H7317

EK-H7317-TM-002

H7317
Power Distribution System Plus (50/60 Hz) Technical Manual

Prepared by Educational Services
of
Digital Equipment Corporation

1st Edition, February 1988
2nd Edition, August 1990

Book production was done by Educational Services Development and Publishing in Merrimack, N.H.

FCC Notice:

WARNING: The equipment described in this manual generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against radio and television interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, the user is encouraged to try to correct the interference.

The postpaid READER'S COMMENTS form in this document requests the user's critical evaluation to assist in preparing future documentation.

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ABOUT THIS MANUAL

This technical manual is intended for use by personnel who have been trained in the operation, installation, and maintenance of the H7317 Power Distribution System Plus.

The manual covers the following topics for the H7317 (50/60 Hz) Power Distribution System Plus (PDS+):

- Chapter 1, "Introduction," gives an overview of the PDS+ and provides detailed information on system controls and operator functions.
- Chapter 2, "Installation," provides site preparation, unpacking, inspection, and installation procedures.
- Chapter 3, "Monitoring," provides a description of internal and external monitoring and detailed information on the monitoring menus available.
- Chapter 4, "Monitoring Options," provides a technical description and installation procedures of the monitoring options available.
- Chapter 5, "Operation," provides operator power-up, power-down, and checkout procedures. This chapter also provides an operator troubleshooting guide.
- Chapter 6, "Maintenance," provides troubleshooting, switch setting, and calibration procedures.
- Chapter 7, "Technical Description," provides a detailed technical description of the PDS+ for the technical person.
- Appendix A, "Term Abbreviations," lists the abbreviations used in this manual.
- Appendix B, "Available Options", lists the options that are available for the PDS+.
- Appendix C, "Input Power Junction Box," describes the junction box (J-Box) and provides installation procedures.
- Appendix D, "PDS+ Specifications," provides environmental and physical specifications.

- Appendix E, "Parts Location," provides three illustrations that identify parts.
- Appendix F, "Probe Data Sheets," provides a table for listing all installed probes and their parameters.

RELATED DOCUMENTS

Title	Part Number
DIGITAL Site Preparation Guide	EK-OCORP-SP
Power and Packaging Catalog	EK-PWRPK-CL

CHAPTER 1

1.1 SAFETY

The H7317 Power Distribution System Plus (PDS+) contains HIGH VOLTAGE. Formal training on this unit is required for all maintenance personnel and all appropriate safety precautions must be taken to ensure the safety of personnel installing, operating, troubleshooting, and repairing this equipment.

During power-on troubleshooting and testing, keep all panels and protective devices in place whenever possible. Remove all rings and jewelry, and wear safety glasses at all times when conducting power-on tests. DO NOT wear an ESD wriststrap when working on the high-voltage section. The ESD wriststrap should be worn when changing printed circuit boards inside the door electronics area.

WARNING

The H7317 PDS+ cabinet contains HIGH VOLTAGE. Only authorized Digital Customer Services representatives who have received formal, authorized training on the H7317 PDS+ product will be certified to work on this product. There will be no exceptions to this policy.

To power down the PDS+ unit for troubleshooting and repair, use the following procedure.

1. Turn OFF the attached equipment using the appropriate sequence,
2. Turn OFF the output circuit breaker(s),
3. Turn OFF the output main circuit breaker(s),
4. Turn OFF the input main circuit breaker, and
5. Unplug the power cable from the J-Box.

1.2 GENERAL

The PDS+ unit provides distribution of ac power for small- to medium-sized computer systems (Figure 1-1). The input voltages can be from 208 Vac to 480 Vac and may be either 50 or 60 Hz. The PDS+ unit is available in 15, 30, 50, 75, and 100 kilo volt ampere (kVA) configurations.

The PDS+ unit can be configured to monitor and display both internal and external failure or status information. When a failure occurs, the PDS+ unit can be programmed to generate an alarm, energize one or more of three logical relays, or cause an emergency shutdown of the system.

Refer to Chapter 7 for a more in depth technical description of the H7317 PDS+.

WARNING

The PDS+ unit can be used to monitor, but should NOT be used to control any life safety systems (for example, halon sprinklers).

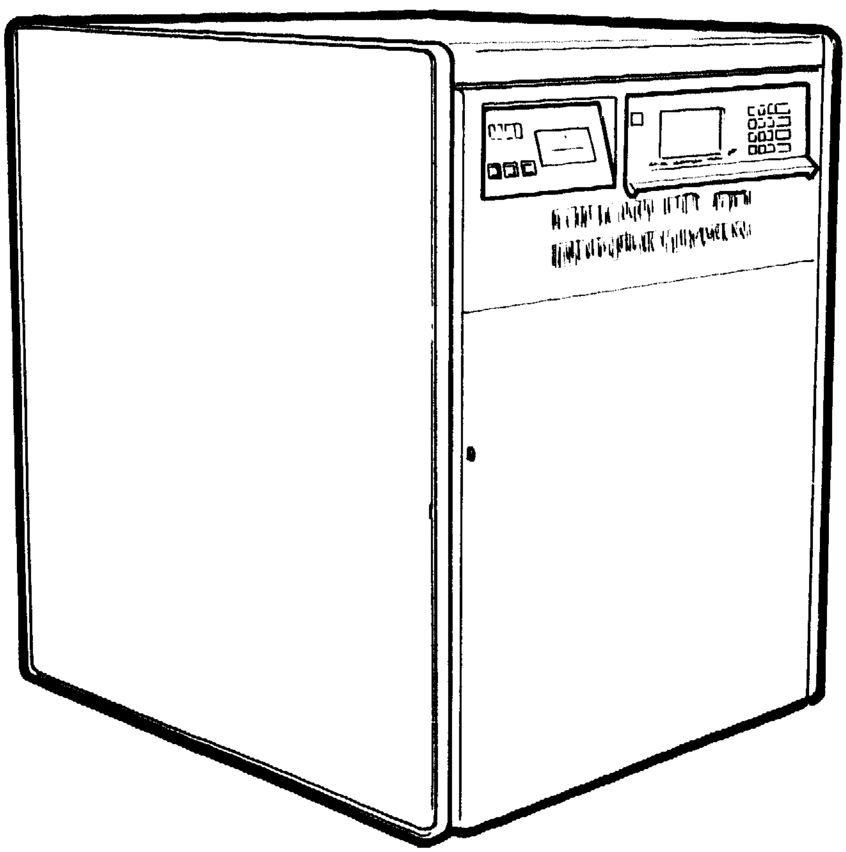

Figure 1-1 Power Distribution System Plus

1.3 SYSTEM DESCRIPTION

The functions of the PDS+ unit are divided into six categories (Figure 1-2). These categories are:

- External ac input (external to the main unit)
- Isolation transformer
- Monitoring logic
- Controls and indicators
- Output power distribution
- Options

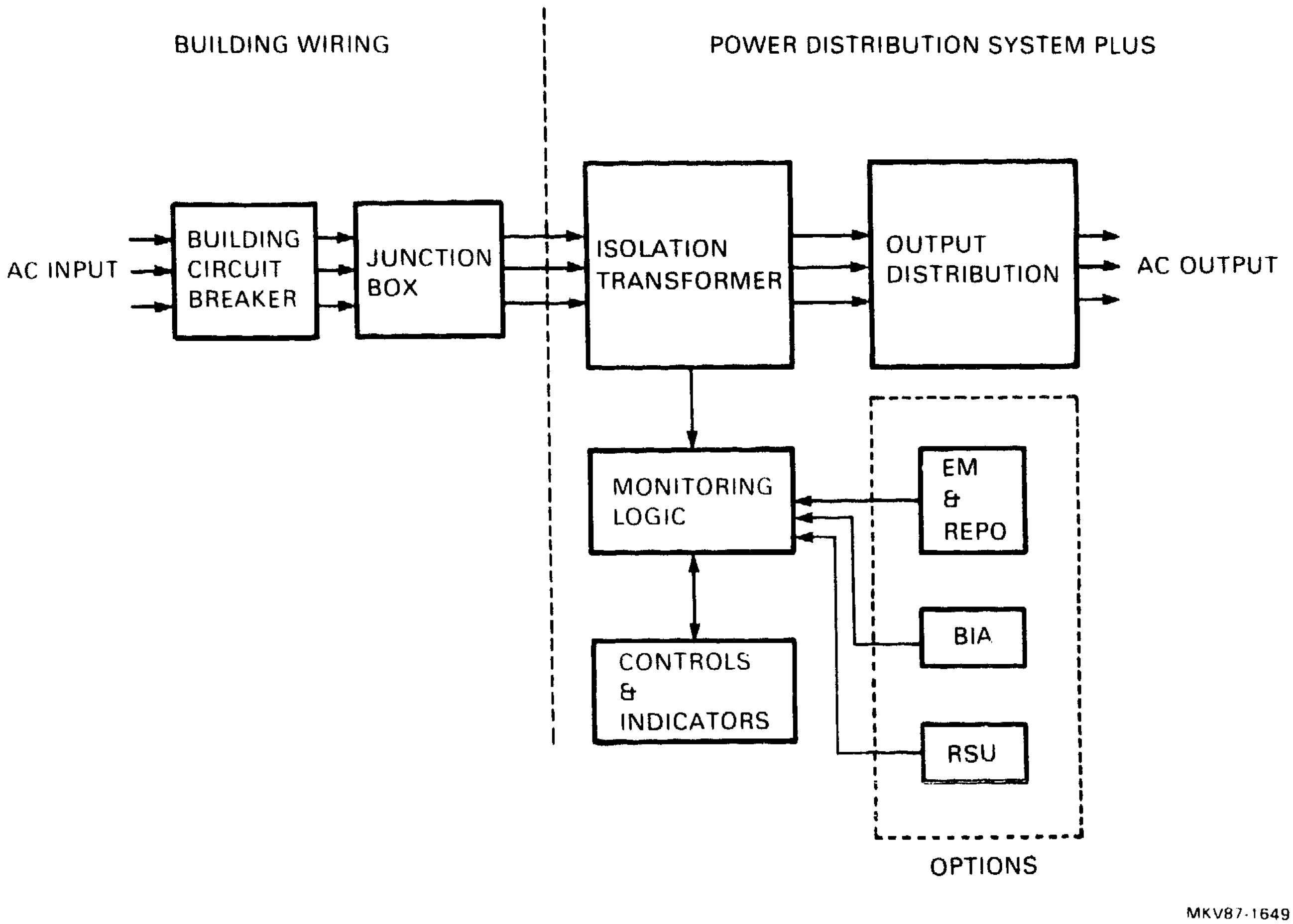

Figure 1-2 System Components

1.3.1 Input Power and Junction Box

The three-phase input branch power ranges from 208 to 600 Vac at 60 Hz and from 380 to 415 Vac at 50 Hz.

The input power junction box (J-Box) connects the building source power (using the input power cable) to the PDS+ unit . The J-Box is included with the PDS+ unit, but is installed and wired by an electrician supplied by the customer.

1.3.2 Input Protection

The ac input is applied to the input main circuit breaker (IMCB), which disconnects the PDS+ unit from the power source. The IMCB may be tripped by hand to serve as an ON/OFF switch, or tripped automatically by the monitoring logic or a REPO switch. From the IMCB the input ac is applied to the isolation transformer.

1.3.3 Monitoring Logic

The PDS+ unit has extensive logic circuits to monitor up to 43 internal and 69 (optional) external probe sensors per unit. Up to 8 PDS+ units can be daisy chained together to form a monitoring network in which one unit (Unit 0) is designated as the "Master Control Unit." This unit controls communication on the network. The alarm circuitry is included in the monitoring logic. The monitoring logic consists of the seven following boards or modules.

- M4 Main Processor Board
- M3 Processor Board
- I3 Interface Board
- P4 Power Supply Board
- Building Interface Adapter (Optional)
- Environmental Monitoring and REPO Station (Optional)
- Remote Sensor Unit (Optional)

1.3.4 Output Distribution Circuits

The output main circuit breaker(s) provide overcurrent protection. The output distribution panel board holds the output distribution circuit breakers. The output power cables provide output power to the system peripherals.

1.3.5 Printer

An internal 40-column impact printer in the PDS+ unit provides hard copy of alarm conditions or probe status and data.

1.3.6 Options

There are several options available to expand the monitoring and control capabilities of the PDS+ unit.

Remote Sensor Unit (RSU) Box

Remote Sensor Unit boxes allow monitoring of external equipment such as temperature sensors, humidity sensors, uninterruptable power supply systems, diesel generators, halon systems, water detectors, air conditioners, security systems, and fire alarm systems. Each RSU box can accept 20 sensor probe inputs. A maximum of 6 RSU boxes can be connected to each PDS+ unit (Section 4.4).

Building Interface Adapter (BIA)

The Building Interface Adapter can monitor up to 8 dry-contact sensor probes. This allows monitoring of external systems such as air conditioners, generators, security systems, and fire alarm systems. The BIA also contains 3 mechanical latching relays which can be used to shut down air conditioners on specific alarm conditions or activate an autodialer on a shunt-trip condition. Only one BIA can be connected to a PDS+ unit (Section 4.3).

Environmental Monitoring and REPO Station

The Environmental Monitoring and REPO Station is used to monitor the temperature and humidity in the computer room and provide emergency POWER OFF capabilities for the entire computer system from a point that is remote from the PDS+ unit (for example, near the entrance/exit door). The EM & REPO station can be one of three types. One type measures temperature and humidity and has a REPO switch. Another type measures temperature and has a REPO switch. These stations can be set to automatically shunt trip the PDS+ unit when a predefined temperature threshold is reached.

The third type is solely a REMOTE EMERGENCY POWER OFF (REPO) switch. Only one EM & REPO station can be connected directly to a PDS+ unit. Other EM & REPO stations can be connected to provide real-time reporting, but they must be routed through an RSU box (Section 4.2).

Communications

The PDS+ unit can be connected to a standard terminal to display the contents of the liquid crystal display (LCD) on the User Control Center or to a VAX system via the RS232 port to allow monitoring and/or programming using the VAX REMS software.

1.4 OPERATOR CONTROLS AND INDICATORS

The User Control Center (UCC) and Local Control Panel (LCP) (Figures 1-3 and 1-4) provide a central location to monitor the status of the PDS+ unit.

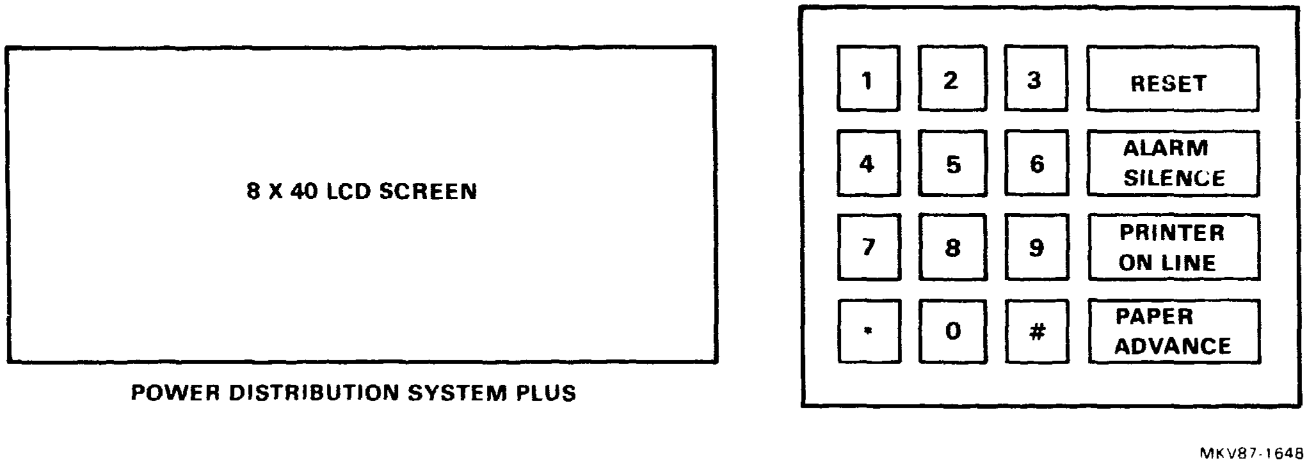

Figure 1-3 User Control Center (UCC)

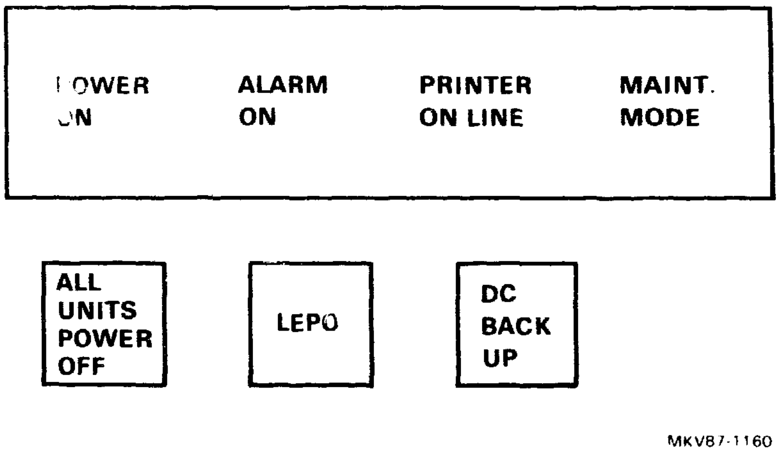

Figure 1-4 Local Control Panel (LCP)

1.4.1 User Control Center

The User Control Center (Figure 1-3) consists of a 16-key keypad and a liquid crystal display (LCD) screen.

The LCD screen has the capacity of displaying 8 lines of data with a maximum of 40 characters per line.

The keypad contains 10 numeric keys and 6 function keys. These keys are described below.

RESET Key

The RESET key resets the operating electronics after an alarm condition has been corrected. It also returns the screen to the Idle Menu.

CAUTION

Do not use the RESET key to access the Idle Menu, as this causes alarm-condition data to be erased.

Press the "*" key from the Main Menu screen or discontinue user activity for a period of 10 minutes, and the LCD screen displays the Idle Menu.

ALARM SILENCE Key

As soon as a probe detects an alarm condition, the PDS+ unit sounds an alarm. The ALARM SILENCE key silences the audible alarm for 15 minutes. If the alarm condition still exists after 15 minutes, the alarm sounds again. If a different alarm occurs after the alarm is silenced, the system overrides the alarm silence and sounds the alarm again. The ALARM ON indicator on the Local Control Panel remains lit until the alarm condition is corrected and the RESET key is pressed.

PRINTER ON LINE Key

This key is only functional if the printer is enabled through the Communication Menu. Under these conditions, this key turns the printer ON and OFF. Pressing the PRINTER ON LINE key turns the printer ON and lights the PRINTER ON LINE indicator on the Local Control Panel. Pressing the PRINTER ON LINE key again turns the printer OFF and extinguishes the PRINTER ON LINE indicator. If the printer is on-line and the Auto/Alarm mode is enabled, the printer automatically prints a hard copy of alarm data when an alarm queue is displayed.

PAPER ADVANCE Key

The PAPER ADVANCE key is used to advance paper in the printer. The printer must be enabled through the Communication Menu to use this key.

Pound "#" Key

The "#" key returns the user to the Main Menu screen on the LCD.

Asterisk "*" Key
The "*" key functions as a "continue" command. It performs the following functions.

- Moves the cursor from field to field in a screen, acting as a TAB key.
- Stores data that has been entered and returns the user to the previous screen.
- Advances display screens manually if Auto Page is not enabled and the Alarm Condition Menu or the Scan Probe Data Menu is selected.
- Advances through the display screens of the menu as selections are made.

Numeric Keys (0-9)
The numeric keys are used to enter probe numbers, probe group numbers, unit numbers, security codes, and data.

1.4.2 Local Control Panel

The Local Control Panel (Figure 1-4) contains three power-function switches and four status indicators.

ALL UNITS POWER OFF Switch (RED)

The ALL UNITS POWER OFF switch is a power off function switch. Pressing this switch trips the input main circuit breaker (IMCB) on all power unit tied together using REPO IN/OUT cabling. In an emergency, this disconnects the PDS+ units from input power. This switch is illuminated when power is applied to the unit.

LOCAL EMERGENCY POWER OFF Switch (YELLOW)

The LOCAL EMERGENCY POWER OFF (LEPO) switch is a power function switch. Pressing this switch trips the IMCB on the PDS+ unit on which the switch is located. In an emergency, this disconnects the PDS+ unit from input power. It has no effect on the other units that are connected together. This switch is illuminated when power is applied to the unit.

BATTERY BACKUP Switch (GREEN)

The BATTERY BACKUP (DC BACK UP) switch provides power for the microprocessor, the indicator lights, the options, and the LCD screen for five minutes when the main power is OFF. After five minutes the screen displays the "Automatic Power Disconnect" message and goes blank. Pressing the switch again gives another five minutes of power to the front door electronics. This switch is not illuminated in either position.

POWER ON Indicator (GREEN)

The POWER ON indicator illuminates when the unit's main power is ON. It does not illuminate if the unit is not receiving input power or if the unit has been turned OFF.

ALARM ON Indicator (RED)

The ALARM ON indicator illuminates when an alarm condition occurs. Correcting the alarm condition and pressing the RESET key extinguishes the light unless a continuing alarm exists.

PRINTER ON LINE Indicator (YELLOW)

The PRINTER ON LINE indicator illuminates when the printer is active. The PRINTER ON LINE key on the User Control Center activates the printer if the printer has been enabled through the Communication Menu.

MAINTENANCE MODE Indicator (YELLOW)

The MAINTENANCE MODE indicator illuminates when the maintenance switch on the I3 interface board is in the MAINTENANCE position. Placing the maintenance switch to the NORMAL position, then pressing RESET on the User Control Center, extinguishes the indicator.

1.4.3 Internal Controls and Indicators

Input Main Circuit Breaker (IMCB)
The input main circuit breaker disconnects input power to the PDS+ unit. The IMCB, located behind the cabinet door, can be tripped:

- Manually,
- By its shunt trip (controlled by monitoring logic or by a REPO switch),
- By an overload,
- By a transformer overtemperature, or
- By the LEPO or ALL UNITS POWER OFF switches.

Output Main Circuit Breaker(s)
The output main circuit breaker(s) limit the total output current of an output panel board. This circuit breaker is on the output panel board under the top panel. A PDS+ unit with two output panel boards has an output main circuit breaker for each panel board.

Output Distribution Circuit Breakers
The output distribution circuit breakers control and protect the output circuits that supply voltages to the computer system. The output circuit breakers are under the top panel.

Maintenance Switch
The maintenance switch is located on the I3 interface board (Figure 6-3). This switch is placed in the MAINTENANCE position when the technician is adding probes, changing probe parameters, or making adjustments. This prevents an accidental shunt trip of the PDS+ unit. The only way the PDS+ unit can shunt trip when in the Maintenance mode is if the REMOTE EMERGENCY POWER OFF switch, the ALL UNITS POWER OFF switch, or the LOCAL EMERGENCY POWER OFF switch is pressed, or the transformer overheats.

CHAPTER 2

2.1 GENERAL

This chapter contains the the following procedures.

- Unpacking
- Inspection
- Installation
- Initialization
- Checkout

These procedures let you verify correct PDS+ operation before you connect the unit to a computer system. See Figures 2-1 and 2-2 during inspection for part locations.

Before installing the PDS+ unit, inspect the following items.

1. Check that the input power junction box (J-Box) is installed.

2. Check that the input voltage to the J-Box is correct.

3. Check that the current rating of the J-Box is correct as specified for the kVA rating in Table C-1.

4. Check that the power-handling capacity (kVA) of the PDS+ unit matches the kVA rating specified on the Master Order Form (refer to Table C-1).

5. Check that the output distribution configuration of the PDS+ unit is correct.

Make sure that these checks meet the needs of the computer system being installed. See Appendix C when inspecting a site prior to installation.

See Appendix D for environmental and physical specifications; including information on circuits, current ratings, branch power, and power capacities.

2.2 UNPACKING THE PDS+ UNIT

1. Position the shipping crate to allow 4 meters (12 feet) of space behind the pallet so that the PDS+ unit can safely roll off the ramp without hitting a wall or other obstruction.

2. Carefully unband the carton.

WARNING
The steel bands can cause injury if incorrectly cut. Use an unbanding tool or take special care when cutting the bands.

3. Lift the cover off the pallet and remove the cardboard box that contains the rear panel.

4. Remove the ramp.

5. Remove the cardboard protectors around the sides of the PDS+ unit.

6. Unband the unit from the pallet and remove the clear plastic cover.

7. Remove the blocking boards around the bottom of the PDS+ unit using a 9/16-inch wrench.

8. Slide the ramp against the back of the pallet.

9. Raise the four leveling feet on the PDS+ unit as high as they can go.

10. Using an adequate number of people, roll the PDS+ unit down the ramp to the floor.

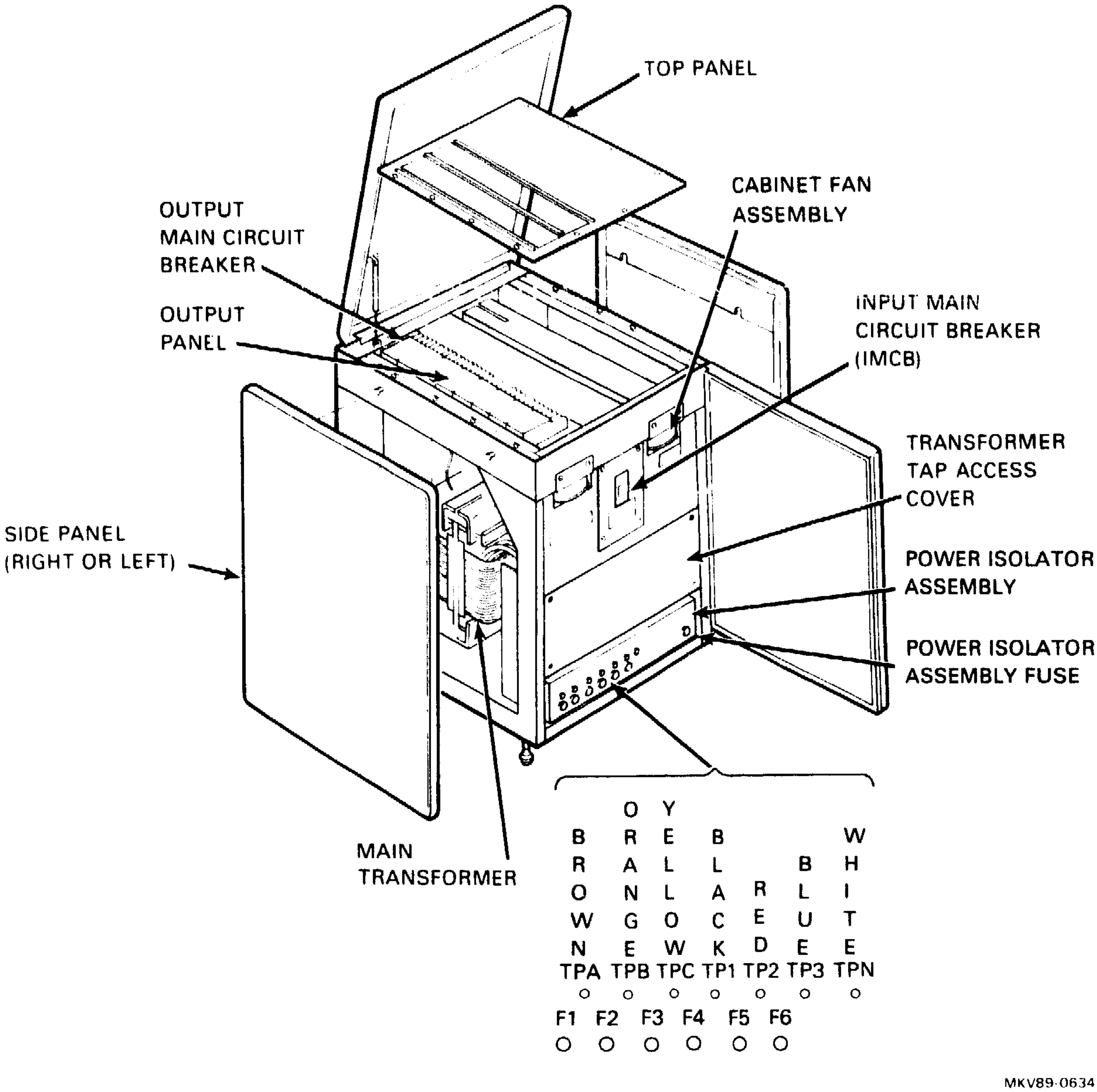

Figure 2-1 PDS+ Components (Front View)

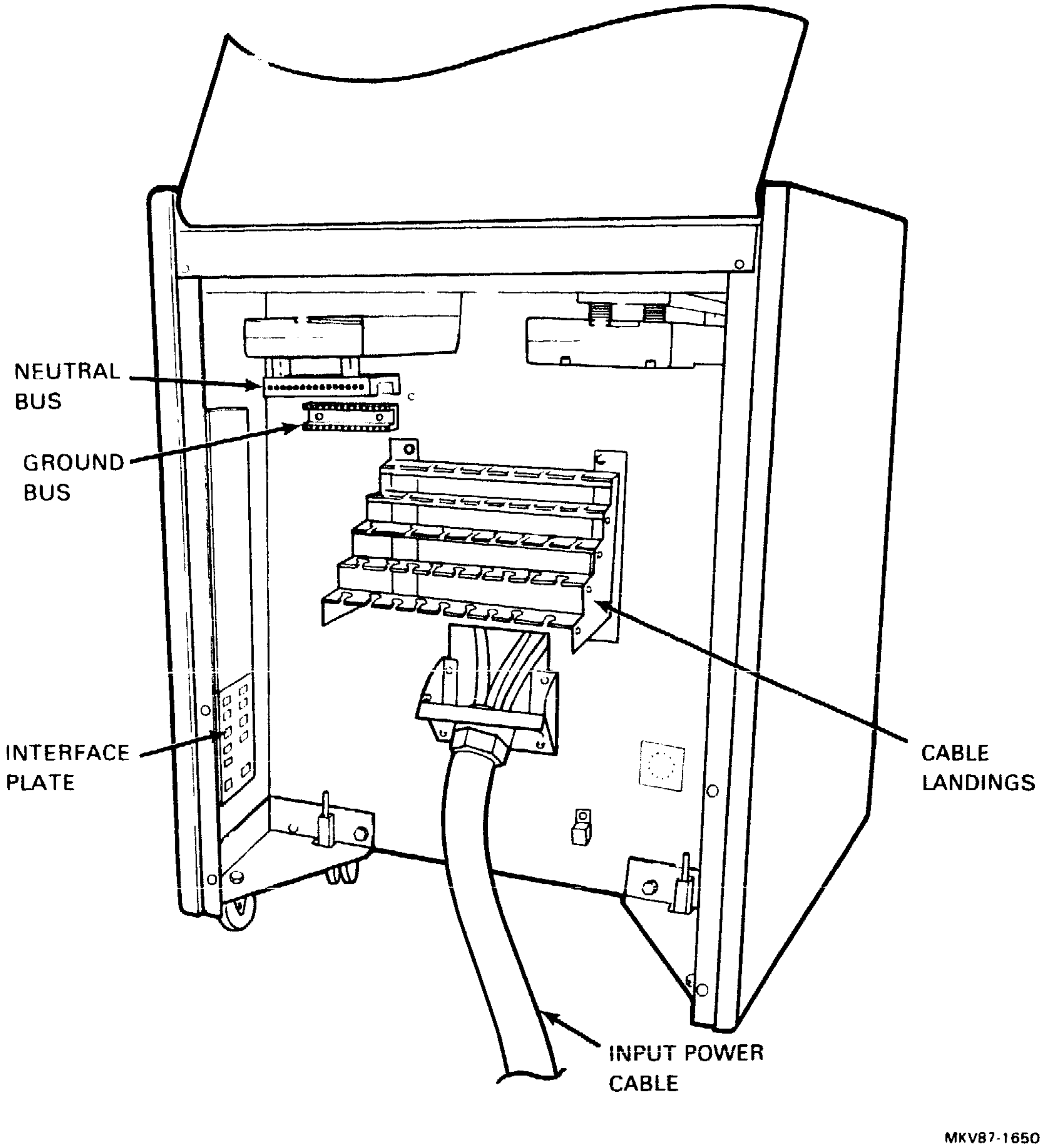

Figure 2-2 PDS+ Components (Rear View)

2.3 INSPECTING THE PDS+ UNIT

Use the checklists in Sections 2.3.1 through 2.3.6 to help detect obvious damage or safety hazards that may have occurred during shipment or handling of the equipment.

