In a multi-rack system, all LEDs off in a rack that does not contain the 884A Controller	3. Check cable connections between this rack and the 884A Controller rack	

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E



Reseating I/O Module

1. Unscrew top and bottom module screws (located under handle).
2. Using module handle, pull I/O module out of the housing.
3. With the handle closed, push I/O module back into its slot.
4. Open handle and screw top and bottom screws securely.

Replacing I/O Modules

To remove I/O module:

1. Unscrew top and bottom I/O module screws (located under I/O module handle).
2. Using I/O module handle pull I/O module out of housing.

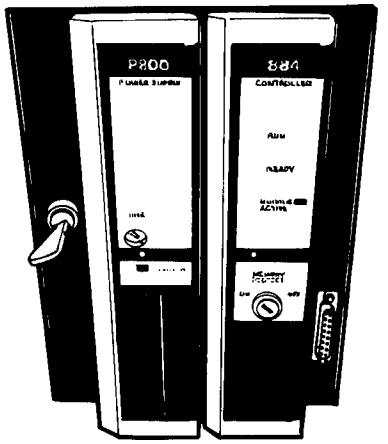
To replace I/O Module:

1. Insert I/O module into slot.
2. Make sure I/O module is flush with the other modules in the housing.
3. Screw top and bottom I/O module screws securely and close handle.

F

Reseating Controller

1. Turn power supply switch to the OFF position.
2. Unscrew top and bottom controller screws (located under handle).
3. Using controller's handle, pull controller out of housing.
4. With the handle closed, push controller back into its slot.
5. Open handle and screw top and bottom screws securely.



To replace controller

1. Make sure power supply is in the OFF position.
2. Insert controller module into the slot to the right of the power supply.
3. Make sure the controller module is flush with the power supply module.
4. Screw top and bottom controller screws securely and close handle.

G

Reseating Power Supply

1. Turn power supply switch to OFF position.
2. Unscrew top and bottom power supply screws (located under handle).
3. Using power supply's handle, pull power supply out of housing.
4. With handle closed, push power supply back into its slot.
5. Open handle and screw top and bottom screws securely.

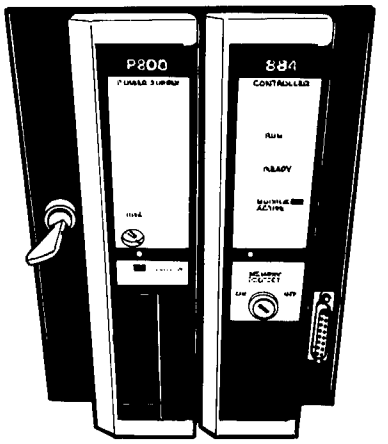
Replacing Power Supply

To remove AS-P800-00X power supply:

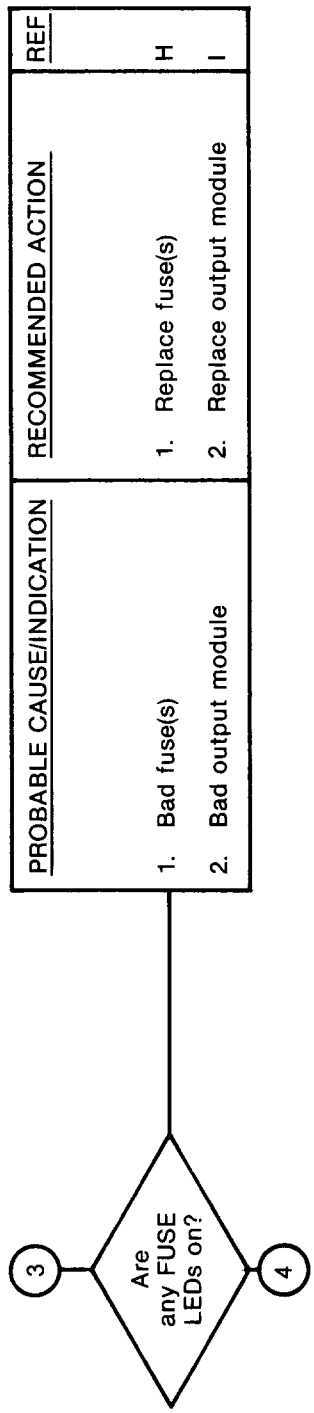
1. Turn power supply switch to the OFF position.
2. Turn circuit breaker (main power to 884) to the OFF position.
3. Disconnect primary power wiring at power supply terminal block.
4. Using power supply handle, pull power supply out of housing.

To replace power supply:

1. Make sure power supply switch is in the OFF position.
2. Insert power supply into slot provided (leftmost slot).
3. Ensure power supply module is flush with other modules.
4. Screw top and bottom power supply module screws.
5. Connect primary wiring.
6. Turn circuit breaker (main power to 884) to the ON position.
7. Return to Troubleshooting Flow Chart, sheet 1.