WARNING

DO NOT connect the PDS+ unit to the building's power at this time.

2.3.1 Enclosure

[ ] Check all external surfaces for scratches, dents, or other obvious damage.

2.3.2 Transformer

WARNING

Make sure that the input power connector is NOT connected to the input J-Box. This ensures that the building's power is NOT connected.

[ ] 1. Open the cabinet door.

[ ] 2. Unlock and remove the side panels by lifting up.

[ ] 3. Check the transformer for shifted, broken, or loose mountings. The transformer coils and terminal lugs must not touch any part of the internal enclosure or other grounded metal surface.

[ ] 4. Ensure that the terminal lugs and connectors used to hold terminal-to-bus connections and wire-to-terminal connections are tight.

NOTE

The red seal on the transformer lugs does not indicate a seal, and should be broken if a nut needs tightening.

[ ] 5. Check all the wire insulation for damage.

[ ] 6. Ensure that the ground lugs are firmly mounted.

[ ] 7. Replace the side panels.

2.3.3 Input Wiring

WARNING
Make sure that the input power connector is NOT connected to the input J-Box. This ensures that the building's power is NOT connected.

[ ] 1. Remove the four bolts on the IMCB cover (Figure 2-1).

[ ] 2. Ensure that the three output wire connections to the IMCB are tight.

[ ] 3. Replace the IMCB cover.

2.3.4 Output Wiring

[ ] 1. Ensure that the input cable-to-grounding bus connections on the back of the PDS+ unit are tight.

[ ] 2. Check the individual distribution circuit ground wire connections (green/yellow wires).

[ ] 3. Remove the panel board cover and check the wiring to the following components.

a. Neutral bus (white wires)

b. Output main circuit breaker (black, red, and blue banded wires).

[ ] 4. Ensure that each circuit breaker is firmly seated.

[ ] 5. Replace the output panel board cover.

2.3.5 Logic Modules

[ ] 1. Check the cabinet door logic area (behind the plastic cover) for any defects or broken parts.

[ ] 2. Ensure that all of the cable connectors, module boards, and ICs are firmly seated.

[ ] 3. Check the jumpers on the M4, M3, and I3 boards to ensure that they are installed in accordance with the configuration of the PDS+ unit being installed. Use Tables 2-1 through 2-3 to verify correct installation.

[ ] 4. Leave the red battery lead disconnected.

Table 2-1 M3 Board Jumpers

	Jumper Numbers																	
Unit Rating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
kVA Rating																		
15 kVA	I	I	I	I														
30 kVA	I	I	O	O														
50 kVA	I	O	I	O														
75 kVA	I	O	O	I														
100 kVA	I	O	O	O														
Input Voltage																		
208 Volts						O	O											
480 Volts						O	I											
600 Volts						I	O											
Frequency																		
50 Hz								I										
60 Hz								O										
Output Voltage																		
120/208					O													
220/415					I													
Enable Watchdog Timer									I									
Enable Clock Interrupts										O								
Enable On-board Memory											O							
Enable On-board I/O Select													I					
Select Memory Power Source												+5						
Unit Address														O	O	O		
Communications Type																	I	I

Ensure that jumpers 9 through 18 are installed according to the above table. Jumper 12 should be installed between the center pin and the +5 V pin.

I = IN/ O = OUT

Table 2-2 M4 Board Jumpers (RS-232-C Port Configuration)

Jumper	Modem With Handshaking*	Modem Without Handshaking*	Terminal Direct
JP-1	A-B	A-B	B-C
JP-2	A-B	JP2-A to JP4-A	A-B
JP-3	A-B	A-B	B-C
JP-4	A-B	JP2-B to JP4-B	A-B

* Handshaking means the PDS+ unit raises a Request To Send signal and the modem must return a Clear To Send signal before data can be transferred.

Table 2-3 I3 Board Jumpers

	Jumper Numbers									
Unit Rating	**1&2**	**3&4**	**5&6**	**7&8**	**9&10**	**11&12**	**13&14**	**15**	**16**	**17**
Input Voltage										
208	1	1	1							
415	2	2	2							
480	2	2	2							
600	3	3	3							
Output Phase and Ground Current										
210 A or less*				1	1	1	1			
420 A or less (100 kVA, 60 Hz)				2	2	2	2			
Output Phase to Neutral Voltage										
120 V								1-2	1-2	1-2
240 V								2-3	2-3	2-3

* All PDS+ units except the 100 kVA 60 Hz units require this jumper setting for output phase and ground current.

2.3.6 Power Isolator Assembly

[ ] 1. Open the front door.

[ ] 2. Ensure that the fuses are properly installed.

[ ] 3. Close the front door.

2.4 INSTALLING THE PDS+ UNIT

The installation of the H7317 Power Distribution System Plus (Figure 2-3) is separated into two parts.

- **CUSTOMER RESPONSIBILITIES** -- The customer is responsible for installing the junction box and the associated wiring, and installing and mounting the RSU box(es), BIA box, and EM & REPO station(s). The customer is also responsible for mounting and wiring any optional remote sensor probes for the RSU box(es), the BIA box, and the EM & REPO station(s). See Appendix C and Chapter 4 for detailed instructions.

- **DIGITAL RESPONSIBILITIES** -- Digital Equipment Corporation will unpack, inspect, install, connect, and check out the PDS+ unit, and connect output cables and computer equipment. They will also connect the RSU box(es), BIA box, EM & REPO station(s), and any optional remote sensor probes for the RSU box(es) and the BIA box.

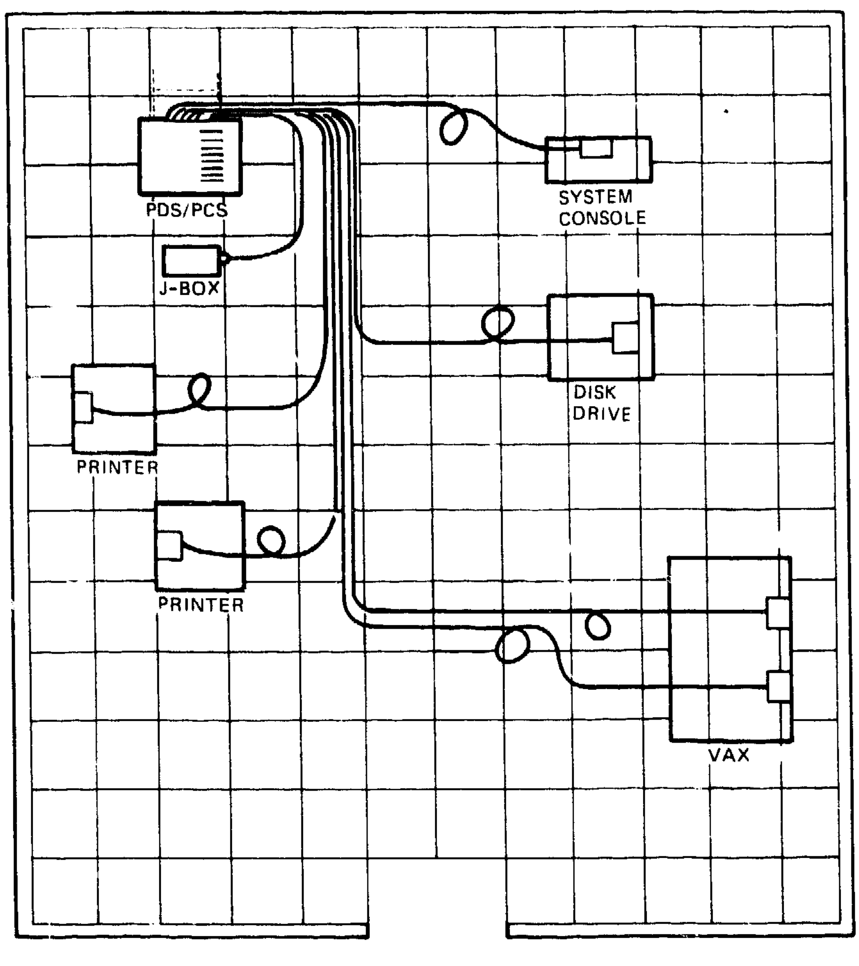

Figure 2-3 Typical PDS+ Installation

2.4.1 J-Box Location

Before the PDS+ unit can be installed, the J-Box must be installed by the customer's electrical contractor according to the procedures in Appendix C, Section C.2.

> **NOTE**
> **Before placing the J-Box, plan the clearance for the PDS+ unit. The PDS+ unit needs 1 meter (3 feet) clearance front and back, and 1.2 meters (4 feet) clearance on each side to allow for transformer replacement.**

The J-Box should be positioned:

1. At least 1 meter (3 feet) from any wall.
2. Within 1.5 meters (5 feet) of the PDS+ unit.
3. Where it is always accessible. No equipment can be on the floor tile covering the J-Box (Figure 2-4).
4. To allow routing of the input cable to the PDS+ unit through the same floor-tile opening as the output distribution cables (Figure 2-5).

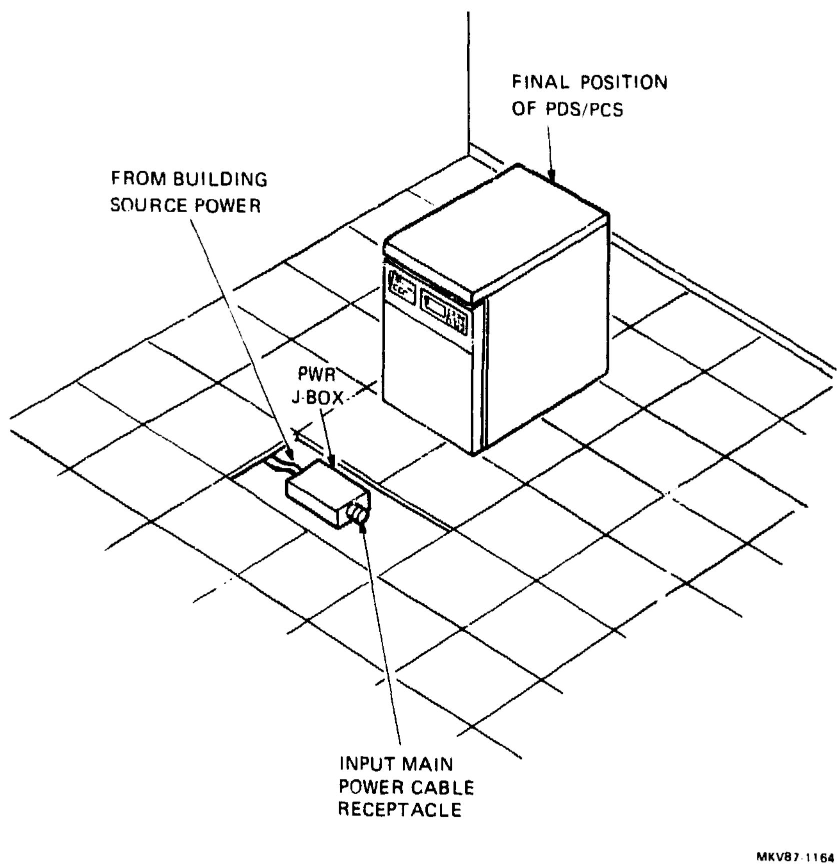

Figure 2-4 Typical J-Box Installation

2.4.2 Floor-Tile Cutouts

The floor tile under the PDS+ unit must have a large enough cutout for the power distribution cables to run under the floor (Figure 2-5). This cutout should be 20.3 cm X 45.7 cm (8 X 18 inches), centered on the rear edge of the tile, and have no sharp edges. The PDS+ unit may use subfloor air circulation to back up its own cooling system.

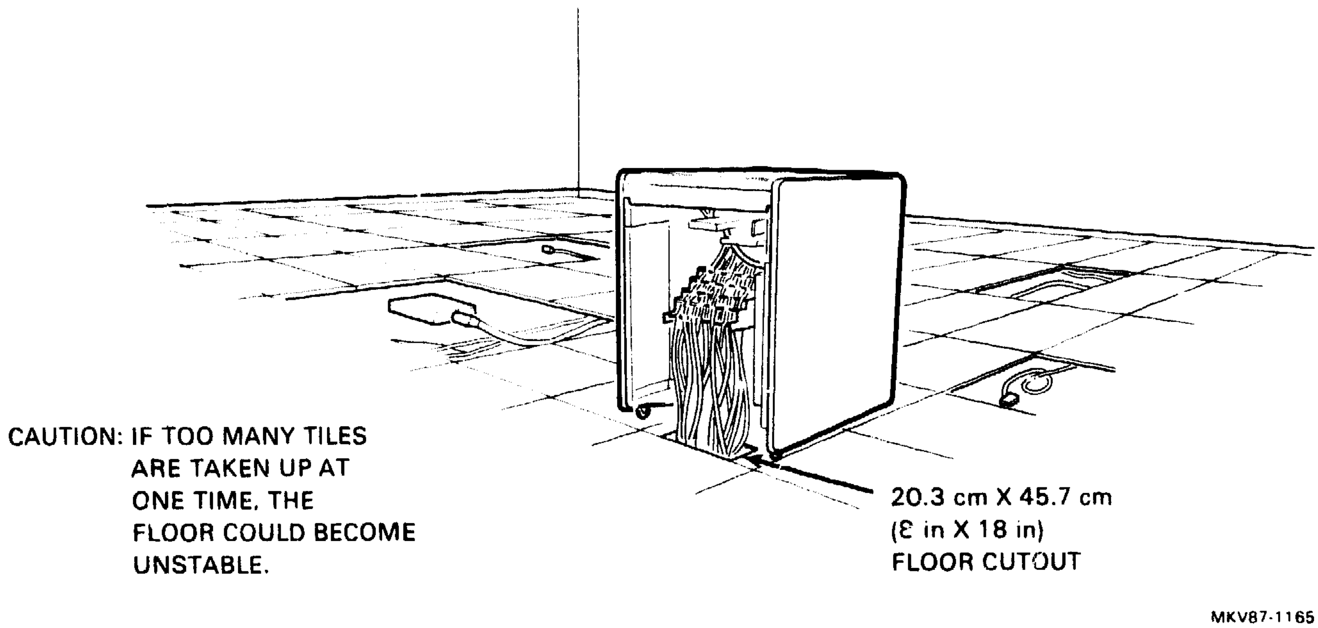

Figure 2-5 Output Cable Distribution

2.4.3 Installing and Adding Cable Assemblies

The PDS+ load center varies with the line frequency.

60 Hz Unit = Bryant Load Center -- Figure 2-6
50 Hz Unit = Merlin Gerin Load Center -- Figure 2-9.

A 60 Hz PDS+ unit comes with the Bryant load center. The 60 Hz cable assemblies are packed separately and consist of a distribution circuit breaker and the power cable terminated with the outlet plug specified by the customer.

A 50 Hz PDS+ unit comes with a Merlin Gerin load center. The 50 Hz cable assemblies are packed separately and consist of a distribution circuit breaker, a circuit-breaker power-feed cable, and the power cable terminated with the outlet plug or terminal strip junction box specified by the customer.

If a circuit is being added to the PDS+ unit after installation, make sure that the capacity of the PDS+ unit will not be exceeded.

WARNING
Ensure that power to the PDS+ unit is OFF when adding a circuit.

To install the cable assemblies:

1. Place the PDS+ unit to allow access for attaching the cables.

2. Remove the output cables from the shipping carton.

3. Uncoil the cables carefully.

   CAUTION
   Pulling a coiled cable by its end may break the inner core of the conduit. Bending the conduit below the diameters shown in Table D-1 may also damage the inner core of the conduit.

4. Match the cables with the associated device and place them under the floor panels (Figure 2-5).

   The output cable assembly length will be determined by customer needs.

5. Raise the top cover and remove the output panel board cover by disengaging the fasteners.

6. Remove the upper trim plate at the back of the PDS+ unit.

7. Find the appropriate size conduit mounting-hole landing bracket (midline or outside) to the side of the load center where the circuit breaker will be mounted.

8. Remove the locking nut from the conduit on the PDS+ termination end. Insert the threaded conduit fitting through the selected mounting hole and secure it with the locking nut (Figure 2-6).

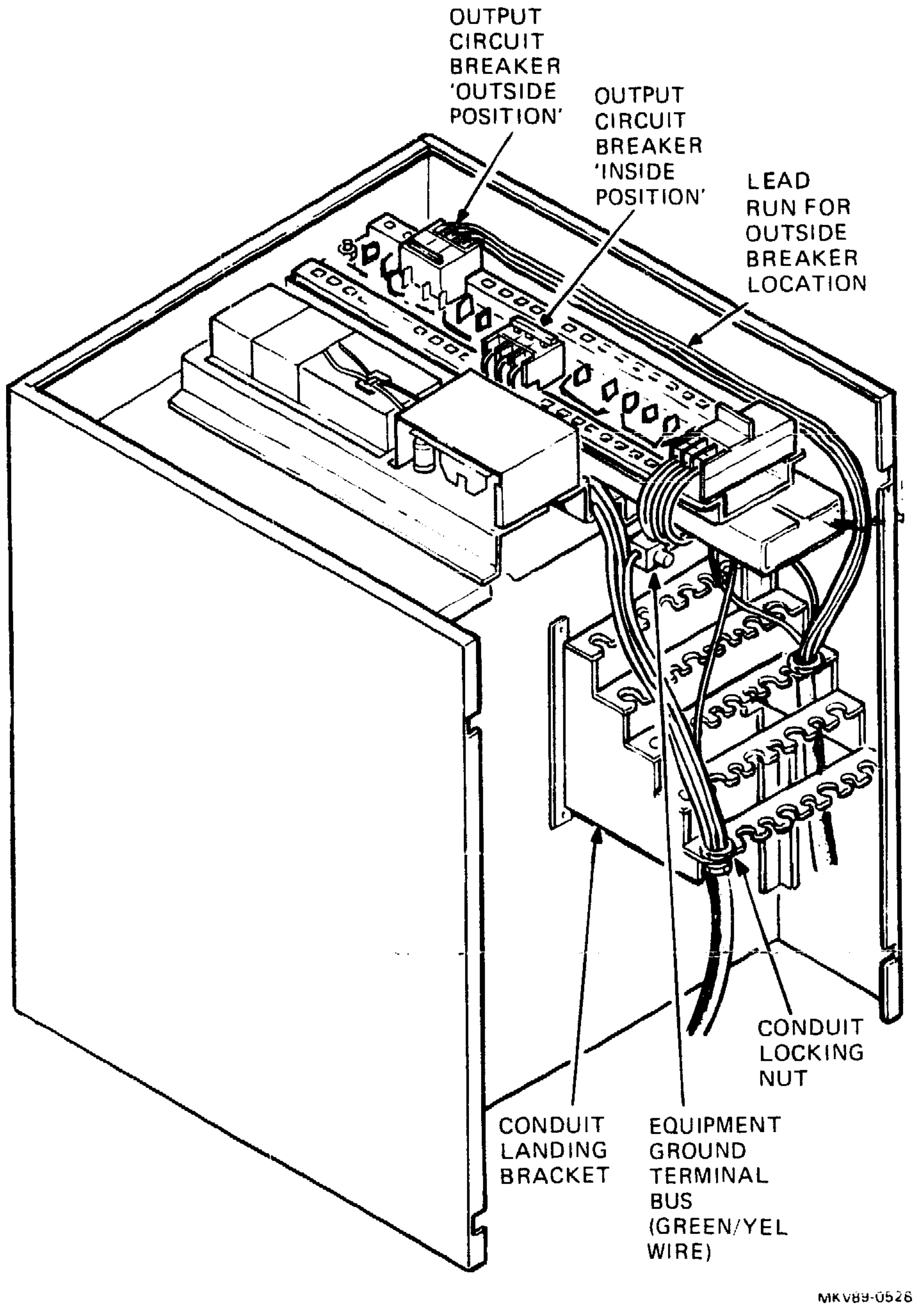

Figure 2-6 Output Cable Installation (Bryant Load Center -- 60 Hz)

9. Trim the power leads as follows.

   a. With the cable secured in the landing bracket, lay the power leads over the front of the PDS+ unit.

   b. Trim the power leads evenly with the front of the PDS+ unit.

   NOTE
   Trimming the power leads so that they will reach the farthest circuit-breaker position allows for later configuration changes.

10. Trim the ground and neutral circuits so that the leads extend 1.2 meters (4 feet) from the conduit. If there is not this much wire to start with, ensure that there is a minimum of .45 meters (1.5 feet) from the conduit.

    NOTE
    Prior to connecting a wire lead, strip the insulation to equal the depth of the lug hole or slot.

11. After selecting the appropriate lug hole based on wire size, connect the ground (green/yellow) wires from the cable conduit to the equipment ground terminal bus (Figure 2-6 or Figure 2-9). Tighten the lug screw.

12. After selecting the appropriate lug hole based on wire size, connect the neutral leads (white on 60 Hz units, blue on 50 Hz units) to the neutral terminal bus (Figure 2-6 or Figure 2-9). Tighten the lug screw.

    CAUTION
    When tightening the bus bar or circuit-breaker lug screws, torque the lug screw as tightly as possible. Then grasp the lead firmly and move it from side to side several times. Now torque the lug screw again to securely fasten the lead.

13. Prior to installing circuit breakers, cut slots from the protective paper that covers the circuit-breaker position to be used.

14A. The 60 Hz distribution circuit-breaker connection is as follows.

SINGLE-PHASE CONNECTION (60 Hz)

a. Attach the circuit breaker to the appropriate cable (see Figure 2-7).

b. Run the black hot lead (with the circuit breaker attached) along the appropriate side of the load center (Figure 2-6: inside or outside, based on the desired circuit-breaker location). Refer to Table 2-4.

c. Snap the circuit breaker into position and ensure that the circuit-breaker lug screw(s) are securely tightened.

THREE-PHASE CONNECTION (60 Hz)

a. Attach the circuit breaker to the appropriate cable (see Figure 2-7).

b. Run the three (black, red, and blue) hot leads (with the circuit breaker attached) along the appropriate side of the load center (Figure 2-6: inside or outside, based on the desired circuit-breaker location). Refer to Table 2-4.

c. Snap the circuit breaker into position and verify the correct color coding of the attached wires to maintain correct phase relationship (see Figure 2-7).

d. Ensure that the circuit-breaker lug screws are securely tightened.

NOTE

After configuring all distribution cables, balance the loads on all three phases so they are equal or as close as possible.

Table 2-4 Output Power Wiring Color Codes

Input Power	Ground	Neutral	Phase 1	Phase 2	Phase 3
60 Hz					
1-Phase	Green/yellow	White	Black	--	--
3-Phase	Green/yellow	White	Black	Red	Blue
50 Hz					
1-Phase	Green/yellow	Blue	Brown	--	--
3-Phase	Green/yellow	Blue	Black	Black	Black

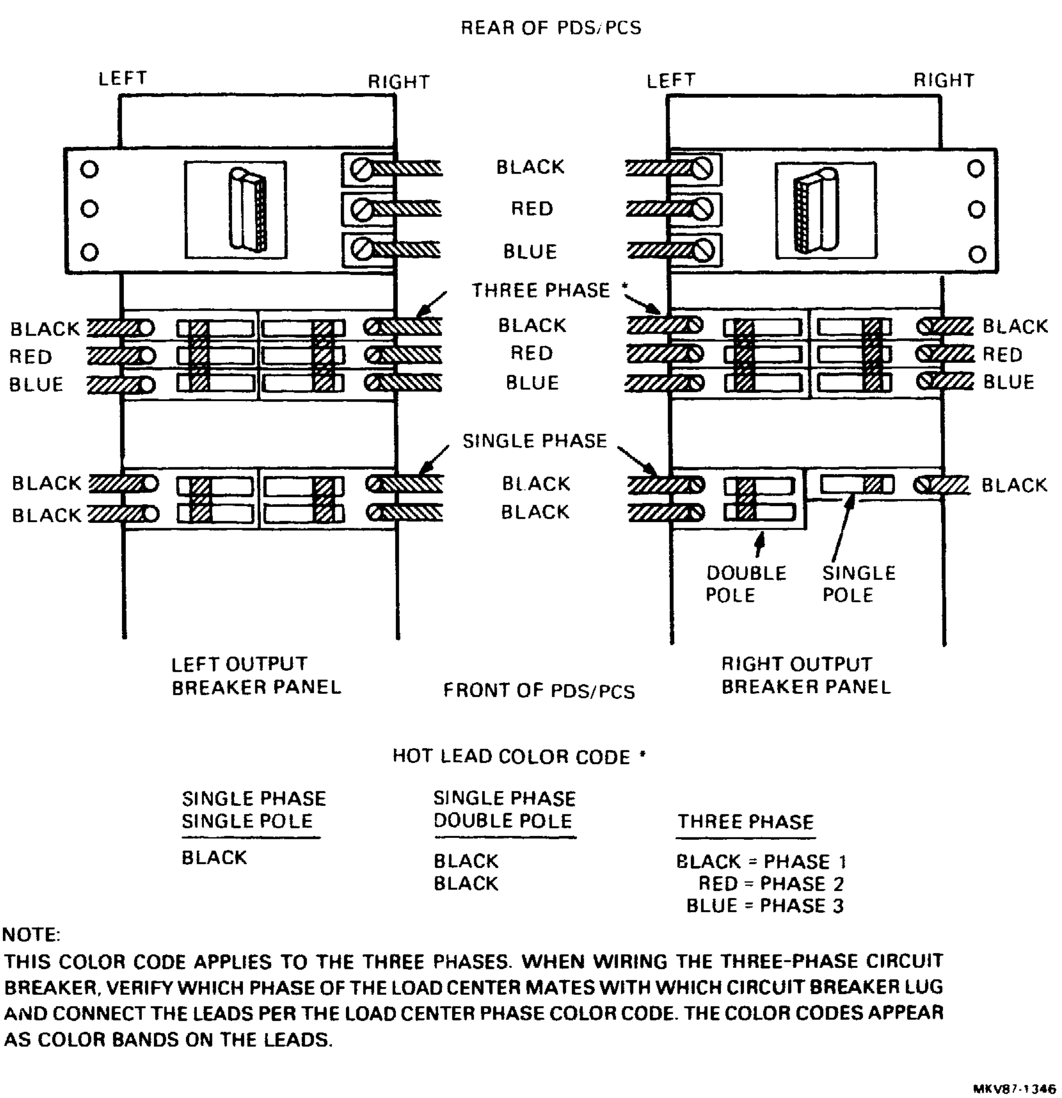

Figure 2-7 60 Hz Distribution Circuit-Breaker Connection

14B. The 50 Hz distribution circuit-breaker connection is as follows.

SINGLE-PHASE CONNECTION (50 Hz)

a. Slide the circuit breaker onto the selected rail.

NOTE
Install the circuits located on the left rails and left bus bars first.

b. Strip the insulation on the power leads back to a length equal to the depth of the lug hole on the circuit-breaker.

c. Run the power lead (brown) along the left side of the selected rail (Figure 2-9, based on the selected circuit-breaker location). Refer to Table 2-4.

d. Insert the power lead into the terminal on the left side of the circuit breaker and tighten (see Figure 2-8).

e. After stripping the ends of the supplied circuit-breaker power-feed cable, connect the cable between the phase bus bar and the right side of the installed circuit breaker (see Figure 2-8).

THREE-PHASE CONNECTION (50 Hz)

a. Slide the three-phase circuit breaker onto the selected rail.

NOTE
Install the circuits located on the left rails and left bus bars first.

b. Strip the insulation on the power leads back to a length equal to the depth of the lug hole on the circuit breaker.

c. Run the power leads (black, black, and black) along the left side of the selected rail (Figure 2-9, based on the selected circuit-breaker location). Refer to Table 2-4.

d. Insert the power leads into the terminals on the left side of the circuit breaker and tighten (see Figure 2-8).

e. After stripping the ends of the supplied circuit-breaker power-feed cables, connect the cables between the phase bus bar and the right side of the installed circuit breaker (see Figure 2-8).

NOTE

After configuring all distribution cables, balance the loads on all three phases so they are equal or as close as possible.

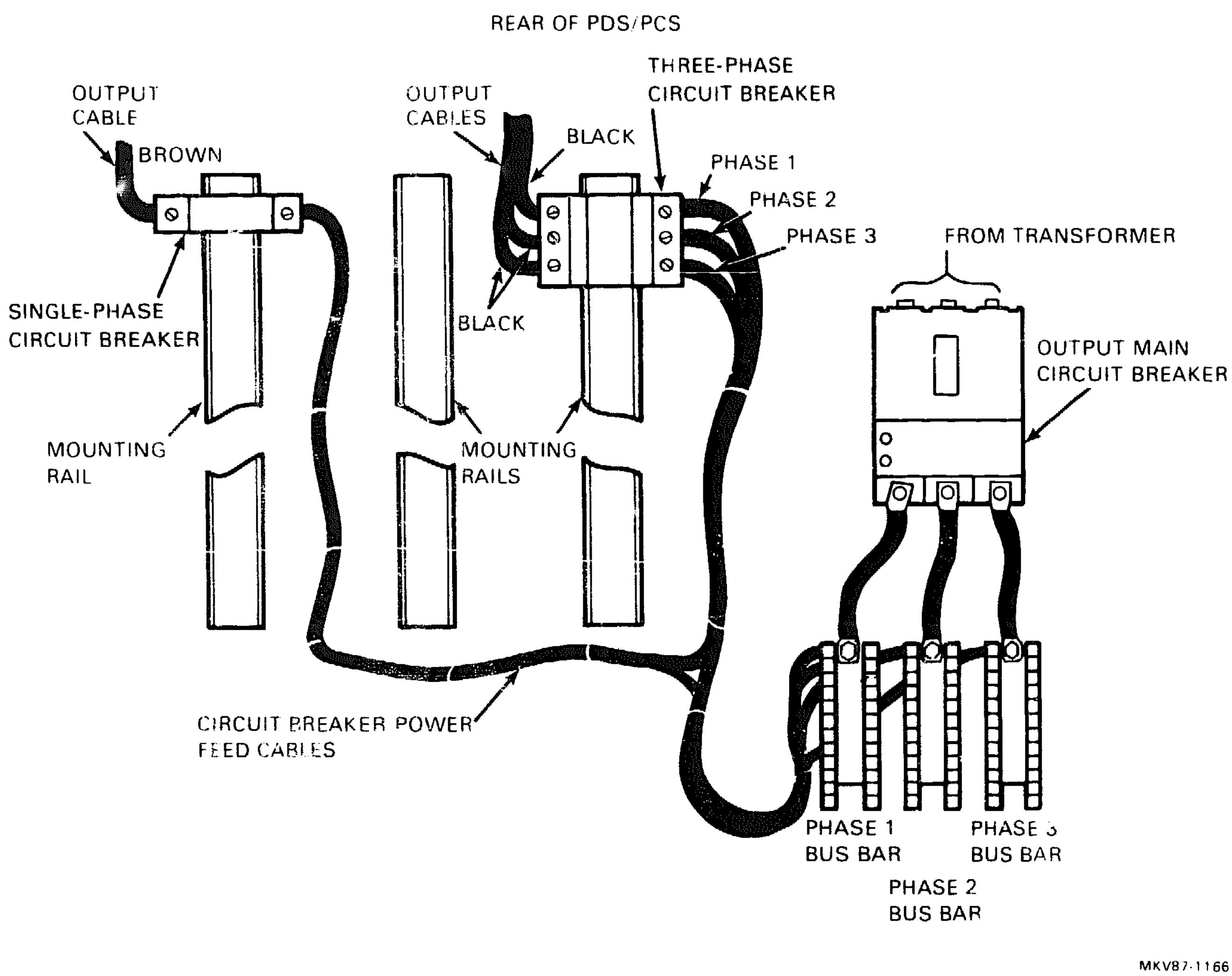

Figure 2-8 50 Hz Distribution Circuit-Breaker Connection

15. Remove the appropriate plastic fillers from the output panel board cover.

16. Reattach the upper trim plate on the back of the PDS+ unit.

17. Reattach the output panel board cover on top of the PDS+ unit.

18. Label the circuit breaker(s).

19. Close the top cover.

20. After all cables are installed and the trim plates are reattached, rotate the PDS+ unit to its correct position, then lower and lock its leveling feet.

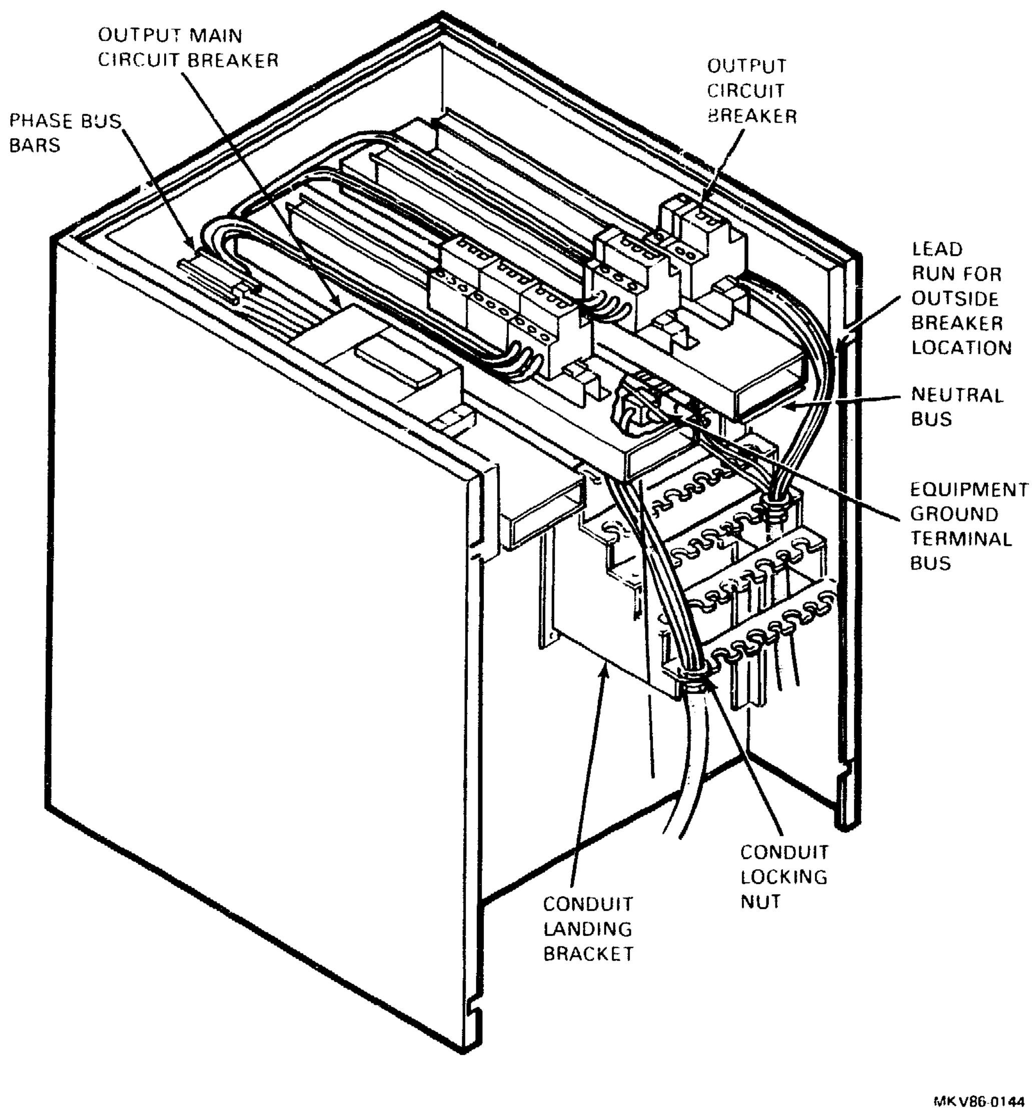

Figure 2-9 Output Cable Installation (Merlin Gerin Load Center -- 50 Hz)

2.5 INITIALIZING THE PDS+ UNIT (FIRST POWERUP)

Follow this procedure upon first powerup of the PDS+ unit . After completing the initial powerup, follow the normal power-up procedure (Section 5.2).

WARNING

DO NOT attach the PDS+ unit to the J-Box or attach the PDS+ output cables to the computer system until directed.

[ ] 1. Have the customer's electrician measure for the proper phase-to-phase voltage and phase rotation at the terminal block inside the J-Box. Ensure that the voltage matches the voltage rating listed on the nameplate above the IMCB.

CAUTION

An error in system input voltage could cause permanent damage to the isolation transformer.

[ ] 2. Have the customer set the building power circuit breaker that supplies power to the J-Box to the OFF position.

[ ] 3. Open the cabinet door and remove the protective cover.

[ ] 4. Set the maintenance switch on the I3 interface board to the MAINTENANCE position.

[ ] 5. Connect the red battery lead located on the cabinet door (see Figure 2-10).

[ ] 6. Set the IMCB and all PDS+ output circuit breakers to the OFF position.

[ ] 7. Connect the PDS+ input power cable to the J-Box.

CAUTION

The input main circuit breaker must be OFF when the input cable is connected to or disconnected from the J-Box.

[ ] 8. Have the customer set the building power circuit breaker that supplies power to the J-Box to the ON position.

[ ] 9. Ensure that the attached computer equipment, the output circuit breakers, and the output main circuit breaker(s) are turned OFF.

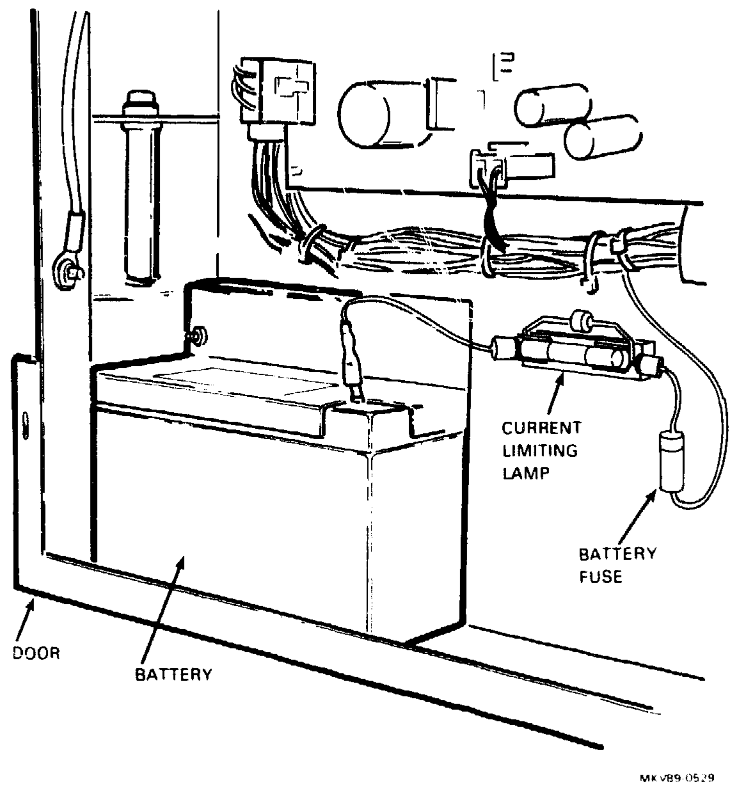

Figure 2-10 Battery Connection

[ ] 10. Set the IMCB to the ON position. Allow five seconds for the PDS+ unit to stabilize.

CAUTION

If the IMCB trips, reset the IMCB and press the RESET key on the User Control Center. If the IMCB fails to stay reset, set the building power circuit breaker to the OFF position and see Chapter 6.

NOTE

The current limiting lamp may glow when power is applied to the PDS+ unit. This is caused by the charging circuit on the P4 board recharging the battery. This is normal when the battery has been disconnected for a long duration or when the battery has been discharged.

[ ] 11. To silence a possible alarm condition, press ALARM SILENCE and then press RESET on the User Control Center.

[ ] 12. If an alarm condition still exists, press the "#" key on the User Control Center to display the Main Menu on the LCD. Choose selection number "1" (Alarm Condition) to display the active alarm condition(s). Press the "*" key on the User Control Center to step through the alarm conditions until all active alarms have been displayed. Correct any alarm conditions before continuing. If a phase error occurs, power down the PDS+ unit. Contact the customer and have any two input phase wires in the J-Box reversed.

[ ] 13. Confirm that the Local Control Panel on the front of the PDS+ unit appears as follows.

a. ALL UNITS POWER OFF Switch - Illuminated (Red)
b. LOCAL EMERGENCY POWER OFF Switch-Illuminated (Yellow)
c. POWER ON Indicator - Illuminated (Green)
d. ALARM ON Indicator - Not Illuminated
e. MAINTENANCE MODE Indicator - Illuminated (Yellow)
f. DC BACK UP Switch - Not Illuminated

[ ] 14. Set the IMCB to the OFF position.

[ ] 15. Connect the output power cables from the PDS+ unit to the corresponding computer system devices.

[ ] 16. Remove the upper trim plate at the back of the PDS+ unit by disengaging the fasteners.

WARNING

With the cover removed and power applied to the PDS+ unit, HIGH VOLTAGE is present. All appropriate safety precautions must be taken to ensure the safety of personnel. Remove all rings and jewelry, and wear safety glasses at all times.

[ ] 17. Set the IMCB to the ON position. If an alarm sounds, press the RESET key on the UCC.

[ ] 18. Set the PDS+ output main circuit breaker(s) to the ON position.

[ ] 19. Set all the output distribution circuit breakers in use to the ON position.

[ ] 20. Power up the computer system devices (one at a time).

CAUTION

The attached computer equipment may require a sequential powerup; turn the equipment ON according to instructions.

NOTE

If the ground current is excessive, or if an alarm sounds, turn OFF the individual output distribution circuit breakers to find the fault.

[ ] 21. Measure the input voltages, the output voltages, and the output currents using the following steps. Record the measured values in Table 2-5.

References

Figure 2-1 PDS+ Components (Front View)
Figure 2-6 Output Cable Installation (60 Hz)
Figure 2-9 Output Cable Installation (50 Hz)

Tools Needed

Digital multimeter (DMM) with true RMS capability and clamp-on ampmeter (29-27932-01)

a. Measure the input voltage phase A (1 to 2), input voltage phase B (2 to 3), and input voltage phase C (1 to 3) at the test points on the power isolator assembly (TP A is phase 1, TP B is phase 2, and TP C is phase 3) and record the measured values in Table 2-5.

b. Measure the output voltage phase A (1 to 2), output voltage phase B (2 to 3), and output voltage phase C (1 to 3) at the test points on the power isolator assembly (TP 1 is phase 1, TP 2 is phase 2, and TP 3 is phase 3) and record the measured values in Table 2-5. If the output voltages are not within 3% of the desired output, go to Section 6.6 before continuing.

c. Measure the output voltage line 1-N, output voltage line 2-N, and output voltage line 3-N between each output phase test point and the neutral test point (TP N is neutral) on the power isolator assembly. Record the measured values in Table 2-5.

d. Measure the output current line 1 (phase 1), output current line 2 (phase 2), and output current line 3 (phase 3) at the rear of the PDS+ cabinet where the cables connect to the output main circuit breaker(s). Measure the ground current at the ground bus bar(s) at the rear of the PDS+ cabinet. A true RMS voltmeter is required in association with the clamp-on ampmeter. If only one output panel board is used, attach the clamp-on ampmeter to each phase cable and the ground cable and record the measured values in Table 2-5. If both output panel boards are used, turn the circuit breakers OFF on one panel board and measure the currents on the other output main circuit breaker and record the measured values in Table 2-5.

[ ] 22. Calibrate the LCD displayed values of the voltages and currents measured in Step 21 by going to Section 6.9.3.

[ ] 23. Go to the Main Menu on the LCD display screen by pressing the "#" key. Select Setup Menu and enter the maintenance security code. Select Time Of Day Menu and enter the date and time.

Table 2-5 Measured Voltages and Currents

Probe Number	**Probe Name**	**Measured Value**
1	Output Voltage Line 1-N	_______Volts
2	Output Voltage Line 2-N	_______Volts
3	Output Voltage Line 3-N	_______Volts
4	Output Voltage Phase A	_______Volts
5	Output Voltage Phase B	_______Volts
6	Output Voltage Phase C	_______Volts
7	Input Voltage Phase A	_______Volts
8	Input Voltage Phase B	_______Volts
9	Input Voltage Phase C	_______Volts
10	Output Current Line 1	_______Amps
11	Output Current Line 2	_______Amps
12	Output Current Line 3	_______Amps
14	Ground Current	_______Amps

[ ] 24. Place the maintenance switch on the I3 interface board to the NORMAL position and press the RESET key on the UCC. If the IMCB does not trip and no alarms are present, a successful installation has been achieved. If any circuit breakers trip, see Chapter 6.

[ ] 25. Turn the computer system devices OFF.

[ ] 26. Set the output distribution circuit breakers to the OFF position.

[ ] 27. Set the output main circuit breaker(s) to the OFF position.

[ ] 28. Set the IMCB to the OFF position.

[ ] 29. Reinstall the upper trim plate on the back of the PDS+ unit.

CAUTION

Before connecting the Environmental Monitoring and REPO Station, the Building Interface Adapter, or the Remote Sensor Unit, the red battery lead must be disconnected on the front door to prevent damage to the logic boards. After the options have been connected, the red battery lead can be reconnected.

[ ] 30. Connect the Environmental Monitoring and REPO Station (EM & REPO) (if installed) as specified in Chapter 4.

[ ] 31. Connect the Building Interface Adapter (BIA) (if installed) as specified in Chapter 4.

[ ] 32. Connect the Remote Sensor Unit (RSU) boxes (if installed) as specified in Chapter 4.

[ ] 33. Digital Equipment Corporation recommends that a record be kept for the computer system kVA loading, operating voltage, and current readings while the system is supplied with a defined power load (that is; CPU and memory ON, and disks spinning but not seeking). This establishes a reference point to estimate leakage current and to calibrate future current. Record these readings when the PDS+ unit is installed.

[ ] 34. Complete and return all quality or product survey forms.

[ ] 35. Complete the probe data sheet table found in Appendix F. The probe data sheet table should be filled out with the customer and kept on-site. It should also be copied into the site management guide.

2.6 CHECKING OUT THE PDS+ UNIT

This section describes the checkout tests that need to be performed after installation to ensure that the PDS+ unit is working correctly. Remove the load from the PDS+ unit by turning OFF all output circuit breakers.

2.6.1 Direct Trip Check

NOTE
The IMCB trips during this test.

1. Set the IMCB to the ON position. If the alarm sounds, press the RESET key on the UCC to clear it. If an alarm is still active, correct the alarm condition before proceeding.

2. The maintenance switch on the I3 interface board should be in the MAINTENANCE position and the Maintenance mode indicator on the LCP should be illuminated.

3 Go to the Main Menu on the LCD screen by pressing the "#" key on the keyboard.

4. Select the Setup Menu by pressing the number "4" key on the keyboard. At this time, a security screen is displayed asking for a four-digit security access code.

5. Enter the four-digit maintenance security code.

6. On the next screen displayed, select the hidden Maintenance Menu by pressing the number "5" key on the keyboard.

7. On the Maintenance Menu, select Modify Probe Parameters by pressing the number "5" key.

8. The next screen asks you to enter the number of the probe you wish to modify and the unit the probe is attached to if more than one PCS+ units are daisy chained together. For the probe number enter the number "1". This selects the output voltage line 1-N probe.

9. Since this is an analog probe, the next screen displayed is the Modify Analog Probe Menu. On this screen enter the number "3" to select the Action Menu.

10. On the Modify Action screen, you are asked if automatic reset is to be enabled. The menu requires a "1" for YES or a "0" for NO. A NO answer should already be on the screen, so enter the number "0" to keep the NO answer.

11. The next screen is a table of alarm, relay, and trip actions for 1st and 2nd stage High action and 1st and 2nd stage Low action.

NOTE

Record the present state of this table and the delay times when the Delay Menu is accessed in Step 14. After these tests are completed, the original state of this table and the original delay times must be replaced before the PCS+ unit can be returned to normal operation.

12. Scan through the possible table combinations by pressing the "8" key to scan forward or the "9" key to scan backward. Continue until the alarm row for all four stages is YES and the trip row for all four stages is YES. All three relay rows should be NO.

13. Press the "*" key to store the displayed table and return to the Modify Analog Probe Menu.

14. Select the Delay Menu by pressing the number "4" key (See the note above).

15. On the Modify Delay screen press the "*" key to move the cursor from the 2nd stage High position to the 1st stage High position. Press the "*" key again to move the cursor to the 1st stage Low position. (Note the original delay times.)

16. At this time, press the "8" key to scan forward or the "9" key to scan backward until 00 SEC is displayed under 1st stage Low. Press the "*" key to move the cursor to the 2nd stage Low position.

17. Scan forward or backward again until 00 SEC is displayed under 2nd stage Low. Press the "*" key to store these delays and return to the Modify Analog Probe Menu. Press the "*" key again to return to the Modify Probe Menu.

18. Press the "#" key to return to the Main Menu. Place the maintenance switch on the I3 interface board to the NORMAL position and press the RESET key on the UCC.

19. Now test the <u>direct</u> shunt trip. Pull plug 13 on the I3 interface board to simulate a loss of output voltage.

20. Verify the following conditions.

    a. The alarm sounds and the IMCB trips immediately after plug 13 is pulled.

    b. Select the Alarm Condition Menu and verify that the output voltages have been lost.

    c. Observe the LCP and verify that the POWER ON indicator is extinguished and the ALARM ON indicator is illuminated.

21. Replace plug 13, reset the IMCB, and press the RESET key on the UCC. This should clear all alarm conditions.

2.6.2 Maintenance Mode Disable Check

NOTE
The IMCB trips during this test.

1. Place the maintenance switch on the I3 interface board to the MAINTENANCE position and verify that the Maintenance mode indicator on the LCP illuminates.

2. Pull plug 13 on the I3 interface board and verify that the ALARM ON indicator on the LCP illuminates (the IMCB does not trip).

3. Place the maintenance switch to the NORMAL position and press the RESET key on the UCC.

4. Replace plug 13 on the I3 interface board.

5. Verify that the IMCB trips immediately, the alarm sounds, and the ALARM ON indicator on the LCP illuminates.

6. Reset the IMCB and press the RESET key on the UCC. This should clear all alarm conditions.

7. Select Main Menu, select Setup Menu, enter the Maintenance security code, select Maintenance Menu, select Modify Probe Parameters, and enter probe number "1" and unit number if two or more PDS+ units are daisy chained together. These choices lead to the display of the Modify Analog Probe Menu.

8. On the Modify Analog Probe Menu, select the Action Menu and replace the action table with the original table that was recorded in Section 2.6.1.

9. Return to the Modify Analog Probe Menu and select the Delay Menu. Replace the delay times with the original delay times that were recorded in Section 2.6.1.

The system checkout is complete.

CHAPTER 3

3.1 GENERAL

This chapter contains a description of the internal monitoring, external monitoring, and communication features of the PDS+ unit. It also contains a detailed description of the menu and screen options available for displaying and modifying alarm conditions, probe data, and network configuration. See Figure 3-1 and Figure 3-2 for a flowchart of the menu structure.

Each PDS+ unit is capable of monitoring up to 112 probe sensors. There are three types of sensors available in a PDS+ system.

- Analog sensors - Used to monitor linear analog voltage and current signals.
- ON/OFF sensors (Digital) - Used to monitor the absence or presence of a specific voltage or current.
- Switch contact sensors (Digital) - Used to monitor an open or closed contact condition with no voltage present.

When new probes are added, the new probe parameters should be recorded in the probe data sheet table in Appendix F and in the site management guide.

3.2 DESCRIPTION

This section contains a description of the internal monitoring, external monitoring, and communication capabilities of the PDS+.

3.2.1 Internal Monitoring

The PDS+ unit has 43 internal probes. Thirty three (33) of these probes are used to monitor conditions within the PDS+ unit itself; such as input voltage, output voltage, output current, circuit capacity, power consumption, frequency, internal dc voltages, and switch positions. Eight (8) probes are assigned to the Building Interface Adapter (BIA) and the remaining two (2) probes are assigned to the Environmental Monitoring & REPO Station (EM & REPO) for monitoring temperature and humidity.

All internal probes, except the eight BIA probes and the environmental monitoring station (EMS) temperature and humidity probes, are preconfigured at the factory.

3.2.2 External Monitoring

The PDS+ unit can have a maximum of 69 external probes. These external probes are connected to the PDS+ unit through the Remote Sensor Unit (RSU) boxes. Each PDS+ unit can have a maximum of 6 RSU boxes connected to it. Up to 2 RSU boxes can be daisy chained together and connected through Port 0, and 4 RSU boxes can be daisy chained together and connected through Port 1. Each RSU box can accept up to 20 different probe inputs.

The external probes are used to monitor external equipment such as uninterruptable power-supply systems, diesel generators, halon systems, temperature sensors, humidity sensors, water detectors, air conditioners, and security systems.

3.2.3 Communications

Communications with the PDS+ unit is accomplished through the interface plate located on the back of the PDS+ unit (see Figure 4-12).

Up to eight PDS+ units can be daisy chained together to form a monitoring network. The PDS+ units are connected through the RS-422 interface jacks on the interface plate. When two or more PDS+ units are connected together, one unit (Unit 0) is assigned as the master control unit and all communication goes through this unit.

The PDS+ unit can be connected to a VT100-compatible terminal for displaying and programming the LCD screen through the RS-232-C interface jack on the interface plate. See the keyboard function chart listed below.

UCC Keyboard	**VT100 Keyboard**
RESET	Shift A
ALARM SILENCE	Shift B
PRINTER ON LINE	Shift C
PAPER ADVANCE	Shift D
*	Shift *
#	Shift #
Numeric 0-9	Numeric 0-9

REMOTE EMERGENCY POWER OFF switches are connected to the REPO IN jack and daisy chained to other PDS+ units on the network through the REPO OUT jack on the interface plate.

The RSU box for Port 0 is connected to the RSU 0 jack and power is supplied to the first RSU box on Port 0 through the RSU power jack. The second RSU box is daisy chained to the first RSU box and requires a separate power adapter/battery back-up option for power. The four RSU boxes for Port 1 are daisy chained together and connected to the RSU 1 jack. Each of these RSU boxes require a separate power adapter/battery back-up option for power.

The EM & REPO and the BIA boxes are connected to the EMS jack and the BIA jack respectively on the interface plate.

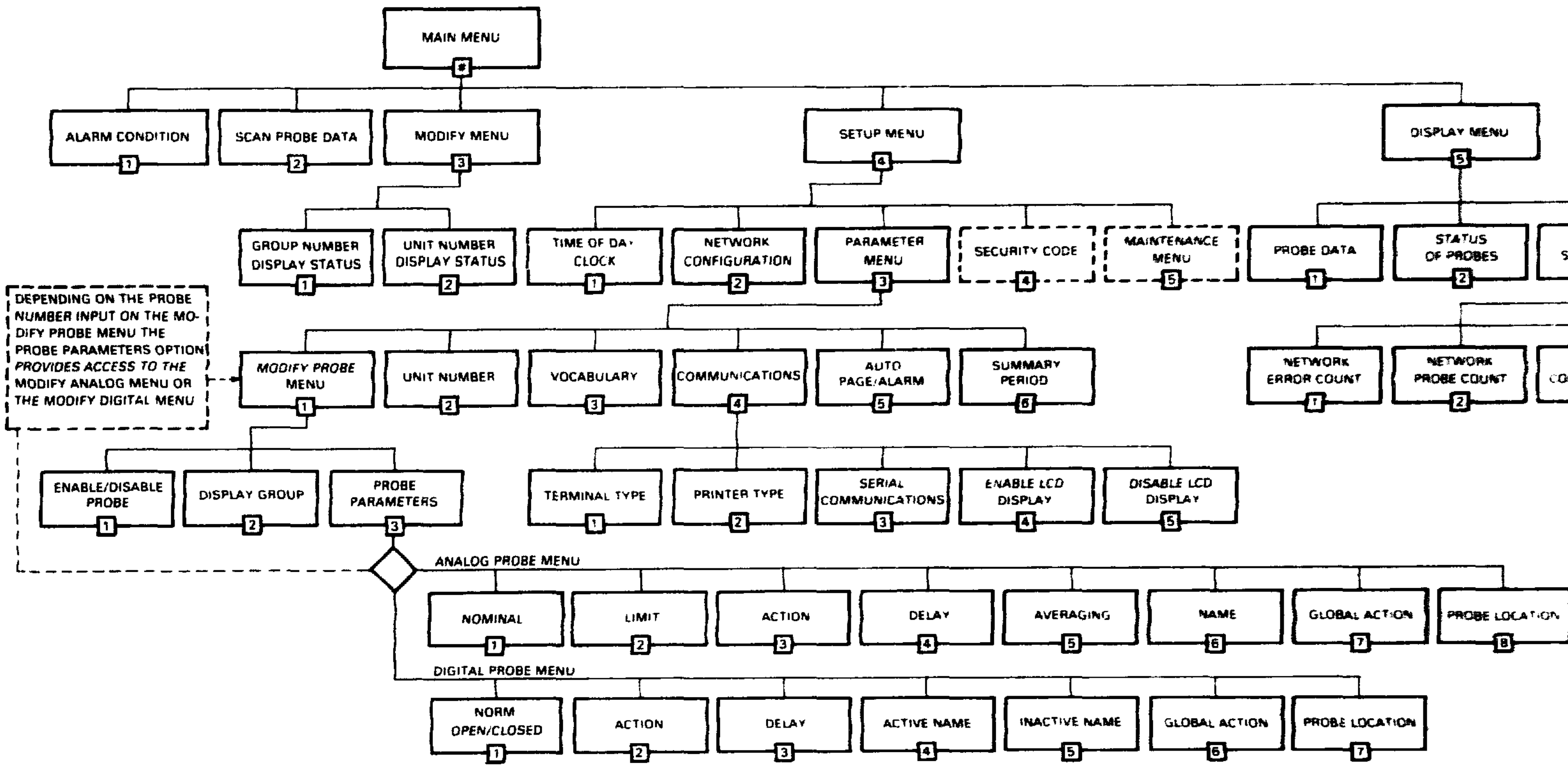

Figure 3-1 PDS+ Menu Structure

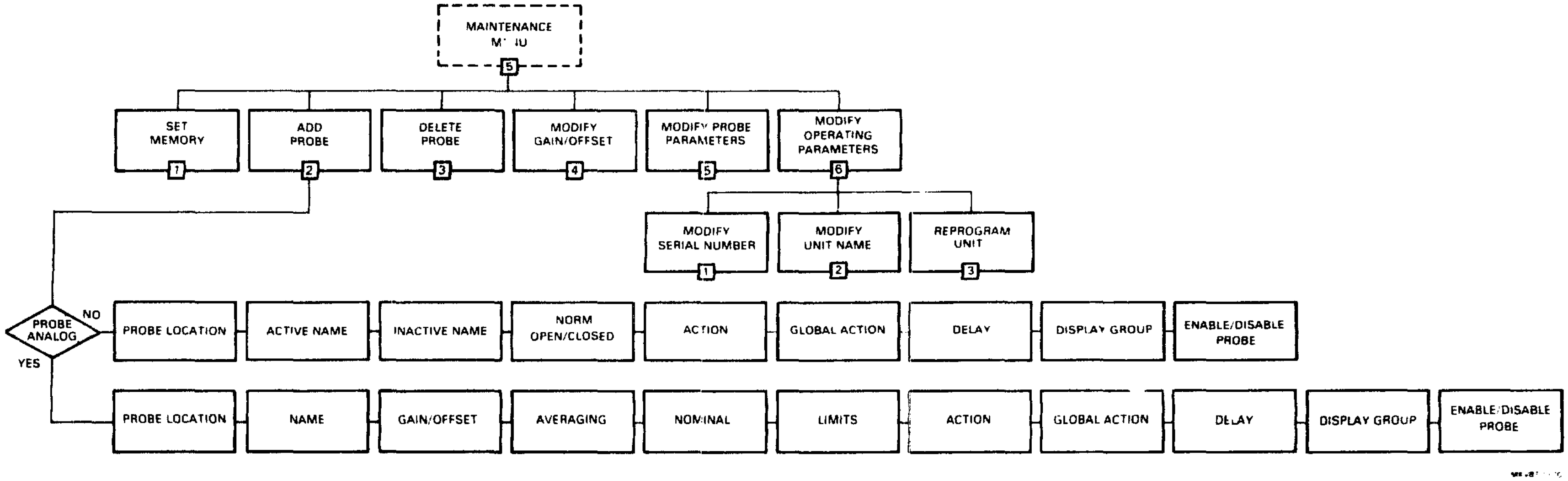

Figure 3-2 Maintenance Menu Structure

3.3 OPERATION OF MONITORING FEATURES

This section describes the menus and screens available for displaying alarm conditions, probe data, probe parameters, and system configuration. It also describes the menus and screens available for adding probes, modifying probe parameters, and modifying system configuration.