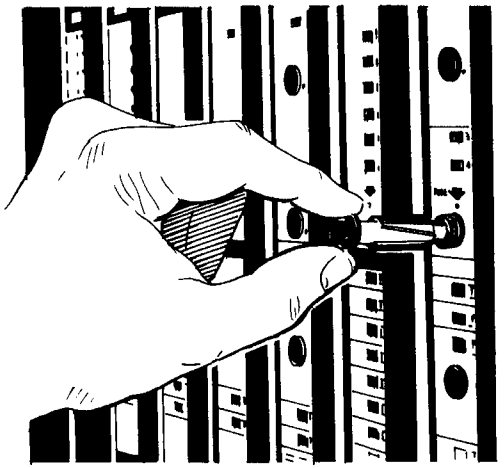


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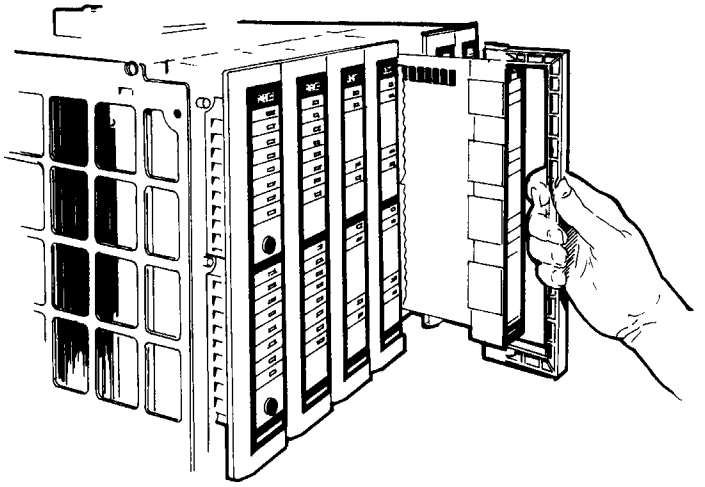
(H)



Replacing Fuses

1. The fuse block is located on the front of the P800 Power Supply module and Series 800 I/O Modules. The fuse block is designed to accept standard glass fuses (1/4 in X ¼ in).
2. Remove the blown fuse from the fuse block, and insert the replacement fuse.
3. Insert the fuse block into the I/O module and turn it clockwise until it engages.

(I)



Reseating I/O Module

1. Unscrew top and bottom module screws (located under handle).
2. Using module handle, pull I/O module out of the housing.
3. With the handle closed, push I/O module back into its slot.
4. Open handle and screw top and bottom screws securely.

Replacing I/O Modules

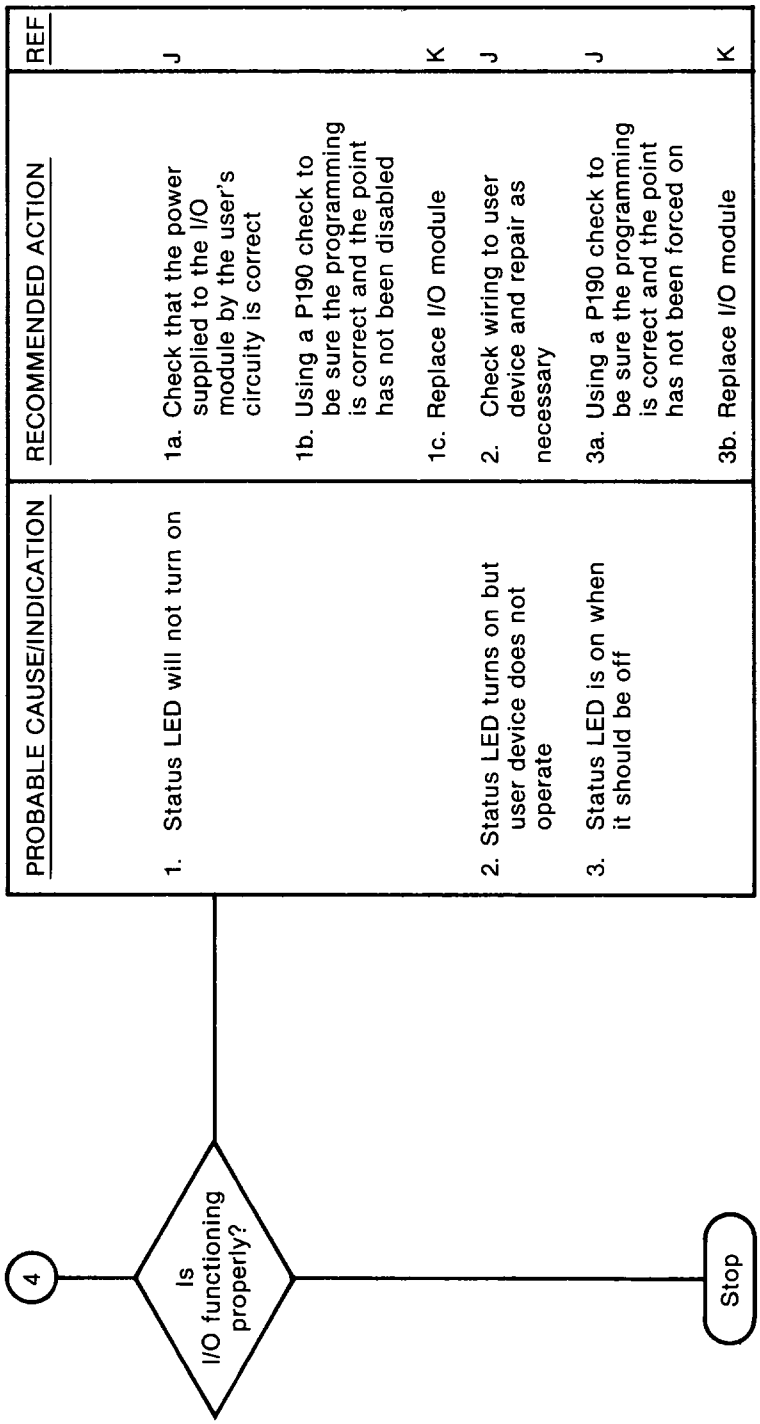
To remove I/O module:

1. Unscrew top and bottom I/O module screws (located under I/O module handle).
2. Using I/O module handle pull I/O module out of housing.

To replace I/O Module:

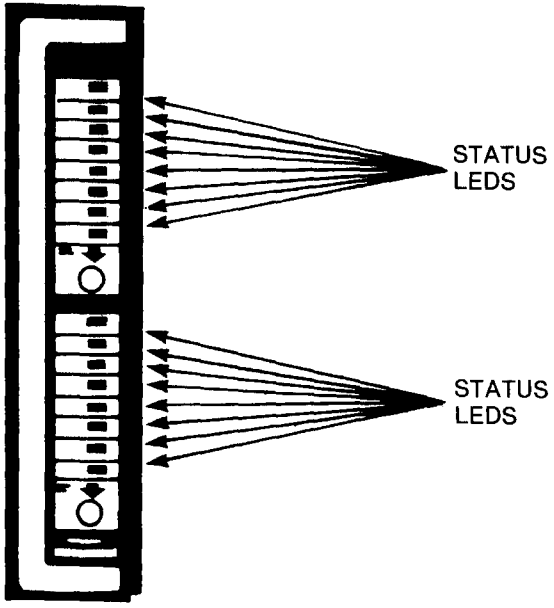
1. Insert I/O module into slot.
2. Make sure I/O module is flush with the other modules in the housing.
3. Screw top and bottom I/O module screws securely and close handle.

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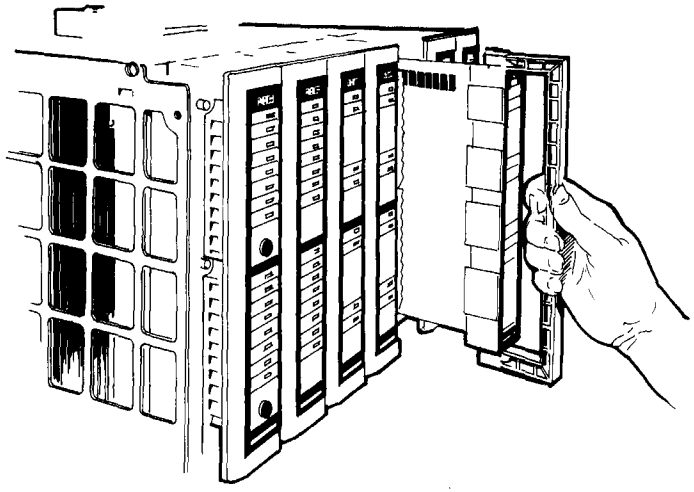


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J



K



Replacing I/O Modules

To remove I/O module:

1. Unscrew top and bottom I/O module screws (located under I/O module handle).
2. Using I/O module handle pull I/O module out of housing.

To replace I/O Module:

1. Insert I/O module into slot.
2. Make sure I/O module is flush with the other modules in the housing.
3. Screw top and bottom I/O module screws securely and close handle.

Reseating I/O Module

1. Unscrew top and bottom module screws (located under handle).
2. Using module handle, pull I/O module out of the housing.
3. With the handle closed, push I/O module back into its slot.
4. Open handle and screw top and bottom screws securely.

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