3.3.1 Security Access

The PDS+ unit has three different four-digit passwords (access codes) as a security measure to prevent unauthorized personnel from accidentally changing probe or system parameters. When the Setup Menu is entered from the Main Menu, a screen is displayed asking for the security access code. The code entered determines which menus can be accessed. The three codes and the access allowed by each are:

- Operator code - Allows access to all menus except the Security Code Menu and the Maintenance Menu.
- Supervisor code - Allows access to all menus except the Maintenance Menu.
- Maintenance code - Allows access to all menus except the Security Code Menu.

The maintenance and supervisor codes are etched into memory and cannot be changed in the field. The operator code can be changed, but only by a person using the supervisor code.

CAUTION

The supervisor's security code should never be programmed as the operator's security code. The system first checks the four-digit code entered to see if it is the operator's code. If it is, only operator functions can be accessed. If the supervisor's code is programmed as the operator's code, the Security Code Menu cannot be accessed to change the operator's security code.

NOTE

Contact the local Digital Customer Services office for the specific four-digit operator and supervisor security codes.

3.3.2 Idle and Main Menus

Idle Menu

```
No Alarms Present
 Time Of Last Reset 12-02-86 12:34:50
Operational Status : Normal
  - - Enter "#" Key For Main Menu - -
  Unit # 0  CHANGE READY REMOTE
Digital Equipment Corporation  VER II4
Serial No. TYPE313IIO        50.00 KVA
Thursday  December  04  1986  13:01:37
```

The Idle Menu lists the PDS+ unit's present operating characteristics. The message in the upper left-hand corner, "No Alarms Present", indicates that no alarm conditions exist. If an alarm condition exists, the message will say "Alarm Present". This menu is displayed until the "#" key is pressed and automatically reappears on the screen if:

- User activity is interrupted for 10 minutes or longer
- The RESET key is pressed
- The "*" key is pressed from the Main Menu

The operational status can be either NORMAL or MAINTENANCE.

Main Menu

Enter: #

```
No Alarms Present
           <<< Main Menu >>>
<1> Alarm Condition   <3> Modify Menu
<2> Scan Probe Data   <4> Setup Menu
                      <5> Display Menu
     - - Enter Selection Desired - -
#=Main Menu
Tuesday  December  02  1986  13:57:28
```

All menus and screens are accessed through the Main Menu. This menu allows one of the five options shown to be selected. To select an option, enter its assigned number.

Pressing the "#" key <u>always</u> returns the display to the Main Menu.

3.3.3 Alarm Condition Menu

The Alarm Condition Menu is selected in order to evaluate alarm conditions that are active. If Auto Alarm is enabled, an alarm condition is displayed for four (4) seconds before advancing <u>automatically</u> to the next alarm condition. If Auto Alarm is <u>disabled</u>, the display is advanced <u>manually</u> from one alarm condition to the next alarm condition by pressing the "*" key.

Enter: #, 1

```
Alarms Present
- -Alarm Condition - -12-02-86  12:50:18
Pr#  3      OUTPUT VOLTAGE LINE 3 N
Unit # 0        Present Value:  135.00
Peak High: 136.53     Peak Low:  134.68
Exceeded 2nd Stage High Limit:  132.00
#=Main Menu; *=Continue
Tuesday  December  02  1986  12:55:21
```

The probe type determines what information is displayed on the screen. The above screen lists the alarm data displayed for an analog probe. This includes:

1. The date and time the alarm occurred.

2. The probe number and unit number that has an alarm condition.

3. The name of the probe that detected the alarm condition.

4. The probe's present value.

5. The highest and lowest values that have been detected following the initial alarm condition.

6. The alarm threshold that was exceeded.

The screen shown below is an example of the alarm data displayed for a digital probe.

Enter: #, 1

```
Alarms Present
- - Alarm Condition - -12-02-86 13:57:21
Pr# 87   AIR CONDITIONER #2 OFF
Unit # 0


#=Main Menu; *=Continue
Tuesday  December  02  1986  14:02:33
```

The alarm data displayed for a digital probe includes:

1. The date and time the alarm occurred.

2. The probe number and unit number that detected the alarm condition.

3. The name of the probe that detected the alarm condition (the digital probe's name indicates the condition).

After all of the alarm conditions are displayed, the following screen appears.

```
        Alarm Queue Displayed
     Display Entire Queue Again?


#=Main Menu; *=Continue; 1=Yes, 0=No
Tuesday  December  02  1986  14:10:26
```

This screen allows the entire alarm queue to be displayed again by entering a "1", or defaults to the Main Menu by entering a "0", "#", or "*".

3.3.4 Scan Probe Data Menu

The Scan Probe Data Menu displays the names and values of the active probes. The probes appear in numerical order, beginning with the lowest unit and group number.

Enter: #, 2

```
No Alarms Present
Unit# 0                  Group# 0
OUTPUT VOLTAGE LINE 1 N        = 121.57
OUTPUT VOLTAGE LINE 2 N        = 119.37
OUTPUT VOLTAGE LINE 3 N        = 119.51
OUTPUT VOLTAGE PHASE A         = 209.46
OUTPUT VOLTAGE PHASE B         = 206.60
OUTPUT VOLTAGE PHASE C         = 207.50
```

If Auto Page is enabled, the screen automatically advances every four (4) seconds until all probes have been displayed. If Auto Page is disabled, the screen is advanced manually by pressing the "*" key. Discontinue displaying the data and return to the Main Menu by pressing the "#" key.

3.3.5 Modify Menu

The Modify Menu allows the group numbers and unit numbers to be designated for display on the Scan Probe Data screens.

Enter: #, 3

```
          < < < Modify Menu > > >

<1> Group Number Display Status
<2> Unit Number Display Status

#=Main Menu
Tuesday   December  02  1986  23:59:23
```

A probe's display status does not affect its activity status. If an alarm condition occurs while a probe's display status is OFF, the unit still collects, stores, displays, and prints the alarm condition data.

Enter: #, 3, 1

```
< < < Group Number Display Status > > >
Display Group
    Group 0 Yes      Group 4 Yes
    Group 1 Yes      Group 5 Yes
    Group 2 Yes      Group 6 Yes
    Group 3 Yes      Group 7 Yes

#=Main Menu; *=Continue;  1=Yes, 0=No
```

This screen is used to designate, by group number, which probe groups are to be displayed on the Scan Probe Data screen. The cursor appears at the Group 0 position. Enter a "1" for YES if Group 0 is to be displayed. Enter a "0" for NO if Group 0 is not to be displayed. The cursor automatically advances to the next group position after the YES or NO choice is entered. If some answers do not need to be changed, the cursor can be advanced to the next group that needs to be changed by pressing the "*" key. After the cursor has advanced through the Group 7 position, the screen returns to the Modify Menu screen. Press the "#" key to return to the Main Menu.

Enter: #, 3, 2

```
< < < Unit Number Display Status > > >

      Unit 0 Yes       Unit 4 Yes
      Unit 1 Yes       Unit 5 Yes
      Unit 2 Yes       Unit 6 Yes
      Unit 3 Yes       Unit 7 Yes
#=Main Menu; *=Continue;  1=Yes  0=No
```

This screen is used to designate which unit's probe groups are to be displayed on the Scan Probe Data screen. The cursor appears at the Unit 0 position. Enter a "1" for YES or a "0" for NO to determine whether a unit's probe groups are displayed. The cursor automatically advances to the next unit position after the YES or NO choice is entered. If some answers do not need to be changed, the cursor can be advanced to the next unit that needs to be changed by pressing the "*" key. After the cursor has advanced through the Unit 7 position, the screen returns to the Modify Menu screen. Press the "#" key to return to the Main Menu.

3.3.6 Display Menu

The Display Menu allows individual probe data and the status of all the probes to be displayed. It also allows the Network Status Menu to be displayed on multiple-unit configurations.

Enter: #, 5

```
        < < < Display Menu > > >
<1> Probe Data
<2> Status Of Probes
<3> Network Status Menu

#=Main Menu
Tuesday   December  02  1986  18:24:36
```

NOTE
In single-unit configurations, the "Network Status Menu" is not displayed.

#, 5, 1

```
     < < < Display Probe Data > > >

Enter Probe #
Unit Name


#=Main Menu; *=Continue
Tuesday   December  02  1986  12:21:10
```

On the screen shown above, two entries are required. First, the unit number to which the probe is assigned (only on multiple-unit systems), and then the probe number. After these entries, the next screen is automatically displayed.

```
      < < < Display Probe Data > > >

Enter Probe # 1
Unit Name   CHANGE READY REMOTE
Pr# 1    OUTPUT VOLTAGE LINE 1 N
Value = 115.29
#=Main Menu; *=Continue
Tuesday   December  02  1986  12:22:04
```

- or -

```
      < < < Display Probe Data > > >

Enter Probe # 0
Unit Name   CHANGE READY REMOTE
Pr# 0  MAINTENANCE SWITCH OFF

#=Main Menu; *=Continue
Tuesday  December  02  1986  12:22:04
```

The probe name and its present value are automatically displayed. The probe value is continuously updated on this screen. Digital probes have two names: an <u>active</u> (alarm) name and an <u>inactive</u> (non-alarm) name. The probe name displayed for a digital probe depends on the alarm status of the probe. Press the "*" key to return to the Display Menu or the "#" key to return to the Main Menu.

Enter: #, 5, 2

```
   < < < Display Status Of Probes > > >


#=Main Menu; *=Continue
```

The above screen is displayed when Status Of Probes is selected. On multiple-unit systems, the unit number must be entered. On single-unit systems, press the "*" key. This causes the following screen to be displayed.

```
Unit# 0    D=Disabled    *=Auto Reset
Pr#   0   MAINTENANCE SWITCH ON
Pr#   1   OUTPUT VOLTAGE LINE 1 N     *
Pr#   2   OUTPUT VOLTAGE LINE 2 N     *
Pr#   3   OUTPUT VOLTAGE LINE 3 N     *
Pr#   4   OUTPUT VOLTAGE PHASE A      *
Pr#   5   OUTPUT VOLTAGE PHASE B      D
```

This screen lists the probe numbers, probe names, and present probe status of the probes in the selected unit. Press the "*" key to advance the list until all of the probes on the unit have been displayed. A "D" in the right-hand column indicates that the probe is currently disabled. An "*" in the right-hand column indicates that the probe is using the Auto Reset function. Press the "*" key to return to the Display Menu or the "#" key to return to the Main Menu.

Enter: #, 5, 3

```
No Alarms Present
    < < < Network Status Menu > > >
<1> Network Error Count
<2> Network Probe Status
<3> Network Configuration Status

#=Main Menu; *=Continue
Tuesday   December  02  1986  12:25:02
```

The Network Status Menu provides access to displays showing the current error count, the status of probes in the network, and the status of units in the network. This menu is only available in multiple-unit configurations. Press the "*" key to return to the Display Menu or the "#" key to return to the Main Menu.

Enter: #, 5, 3, 1

```
< < < Network Error Count > > >
            Abort Count    0
          Overrun Count    0
        CRC Error Count    0
         Time-Out Count    7
         Underrun Count    0
      Bad Message Count    0
```

The current number of errors is displayed beside each error type. If a Time-Out error occurs, verify that unit communications are enabled for all units on the network. Press the "*" key to return to the Display Menu or the "#" key to return to the Main Menu.

NOTE

If units that do not exist are enabled on the Communications Menu, Time-Out errors will occur. Any errors other than Time-Out errors indicate a problem.

Enter: #, 5, 3, 2

```
No Alarms Present

    < < < Network Probe Status > > >
          Enabled Probes   448
          Disabled Probes    2

#=Main Menu; *=Continue
```

The above screen displays the total number of probes that are enabled and the number of probes that are disabled. Press the "*" key to return to the Display Menu or the "#" key to return to the Main Menu.

Enter: #, 5, 3, 3

```
< < < Network Configuration Status > > >
      Communications Enabled With:
      Unit 0 Yes    Unit 4 Yes
      Unit 1 Yes    Unit 5 Yes
      Unit 2 Yes    Unit 6 Yes
      Unit 3 Yes    Unit 7 Yes
#=Main Menu; *= Continue
```

The above screen displays the communication status of the units in the network. Press the "*" key to return to the Display Menu or the "#" key to return to the Main Menu.

3.3.7 Setup Menu

The Setup Menu allows authorized personnel to set the time of day clock, modify the network configuration, modify probe parameters, modify the factory set operator security code, and access the Maintenance Menu.

When the Setup Menu is selected (by entering a 4) from the Main Menu, the following security screen is displayed requesting a security access code to be entered.

```
        < < < Security > > >
Enter Security Access Code  NNNN



#=Main Menu
```

One of the three security access codes is entered at this time. The four-digit code does not appear on the screen as it is entered. Upon entering the security code, the Setup Menu is displayed. If an invalid code is entered, the display returns to the Main Menu. See Section 3.3.1 for access allowed by each code.

Enter: #, 4, SC

```
        < < < Setup Menu > > >
<1> Time Of Day
<2> Network Configuration
<3> Parameters
<4> Security Code
<5> Maintenance (not shown on screen)
```

Enter: #, 4, SC, 1

```
  < < < Setup Time Of Day Clock > > >
Date    : Month(MM) Day(DD) Year(YYYY)
Weekday(W): MO=1 TU=2 WE=3 TH=4 FR=5
            SA=6 SU=7
 Date=MMDD Weekday=W Time=HHMM Year=YYYY
Enter 1202          2       1321       1986
#=Main Menu; *=Continue
Tuesday   December  02  1986  13:21:18
```

This screen allows the current date, weekday, time, and year settings to be modified. The system saves and activates the changes as they are made. If it is a multiple-unit system, the date and time are automatically set in all units.

The cursor is initially positioned at the first digit of the date field. Enter the two-digit MM and two-digit DD numbers for the month and day. Next, enter the one-digit W number for the day of the week. Next, enter the two-digit HH and two-digit MM numbers for the hour and minutes of the 24-hour clock. Finally, enter the four-digit YYYY numbers for the year. If all of the fields do not need changing, the cursor can be moved from field to field with the "*" key. After the entries have been made, press the "*" key to return to the Setup Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 2

```
< < < Network Configuration Status > > >
Communications Enabled With:
Unit 0 Yes    Unit 4 Yes
Unit 1 Yes    Unit 5 Yes
Unit 2 Yes    Unit 6 Yes
Unit 3 Yes    Unit 7 Yes
#=Main Menu; *=Continue;  1=Yes, 0=No
```

The Network Configuration screen is used to establish communications between all operating units on the network. This is done by entering a "1" for YES beside each operating unit and a "0" for NO beside the units that do not exist. An operating unit that is part of a multiple-unit configuration should be sending data to and from other units. Discontinuing an operating unit's communications results in losing communications with a valid unit and causes error messages and time-out errors to occur. If it is a single-unit configuration, enter a "0" for NO beside all units; otherwise, the software attempts to run in multiple-unit mode and communication errors may occur.

Enter: #, 4, SC, 3

```
      < < < Parameter Menu > > >
<1> Modify Probe Menu
<2> Modify Unit Number
<3> Modify Custom Vocabulary
<4> Modify Communications Menu
<5> Modify Auto Page/Alarm
<6> Modify Summary Period
```

This menu allows present parameters to be modified or additional parameters to be added. It allows units to be customized according to present and future monitoring needs. One of the six options is selected by entering its assigned number. Press the "*" key to return to the Setup Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1

```
     < < < Modify Probe Menu > > >
Probe Number?        Unit Number?
<1> Enable/Disable Probe
<2> Modify Display Group
<3> Modify Probe Parameters

#=Main Menu
```

The Modify Probe Menu requires that the probe number and the assigned unit's number (unit number is not required on a single-unit configuration) be entered before one of the three options is selected. Three digits are allowed for the probe number. If the probe number is less than three digits, press the "*" key to advance the cursor.

Press the "*" key to return to the Parameter Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 1

```
    < < < Enable/Disable Probe > > >
Probe Number: 111  Unit Number: 1
Name: AIR CONDITIONER #3 ON

Enabled: Yes

#=Main Menu; *=Continue;  1=Yes, 0=No
```

This screen is used to enable or disable a probe's activity. The probe number and the probe name are displayed. To activate the probe, enter a "1" for YES. To deactivate the probe, enter a "0" for NO. To save the change, and modify another probe's status, press the "*" key to return to the Modify Probe Menu. To abort the modification, press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 2

```
    < < < Modify Display Group > > >
Probe Number: 111
Name: AIR CONDITIONER #3 ON

Group: 2

#=Main Menu; *=Continue
```

This screen allows modification of the group to which a probe is assigned. The group number determines which display group the probe is displayed with when the Scan Probe Data Menu is accessed. Press the "*" key to save the change and return to the Modify Probe Menu. Press the "#" key to abort the modification and return to the Main Menu.

Enter: # 4, SC, 3, 1, probe #, unit # (if required), 3

```
  < < < Modify Analog Probe Menu > > >
Probe Number: 2      Unit Number: 0
Name: COMPUTER ROOM TEMPERATURE
<1> Nominal          <5> Averaging
<2> Limits           <6> Name
<3> Action           <7> Global Action
<4> Delay            <8> Location
```

The above menu is displayed if the probe number entered on the Modify Probe Menu is assigned to an <u>analog</u> probe. This menu contains eight options for modifying specific parameters of an analog probe. To select an option, enter the assigned number. Press the "*" key to return to the Modify Probe Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 1

```
       < < < Modify Nominal > > >
Probe Number: 2       Unit Number: 0

       Nominal Value  65

8=Scan Forward,  9=Scan Backward
#=Main Menu; *=Continue
```

The Modify Nomimal screen is used to change the nominal value of an analog probe. The nominal value is the base value against which alarm thresholds are measured. An alarm condition occurs when a threshold is crossed. Press the "8" key to scan forward or the "9" key to scan backward until the nominal value desired is displayed. Press the "*" key to save the change and return to the Modify Analog Probe Menu. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 2

```
        < < < Modify Limits > > >
        High                Low
2nd Stg   1st Stg   1st Stg   2nd Stg
  146%      123%      85%       62%
  95.00     80.00     55.00    40.00
8=Scan Forward,  9=Scan Backward
#=Main Menu; *=Continue
```

The Modify Limits screen allows modification of a probe's four alarm-threshold limits. For convenience, limits are displayed in both percentages and actual values. Press the "8" key to scan forward or the "9" key to scan backward until the desired limits are displayed. Press the "*" key to save the change and return to the Modify Analog Probe Menu or press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 3

```
        < < < Modify Action > > >
Probe Number:  2    Unit Number:   2
Name: COMPUTER ROOM TEMPERATURE
Automatic Reset?  No


#=Main Menu; *=Continue;  1=Yes, 0=No
```

The Modify Action screen is used to modify both the Reset mode and the actions the system is required to take during an alarm condition. Two things must be understood before modifying the Reset mode. First, the normal operation is for the system to automatically display and print the initial alarm data. Second, the system does not report on a repeated occurrence until the RESET key is pressed.

Users who prefer to document all alarm conditions detected by a probe should use the Automatic Reset feature. This allows a probe to reset itself once it returns to a normal status. As a result, repetitive alarm occurrences are documented and the probe's most recent alarm occurrences are displayed. Be aware that Automatic Reset may allow an excessive number of alarms and/or printouts for one alarm condition. To avoid documenting repetitive alarm occurrences, select the Manual mode. In this mode, the system waits for the RESET key to be pressed before it documents additional alarm conditions. Press the "1" key to select Automatic Reset or the "0" key to select Manual mode. Press the "*" key to go to the next screen of this menu.

```
     High Action        Low Action
   2nd Stg  1st Stg   1st Stg  2nd Stg
Alarm    Yes      Yes       Yes      Yes
Relay1   No       No        No       No
Relay2   No       No        No       No
Relay3   No       No        No       No
Trip     Yes      Yes       Yes      Yes
8=Scan Forward, 9=Backward, *=Continue
```

This is the second screen of the Modify Action Menu. It is used to select whether the alarm, relays, and/or shunt trip are to be activated when alarm thresholds are exceeded. Press the "8" key to scan forward or the "9" key to scan backward until the desired action table is displayed. Press the "*" key to store the table option displayed and return to the Modify Analog Probe Menu. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 4

```
         < < < Modify Delay > > >
     High                     Low
2nd Stg    1st Stg     1st Stg   2nd Stg
  00 Sec     00 Sec      00 Sec    00 Sec

8=Scan Forward,   9=Scan Backward
#=Main Menu; *=Continue
```

The Modify Delay screen is used to set the number of seconds or minutes an alarm is to persist before action is taken in response to an alarm condition. The cursor appears underneath the 2nd Stg High. Press the "8" key to scan forward or the "9" key to scan backward until the desired time is shown. Press the "*" key to save that time and advance the cursor to the next level. After times have been selected for all stages using the above procedure, press the "*" key to return to the Modify Analog Probe Menu. Press the "#" key to return to the Main Menu.

NOTE

If the unit loses power, any action with a delay of over five minutes will not be executed.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 5

```
      < < < Modify Averaging > > >
Probe Number:  2    Unit Number: 0
Name: COMPUTER ROOM TEMPERATURE

Averaging On:  No

#=Main Menu; *=Continue;  1=Yes, 0=No
```

The Modify Averaging screen allows a probe's values to be averaged before displaying. Data displays of unstable waveforms produce fluctuations on the screen unless they are averaged. Averaging is not necessary for probes that monitor stable signals. Press the "1" key for averaging or the "0" key for no averaging. Press the "*" key to save the change and return to the Modify Analog Probe Menu. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 6

```
        < < < Modify Name > > >
COMPUTER ROOM TEMPERATURE
<0>                   <4> = ACTUAL
<1> = A               <5> = AIR
<2> = ABORTED         <6> = ALARM
<3> = ACCESS          <7> = ALTERNATOR

8=Scan Forward,  9=Scan Backward
```

The Modify Name screen is used to change the name of a probe. A built-in dictionary of commonly used environmental terms is available to create probe names. A probe name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name does not need to be modified, the cursor can be advanced through the five word positions with the "*" key. To save the change and return to the Modify Analog Probe Menu, press the "*" key. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 7

```
      < < < Global Action > > >
Probe Number:  2     Unit Number:  2

Identifier?   0
Send?         Yes
Receive?      No
#=Main Menu; *=Continue;  1=Yes,  0=No
```

The Global Action feature is functional only with multiple units configured in an operational network. Extreme care must be used when using this feature since alarms on one unit cause other units to take actions also. The implementation of this feature requires a considerable amount of planning. Enter an identifier number from 0 to 31. Designate if the probe is a sender and/or receiver of the action message by entering a "1" for YES or a "0" for NO.

A probe may be programmed to both transmit and receive a global alarm based on its global alarm identifier field. The identifier number can be any number from 0 to 31. A probe that is programmed to be a global transmitter will, upon sensing an alarm condition, take the action in its own action field and transmit a message to all other units in the network. This message contains the global alarm identifier, the threshold level that was crossed, and the action-code index of the transmitter.

All other units in the network check their probe tables to see if there are global receivers with the same identifier number. If none are found, the message is ignored. If a receiver is found with the same identifier number, action is taken based on the threshold in the transmitted message.

Example #1
There are four units in a network and each unit is monitoring several air conditioners. A single autodialer unit that is connected to Unit 1 will dial building maintenance and inform them that a problem exists with an air conditioner. All the probes that are monitoring air conditioners in all of the units will be programmed to transmit a global alarm with an identifier of 2. Unit 1 will have a probe programmed to be a global receiver with an identifier of 2 and an action to energize the relay that activates the autodialer.

If an alarm occurs in any unit, the global alarm will be transmitted and unit 1 will receive the global alarm message and activate the autodialer to call building maintenance.

Example #2

The same four units are monitoring the chilled water flow, that cools the computer, at several different points. For safety purposes, the customer wants to power OFF all of the computers if flow is lost at any point in the system. All of the probes in all of the units that are monitoring flow will be programmed to both transmit and receive a global alarm with an identifier of 3 and an action of shunt trip.

With this programming, a loss of chilled water flow sensed on any unit will cause all of the units to shunt trip.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 8

```
   < < < Modify Probe Location > > >
Probe Box? 3
<1> RESERVED                 <5> RSU 1-0
<2> RESERVED                 <6> RSU 1-1
<3> RSU 0-2                  <7> RSU 1-2
<4> RSU 0-3                  <8> RSU 1-3
Slot Number (1-20)?  1
```

The Modify Probe Location screen allows the RSU box and the individual box slot, through which a probe signal is routed, to be changed. The screen displays the numbers that are assigned to the Remote Sensor Unit boxes. RSU 0-2 and RSU 0-3 are the RSU boxes for RSU Port 0. RSU 1-0, RSU 1-1, RSU 1-2, and RSU 1-3 are the RSU boxes for RSU Port 1. Enter the number assigned to the RSU box that the probe is connected to. Next enter the slot number, within the box, that is assigned to the probe. Press the "*" key to save the change and return to the Modify Analog Probe Menu or the "#" key to return to the Main Menu.

NOTE

When an RSU box is first connected, it must be programmed as a digital probe and assigned a slot number of 32 so that communications are enabled between the 20 slots within the box and the PDS+ unit.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3

```
 < < < Modify Digital Probe Menu > > >
Probe Number:  0      Unit Number:  0
Name: MAINTENANCE SWITCH OFF
<1> Norm Open/Closed   <5> Inactive Name
<2> Action             <6> Global Action
<3> Delay              <7> Location
<4> Active Name
```

The above menu is displayed if the probe number entered on the Modify Probe Menu is assigned to a digital probe. This menu contains seven options for modifying specific parameters of a digital probe. To select an option, enter the assigned number. Press the "*" key to return to the Modify Probe Menu or the # key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit #(if required), 3, 1

```
< < < Modify Normally Open/Closed > > >
Probe Number:  0
Name: MAINTENANCE SWITCH OFF
Normally: Closed

1=Open; 0=Closed
#=Main Menu; *=Continue
```

During normal operation, switches are either open or closed. Likewise, voltage and current are either present or not present. This screen allows the normal operation of individual switch, voltage, and current probe sensors to be defined. The normally open/closed condition is the condition that matches the active name/alarm condition.

Example:

The active name for a switch is MAINTENANCE SWITCH ON. When the switch is closed or in the MAINTENANCE position, the MAINTENANCE SWITCH ON name should appear when probe data is displayed. Under these conditions, the probe should be defined as normally closed.

Define the probe's normal operation mode by entering a "1" for open (not present) or a "0" for closed (present). Press the "*" key to save the change and return to the Modify Digital Probe Menu or press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 2

```
        < < < Modify Action > > >
Probe Number: 110    Unit Number:  2
Name: COMPUTER DOOR CLOSED
Automatic Reset?  No


#=Main Menu; *=Continue;  1=Yes,  0=No
```

The Modify Action screen is used to modify both the Reset mode and the actions the system is required to take during an alarm condition. Two things must be understood before modifying the Reset mode. First, the normal operation is for the system to automatically display and print the initial alarm data. Second, the system does not report on a repeated occurrence until the RESET key is pressed.

Users who prefer to document all alarm conditions detected by a probe should use the Automatic Reset feature. This allows a probe to reset itself once it returns to a normal status. As a result, repetitive alarm occurrences are documented and the probe's most recent alarm occurrences are displayed. Be aware that Automatic Reset may allow an excessive number of alarms and/or printouts for one alarm condition. To avoid documenting repetitive alarm occurrences, select the Manual mode. In this mode, the system waits for the RESET key to be pressed before it documents additional alarm conditions. Press the "1" key to select Automatic Reset or the "0" key to select Manual mode. Press the "*" key to go to the next screen of this menu.

```
        < < < Modify Action > > >

Alarm    Yes
Relay1   No
Relay2   No
Relay3   No
Trip     Yes
8=Scan Forward, 9=Backward;  *=Continue
```

This is the second screen of the Modify Action Menu. It is used to select whether the alarm, relays, and/or shunt trip are to be activated when an alarm condition exists. Press the "8" key to scan forward or the "9" key to scan backward until the desired action table is displayed. Press the "*" key to store the table option displayed and return to the Modify Digital Probe Menu. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 3

```
< < < Modify Delay > > >


00 Sec

8=Scan Forward,   9=Scan Backward
#=Main Menu; *=Continue
```

The Modify Delay screen is used to set the number of seconds or minutes an alarm is to persist before action is taken in response to an alarm condition. Press the "8" key to scan forward or the "9" key to scan backward until the desired time is shown. Press the "*" key to save that time and return to the Modify Digital Probe Menu. Press the "#" key to return to the Main Menu. All dry-contact switches should have a minimum delay of two seconds to prevent chatter or noise from generating alarms.

NOTE

If the unit loses power, any action with a delay of over five minutes will not be executed.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 4

```
< < < Modify Active Name > > >
MAINTENANCE SWITCH ON
<0>                  <4> = ACTUAL
<1> = A              <5> = AIR
<2> = ABORTED        <6> = ALARM
<3> = ACCESS         <7> = ALTERNATOR

8=Scan Forward,  9=Scan Backward
```

Digital probes are assigned two names: an active name and an inactive name. The active name describes the alarm condition and the inactive name describes the normal condition.

The above screen is used to change the active name of a probe. A built-in dictionary of commonly used environmental terms is available to create probe names. A probe name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name does not need to be modified, the cursor can be advanced through the five word positions with the "*" key. To save the change and return to the Modify Digital Probe

Menu, press the "*" key. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 5

```
     < < < Modify Inactive Name > > >
MAINTENANCE SWITCH OFF
<0>                   <4> = ACTUAL
<1> = A               <5> = AIR
<2> = ABORTED         <6> = ALARM
<3> = ACCESS          <7> = ALTERNATOR

8=Scan Forward,  9=Scan Backward
```

The above screen is used to change the inactive name of a probe. A built-in dictionary of commonly used environmental terms is available to create probe names. A probe name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name does not need to be modified, the cursor can be advanced through the five word positions with the "*" key. To save the change and return to the Modify Digital Probe Menu, press the "*" key. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 6

```
        < < < Global Action > > >
Probe Number:  2     Unit Number:  2

Identifier?   0
Send?         Yes
Receive?      No
#=Main Menu; *=Continue;  1=Yes,  0=No
```

The Global Action feature is functional only with multiple units configured in an operational network. Extreme care must be used when using this feature since alarms on one unit cause other units to take actions also. The implementation of this feature requires a considerable amount of planning. Enter an identifier number from 0 to 31. Designate if the probe is a sender and/or receiver of the action message by entering a "1" for YES or a "0" for NO.

A probe may be programmed to both transmit and receive a global alarm based on its global alarm identifier field. The identifier number can be any number from 0 to 31. A probe that is programmed to be a global transmitter will, upon sensing an alarm condition, take the action in its own action field and transmit a message to all other units in the network. This message contains the global alarm identifier, the threshold level that was crossed, and the action-code index of the transmitter.

All other units in the network check their probe tables to see if there are global receivers with the same identifier number. If none are found, the message is ignored. If a receiver is found with the same identifier number, action is taken based on the alarm condition in the transmitted message.

Example #1
There are four units in a network and each unit is monitoring several air conditioners. A single autodialer unit that is connected to Unit 1 will dial building maintenance and inform them that a problem exists with an air conditioner. All the probes that are monitoring air conditioners in all of the units will be programmed to transmit a global alarm with an identifier of 2. Unit 1 will have a probe programmed to be a global receiver with an identifier of 2 and an action to energize the relay that activates the autodialer.

If an alarm occurs in any unit, the global alarm will be transmitted and unit #1 will receive the global alarm message and activate the autodialer to call building maintenance.

Example #2
The same four units are monitoring the chilled water flow, that cools the computer, at several different points. For safety purposes, the customer wants to power OFF all of the computers if flow is lost at any point in the system. All of the probes in all of the units that are monitoring flow will be programmed to both transmit and receive a global alarm with an identifier of 3 and an action of shunt trip.

With this programming, a loss of chilled water flow sensed on any unit will cause all of the units to shunt trip.

Enter: #, 4, SC, 3, 1, probe #, unit # (if required), 3, 7

```
   < < < Modify Probe Location > > >
Probe Box? 3
<1> RESERVED               <5> RSU 1-0
<2> RESERVED               <6> RSU 1-1
<3> RSU 0-2                <7> RSU 1-2
<4> RSU 0-3                <8> RSU 1-3
Slot Number (1-20)?  1
```

The Modify Probe Location screen allows the RSU box and the individual box slot, through which a probe signal is routed, to be changed. The screen displays the numbers that are assigned to the Remote Sensor Unit boxes. RSU 0-2 and RSU 0-3 are the RSU boxes for RSU Port 0. RSU 1-0, RSU 1-1, RSU 1-2, and RSU 1-3 are the RSU boxes for RSU Port 1. Enter the number assigned to the RSU box that the probe is connected to. Next enter the slot number, within the box, that is assigned to the probe. Press the "*" key to save the change and return to the Modify Digital Probe Menu or the "#" key to return to the Main Menu.

NOTE

When an RSU box is first connected, it must be programmed as a digital probe and assigned a slot number of 32 so that communications are enabled between the 20 slots within the box and the PDS+ unit.

Enter: #, 4, SC, 3, 2

```
     < < < Modify Unit Number > > >

Unit Number:  6
Enter New Unit Number


#=Main Menu; *=Continue
```

This screen is used to assign a new unit number to the unit this display appears on. It is only used for units in a multiple-unit configuration. Assigning the same unit number to two units in a network causes network errors. This menu is used when the master control unit (Unit 0) is malfunctioning and its communications procedures are to be transferred to another unit. Enter the new unit number (0-7). Press the "*" key to save the change and return to the Parameter Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 3

```
        < < < Custom Vocabulary > > >
<1> Auxiliary           <4>
<2>                     <5>
<3>                     <6>

Select Word To Be Modified
#=Main Menu; *=Continue
```

This is the first screen of a two-screen option. It allows custom words to be added to the system's dictionary. Up to six words can be added. Custom words are automatically maintained the same in all units. Any changes that are made will be effective in all units of a multiple-unit configuration. Enter the number of the word to be created or modified. The display automatically advances to the screen shown below.

```
        < < < Modify Custom Word > > >


0 1 2 3 4 5 6 7      8          9
! " # $ % & ' (      Scan       Scan
                     Forward    Backward
```

On this screen, up to 15 characters can be entered. The space character is used to mark the end of a vocabulary entry. To have more than one word in a vocabulary entry, use a "-", "/", or another character to separate the words. Press the "8" key to scan forward or the "9" key to scan backward through the alphanumeric characters and symbols. When the desired character is found, enter the number assigned to it. The character selected appears in the center of the screen. After the word is complete, enter the space character to end the word and press the "*" key to save the word and return to the Parameter Menu. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 4

```
    < < < Communications Menu > > >
<1> Terminal Type
<2> Printer Type
<3> Serial Communications Rate
<4> Enable LCD Display
<5> Disable LCD Display
#=Main Menu; *=Continue
```

The Communications Menu provides five options for modifying the terminal type, printer type, communications rate, and enabling/disabling the LCD display. Select an option by entering the assigned number. Press the "*" key to return to the Parameter Menu or the "#" key to return to the Main Menu.

CAUTION

If option 5 (Disable LCD Display) is selected, the message "Turns off display. Do you want to do this?" appears on the screen. Enter a "1" for YES or a "0" for NO. If a "1" is entered for YES, the screen immediately goes blank. The only way to reenable the LCD is to go through the menus blindly to select the Enable LCD Display option. Enter: #, 4, SC, 3, 4, 4 to enable the LCD display.

Enter: #, 4, SC, 3, 4, 1

```
       < < < Terminal Type > > >
Terminal Type?  2
<1> TV910,912,920,921
    WY30,50,350--QVT101,102
    ADM 3A/5
<2> DEC VT100
<3> Disable RS232
<4> VAX Control
```

This screen allows the type of terminal being used to be selected or the RS-232-C option to be disabled. Enter the number for the option desired. Press the "*" key to save the change and return to the Communications Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 4, 2

```
        < < < Printer Type > > >

Printer Type?  1
<1> Internal Printer
<2> External Printer
<3> Disable Printer
#=Main Menu; *=Continue
```

This screen allows selection of the built-in printer, an external printer, or disabling the printer. Enter the number assigned to the option desired. Press the "*" key to save the change and return to the Communications Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 4, 3

```
 < < < Serial Communications Rate > > >

Baud Rate?  3
<1> 300 Baud Full Duplex
<2> 1200 Baud Half Duplex
<3> 9600 Baud Full Duplex
#=Main Menu; *=Continue
```

This screen defines the alternate baud rates and modem types which the unit can support. Prior to changing this option, confirm that the remote device has a compatible baud rate. Enter the number assigned to the option desired. Press the "*" key to save the change and return to the Communications Menu or the "#" key to return to the Main Menu.

NOTE

The LCD operates at the selected baud rate. Selecting a low rate causes the LCD to operate slower.

Enter: #, 4, SC, 3, 5

```
   < < < Modify Auto Page/Alarm > > >

Auto Page/Alarm Mode?  2
<1> Auto Page On
<2> Auto Alarm On
<3> Auto Page/Alarm Off
#=Main Menu; *=Continue
```

This screen allows the Auto Page function or the Auto Alarm function to be selected or both functions to be disabled. The Auto Page function automatically advances the Scan Probe Data screens every four seconds. The Auto Alarm function automatically advances the Scan Probe Data and the Alarm Condition screens every four seconds. In addition, Auto Alarm automatically prints a hard copy of the screen data as it appears on the screen for Scan Probe Data and Alarm Condition menus if the printer option is installed and enabled. In multiple-unit configurations, Auto Alarm should be enabled in the master control unit (Unit 0) only. All other units should have Auto Page enabled. Enter the assigned number of the option desired. Press the "*" key to save the change and return to the Parameter Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 3, 6

```
        < < < Summary Period > > >

Enter Summary Period   2
0 = Hour          3 = Month
1 = Day           4 = Disable
2 = Week
#=Main Menu; *=Continue
```

This screen is used to define the summary period. An automatic printout is provided at the end of each summary period if the printer option is installed and enabled. The printout contains the names and current values of all probes whose display status is active. The system also resets the kWH probe's value to zero at the end of each summary period. Enter the assigned number of the option desired. The printout and resetting of the kWH probe can be disabled by selecting option 4 (disable). Press the "*" key to save the change and return to the Parameter Menu or the "#" key to return to the Main Menu.

3.3.8 Maintenance Menu

The Maintenance Menu allows the Customer Services technician to change any byte in memory, add a probe, delete a probe, modify the gain/offset of an analog probe, modify probe parameters, and modify the operating parameters of the unit. The Maintenance Menu is accessed through the Setup Menu by entering the maintenance security code. It is the number 5 option that is hidden or not shown on the Setup Menu.

Enter: #, 4, SC, 5

```
      < < < Maintenance Menu > > >
<1> Set Memory
<2> Add Probe
<3> Delete Probe
<4> Modify Gain/Offset
<5> Modify Probe Parameters
<6> Modify Operating Parameters Menu
```

Option 1 (Set Memory) allows any byte in memory to be changed. **Extreme caution is advised when using this option since changing memory areas other than the EAROM will have unpredictable results on unit operation.**

Option 2 (Add Probe) allows the addition of analog or digital probes. This option advances through a successive series of screens to set up all probe parameters before returning to the Maintenance Menu or Main Menu.

Option 3 (Delete Probe) allows a probe to be deleted.

Option 4 (Modify Gain/Offset) allows the gain/offset of an analog probe to be changed.

CAUTION

Do not modify the gain/offset of the internal probes. Modifying the gain/offset of an internal probe affects all of the internal probes.

Option 5 (Modify Probe Parameters) allows individual probe parameters to be modified. **This option gives the same series of screens as going through the Setup Menu, Parameter Menu, and the Modify Probe Menu (#, 4, SC, 3, 1).**

Option 6 (Modify Operating Parameters Menu) allows the unit serial number or the unit name to be modified, or the unit to be reprogrammed.

Enter: #, 4, SC, 5, 1

```
            < < < Set Memory > > >

                         Unit Number? ____
Starting Page #
Starting Byte #


#=Main Menu; *=Continue
```

Enter the unit number of the PDS+ unit that requires a memory change. Enter the starting page number in memory that requires a memory change. Enter the number of the starting byte of the starting page that requires changing and press the "*" key to advance to the next screen.

CAUTION
This menu should only be accessed by an experienced technician who knows the layout of the PDS+ memory. Accidental changing of memory areas other than the EAROM will have unpredictable results on unit operation. This menu is not needed for normal programming, operation, or maintenance of the PDS+ unit.

```
        < < < Set Memory > > >
Page    Byte     0    1    2    3
 1       0      000  001  002  003
 1       4      004  005  006  007
 1       8      008  009  010  011
 1      12      012  013  014  015
4=Move Left, 6=Move Right, 2=Move Up
8=Move Down, 0=Set Memory, 7=Fwd, 9=Bkwd
```

On the above screen, move the cursor to the byte that requires changing by using the controls listed at the bottom of the screen. Press the "0" key and then enter the desired data. Press the "*" key to save the change and return to the Maintenance Menu. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 5, 2

```
          < < < Add Probe > > >
                Enter Unit Number? ____

New Probe Is Probe Number:   48

Is The New Probe Analog?
#=Main Menu; *=Continue;  1=Yes, 0=No
```

On the above screen enter the unit number to which the new probe is to be added. The system automatically displays the number of the next available probe. If the unit referenced has 47 probes attached, the new probe number is 48. Enter a "1" for YES if the probe is an analog probe or a "0" for NO if the probe is a digital probe. This answer determines whether the next successive series of screens represent the parameters for an analog or a digital probe.

The following displays represent the parameters for adding an analog probe.

```
   < < < Modify Probe Location > > >
Probe Box? 3
<1> RESERVED                <5> RSU 1-0
<2> RESERVED                <6> RSU 1-1
<3> RSU 0-2                 <7> RSU 1-2
<4> RSU 0-3                 <8> RSU 1-3
Slot Number (1-20)?  1
```

The Modify Probe Location screen allows the RSU box and the individual box slot, through which a probe signal is routed, to be entered. The screen displays the numbers that are assigned to the Remote Sensor Unit boxes. RSU 0-2 and RSU 0-3 are the RSU boxes for RSU Port 0. RSU 1-0, RSU 1-1, RSU 1-2, and RSU 1-3 are the RSU boxes for RSU Port 1. Enter the number assigned to the RSU box that the probe is connected to. Next enter the slot number, within the box, that is assigned to the probe. Press the "*" key to save the change and advance to the next screen.

NOTE

When an RSU box is first connected, it must be programmed as a digital probe and assigned a slot number of 32 so that communications are enabled between the 20 slots within the box and the PDS+ unit.

```
         < < < Modify Name > > >
COMPUTER ROOM TEMPERATURE
<0>                   <4> = ACTUAL
<1> = A               <5> = AIR
<2> = ABORTED         <6> = ALARM
<3> = ACCESS          <7> = ALTERNATOR

8=Scan Forward,  9=Scan Backward
```

This screen is used to enter the name of the probe. A built-in dictionary of commonly used environmental terms is available to create probe names. A probe name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name does not need to be modified, the cursor can be advanced through the five word positions with the "*" key. To save the change and advance to the next screen press the "*" key.

```
< < < Assign New Gain/Offset Menu > > >

Probe Number   48

<1> Calculate New Gain/Offset Value
<2> Use Gain/Offset Value of Other Probe

#=Main Menu; *=Continue
```

The above screen allows new gain/offset values to be calculated or the gain/offset of another probe to be used. If the gain/offset values of another probe are used, the probe used must be in the same unit as the probe being added. If new values are being calculated, see Section 4.5.3 for the correct procedure.

If option 1 (Calculate New Gain/Offset Value) is selected, the following screen is displayed.

```
 < < < Calculate New Gain/Offset > > >

Minimum Reading?
DC Voltage for Min Reading?
Maximum Reading?
DC Voltage for Max Reading?
#=Main Menu; *=Continue
```

If the probe being added is measuring a 12 volt ac signal, the following is typical of what is entered on this screen. The minimum reading would be 0 volts. The dc voltage for minimum reading, as represented by the Electrical Interface Adapter (EIA) output, to the A to D converter would be 0 volts. The maximum reading would be 12 volts. The dc voltage for maximum reading would be what the EIA output was adjusted for (between 3.5 and 4.5 volts). See Section 4.5.3 for the EIA adjustment procedure. Press the "*" key to save the values and return to the Assign New Gain/Offset Menu. Press the "*" key again to advance to the next screen.

If option 2 (Use Gain/Offset Value of Other Probe) is selected, the following screen is displayed.

```
 < < Use Gain/Offset of Other Probe > >

Which Probe?  25


#=Main Menu; *=Continue
```

Enter the number of the probe whose gain/offset values are to be used. The probe must have the same specifications as the new probe and be in the same unit as the new probe. Press the "*" key to return to the Assign New Gain/Offset Menu. Press the "*" key again to advance to the next screen.

```
        < < < Modify Averaging > > >
Probe Number:  2    Unit Number: 0
Name: COMPUTER ROOM TEMPERATURE

Averaging On:  No

#=Main Menu; *=Continue;  1=Yes, 0=No
```

The Modify Averaging screen allows a probe's values to be averaged before displaying. Data displays of unstable waveforms produce fluctuations on the screen unless they are averaged. Averaging is not necessary for probes that monitor stable signals. Press the "1" key for averaging or the "0" key for no averaging. Press the "*" key to save the change and advance to the next screen.

```
       < < < Modify Nominal > > >
Probe Number: 2      Unit Number: 0

       Nominal Value  65

8=Scan Forward,  9=Scan Backward
#=Main Menu; *=Continue
```

This screen is used to change the nominal value of an analog probe. The nominal value is the base value against which alarm thresholds are measured. An alarm condition occurs when a threshold is crossed. Press the "8" key to scan forward or the "9" key to scan backward until the nominal value desired is displayed. Press the "*" key to save the change and advance to the next screen.

```
        < < < Modify Limits > > >
       High                 Low
2nd Stg    1st Stg    1st Stg    2nd Stg
  146%       123%       85%        62%
  95.00      80.00      55.00     40.00
8=Scan Forward,  9=Scan Backward
#=Main Menu; *=Continue
```

The Modify Limits screen allows modification of a probe's four alarm-threshold limits. For convenience, limits are displayed in both percentages and actual values. Press the "8" key to scan forward or the "9" key to scan backward until the desired limits are displayed. Press the "*" key to save the change and advance to the next screen.

```
        < < < Modify Action > > >
Probe Number:  2    Unit Number:   2
Name: COMPUTER ROOM TEMPERATURE
Automatic Reset?  No


#=Main Menu; *=Continue;  1=Yes, 0=No
```

The Modify Action screen is used to modify both the Reset mode and the actions the system is required to take during an alarm condition. Two things must be understood before modifying the Reset mode. First, the normal operation is for the system to automatically display and print the initial alarm data. Second, the system does not report on a repeated occurrence until the RESET key is pressed.

Users who prefer to document all alarm conditions detected by a probe should use the Automatic Reset feature. This allows a probe to reset itself once it returns to a normal status. As a result, repetitive alarm occurrences are documented and the probe's most recent alarm occurrences are displayed. Be aware that Automatic Reset may allow an excessive number of alarms and/or printouts for one alarm condition. To avoid documenting repetitive alarm occurrences, select the Manual mode. In this mode, the system waits for the RESET key to be pressed before it documents additional alarm conditions. Press the "1" key to select Automatic Reset or the "0" key to select Manual mode. Press the "*" key to go to the next screen of this menu.

```
      High Action         Low Action
    2nd Stg  1st Stg   1st Stg  2nd Stg
Alarm    Yes       Yes       Yes       Yes
Relay1   No        No        No        No
Relay2   No        No        No        No
Relay3   No        No        No        No
Trip     Yes       Yes       Yes       Yes
8=Scan Forward, 9=Backward, *=Continue
```

This is the second screen of the Modify Action Menu. It is used to select whether the alarm, relays, and/or shunt trip are to be activated when alarm thresholds are exceeded. Press the "8" key to scan forward or the "9" key to scan backward until the desired action table is displayed. Press the "*" key to store the table option displayed and advance to the next screen.

```
        < < < Global Action > > >
Probe Number:  2     Unit Number:  2

Identifier?    0
Send?          Yes
Receive?       No
#=Main Menu; *=Continue;  1=Yes,  0=No
```

The Global Action feature is functional only with multiple units configured in an operational network. Extreme care must be used when using this feature since alarms on one unit cause other units to take actions also. The implementation of this feature requires a considerable amount of planning. Enter an identifier number from 0 to 31. Designate if the probe is a sender and/or receiver of the action message by entering a "1" for YES or a "0" for NO.

A probe may be programmed to both transmit and receive a global alarm based on its global alarm identifier field. The identifier number can be any number from 0 to 31. A probe that is programmed to be a global transmitter will, upon sensing an alarm condition, take the action in its own action field and transmit a message to all other units in the network. This message contains the global alarm identifier, the threshold level that was crossed, and the action-code index of the transmitter.

All other units in the network check their probe tables to see if there are global receivers with the same identifier number. If none are found, the message is ignored. If a receiver is found with the same identifier number, action is taken based on the threshold in the transmitted message.

Example #1
There are four units in a network and each unit is monitoring several air conditioners. A single autodialer unit that is connected to Unit 1 will dial building maintenance and inform them that a problem exists with an air conditioner. All the probes that are monitoring air conditioners in all of the units will be programmed to transmit a global alarm with an identifier of 2. Unit 1 will have a probe programmed to be a global receiver with an identifier of 2 and an action to energize the relay that activates the autodialer.

If an alarm occurs in any unit, the global alarm will be transmitted and Unit 1 will receive the global alarm message and activate the autodialer to call building maintenance.

Example #2
The same four units are monitoring the chilled water flow, that cools the computer, at several different points. For safety purposes, the customer wants to power OFF all of the computers if flow is lost at any point in the system. All of the probes in all of the units that are monitoring flow will be programmed to both transmit and receive a global alarm with an identifier of 3 and an action of shunt trip.

With this programming, a loss of chilled water flow sensed on any unit will cause all of the units to shunt trip.

```
        < < < Modify Delay > > >
     High                      Low
2nd Stg   1st Stg   1st Stg   2nd Stg
  00 Sec    00 Sec    00 Sec    00 Sec

8=Scan Forward,   9=Scan Backward
#=Main Menu; *=Continue
```

The Modify Delay screen is used to set the number of seconds or minutes an alarm is to persist before action is taken in response to an alarm condition. The cursor appears underneath the 2nd Stg High. Press the "8" key to scan forward or the "9" key to scan backward until the desired time is shown. Press the "*" key to save that time and advance the cursor to the next level. After times have been selected for all stages using the above procedure, press the "*" key to save the times and advance to the next screen.

NOTE

If the unit loses power, any action with a delay of over five minutes will not be executed.

```
    < < < Modify Display Group > > >
Probe Number: 111
Name: AIR CONDITIONER #3 ON

Group: 2

#=Main Menu; *=Continue
```

This screen allows a group number to be assigned to the probe. The group number determines which display group the probe is displayed with when the Scan Probe Data Menu is accessed. Enter the group number (0 to 7). Press the "*" key to save the change and advance to the next screen.

```
    < < < Enable/Disable Probe > > >
Probe Number: 111  Unit Number: 1
Name: AIR CONDITIONER #3 ON

Enabled: Yes

#=Main Menu; *=Continue;  1=Yes, 0=No
```

This screen is used to enable or disable a probe's activity. The probe number and the probe name are displayed. To activate the probe, enter a "1" for YES. To deactivate the probe, enter a "0" for NO. To save the change and return to the Add Probe Menu press the "*" key. Press the "#" key to return to the Main Menu.

The following displays represent the parameters for adding a digital probe.

```
    < < < Modify Probe Location > > >
Probe Box? 3
<1> RESERVED                <5> RSU 1-0
<2> RESERVED                <6> RSU 1-1
<3> RSU 0-2                 <7> RSU 1-2
<4> RSU 0-3                 <8> RSU 1-3
Slot Number (1-20)?  1
```

The Modify Probe Location screen allows the RSU box and the individual box slot, through which a probe signal is routed, to be entered. The screen displays the numbers that are assigned to the Remote Sensor Unit boxes. RSU 0-2 and RSU 0-3 are the RSU boxes for RSU Port 0. RSU 1-0, RSU 1-1, RSU 1-2, and RSU 1-3 are the RSU boxes for RSU Port 1. Enter the number assigned to the RSU box that the probe is connected to. Next enter the slot number, within the box, that is assigned to the probe. Press the "*" key to save the change and advance to the next screen.

NOTE

When an RSU box is first connected, it must be programmed as a digital probe and assigned a slot number of 32 so that communications are enabled between the 20 slots within the box and the PDS+ unit.

```
     < < < Modify Active Name >D > >
MAINTENANCE SWITCH ON
<0>                          <4> = ACTUAL
<1> = A                      <5> = AIR
<2> = ABORTED                <6> = ALARM
<3> = ACCESS                 <7> = ALTERNATOR

8=Scan Forward,  9=Scan Backward
```

Digital probes are assigned two names: an active name and an inactive name. The active name describes the alarm condition and the inactive name describes the normal condition.

The above screen is used to enter the active name of a probe. A built-in dictionary of commonly used environmental terms is available to create probe names. A probe name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name does not need to be modified, the cursor can be advanced through the five word positions with the "*" key. To save the change and advance to the next screen, press the "*" key.

```
    < < < Modify Inactive Name > > >
MAINTENANCE SWITCH OFF
<0>                          <4> = ACTUAL
<1> = A                      <5> = AIR
<2> = ABORTED                <6> = ALARM
<3> = ACCESS                 <7> = ALTERNATOR

8=Scan Forward,  9=Scan Backward
```

The above screen is used to enter the inactive name of a probe. A built-in dictionary of commonly used environmental terms is available to create probe names. A probe name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name does not need to be modified, the cursor can be advanced through the five word positions with the "*" key. To save the change and advance to the next screen, press the "*" key.

```
< < < Modify Normally Open/Closed > > >
Probe Number:  0
Name: MAINTENANCE SWITCH OFF
Normally: Closed

1=Open; 0=Closed
#=Main Menu; *=Continue
```

During normal operation, switches are either open or closed. Likewise, voltage and current are either present or not present. This screen allows the normal operation of individual switch, voltage, and current probe sensors to be defined. The normally open/closed condition is the condition that matches the active name/alarm condition.

Example:

The active name for a switch is MAINTENANCE SWITCH ON. When the switch is closed or in the MAINTENANCE position, the MAINTENANCE SWITCH ON name should appear when probe data is displayed. Under these conditions, the probe should be defined as normally closed.

Define the probe's normal operation mode by entering a "1" for open (not present) or a "0" for closed (present). Press the "*" key to save the change and advance to the next screen.

```
      < < < Modify Action > > >
Probe Number: 110    Unit Number:  2
Name: COMPUTER DOOR CLOSED
Automatic Reset?  No


#=Main Menu; *=Continue;  1=Yes,  0=No
```

The Modify Action screen is used to modify both the Reset mode and the actions the system is required to take during an alarm condition. Two things must be understood before modifying the Reset mode. First, the normal operation is for the system to automatically display and print the initial alarm data. Second, the system does not report on a repeated occurrence until the RESET key is pressed.

Users who prefer to document all alarm conditions detected by a probe should use the Automatic Reset feature. This allows a probe to reset itself once it returns to a normal status. As a result, repetitive alarm occurrences are documented and the probe's most recent alarm occurrences are displayed. Be aware that Automatic Reset may allow an excessive number of alarms and/or printouts for one alarm condition. To avoid documenting repetitive alarm occurrences, select the Manual mode. In this mode, the system waits for the **RESET** key to be pressed before it documents additional alarm conditions. Press the "1" key to select Automatic Reset or the "0" key to select Manual mode. Press the "*" key to go to the next screen of this menu.

```
            < < < Modify Action > > >

Alarm    Yes
Relay1   No
Relay2   No
Relay3   No
Trip     Yes
8=Scan Forward, 9=Backward;  *=Continue
```

This is the second screen of the Modify Action Menu. It is used to select whether the alarm, relays, and/or shunt trip are to be activated when an alarm condition exists. Press the "8" key to scan forward or the "9" key to scan backward until the desired action table is displayed. Press the "*" key to store the table option displayed and advance to the next screen.

```
      < < < Global Action > > >
Probe Number:  2     Unit Number:  2

Identifier?    0
Send?          Yes
Receive?       No
#=Main Menu; *=Continue;  1=Yes,  0=No
```

The Global Action feature is functional only with multiple units configured in an operational network. Extreme care must be used when using this feature since alarms on one unit cause other units to take actions also. The implementation of this feature requires a considerable amount of planning. Enter an identifier number from 0 to 31. Designate if the probe is a sender and/or receiver of the action message by entering a "1" for YES or a "0" for NO.

A probe may be programmed to both transmit and receive a global alarm based on its global alarm identifier field. The identifier number can be any number from 0 to 31. A probe that is programmed to be a global transmitter will, upon sensing an alarm condition, take the action in its own action field and transmit a message to all other units in the network. This message contains the global alarm identifier, the threshold level that was crossed, and the action-code index of the transmitter.

All other units in the network check their probe tables to see if there are global receivers with the same identifier number. If none are found, the message is ignored. If a receiver is found with the same identifier number, action is taken based on the threshold in the transmitted message.

Example #1
There are four units in a network and each unit is monitoring several air conditioners. A single autodialer unit that is connected to Unit 1 will dial building maintenance and inform them that a problem exists with an air conditioner. All the probes that are monitoring air conditioners in all of the units will be programmed to transmit a global alarm with an identifier of 2. Unit 1 will have a probe programmed to be a global receiver with an identifier of 2 and an action to energize the relay that activates the autodialer.

If an alarm occurs in any unit, the global alarm will be transmitted and Unit 1 will receive the global alarm message and activate the autodialer to call building maintenance.

Example #2
The same four units are monitoring the chilled water flow, that cools the computer, at several different points. For safety purposes, the customer wants to power OFF all of the computers if flow is lost at any point in the system. All of the probes in all of the units that are monitoring flow will be programmed to both transmit and receive a global alarm with an identifier of 3 and an action of shunt trip.

With this programming, a loss of chilled water flow sensed on any unit will cause all of the units to shunt trip.

```
          < < < Modify Delay > > >


  00 Sec

8=Scan Forward,    9=Scan Backward
#=Main Menu; *=Continue
```

The Modify Delay screen is used to set the number of seconds or minutes an alarm is to persist before action is taken in response to an alarm condition. Press the "8" key to scan forward or the "9" key to scan backward until the desired time is shown. Press the "*" key to save that time and advance to the next screen. All dry-contact switches should have a minimum delay of two seconds to prevent chatter or noise from generating alarms.

NOTE
If the unit loses power, any action with a delay of over five minutes will not be executed.

```
    < < < Modify Display Group > > >
Probe Number: 111
Name: AIR CONDITIONER #3 ON

Group: 2

#=Main Menu; *=Continue
```

This screen allows a group number to be assigned to the probe. The group number determines which display group the probe is displayed with when the Scan Probe Data Menu is accessed. Enter the group number (0 to 7). Press the "*" key to save the change and advance to the next screen.

```
    < < < Enable/Disable Probe > > >
Probe Number: 111  Unit Number: 1
Name: AIR CONDITIONER #3 ON

Enabled: Yes

#=Main Menu; *=Continue;  1=Yes, 0=No
```

This screen is used to enable or disable a probe's activity. The probe number and the probe name are displayed. To activate the probe, enter a "1" for YES. To deactivate the probe, enter a "0" for NO. To save the change and return to the Add Probe Menu press the "*" key. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 5, 3

```
        < < < Delete Probe > > >

Which Probe?   87

Are You Sure?

#=Main Menu; *=Continue;  1=Yes, 0=No
```

The Delete Probe Menu is used to delete a probe from the system. Enter the probe number and press the "*" key. The screen displays the question "Are You Sure?". Answer the question by entering a "1" for YES or a "0" for NO. Press the "*" key to return to the Maintenance Menu or the "#" key to return to the Main Menu.

Enter: #, 4, SC, 5, 4

```
        < < < Gain/Offset > > >
Probe Number?  105  Unit Number?  0
Reading:  208
<1> Inc Gain Fast    <2> Inc Gain Slow
<3> Dec Gain Fast    <4> Dec Gain Slow
<5> Inc Offset Fast <6> Inc Offset Slow
<7> Dec Offset Fast <8> Dec Offset Slow
<9> Assign New Gain/Offset Menu
```

This menu allows the gain and offset to be incremented or decremented. Enter the probe number and unit number. The present value of the probe is displayed. Select the option desired to change the gain and continue selecting that option until the correct value is displayed. Select the option desired to change the offset and continue selecting that option until the correct offset is obtained. This is an electronic method to calibrate an analog probe sensor. Gain is used to increase or decrease the reading while the signal is present. Offset is used to adjust the zero reading. If a calculated gain/offset or the gain/offset of another probe is to be used, select option 9.

CAUTION

Do not modify the gain/offset of the internal probes. Modifying the gain/offset of an internal probe affects all of the internal probes.

Enter: #, 4, SC, 5, 4, 9

```
< < < Assign New Gain/Offset Menu > > >

Probe Number   105

<1> Calculate New Gain/Offset Value
<2> Use Gain/Offset Value of Other Probe

#=Main Menu; *=Continue
```

The above screen allows new gain/offset values to be calculated or the gain/offset of another probe to be used. If the gain/offset values of another probe are used, the probe used must be in the same unit as the probe being modified. If new values are being calculated, see Section 4.5.3 for the correct procedure.

If option 1 (Calculate New Gain/Offset Value) is selected, the following screen is displayed.

```
< < < Calculate New Gain/Offset > > >

Minimum Reading?
DC Voltage for Min Reading?
Maximum Reading?
DC Voltage for Max Reading?
#=Main Menu; *=Continue
```

If the probe being added is measuring a 12 volt ac signal, the following is typical of what is entered on this screen. The minimum reading would be 0 volts. The dc voltage for minimum reading, as represented by the Electrical Interface Adapter (EIA) output, to the A to D converter would be 0 volts. The maximum reading would be 12 volts. The dc voltage for maximum reading would be what the EIA output was adjusted for (between 3.5 and 4.5 volts). See Section 4.5.3 for the EIA adjustment procedure. Press the "*" key to save the values and return to the Assign New Gain/Offset Menu. Press the "#" key to return to the Main Menu.

If option 2 (Use Gain/Offset Value of Other Probe) is selected, the following screen is displayed.

```
< < Use Gain/Offset of Other Probe > >

Which Probe?  25


#=Main Menu; *=Continue
```

Enter the number of the probe whose gain/offset values are to be used. The probe must have the same specifications as the probe being modified and be in the same unit as the probe being modified. Press the "*" key to return to the Assign New Gain/Offset Menu. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 5, 6

```
< < < Modify Operating Parameters > > >

<1> Modify Serial Number
<2> Modify Unit Name
<3> Reprogram Unit


#=Main Menu; *=Continue
```

The Modify Operating Parameters Menu allows the serial number or the unit name to be modified, or the unit to be reprogrammed.

Enter: #, 4, SC, 5, 6, 1

```
< < < Modify Unit Serial Number > > >

          TYPE313
          -------
0 1 2 3 4 5 6 7       8         9
  ! " # $ % & '       Scan      Scan
                      Forward   Backward
```

This screen allows the serial number of the PDS+ unit to be modified. The current serial number is displayed along with seven dashes below it indicating that there are seven digit positions available. The cursor appears in the first digit position of the serial number. Press the "8" key to scan forward or the "9" key to scan backward through the list of characters available until the desired character is found. Enter the number assigned to the character desired and the character appears in the digit position of the serial number. The cursor advances to the next digit position. If a digit does not need to be modified, pressing the "*" key advances the cursor to the next digit position and leaves the present digit unmodified. Continue until all seven digits have been entered. Press the "*" key to store the new serial number and return to the Modify Operating Parameters Menu. Press the "#" key to return to the Main Menu.

Enter: #, 4, SC, 5, 6, 2

```
     < < < Modify Unit Name > > >
COMPUTER ROOM TEMPERATURE
<0>                     <4> = ACTUAL
<1> = A                 <5> = AIR
<2> = ABORTED           <6> = ALARM
<3> = ACCESS            <7> = ALTERNATOR

8=Scan Forward,  9=Scan Backward
```

This screen is used to modify the name of the unit. The present unit name is displayed on the screen. A built-in dictionary of commonly used environmental terms is available to create unit names. A unit name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name does not need to be modified, the cursor can be advanced through the five word positions with the "*" key. To save the change and return to the Modify Operating Parameters Menu press the "*" key.

Enter: #, 4, SC, 5, 6, 3

This option is used to reload the system configuration. When this option is selected, all of the internal probe sensors in the system EAROM are reprogrammed to factory-order specifications. Press the "*" key to return to the Modify Operating Parameters Menu. Press the "#" key to return to the Main Menu.

CAUTION

Reprogram unit reprogrammes the internal probes to factory-order specifications. All external probes are lost and have to be reprogrammed. If any internal probes have been modified, the modifications are lost and the internal probes have to be modified again.

After the unit has been reprogrammed, the Modify Unit Serial Number screen must be selected. Advance the cursor through the seven-digit serial number with the "*" key. Press the "*" key to return to the Modify Operating Parameters Menu. Press the "#" key to return to the Main Menu. This must be done to rematch the firmware with the unit.

CHAPTER 4

4.1 GENERAL

This chapter contains a technical description and installation procedures for the Environmental Monitoring and REPO Station, Building Interface Adapter, Remote Sensor Unit, Probes, H7317-KC Temperature Sensor, Water Detector, Relay Modules, and Communications options.

4.2 ENVIRONMENTAL MONITORING AND REPO STATION

The Environmental Monitoring and Remote Emergency Power Off (EM & REPO) station is a wall-mounted unit that provides the user with an alternating display of the ambient computer-room temperature and humidity. It also contains a REPO push button that allows power to be removed from the PDS+ unit in emergency situations. The customer's electrical contractor must install this option.

The Environmental Monitoring and REPO stations are available in the following configurations.

- Configurations that connect to the PDS+ unit with a 3-wire cable to the REPO IN jack on the interface plate.

  -- H7317-JA -- REPO push button only
  -- H7317-JB -- REPO with temperature monitoring
  -- H7317-JC -- REPO with temperature and humidity monitoring

- Configurations that connect to the PDS+ unit through the EMS jack on the interface plate and allow temperature or temperature and humidity to be displayed on the LCD screen.

  -- H7317-JD -- REPO with real-time temperature reporting to PDS+ unit (Probe 28)

  -- H7317-JE -- REPO with real-time temperature and humidity reporting to PDS+ unit (Probes 28 and 29)

- Configurations that connect to the PDS+ unit through an RSU box and are programmed as external probes.

  -- H7317-JF -- REPO with real-time temperature reporting through an RSU box

  -- H7317-JG -- REPO with real-time temperature and humidity reporting through an RSU box

4.2.1 Technical Description

The EM & REPO station is housed in a heavy-gauge steel box and has the following specifications.

• Temperature Monitoring	$+4^{\circ}$ to $+38^{\circ}$C ($+40^{\circ}$ to $+99^{\circ}$F)
• Temperature Accuracy	$\pm 2^{\circ}$F
• Temperature Alarm Range	$+21^{\circ}$ to $+38^{\circ}$C ($+70^{\circ}$ to $+99^{\circ}$F)
• Humidity Monitoring	15 to 85% RH
• Humidity Accuracy	±3% RH
• Humidity Alarm Range	15 to 85% RH
• 2nd Stage Contact Closure	Rated 5 A at 24 Vdc (Normally Open)
• Manual Switch	Rated 5 A at 120 Vac (Normally Open)
• Dimensions	
-- Height	18.7 cm (7 3/8 in)
-- Width	15.5 cm (6 1/8 in)
-- Depth	7.9 cm (3 1/8 in)
• Weight	1.6 kg (3.5 lb)

The EM & REPO station has a front panel that is secured with four (4) screws. The front panel (Figure 4-1) has four sets of LED indicators that illuminate when a preselected limit has been reached (HIGH HUMIDITY, LOW HUMIDITY, TEMP WARNING, TEMP SHTDN). Below the four LED indicators is a 3-character LCD that displays two numeric digits for temperature or humidity, and a letter digit: F (Fahrenheit), C (Celsius), or H (Humidity). To the right of the LCD is the SELECT/SILENT switch, which is used to silence and reset an audible alarm or display, in sequential order, according to preselected limits (HIGH HUMIDITY, LOW HUMIDITY, TEMP WARNING, TEMP SHTDN). The REPO push button, located at the bottom center of the front panel, is used to remove power from the PDS+ unit in emergency situations.

When one of the preselected temperature or humidity limits is exceeded, an alarm sounds and the corresponding LED indicator illuminates. Pressing the SELECT/SILENT switch silences the audible alarm; however, the corresponding limit LED indicator remains illuminated until the value of the temperature/humidity returns to normal and the SELECT/SILENT switch is pressed again.

To display the values of user-selected limits, press and hold the SELECT/SILENT switch. One of the user-selected limits is displayed on the LCD and the corresponding LED indicator illuminates. Releasing the SELECT/SILENT switch and pressing and holding it again, displays the next sequential limit and illuminates the corresponding LED indicator. This process can be continued until all four limits have been displayed. The sequence of displayed limits is HIGH HUMIDITY, LOW HUMIDITY, TEMP WARNING, and TEMP SHTDN.

When the SELECT/SILENT switch is released, the LCD alternately displays the present surrounding ambient temperature and relative humidity in 3-second intervals.

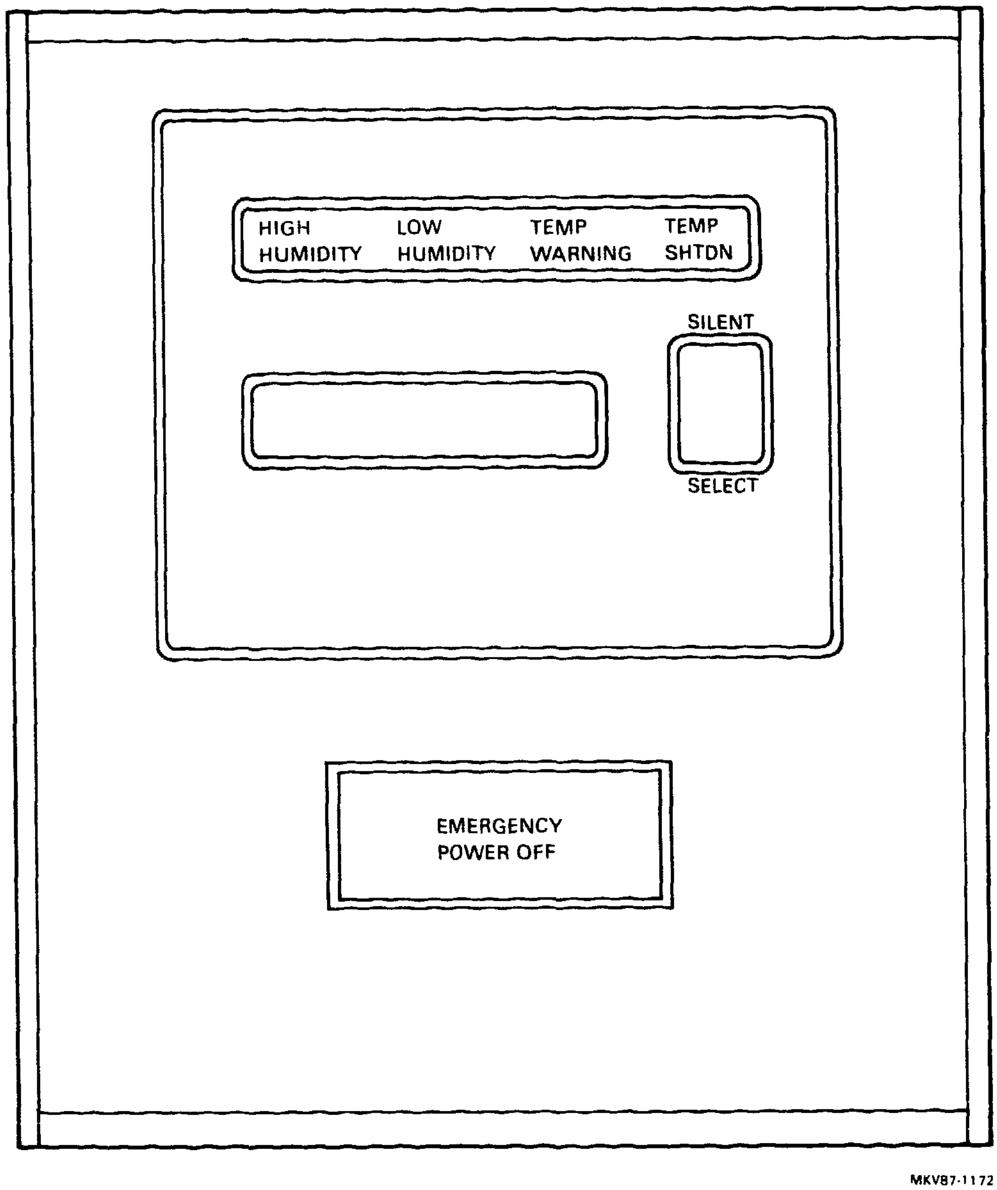

Figure 4-1 EM & REPO Front Panel

The Environmental Monitoring and REPO station contains a maximum of three printed circuit boards (PCBs) for controlling all electronic functions (Figure 4-2). The display PCB and controller PCB are installed in the EM & REPO station and used for temperature monitoring with REPO. The humidity PCB is added to the EM & REPO station and used for temperature and humidity monitoring with REPO. All PCBs are mounted with the component side down.

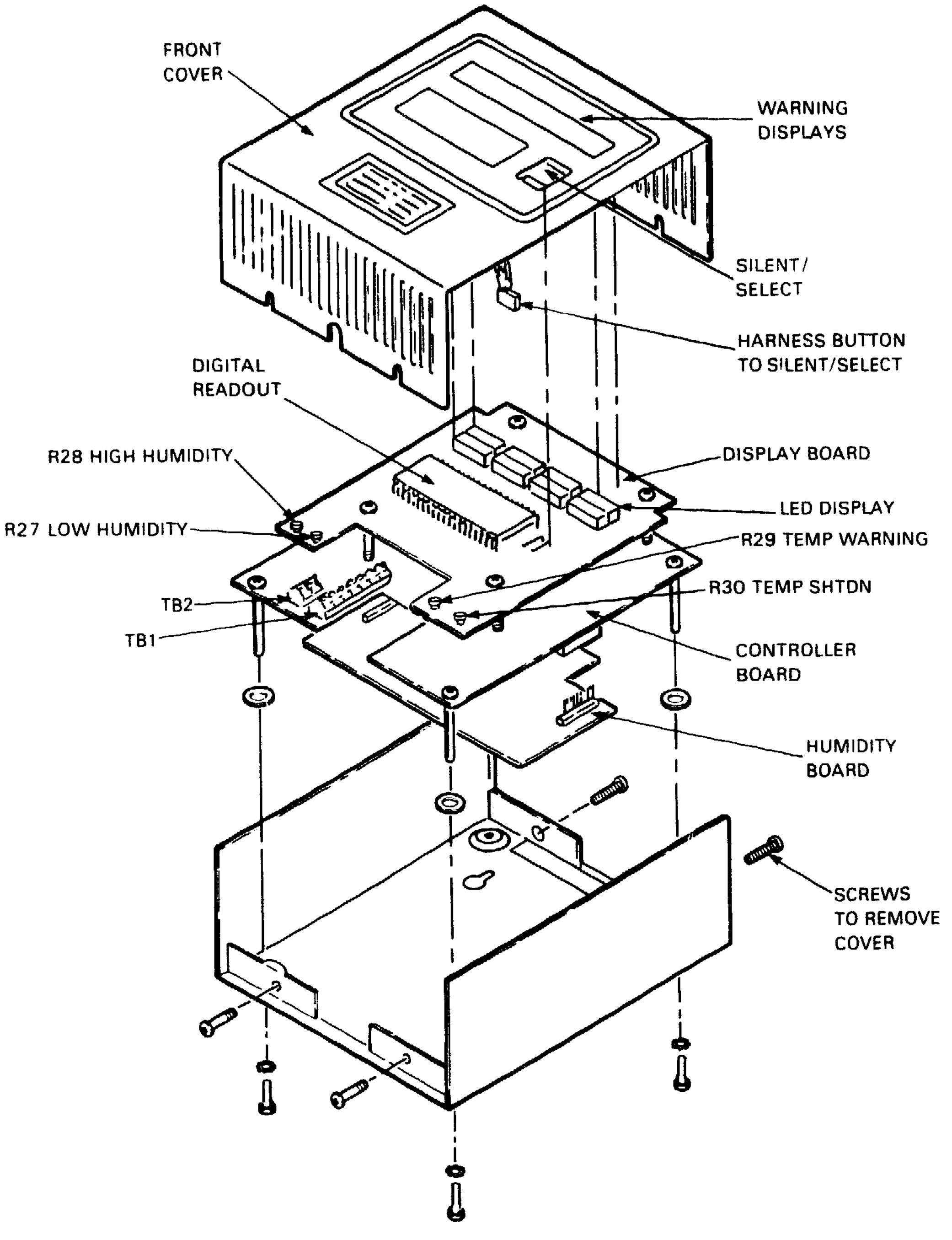

Figure 4-2 Environmental Monitoring and REPO Assembly

Display Printed Circuit Board
The display PCB is mounted, component side down, behind the front panel. It contains the circuitry and components for:

- Nonvarying voltage
- Reference voltage
- Liquid crystal display (LCD)
- 3-second clock
- Analog-to-digital (A/D) converter

The nonvarying 2.482 Vdc is fed to the controller PCB for use in the temperature-sensing circuit, and to the humidity PCB for use in the humidity-sensing circuit.

The 2.5 Vdc reference voltage is used to establish the adjustable voltage levels that become the user-selected voltage levels representing HIGH HUMIDITY through R28, LOW HUMIDITY through R27, TEMP WARNING through R29, and TEMP SHTDN through R30. These level potentiometers are located on the display PCB.

The LCD contains 3-digit positions with each digit position made up of seven segments. The logic circuits on the controller PCB determine which of the segments in each digit position will be illuminated.

Output pin 21 of the analog-to-digital (A/D) converter is a 60 Hz square wave. This waveform is fed to a frequency divider (U4) to obtain the 3-second clock for the alternating display. The temperature is displayed on the high side of the pulse and the humidity is displayed on the low side.

The A/D converter receives voltage levels that are changed to digital signals to select the segments of the LCD.

The SELECT/SILENT switch is connected to connector J1 on the display PCB.

Controller Printed Circuit Board
The controller PCB is mounted, component side down, below the display PCB. It is connected directly to the display PCB through J1 on the back of the controller PCB, and to P1 on the component side of the display PCB. The controller PCB contains the circuits for:

- Temperature display logic
- C, F, H display logic
- Indicator LED logic
- Audible alarm logic
- Output relay contact logic
- Input power from the I3 interface board or the H7317-KZ ac power adapter

The constant 2.482 Vdc from the display PCB is applied to a thermistor and adjustable resistor (R3) circuit to produce a voltage that varies with the temperature. This varying voltage is sent to either the Celsius or Fahrenheit logic circuits, depending on the position of switch 1 on the controller PCB.

If switch 1 is in the Celsius position, the varying voltage is applied to a differential amplifier. The output of the differential amplifier is gated to a multiplexer and then to the display PCB to display the numerics of the sensor-detected temperature in Celsius. The output of the differential amplifier is also sent through a voltage-to-current converter to produce a varying current that is sent to the EMS temperature sensor probe in the PDS+ unit.

If switch 1 is in the Fahrenheit position, the varying voltage is applied to a differential amplifier. The output of the differential amplifier is gated to a multiplexer and then to a Fahrenheit converter circuit. The output of the converter circuit is gated through another multiplexer to the display PCB to display the numerics of the sensor-detected temperature in Fahrenheit. The output of the converter circuit is adjustable through potentiometer R16 to produce the correct display value.

The output of the differential amplifier, representing present temperature, goes to a comparator. The outputs from the two limit potentiometers (R29 and R30) also go to the comparator. If the present temperature voltage exceeds the limit voltage of R29 (TEMP WARNING), an output of the comparator causes the TEMP WARNING LED to illuminate and the alarm to sound. Pressing the SELECT/SILENT switch silences the audible alarm. When the present temperature falls below the limit setting of R29, pressing the SELECT/SILENT switch extinguishes the TEMP WARNING LED. If the present temperature voltage exceeds the limit voltage of R30 (TEMP SHTDN), an output of the comparator causes the TEMP SHTDN LED to illuminate, the alarm to sound, and relay K1 to energize. When relay K1 energizes, a REPO signal is sent to the PDS+ unit, which causes the IMCB to trip and remove power from the PDS+ unit.

Humidity Printed Circuit Board
The humidity PCB is mounted, component side down, below the controller PCB. It is connected directly to the controller PCB through J2 and J3 on the back of the humidity PCB, and to P2 and P3 on the component side of the controller PCB. The humidity PCB contains the circuits for:

- Humidity sensor logic
- Analog multiplexer

The humidity sensor detects the relative humidity of the surrounding area. The humidity PCB sends a high-humidity alarm, a low-humidity alarm, and the present sensor-detected humidity reading to the display PCB through multiplexer U5.

The output of the humidity sensor goes to a differential amplifier and then to a linearizing circuit that responds in proportion to the input. The output of the linearizing circuit goes to multiplexer U5 and is the humidity-sensor output times a factor of 25. The output of the differential amplifier is also sent through a voltage-to-current converter to produce a varying current that is sent to the EMS humidity sensor probe in the PDS+ unit.

The output of the humidity-sensor circuit, along with the outputs from the two humidity-limit potentiometers (R27 and R28), is sent to a comparator. If the present humidity-sensor output falls below the value set by R27 (LOW HUMIDITY), an output of the comparator causes the LOW HUMIDITY LED to illuminate and the alarm to sound. Pressing the SELECT/SILENT switch silences the audible alarm. When the present humidity has increased above the limit setting of R27, pressing the SELECT/SILENT switch extinguishes the LOW HUMIDITY LED. If the present humidity-sensor output goes above the value set by R28 (HIGH HUMIDITY), an output of the comparator causes the HIGH HUMIDITY LED to illuminate and the alarm to sound. Pressing the SELECT/SILENT switch silences the audible alarm. When the present humidity has decreased below the limit setting of R28 (HIGH HUMIDITY), pressing the SELECT/SILENT switch extinguishes the HIGH HUMIDITY LED.

4.2.2 Installation

The Environmental Monitoring and REPO station is normally installed within 15.2 m (50 ft) of the PDS+ unit. It operates effectively at a maximum distance of 61 m (200 feet). The customer is responsible for mounting the EM & REPO station in the desired location and routing the connecting cable from the EM & REPO station to the PDS+ unit. Digital Customer Services is responsible for connecting the cable to the EM & REPO station and the PDS+ unit, configuring the unit, calibrating the unit and display, and testing the REPO function.

The Environmental Monitoring and REPO station is designed to wall-mount and should mount vertically so that the LCD display is at, or slightly below, eye level.

Use the installation instructions that are provided with each individual Environmental Monitoring and REPO station and the diagram shown in Figure 4-3 to install, configure, calibrate, and test the EM & REPO station.

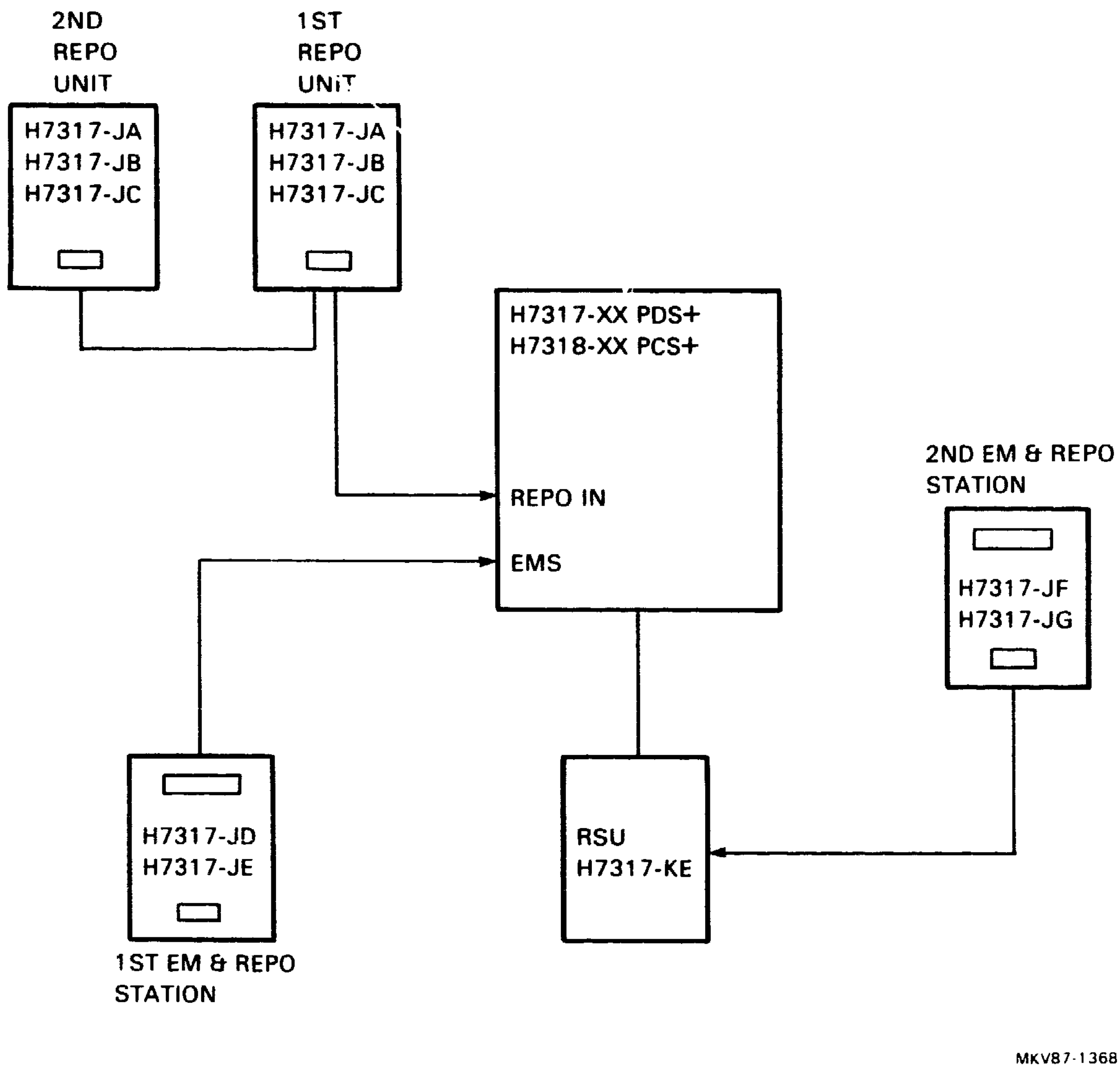

Figure 4-3 Environmental Monitoring and REPO Connecting Diagram

4.3 BUILDING INTERFACE ADAPTER (BIA)

The Building Interface Adapter can monitor up to eight dry-contact sensor probes. This allows monitoring of external systems such as air conditioners, generators, security systems, and fire alarm systems. The BIA also contains three relays, which can be used to shut down air conditioners on specific alarm conditions or activate an autodialer on a shunt trip condition. Only one BIA can be connected to a PDS+ unit.

4.3.1 Technical Description

The BIA is housed in a heavy-gauge steel box and contains one board. The BIA box is connected to the PDS+ unit through the 15-pin BIA plug on the interface plate located on the back of the PDS+ unit.

The BIA board contains a terminal block (TB1) with eight pairs of connectors. These connectors are used to connect the wires from the eight possible dry-contact probe sensors (Figure 4-4).

There are three relays (K1, K2, and K3) on the BIA board that can be used to control other equipment such as shutting down air conditioners or activating an autodialer on a shunt trip. If an alarm condition occurs for any probe that has a Relay1 action selected, relay K1 will energize. A Relay2 action will cause relay K2 to energize and a Relay3 action will cause relay K3 to energize. Relays K1, K2 and K3 are latching relays that energize when an enable signal is received and remain energized after the enable signal is removed. To deenergize the latching relays, the RESET switch on the PDS+ unit must be pressed. There are three terminal blocks on the BIA board that are used for controlling other equipment. TB2 is the terminal block for relay K1, TB3 is the terminal block for relay K2, and TB4 is the terminal block for relay K3.

WARNING

The relay module should NOT be used to control any life safety systems (for example, halon sprinklers).

The BIA interface cable is connected to P27 on the BIA board. The other end of the BIA cable is connected to the BIA plug on the interface plate.

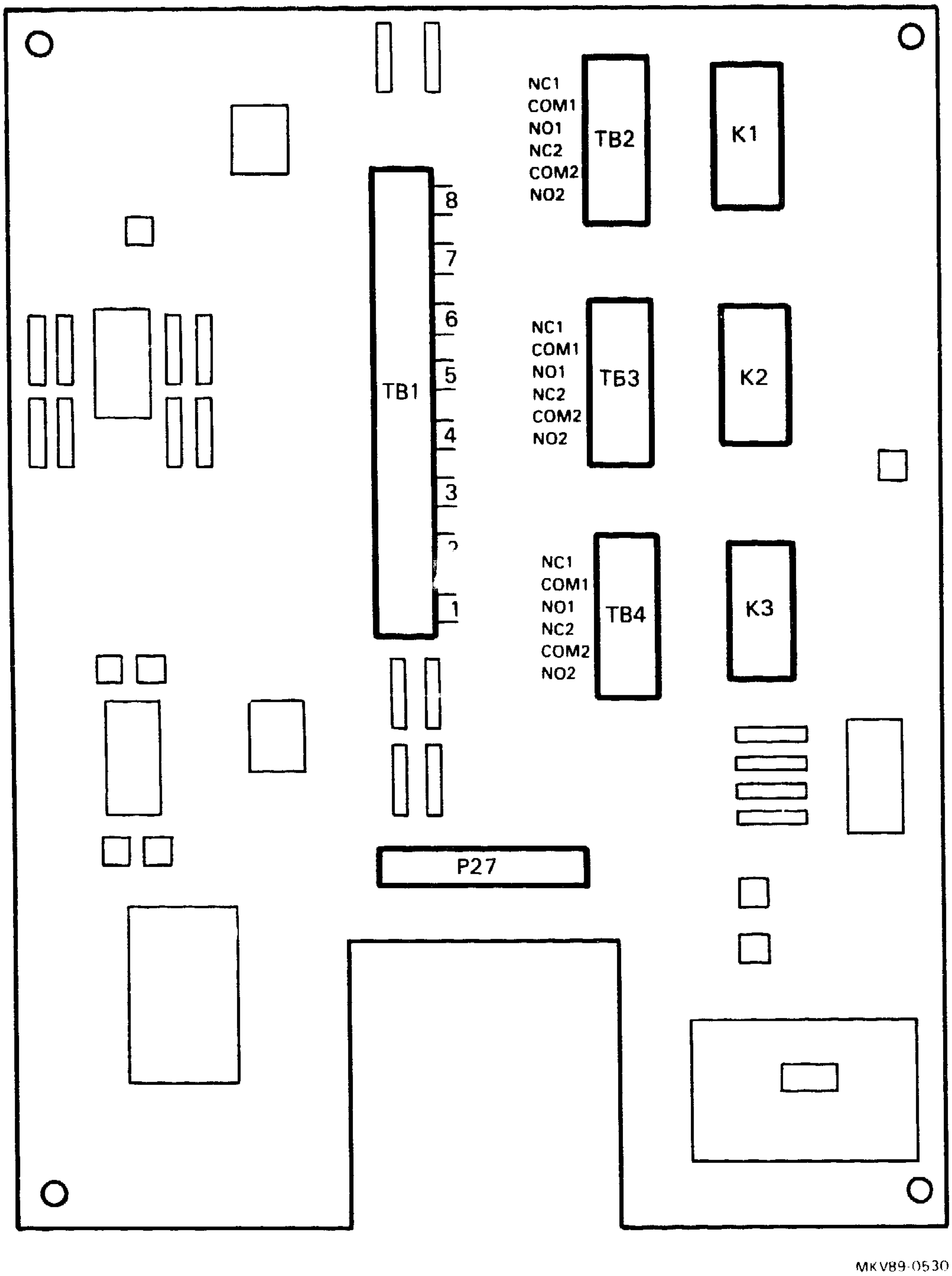

Figure 4-4 Building Interface Adapter Board

4.3.2 Installation

This section contains the procedures for installing the BIA box, connecting the external dry-contact sensors, and connecting the control outputs for controlling other equipment. The customer is responsible for mounting the BIA box in the desired location, installing the external dry-contact sensors and routing the wires to the BIA box location, routing output wires for controlling equipment, and routing the interface cable to the BIA box location. Digital Customer Services is responsible for connecting the external dry-contact sensor wires to TB1 inside the BIA box, connecting the output wires for controlling other equipment to the BIA box, and connecting the interface cable between the BIA box and the interface plate on the PDS+ unit.

Use the following procedure to install the Building Interface Adapter.

[ ] 1. Unpack, ensuring that you have the BIA box, BIA board, and BIA cable assembly.

[ ] 2. Loosen the four cover screws and remove the cover.

[ ] 3. Locate the BIA box within 1.8 m (6 ft) of the PDS+ unit.

[ ] 4. Secure the BIA box to the floor or wall. If the BIA box is floor mounted, entry fittings should be used to maintain watertight integrity.

NOTE

Remove the BIA board before drilling holes in the BIA box. This prevents damage to the board and metal particles from lodging on the board that could cause short circuits when power is applied.

[ ] 5. The customer will drill the necessary holes for routing the external dry-contact sensor wires, the output control wires, and the interface cable.

[ ] 6. Mount the BIA board in the BIA box and route the interface cable from the PDS+ unit (DO NOT connect at this time) to the BIA box and feed it through the access hole.

CAUTION

Only dry-contact sensors, normally open/closed, can be used. Any sensor with voltage or current must be connected through an RSU box. Connecting a voltage or current sensor to the BIA box may damage the BIA board, the M3 board, and the I3 board.

[ ] 7. Connect the two wires from the first external dry-contact sensor to the two connectors labeled "1" on TB1. Note whether the sensor's contacts are normally open or normally closed. This sensor is designated as "Building Alarm 1" when the probe parameters are programmed on the PDS+ unit.

[ ] 8. Connect the rest of the external dry-contact sensors to successive connectors on TB1.

[ ] 9. If the relays are used to control other equipment, connect the two wires from the other equipment to TB2, TB3, or TB4.

Example: Relay K1 is used to shut off an air conditioner.

Air conditioner relay contacts are normally closed; therefore, run two wires from the air conditioner remote control circuit to NC1 and COM1 or NC2 and COM2 on TB2. When relay K1 energizes, these contacts open and shut the air conditioner OFF.

Example: Relay K1 is used to shut off equipment with normally open contacts.

Run the two wires from the equipment's normally open contacts to NO1 and COM1 or NO2 and COM2 on TB2. When relay K1 energizes, these contacts close and shut the equipment OFF.

[ ] 10. Disconnect power from the door electronics by placing the maintenance switch on the I3 board to the MAINTENANCE position, disconnecting P6 on the I3 board, disconnecting the red battery lead, and disconnecting P41 on the P4 board.

[ ] 11. Connect one end of the interface cable to P27 on the BIA board and the other end to the BIA plug on the interface plate located on the back of the PDS+ unit.

[ ] 12. Replace the cover on the BIA box and tighten the four cover screws.

[ ] 13. Reconnect power to the door electronics by reconnecting P41 on the P4 board, reconnecting the red battery lead, reconnecting P6 on the I3 board, placing the maintenance switch on the I3 board to the NORMAL position, and pressing the RESET switch on the UCC.

[ ] 14. Installation of the BIA box and the BIA probes is complete. Proceed to the "Programming the BIA Probes" procedure.

Programming the BIA Probes

The BIA probes are dry-contact sensors and are programmed as digital probes. Use the following procedure to modify the probe parameters for each building alarm probe that is installed.

[ ] 1. Power up the PDS+ unit.

[ ] 2. Place the maintenance switch on the I3 interface board to the MAINTENANCE position (see Figures 6-2 and 6-3).

[ ] 3. Enter: #, 4, SC, 5, 5 on the LCD of the PDS+ unit to access the Modify Probe Parameters Menu. The next screen asks for the probe number.

[ ] 4. Enter: 030 for Building Alarm 1; 031 for Building Alarm 2; 032 for Building Alarm 3; 033 for Building Alarm 4; 034 for Building Alarm 5; 035 for Building Alarm 6; 036 for Building Alarm 7; or 037 for Building Alarm 8. Press the "3" key.

[ ] 5. The next screen displays the probe number just entered, the probe name, and a list of seven options for modifying specific parameters of the probe.

[ ] 6. Select the Normally Open/Closed option by pressing the "1" key. This displays the Modify Normally Open/Closed screen. The normally open/closed condition describes the probe in an alarm condition. If the sensor's contacts being open indicates an alarm condition, enter a "1" for open and press the "*" key to return to the Modify Digital Probe Menu. If the sensor's contacts being closed indicates an alarm condition, enter a "0" for closed and press the "*" key to return to the Modify Digital Probe Menu.

[ ] 7. Select the Action option by pressing the "2" key. This displays the Modify Action screen. Enter a "1" for YES to the question, "Automatic Reset?" and press the "*" key to advance to the next screen.

[ ] 8. The next display allows an action table to be selected. This table determines what actions occur when an alarm condition exists. Use the "8" key to scan forward or the "9" key to scan backward through the possible tables until the desired table is displayed. Unless otherwise specified by the customer, select the table with Alarm-Yes, Relay1-No, Relay2-No, Relay3-No, and Trip-No. When the desired table is displayed, press the "*" key to store the table and return to the Modify Digital Probe Menu.

[ ] 9. Select the Delay option by pressing the "3" key. This displays the Modify Delay screen. This screen is used to select the number of seconds or minutes an alarm condition must exist before any action is taken. Use the "8" key to scan forward or the "9" key to scan backward until the desired time is shown (a minimum delay of one second should be selected). Press the "*" key to store the time, and return to the Modify Digital Probe Menu.

[ ] 10. If a name change is desired, select the Active Name option by pressing the "4" key. This displays the Modify Active Name screen. The active name describes the alarm condition (Example: BUILDING ALARM 1). A built-in dictionary of commonly used environmental terms is available to create names. A name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name is not five words long, the cursor can be advanced through the remaining word positions with the "*" key. To save the change and return to the Modify Digital Probe Menu, press the "*" key.

[ ] 11. If a name change is desired, select the Inactive Name option by pressing the "5" key. This displays the Modify Inactive Name screen. The inactive name describes the normal condition (Example: LOCAL 1 OKAY). Scan the built-in dictionary to select words for the inactive name using the procedure in Step 10.

[ ] 12. If Global Action is desired, press the "6" key to display the Global Action screen. Global Action can be used only on multiple-unit configurations. If Global Action is desired by the customer, refer to page 3-51 for a detailed explanation. If Global Action is not desired, press the "*" key to advance the cursor through the three questions, ensuring that the answer to "Send?" and "Receive?" is NO, and return to the Modify Digital Probe Menu.

[ ] 13. The BIA probes are internal probes and the location will not be modified.

[ ] 14. Press the "#" key to return to the Main Menu.

[ ] 15. At this time, the BIA box and the BIA probes have been installed and the parameters for a BIA probe have been modified. If more BIA probes have been installed, return to Step 3 and repeat this procedure for the next probe. Continue repeating this procedure until the parameters for all installed BIA probes have been modified.

[ ] 16. Return the PDS+ unit to Normal mode by placing the maintenance switch on the I3 interface board to the NORMAL position and pressing the RESET key on the UCC. Complete the probe data sheet (Table F-1) in Appendix F by entering the new parameters for the BIA probes.

4.4 REMOTE SENSOR UNIT (RSU)

Remote Sensor Unit boxes allow the monitoring of external equipment such as temperature sensors, humidity sensors, uninterruptible power supply systems, diesel generators, halon systems, water detectors, air conditioners, security systems, and fire alarm systems. Each RSU box can accept 20 sensor probe inputs. A maximum of 6 RSU boxes can be connected to each PDS+ unit. A maximum of 69 external sensor probes can be connected to each PDS+ unit.

4.4.1 Technical Description

The Remote Sensor Unit boxes are connected to the PDS+ unit through the interface plate located on the back of the unit. There are two RSU connectors on the interface plate. The connector labeled RSU 0 is for Port 0 and can have two RSU boxes connected through it. The connector labeled RSU 1 is for Port 1 and can have four RSU boxes connected through it.

The purpose of the RSU box is to gather up to 20 signals from sensors, convert them to digital signals, and send them to the PDS+ unit through an RS-422 interface. This interface can be up to 1,524 m (5,000 ft) in length from end-to-end. The RSU box can receive power from the PDS+ unit, through the RSU power connector on the interface plate, if it is located within 61 m (200 ft) of the PDS+ unit. The PDS+ unit can provide power for only one RSU box. If more RSU boxes are attached, they must have the RSU power adapter option (H7317-KY) installed.

The RSU box contains a motherboard and a data collector board that is mounted on the motherboard (Figure 4-5).

Motherboard

The motherboard contains four terminal blocks for connecting the external sensors. TB1 is for dry-contact switch (open/closed) type sensors. TB2 is for analog (voltage/current) type sensors. TB3 and TB4 are for ON/OFF (voltage/current) type sensors. TB1 and TB2 have 20 pairs of connectors each, one pair for each electrical interface adapter (EIA) slot. TB3 and TB4 together have 20 pairs of connectors, one pair for each EIA slot. This allows any type of sensor (dry-contact, analog, or ON/OFF) to be connected through any EIA slot.

There are 20 EIA slots (S1 through S20) on the motherboard. One of the various EIA modules can be plugged into each EIA slot. The type of EIA module depends on the type of sensor connected to the slot. Slot S21 is for installing a relay module which can be activated by the programming of the probe actions in the PDS+ unit.

There are two jacks on the motherboard. J2 on the motherboard is connected to J4 on the data collector board to provide for the transfer of probe signals from the motherboard and 12 Vdc power to the motherboard. J1 on the motherboard is connected to J3 on the data collector board to provide relay control for the relay module installed in slot S21.

Data Collector Board

The data collector board is the control center of the RSU box. It is responsible for probe-data acquisition and serial-data communication between the RSU box and the PDS+ unit. Analog probe signals from the EIA modules go to A/D converters (U8 and U9) before being processed and sent to the PDS+ unit.

There are eight connectors on the data collector board. These connectors and their functions are listed below.

Connector	**Function**
J1 & J2	These jacks are for power connection from either the interface plate on the PDS+ unit (if the RSU box is within 61 m (200 ft) of the PDS+) or the power isolator board and battery back-up option. Pin 1 is 12 Vdc and Pin 2 is ground. Either jack can be used.
J3	This jack connects to J1 on the motherboard, providing relay control to the relay module installed in slot S21 on the motherboard. Pin 1 is 12 Vdc and connects to J1 Pin 9 on the motherboard. Pin 2 connects to J1 Pin 1 on the motherboard.
J4	This jack connects to J2 on the motherboard, providing for the transfer of probe signals from the motherboard and 12 Vdc power to the motherboard.
J5 & J6	These jacks are for RS-422 interface cable connection. Either jack can be used, or both can be used if other RSU boxes are being daisy chained together.
J7	This jack provides test points for testing only.
J8	This jack is for plugging the power isolator board into (if the power isolator board and battery back-up option is installed). **If this option is not installed, jumpers must be connected across each of the five pairs of pins to make the RS-422 line active.**

Relay Addressing
There are six jumpers on the data collector board that must be configured when the RSU box is installed. Jumpers JP1, JP2, and JP3 are used to assign a logical relay number to the relay module installed in slot S21 on the motherboard. A jumper installed on JP1 designates the relay module as relay 1. A jumper on JP2 designates relay 2, and a jumper on JP3 designates relay 3. Only one relay jumper can be installed in each RSU box.

NOTE
The RSU relay can be assigned a logical relay number of 1, 2, or 3. If a logical relay number of 1 is assigned and an alarm condition occurs for any probe with a Relay1 action selected, the RSU relay will energize and relay K1 in the BIA box will also energize since they are both designated as logical relay 1.

RSU Box Addressing
Jumpers JP4, JP5, and JP6 are used to assign a box number to the RSU box. (See Step 7 of the RSU box installation procedures.) Each jumper consists of three pins: a +5 volt pin, a center pin, and a ground pin. These three jumpers represent a binary number from 0 to 7, with JP4 being the least significant bit. If a box number of 0 is to be assigned, each of the jumpers will be connected between the center pin and the ground pin. If a box number of 1 is to be assigned, JP4 will be connected between the center pin and the +5 volt pin, and JP5 and JP6 will be connected between the center pin and the ground pin. Since four RSU boxes can be daisy chained together on RSU Port 1, the largest box number that can be assigned is 3. The two RSU boxes that can be connected on RSU Port 0 are assigned box numbers of 2 and 3. If a box number between 4 and 7 is assigned to a box, the remote interface board will never receive information from that box. If two boxes connected to the same port on the same PDS+ unit are assigned the same box number, a data crash will occur. When JP4, JP5, and JP6 are installed or changed, the RESET switch (SW1 on the data collector board) must be pressed to update the box number in memory.

Electrical Interface Adapters
The EIA modules are basically signal conditioners powered by 12 Vdc from the data collector board. They take the input signal that is to be monitored and reduce it down to a signal voltage that can be utilized by the data acquisition system for digitizing and subsequent monitoring by the PDS+ operating system. There are three basic types of EIA modules (dry-contact, ON/OFF voltage/current, and analog voltage/current/frequency) used in the RSU box. The dry-contact and ON/OFF types produce a conditioned output of either 0 volts or 5 volts. The analog type produces a conditioned output that varies continuously between 0 and 5 volts.

The various EIA modules available for use in the RSU box are listed below.

1. EIA 1 -- Dry-contact closure sensor (H7317-KJ)

2 EIA 2 -- 1 mA current transducer: ON/OFF type (H7317-KK)

3. EIA 15 -- 5 volt interface: ON/OFF type (H7317-KP)

4. EIA 3 -- 12 volt interface: ON/OFF type (H7317-KL)

5. EIA 4 -- 24 volt interface: ON/OFF type (H7317-KM)

6. EIA 12 -- Frequency interface: analog type (H7317-KN)

7. EIA 8 -- Analog buffer: analog type - 0 to 12 Vac (H7317-KS)

8. EIA 9 -- Isolated buffer: analog type - 0 to 5 Amps ac (H7317-KT)

9. EIA 10 -- EMS interface: analog type - temperature or humidity (H7317-KU)

10. EIA 17 -- Current loop: analog type - 4 to 20 mA (H7317-KR)

Relay Modules

There are two types of relay modules available for use in the RSU box. One type (H7317-KV) is a normal relay that energizes when an enable signal is received, and deenergizes when the enable signal is removed. The other type (H7317-KW) is a mechanical latching relay that energizes when an enable signal is received and remains energized after the enable signal is removed. To deenergize the latching relay, press the RESET switch on the PDS+ unit. These relay modules can be activated by user-programming of the probe alarm actions in the PDS+ unit. Both relay modules have four poles of normally open/normally closed contacts that can be used to control other equipment (such as turning off the air conditioner if a low temperature alarm occurs).

WARNING

The relay module should NOT be used to control any life safety systems (for example, halon sprinklers). The relay contacts should be utilized for voltages of less than 42 volts.

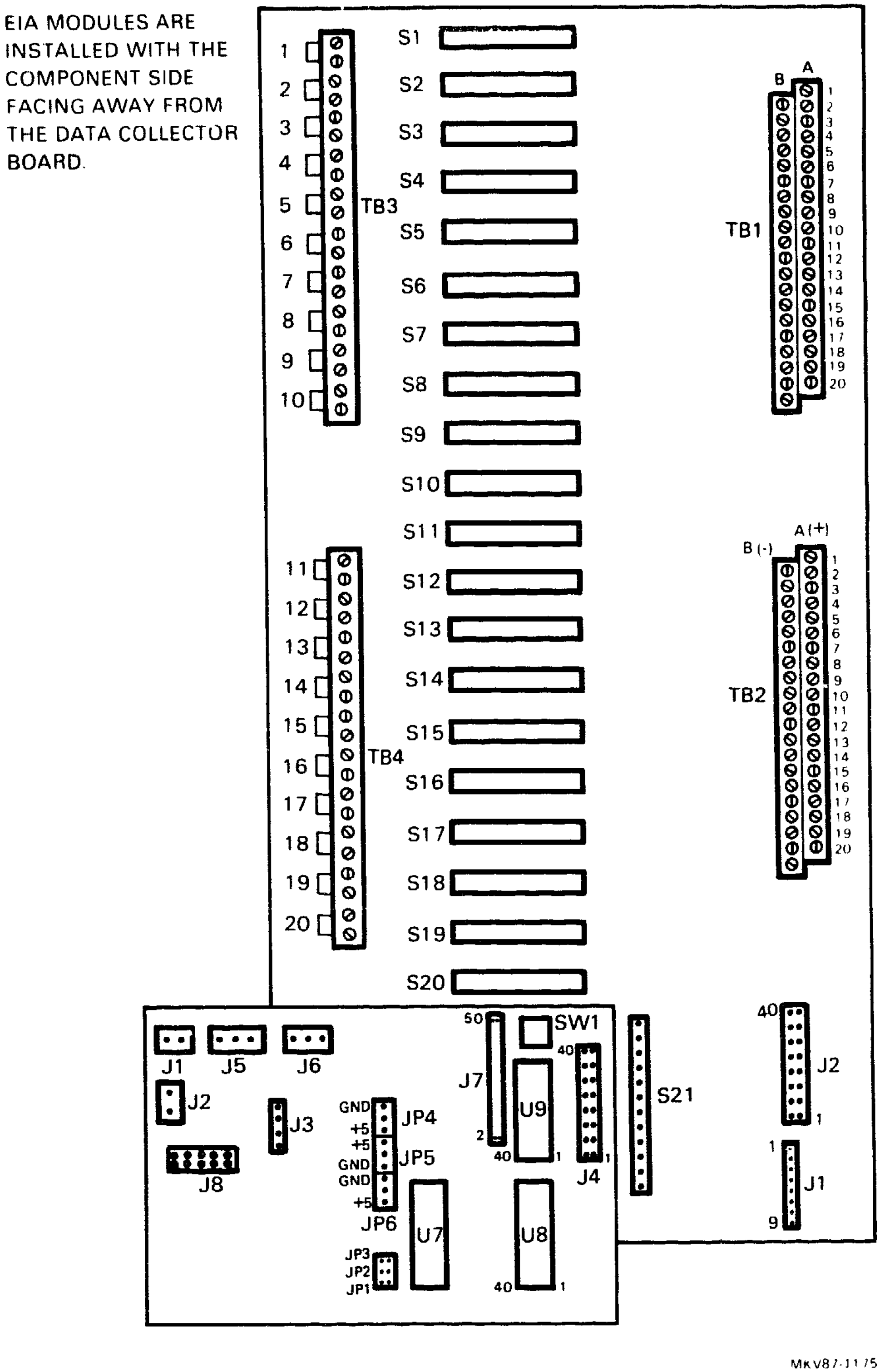

Figure 4-5 RSU Motherboard and Data Collector Board

4.4.2 Installation

This section contains the procedures for installing the RSU box, external probes, and the power isolator board and battery back-up option. The customer is responsible for mounting the RSU box in the desired location, installing the external probe sensors and routing the wires to the RSU box location, drilling any holes that are required in the RSU box, and routing the RS-422 interface cable to the RSU box location. Digital Customer Services is responsible for configuring the RSU box, connecting the external probe sensor wires to the proper terminal inside the RSU box, installing and adjusting the correct EIA modules for the external sensors, connecting the RS-422 interface cable, and installing the power isolator board and battery back-up option.

NOTE

If the power isolator board and battery back-up option are to be installed, the RSU box must be mounted within 1.8 m (6 ft) of a 120 Vac electrical outlet.

Use the following procedure to install and configure the RSU box.

[ ] 1. Unpack the RSU box, ensuring that all of the components are included. (See the enclosed inventory sheet.)

[ ] 2. Remove the screws holding the cover on the RSU box.

CAUTION

Remove the data collector board and the motherboard before drilling holes in the RSU box. This prevents damage to the boards and metal particles from lodging on the boards that could cause short circuits when power is applied.

[ ] 3. Drill holes in the back of the RSU box to mount the box to the wall or floor. Ensure that the mounting screws do not touch the motherboard. Drill hole(s) in the side of the box for routing the external probe sensor wires. A hole for routing the interface cable should already exist. Entry fittings should be used to maintain watertight integrity.

[ ] 4. Mount the motherboard in the RSU box. Mount the data collector board on the motherboard and connect the cable from J4 on the data collector board to J2 on the motherboard.

[ ] 5. If a relay module is to be installed, plug the relay module into slot S21 on the motherboard, and connect the cable from J3 on the data collector board to J1 on the motherboard. J3 Pin 1 on the data collector board is 12 Vdc and connects to J1 Pin 9 on the motherboard. J3 Pir 2 on the data collector board connects to J1 Pin 1 on the motherboard.

[ ] 6. On the data collector board, connect a jumper on JP1, JP2, or JP3 to assign a logical relay number to the relay module (JP1=Relay 1, JP2= Relay 2, JP3=Relay 3). Refer to Figure 4-5 for the jumper location.

[ ] 7. On the data collector board, configure JP4, JP5, and JP6 to the correct box number. If the RSU box is connected to Port 0 on the PDS+ unit, a box number of 2 or 3 can be assigned. If the RSU box is connected to Port 1 on the PDS+ unit, a box number of 0, 1, 2, or 3 can be assigned. Use the following chart and Figure 4-6 for proper configuration. The jumpers should be connected between the center pin and the GND or 5V pin as indicated by the following chart.

Port and Box Number	**JP4**		**JP5**		**JP6**	
	GND	**5V**	**GND**	**5V**	**GND**	**5V**
0-0	Reserved, do not assign on Port 0					
0-1	Reserved, do not assign on Port 0					
0-2	X			X	X	
0-3		X		X	X	
1-0	X		X		X	
1-1		X	X		X	
1-2	X			X	X	
1-3		X		X	X	

[ ] 8. If power is being supplied by the power adapter option, refer to the power adapter installation procedure located on page 4-29 and install the power adapter option <u>before continuing</u>.

[ ] 9. Mount the RSU box in the desired location.

[ ] 10. Connect the 3-pin plug on the interface cable to J5 or J6 on the data collector board. Connect the other end of the interface cable into:

a. The RSU 0 mini D-type connector on the interface plate located at the rear of the PDS+ unit if the RSU is configured as box 2 on Port 0.

b. The RSU 1 mini D-type connector on the interface plate located at the rear of the PDS+ unit if the RSU is configured as box 0 on Port 1.

c. J5 or J6 on the data collector board of the preceding RSU box if it is being daisy chained to an existing RSU box.

If power is being supplied by the PDS+ unit, connect the 2-pin plug on the interface cable to J1 or J2 on the data collector board.

[ ] 11. Press the RESET switch (SW1) on the data collector board to store the assigned box number in memory.

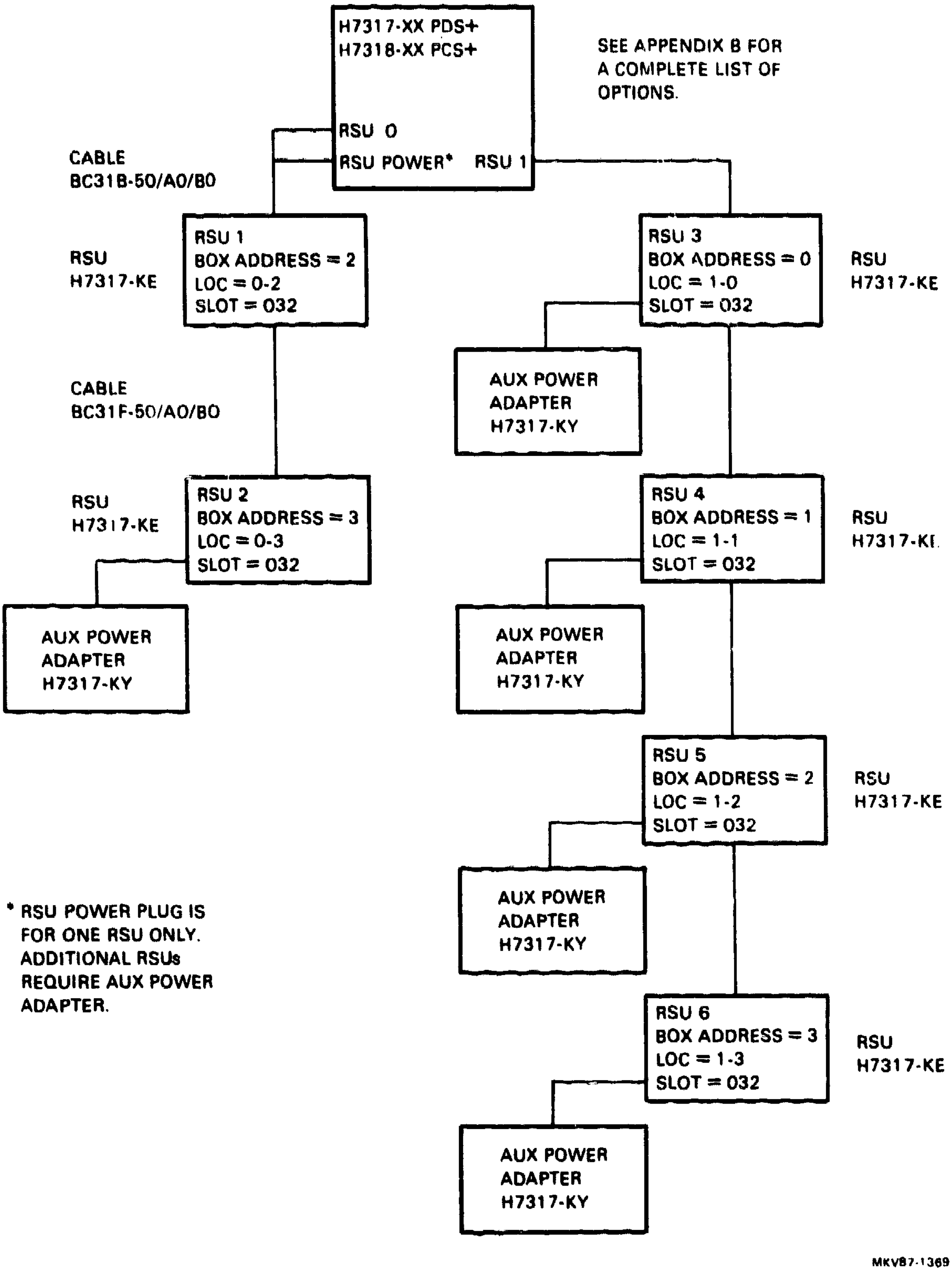

Figure 4-6 Remote Sensor Unit Location Assignments

Programming and Testing the RSU Box

The RSU box must be programmed as a digital probe in order to establish communications with the PDS+ unit. Use the following procedure to program the RSU box and test for communications.

[ ] 1. Power up the PDS+ unit.

[ ] 2. Place the maintenance switch on the I3 interface board to the MAINTENANCE position (see Figures 6-2 and 6-3).

[ ] 3. Enter: #, 4, SC, 5, 2 on the LCD of the PDS+ unit to access the Add Probe Menu. The system automatically displays the number of the next available probe.

[ ] 4. The screen asks the question, "Is The New Probe Analog?" Enter a "0" for NO.

[ ] 5. The next display is Modify Probe Location and asks what probe box. Enter the number that corresponds to the port and box configuration set in Step 7 of the RSU box installation procedure. Refer to Figure 4-6.

Example: RSU 0-2 is Port 0 and box 2
RSU 0-3 is Port 0 and box 3
RSU 1-0 is Port 1 and box 0
RSU 1-1 is Port 1 and box 1
RSU 1-2 is Port 1 and box 2
RSU 1-3 is Port 1 and box 3

[ ] 6. The cursor advances to the bottom of the display and asks for slot number. Enter 032 and press the "*" key to save the change and advance to the next screen.

[ ] 7. The next display is Modify Active Name. The active name describes the probe in an alarm condition (Example: RSU 0-2 Failure). A built-in dictionary of commonly used environmental terms is available to create names. A name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name is not five words long, the cursor can be advanced through the remaining word positions with the "*" key. To save the change and advance to the next display, press the "*" key.

[ ] 8. The next display is Modify Inactive Name. The inactive name describes the normal condition (Example: RSU 0-2 OK). Scan the built-in dictionary to select words for the inactive name using the same procedure in Step 7.

[ ] 9. The next display is Modify Normally Open/Closed. Enter a "0" for closed and press the "*" key to advance to the next display.

[ ] 10. The next display is Modify Action. Enter a "1" for YES to the question, "Automatic Reset?" and press the "*" key to advance to the next screen.

[ ] 11. The next display allows an action table to be selected. This table determines what actions occur when an alarm condition exists. Use the "8" key to scan forward or the "9" key to scan backward through the possible tables until the desired table is displayed. Unless otherwise specified by the customer, select the table with Alarm-Yes, Relay1-No, Relay2-No, Relay3-No, and Trip-No. When the desired table is displayed, press the "*" key to store the table and advance to the next screen.

[ ] 12. The next display is Global Action. Global Action can be used only on multiple-unit configurations. If Global Action is desired by the customer, refer to page 3-51 for a detailed explanation. If Global Action is not desired, press the "*" key to advance the cursor through the three questions, ensuring that the answer to "Send?" and "Receive?" is NO, and advance to the next screen.

[ ] 13. The next display is Modify Delay. This screen is used to select the number of seconds or minutes an alarm condition must exist before any action is taken. Use the "8" key to scan forward or the "9" key to scan backward until the desired time is shown (a minimum delay of one second should be selected). Press the "*" key to store the time and advance to the next screen.

[ ] 14. The next display is Modify Display Group. This screen allows a group number to be assigned to the RSU box. The group number determines with which display group the RSU box is displayed when the Scan Probe Data Menu is accessed. Enter the group number (0 to 7) and press the "*" key to save the change and advance to the next screen.

[ ] 15. The next display is Enable/Disable Probe. Enter a "1" for YES to enable the probe, and press the "*" key to return to the Add Probe Menu. Press the "#" key to return to the Main Menu.

At this point, the programming of the probe is complete. The remaining steps are for testing to ensure that communications have been established between the probe and the PDS+ unit.

[ ] 16. Enter: #, 5, 1 on the LCD keyboard to access the Display Probe Data screen. Enter the 3-digit probe number assigned to the RSU box. If the probe number is a 2-digit number, enter a leading 0 (Example: 046, 053). The screen automatically advances to the next display.

[ ] 17. The next display shows the probe number and the inactive name assigned in Step 8. This indicates that the RSU box and the PDS+ unit are communicating properly.

[ ] 18. Go to the RSU box and disconnect the RSU interface cable from J5 or J6 on the data collector board.

[ ] 19. The ALARM ON indicator should light, the alarm should sound, and the probe name should change to the active name that was assigned in Step 7.

[ ] 20. Reconnect the RSU interface cable to J5 or J6 on the data collector board and press the RESET key on the PDS+ unit.

[ ] 21. The RSU box has been installed and communications have been established. External probes can now be connected and programmed. After the modification, complete the probe data sheet (Table F-1) in Appendix F by entering the new parameters.

Power Adapter Installation

Use the following procedure to install the power adapter option.

[ ] 1. Unpack the power adapter option (H7317-KY), ensuring that the following items are included.

- Power isolator board
- AC adapter
- Battery
- Two cable connectors
- Cable entry gland assembly

[ ] 2. Remove the jumpers from J8 on the data collector board in the RSU box. Save these jumpers by taping them inside the RSU box.

[ ] 3. Plug J1 on the power isolator board into J8 on the data collector board. Ensure that the power isolator board is centered on the data collector board and that the power isolator board is NOT making contact with any components on the data collector board except J8.

[ ] 4. Route the cable from the ac adapter to the RSU box through the hole that has been drilled for this cable entry by the customer. DO NOT plug the ac adapter into an electrical outlet at this time.

[ ] 5. Connect the cable from the ac adapter to J2 on the power isolator board (Figure 4-7).

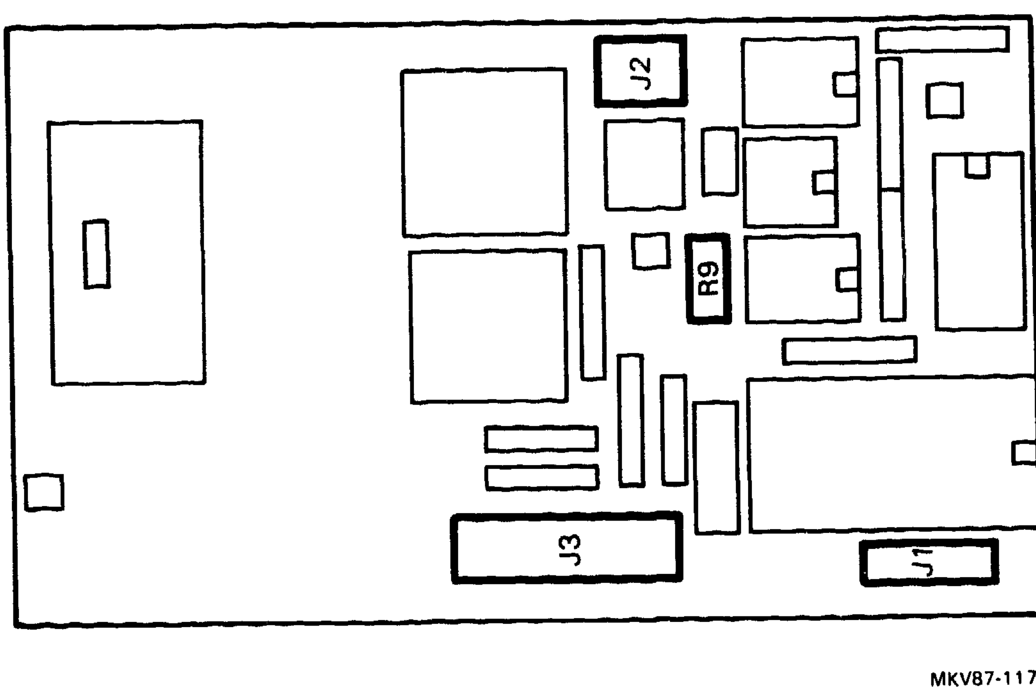

Figure 4-7 Power Isolator Board

[ ] 6. Plug the ac adapter into a 120 Vac electrical outlet.

[ ] 7. With a digital multimeter, measure the voltage between pins 1 and 2 of J2 on the power isolator board. The measurement should be approximately 16 Vac.

[ ] 8. With a digital multimeter, measure the voltage between pins 3 and 4 of J3 on the power isolator board. The measurement should be 12 Vdc. If necessary adjust R9 on the power isolator board until 12 Vdc is measured.

[ ] 9. Unplug the ac adapter and pl .ce the battery inside the RSU box. Connect one end of the battery cable to the battery, observing correct polarity.

[ ] 10. Connect the remaining cable harness to J3 on the power isolator board.

[ ] 11. Connect the other end of the battery cable to the mating plug on the cable harness installed in Step 10.

[ ] 12. Connect the remaining plug (P1) on the J3 cable harness to J1 or J2 on the data collector board.

[ ] 13. Plug the ac adapter into a 120 Vac electrical outlet and return to Step 9 of the RSU box installation procedure.

4.5 GENERAL PROBE INSTALLATION

Three basic types of sensor probes can be connected to the RSU box. Use the following procedures to install each type of probe sensor. The customer is responsible for installing the sensor, routing the connecting twisted-pair wires from the sensor to the RSU or BIA box, and drilling any holes in the RSU or BIA box for connecting wire access. Digital Customer Services is responsible for installing the EIA module, connecting the connecting twisted-pair wires to the RSU box, and programming the probe.

NOTE

Probe sensor wires should not run parallel to unshielded power cables or wires to and from air conditioning interlocks. If probe sensor wires must run parallel to other cables, use shielded probe sensor wires.

4.5.1 Dry-Contact Sensors

All dry-contact probe sensors are connected through TB1 on the RSU motherboard. Each sensor has two wires. One of the wires is connected to TB1-A and the other is connected to TB1-B. Use the following procedure for installing a dry-contact sensor probe.

[ ] 1. Install the dry-contact sensor EIA module (H7317-KJ) in one of the EIA slots (S1-S20) on the RSU motherboard. The EIA module is installed with the component side facing away from the data collector board.

[ ] 2. Connect the two wires from the external probe sensor to the terminals on TB1 that correspond to the EIA slot. Ensure that the customer has connected the other end of these wires to the sensor.

Example: If the EIA module is installed in slot S6, connect one of the external probe sensor wires to TB1-A6 and the other wire to TB1-B6 (Figure 4-8).

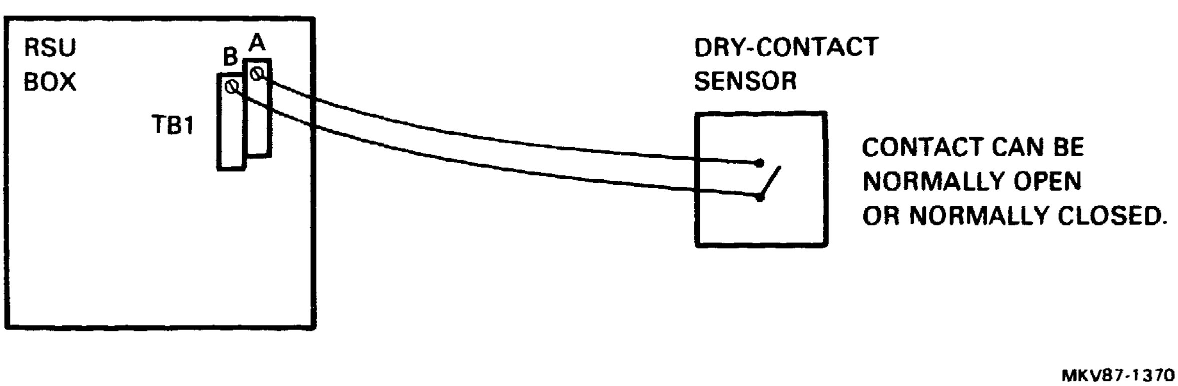

Figure 4-8 Typical Dry-Contact Sensor Connection Diagram

Programming the Dry-Contact Sensor
The dry-contact sensor is programmed as a digital probe. Use the following procedure to program the dry-contact sensor.

[ ] 1. Power up the PDS+ unit.

[ ] 2. Place the maintenance switch on the I3 interface board to the MAINTENANCE position (see Figures 6-2 and 6-3).

[ ] 3. Enter: #, 4, SC, 5, 2 on the LCD of the PDS+ unit to access the Add Probe Menu. The system automatically displays the number of the next available probe.

[ ] 4. The screen asks the question, "Is The New Probe Analog?" Enter a "0" for NO.

[ ] 5. The next display is Modify Probe Location and asks what probe box. Enter the number that corresponds to the port and box configuration of the RSU box to which the probe is being connected. Refer to Figure 4-6.

Example: RSU 0-2 is Port 0 and box 2
RSU 0-3 is Port 0 and box 3
RSU 1-0 is Port 1 and box 0
RSU 1-1 is Port 1 and box 1
RSU 1-2 is Port 1 and box 2
RSU 1-3 is Port 1 and box 3

[ ] 6. The cursor advances to the bottom of the display and asks for slot number. Enter the slot number in which the EIA module was installed and press the "*" key to save the change and advance to the next screen.

[ ] 7. The next display is Modify Active Name. The active name describes the probe in an alarm condition (Example: DOOR 1 OPEN). A built-in dictionary of commonly used environmental terms is available to create names. A name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name is not five words long, the cursor can be advanced through the remaining word positions with the "*" key. To save the change and advance to the next display, press the "*" key.

[ ] 8. The next display is Modify Inactive Name. The inactive name describes the normal condition (Example: DOOR 1 CLOSED). Scan the built-in dictionary to select words for the inactive name using the same procedure in Step 7.

[ ] 9. The next display is Modify Normally Open/Closed. Enter a "0" for closed or a "1" for open and press the "*" key to advance to the next display. The normally open/closed condition refers to the active or alarm condition. If the dry-contact switch being closed indicates an alarm condition, then it is designated as normally closed. If the dry-contact switch being open indicates an alarm condition, then it is designated as normally open.

[ ] 10. The next display is Modify Action. Enter a "1" for YES to the question "Automatic Reset?" and press the "*" key to advance to the next screen.

[ ] 11. The next display allows an action table to be selected. This table determines what actions occur when an alarm condition exists. Use the "8" key to scan forward or the "9" key to scan backward through the possible tables until the desired table is displayed. Unless otherwise specified by the customer, select the table with Alarm-Yes, Relay1-No, Relay2-No, Relay3-No, and Trip-No. When the desired table is displayed, press the "*" key to store the table and advance to the next screen.

[ ] 12. The next display is Global Action. Global Action can be used only on multiple-unit configurations. If Global Action is desired by the customer, refer to page 3-51 for a detailed explanation. If Global Action is not desired, press the "*" key to advance the cursor through the three questions, ensuring that the answer to "Send?" and "Receive?" is NO, and advance to the next screen.

[ ] 13. The next display is Modify Delay. This screen is used to select the number of seconds or minutes an alarm condition must exist before any action is taken. Use the "8" key to scan forward or the "9" key to scan backward until the desired time is shown (a minimum delay of one second should be selected). Press the "*" key to store the time and advance to the next screen.

[ ] 14. The next display is Modify Display Group. This screen allows a group number to be assigned to the probe. The group number determines with which display group the probe is displayed when the Scan Probe Data Menu is accessed. Enter the group number (0 to 7) and press the "*" key to save the change and advance to the next screen.

[ ] 15. The next display is Enable/Disable Probe. Enter a "1" for YES to enable the probe and press the "*" key to return to the Add Probe Menu. Press the "#" key to return to the Main Menu.

At this point, the programming of the probe is complete. The remaining steps are for testing to ensure that communications have been established between the probe and the PDS+ unit.

[ ] 16. Enter: #, 5, 1 on the LCD keyboard to access the Display Probe Data screen. Enter the 3-digit probe number assigned to the dry-contact sensor probe. If the probe number is a 2-digit number, enter a leading 0 (Example: 046, 053). The screen automatically advances to the next display.

[ ] 17. The next display shows the probe number and the inactive name that was assigned in Step 8. This indicates that the probe and the PDS+ unit are communicating properly.

[ ] 18. Return the PDS+ unit to Normal mode by placing the maintenance switch on the I3 interface board to the NORMAL position and pressing the RESET switch on the UCC.

[ ] 19. After adding the probe, complete the probe data sheet (Table F-1) in Appendix F by entering the new probe number, name, and parameters.

4.5.2 ON/OFF Sensors

All ON/OFF type sensors (voltage or current) are connected through TB3 and TB4 on the RSU motherboard. TB3 is for EIA slots S1 through S10. TB4 is for EIA slots S11 through S20. Use the following procedure for installing an ON/OFF sensor probe.

[ ] 1. Install the correct (voltage or current) EIA module (H7317-KK/KL/KM/KP) in one of the EIA slots (S1-S20) on the RSU motherboard. The EIA module is installed with the component side facing away from the data collector board.

[ ] 2. Connect the two wires from the external probe sensor to the two terminals on TB3 or TB4 that correspond to the EIA slot. Ensure that the customer has connected the other end of these wires to the sensor.

Example: If the EIA module is installed in slot S10, connect the two external probe sensor wires to the two terminals labeled 10 on TB3. If the EIA module is installed in slot S15, connect the two wires to the two terminals labeled 15 on TB4 (Figure 4-9).

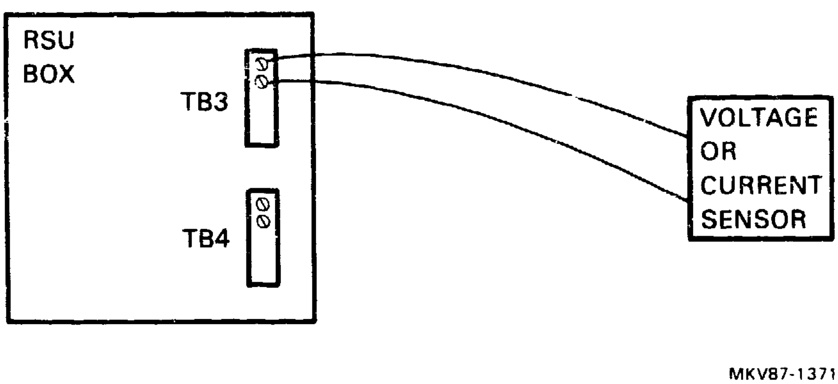

Figure 4-9 Typical ON/OFF Sensor Connection Diagram

Programming the ON/OFF Sensor

The ON/OFF sensor is programmed as a digital probe. Use the following procedure to program the ON/OFF sensor.

[ ] 1. Power up the PDS+ unit.

[ ] 2. Place the maintenance switch on the I3 interface board to the MAINTENANCE position (see Figures 6-2 and 6-3).

[ ] 3. Enter: #, 4, SC, 5, 2 on the LCD of the PDS+ unit to access the Add Probe Menu. The system automatically displays the number of the next available probe.

[ ] 4. The screen asks the question, "Is The New Probe Analog?" Enter a "0" for NO.

[ ] 5. The next display is Modify Probe Location and asks what probe box. Enter the number that corresponds to the port and box configuration of the RSU box to which the probe is being connected. Refer to Figure 4-6.

Example: RSU 0-2 is Port 0 and box 2
RSU 0-3 is Port 0 and box 3
RSU 1-0 is Port 1 and box 0
RSU 1-1 is Port 1 and box 1
RSU 1-2 is Port 1 and box 2
RSU 1-3 is Port 1 and box 3

[ ] 6. The cursor advances to the bottom of the display and asks for slot number. Enter the slot number in which the EIA module was installed and press the "*" key to save the change and advance to the next screen.

[ ] 7. The next display is Modify Active Name. The active name describes the probe in an alarm condition (Example: GENERATOR OFF). A built-in dictionary of commonly used environmental terms is available to create names. A name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name is not five words long, the cursor can be advanced through the remaining word positions with the "*" key. To save the change and advance to the next display, press the "*" key.

[ ] 8. The next display is Modify Inactive Name. The inactive name describes the normal condition (Example: GENERATOR ON). Scan the built-in dictionary to select words for the inactive name using the same procedure in Step 7.

[ ] 9. The next display is Modify Normally Open/Closed. Enter a "0" for closed or a "1" for open and press the "*" key to advance to the next display. The normally open/closed condition refers to the active or alarm condition. If the ON/OFF sensor detecting voltage or current indicates an alarm condition, then it is designated as normally closed. If the ON/OFF sensor detecting no voltage or current indicates an alarm condition, then it is designated as normally open.

[ ] 10. The next display is Modify Action. Enter a "1" for YES to the question "Automatic Reset?" and press the "*" key to advance to the next screen.

[ ] 11. The next display allows an action table to be selected. This table determines what actions occur when an alarm condition exists. Use the "8" key to scan forward or the "9" key to scan backward through the possible tables until the desired table is displayed. Unless otherwise specified by the customer, select the table with Alarm-Yes, Relay1-No, Relay2-No, Relay3-No, and Trip-No. When the desired table is displayed, press the "*" key to store the table and advance to next screen.

[ ] 12. The next display is Global Action. Global Action can be used only on multiple-unit configurations. If Global Action is desired by the customer, refer to page 3-51 for a detailed explanation. If Global Action is not desired, press the "*" key to advance the cursor through the three questions, ensuring that the answer to "Send?" and "Receive?" is NO, and advance to the next screen.

[ ] 13. The next display is Modify Delay. This screen is used to select the number of seconds or minutes an alarm condition must exist before any action is taken. Use the "8" key to scan forward or the "9" key to scan backward until the desired time is shown (a minimum delay of one second should be selected). Press the "*" key to store the time and advance to the next screen.

[ ] 14. The next display is Modify Display Group. This screen allows a group number to be assigned to the probe. The group number determines with which display group the probe is displayed when the Scan Probe Data Menu is accessed. Enter the group number (0 to 7) and press the "*" key to save the change and advance to the next screen.

[ ] 15. The next display is Enable/Disable Probe. Enter a "1" for YES to enable the probe and press the "*" key to return to the Add Probe Menu. Press the "#" key to return to the Main Menu.

At this point, the programming of the probe is complete. The remaining steps are for testing to ensure that communications have been established between the probe and the PDS+ unit.

[ ] 16. Enter: #, 5, 1 on the LCD keyboard to access the Display Probe Data screen. Enter the 3-digit probe number assigned to the ON/OFF sensor probe. If the probe number is a 2-digit number, enter a leading 0 (Example: 046, 053). The screen automatically advances to the next display.

[ ] 17. The next display shows the probe number and the inactive name that was assigned in Step 8. This indicates that the probe and the PDS+ unit are communicating properly.

[ ] 18. Return the PDS+ unit to Normal mode by placing the maintenance switch on the I3 interface board to the NORMAL position and pressing the RESET switch on the UCC.

CAUTION
Testing in the Normal mode may result in a shunt trip of the PDS+ unit.

[ ] 19. After adding the probe, complete the probe data sheet (Table F-1) in Appendix F by entering the new probe number, name, and parameters.

4.5.3 Analog Sensors

All analog type sensors (voltage/current/frequency) are connected through TB2 to the RSU motherboard. Each sensor has two wires. The wire with the higher potential should be connected to TB2-A(+) and the wire with the lower potential should be connected to TB2-B(-).

EIA Module Option	Minimum Input	Maximum Input
H7317-KN (frequency)	0 Vac	12 Vac
H7317-KS (voltage)	0 Vac	12 Vac
H7317-KT (current)	0 Amps ac	5 Amps ac
H7317-KR (current)	4 mA	20 mA

If the voltage or frequency signal has an amplitude greater than 12 Vac, the signal must be stepped down through a transformer before being sent to the EIA module. If the current signal for the H7317-KT option has an amplitude greater than 5 A, the signal must be reduced through a current doughnut before being sent to the EIA module. The current for the H7317-KR option must be from a 4 to 20 mA probe, with 4 mA representing the minimum probe range and 20 mA representing the maximum probe range.

NOTE

Only an analog probe with an output linearly related to its input should be used. The minimum and maximum gain/offset points are established with an assumed linear range between these points. If an analog probe whose output is not linearly related to its input is used, an error may exist between the displayed probe value and the actual value being monitored.

Use the following procedure to install an analog probe.

[ ] 1. Install the correct (frequency/voltage/current) EIA module (H7317-KN/KS/KT/KR) in one of the EIA slots (S1-S20) on the RSU motherboard. The EIA module is installed with the component side facing away from the data collector board.

[ ] 2. Connect the two wires from the external probe sensor to the two terminals on TB2 that correspond to the EIA slot. Correct polarity must be observed. Ensure that the customer has connected the other end of these wires to the sensor.

Example: If the EIA module is installed in slot S18, connect the external probe sensor wire with the <u>higher</u> potential to TB2-A18, and the wire with the <u>lower</u> potential to TB2-B18.

[ ] 3. Use one of the following procedures to adjust the potentiometer on the analog EIA module for the correct gain/offset values. The correct procedure is determined by whether the EIA module is a voltage (H7317-KS) EIA, a frequency (H7317-KN) EIA, a current (H7317-KT) EIA, or a current (H7317-KR) EIA.

Voltage EIA (H7317-KS)

[ ] 4. Measure the actual voltage that the sensor is monitoring. (Example: 120 Vac, 220 Vac, 440 Vac)

[ ] 5. With the EIA module installed, the external probe sensor connected to TB2, and the voltage applied, use a digital voltmeter to measure the output of the EIA module at the input to the A/D converter on the data collector board. See Table 4-1 for the EIA slot output to A/D converter input connections.

[ ] 6. Connect the <u>positive</u> lead of the voltmeter to the correct A/D converter input pin, and the <u>negative</u> lead to Pin 2 of J1 or J2 on the data collector board.

[ ] 7. Adjust the potentiometer on the EIA module until a reading between 3.5 Vdc and 4.5 Vdc is obtained. Do not exceed 5 Vdc because this is the maximum the A/D converter can accept and will cause erratic probe readings. If multiple EIAs are being used to measure related voltages (for example, phase A, phase B, phase C), the outputs of the EIAs should be adjusted to the same value.

[ ] 8. Record the value to which the EIA module was adjusted, for use in setting the gain/offset parameters when programming the probe. The Gain/Offset screen is shown below.

Minimum Reading = 00.00
DC Voltage For Min Reading = 0.0
Maximum Reading = The voltage measured in Step 4
DC Voltage For Max Reading = Voltage set in Step 7

[ ] 9. The sensor has been installed and the EIA module has been adjusted. Proceed to the "Programming and Calibrating the Analog Sensor" procedure.

Frequency EIA (H7317-KN)

[ ] 4. Measure the actual frequency that the sensor is monitoring. (Example: 60 Hz, 400 Hz, 50 Hz)

[ ] 5. With the EIA module installed, the external probe sensor connected to TB2, and voltage applied, use a digital voltmeter to measure the output of the EIA module at the input to the A/D converter on the data collector board. See Table 4-1 for the EIA slot output to A/D converter input connections.

[ ] 6. Connect the positive lead of the voltmeter to the correct A/D converter input pin, and the negative lead to Pin 2 of J1 or J2 on the data collector board.

[ ] 7. Adjust the potentiometer on the EIA module until a reading between 3.5 Vdc and 4.5 Vdc is obtained. Do not exceed 5 Vdc because this is the maximum the A/D converter can accept and will cause erratic probe readings.

[ ] 8. Record the value to which the EIA module was adjusted, for use in setting the gain/offset parameters when programming the probe. The Gain/Offset screen is shown below.

Minimum Reading = 00.00
DC Voltage For Min Reading = 0.0
Maximum Reading = The frequency measured in Step 4
DC Voltage For Max Reading = Voltage set in Step 7

[ ] 9. The sensor has been installed and the EIA module has been adjusted. Proceed to the "Programming and Calibrating the Analog Sensor" procedure.

Current EIA (H7317-KT)

[ ] 4. Measure the actual current that the sensor is monitoring. (Example: 20 A, 30 A, 150 A)

Use one of the following formulas or a similar formula, depending upon the current doughnut turns ratio, to determine to what value the output of the EIA module must be adjusted.

For 800:5 current doughnut:

$$\frac{\text{Actual current being monitored X 5}}{800} = \text{n.nn}$$

For 400:5 current doughnut:

$$\frac{\text{Actual current being monitored X 5}}{400} = \text{n.nn}$$

[ ] 5. With the EIA module installed, the external probe sensor connected to TB2, and voltage applied, use a digital voltmeter to measure the output of the EIA module at the input to the A/D converter on the data collector board. See Table 4-1 for the EIA slot output to A/D converter input connections.

[ ] 6. Connect the positive lead of the voltmeter to the correct A/D converter input pin, and the negative lead to Pin 2 of J1 or J2 on the data collector board.

[ ] 7. Adjust the potentiometer on the EIA module until a reading equal to the n.nn value calculated in Step 4 is obtained. Do not exceed 5 Vdc because this is the maximum the A/D converter can accept and will cause erratic probe readings.

[ ] 8. Record the value to which the EIA module was adjusted for use in setting the gain/offset parameters when programming the probe. The Gain/Offset screen is shown below.

Minimum Reading = 00.00
DC Voltage For Min Reading = 0.0
Maximum Reading = The current measured in Step 4
DC Voltage For Max Reading = Voltage set in Step 7

[ ] 9. The sensor has been installed and the EIA module has been adjusted. Proceed to the "Programming and Calibrating the Analog Sensor" procedure.

Current EIA (H7317-KR)

[ ] 4. Record the actual value that the probe is monitoring.

[ ] 5. Record the minimum and maximum range values of the installed probe.

[ ] 6. Use the values shown on the next page in setting the gain/offset parameters when programming the probe. The Gain/Offset screen is shown on the next page.

Minimum Reading = Minimum probe range value
DC Voltage For Min Reading = 1.0
Maximum Reading = Maximum probe range value
DC Voltage For Max Reading = 5.00

[ ] 7. The sensor and the EIA module have been installed. Proceed to the "Programming and Calibrating the Analog Sensor" procedure.

Table 4-1 EIA Slot Output to A/D Converter Input Connections

	A/D Converter Input	
EIA Slot	**Chip**	**Pin**
1	U8	38
2	U8	39
3	U8	40
4	U8	1
5	U8	2
6	U8	3
7	U8	4
8	U8	5
9	U8	6
10	U8	7
11	U8	8
12	U8	9
13	U8	10
14	U8	11
15	U8	12
16	U8	14
17	U9	38
18	U9	39
19	U9	40
20	U9	1

Refer to Figure 4-5 for A/D converter chip location on the data collector board.

Programming and Calibrating the Analog Sensor
The analog sensor is programmed as an analog probe. Use the following procedure to program and calibrate the analog sensor.

[ ] 1. Power up the PDS+ unit.

[ ] 2. Place the maintenance switch on the I3 interface board to the MAINTENANCE position (see Figures 6-2 and 6-3).

[ ] 3. Enter: #, 4, SC, 5, 2 on the LCD of the PDS+ unit to access the Add Probe Menu. The system automatically displays the number of the next available probe.

[ ] 4. The screen asks the question "Is The New Probe Analog?" Enter a "1" for YES.

[ ] 5. The next display is Modify Probe Location and asks what probe box. Enter the number that corresponds to the port and box configuration of the RSU box to which the probe is being connected. Refer to Figure 4-6.

Example: RSU 0-2 is Port 0 and box 2
RSU 0-3 is Port 0 and box 3
RSU 1-0 is Port 1 and box 0
RSU 1-1 is Port 1 and box 1
RSU 1-2 is Port 1 and box 2
RSU 1-3 is Port 1 and box 3

[ ] 6. The cursor advances to the bottom of the display and asks for slot number. Enter the slot number in which the EIA module was installed and press the "*" key to save the change and advance to the next screen.

[ ] 7. The next display is Modify Name. This display is used to enter the probe name (Example: GENERATOR VOLTAGE or GENERATOR FREQUENCY or LOAD CURRENT). A built-in dictionary of commonly used environmental terms is available to create names. A name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name is not five words long, the cursor can be advanced through the remaining word positions with the "*" key. To save the name and advance to the next display, press the "*" key.

[ ] 8. The next display is Assign New Gain/Offset. Select the Calculate New Gain/Offset Value option by pressing the "1" key.

When performing Steps 9 through 12, refer to the appropriate EIA procedure performed in Steps 4 through 9 of the analog probe installation.

[ ] 9. The next display asks the question, "Minimum Reading?" Enter 0000 and press the "*" key to continue.

For the H7317-KR option, enter the minimum probe range value and press the "*" key to continue.

[ ] 10. The next question to appear on the display is, "DC Voltage For Min Reading?" Enter 00 and press the "*" key.

For the H7317-KR option, enter 10 and press the "*" key.

[ ] 11. The next question to appear is, "Maximum Reading?" Enter the value of the signal measured in Step 4 of the appropriate EIA procedure in the analog probe installation (Example: 1200 for 120 Vac, 1500 for 150 A, 0600 for 60 Hz). Press the "*" key to continue.

For the H7317-KR option, enter the maximum probe range value and press the "*" key to continue.

[ ] 12. The next question to appear is, "DC Voltage For Max Reading?" Enter the value to which the EIA potentiometer was adjusted in Step 7 of the installation procedures (Example: 350 for 3.5 Vdc, 450 for 4.5 Vdc), and press the "*" key to return to the Assign New Gain/Offset screen. Press the "*" key again to advance to the next display.

For the H7317-KR option, enter 500 and press the "*" key to return to the Assign New Gain/Offset screen. Press the "*" key again to advance to the next display.

[ ] 13. The next display is Modify Averaging. This allows a probe's values to be averaged before displaying. Data displays of unstable waveforms produce fluctuations on the screen unless they are averaged. Averaging is not necessary for probes that monitor stable signals. Press the "1" key if averaging is desired or the "0" key if averaging is not desired. Press the "*" key to advance to the next display.

[ ] 14. The next display is Modify Nominal. Press the "8" key to scan forward or the "9" key to scan backward until the desired value is displayed (120 for 120 Vac, 150 for 150 A, or 60 for 60 Hz). Press the "*" key to save the displayed value and advance to the next display.

[ ] 15. The next display is Modify Limits. This screen allows the probe's four alarm-threshold limits to be set. Limits are displayed in both percentages and actual values. The

values are based on the nominal value selected on the previous display. Press the "8" key to scan forward or the "9" key to scan backward until the desired limits are displayed. Press the "*" key to save the displayed limits and advance to the next screen.

[ ] 16. The next display is Modify Action. Enter a "1" for YES to the question, "Automatic Reset?" and press the "*" key to advance to the next screen.

[ ] 17. The next display allows an action table to be selected. This table determines what actions occur for each of the four limits when an alarm condition exists. Use the "8" key to scan forward or the "9" key to scan backward through the possible tables until the desired table is displayed. Unless otherwise specified by the customer, select the table with Alarm-Yes, Relay1-No, Relay2-No, Relay3-No, and Trip-No for each of the four threshold limits. When the desired table is displayed, press the "*" key to store the table and advance to the next screen.

[ ] 18. The next display is Global Action. Global Action can be used only on multiple-unit configurations. If Global Action is desired by the customer, refer to page 3-44 for a detailed explanation. If Global Action is not desired, press the "*" key to advance the cursor through the three questions, ensuring that the answer to "Send?" and "Receive?" is NO, and advance to the next screen.

[ ] 19. The next display is Modify Delay. This screen is used to select the number of seconds or minutes an alarm condition must exist for each of the four threshold limits before any action is taken. The cursor appears underneath the 2nd Stg High. Use the "8" key to scan forward or the "9" key to scan backward until the desired time is shown (a minimum delay of one second should be selected). Press the "*" key to save that time and advance the cursor to the next stage (1st Stg High). After times have been selected for all stages using the above procedure, press the "*" key to save the times and advance to the next screen.

[ ] 20. The next display is Modify Display Group. This screen allows a group number to be assigned to the probe. The group number determines with which display group the probe is displayed when the Scan Probe Data Menu is accessed. Enter the group number (0 to 7) and press the "*" key to save the change and advance to the next screen.

[ ] 21. The next display is Enable/Disable Probe. Enter a "1" for YES to enable the probe and press the "*" key to return to the Add Probe Menu. Press the "#" key to return to the Main Menu.

[ ] 22. At this time, the analog sensor probe has been installed and programmed. The probe's displayed value on the PDS+ LCD screen needs to be calibrated to the value being detected by the analog sensor.

[ ] 23. Enter: #, 5, 1 on the LCD keyboard to access the Display Probe Data screen. Enter the 3-digit probe number assigned to the analog sensor probe. If the probe number is a 2-digit number, enter a leading 0 (Example: 046, 053). The screen automatically advances to the next display.

[ ] 24. The next display shows the probe number, the probe name assigned in Step 7, and the present value the probe is detecting. The probe value is continuously updated on this screen which indicates that the probe and the PDS+ unit are communicating properly.

[ ] 25. If the displayed value is close to the actual value being monitored, perform Step 26 and stop. If the displayed value is not close to the actual value being monitored, proceed to step 27 and continue.

For the H7317-KR option, if the displayed value is close to the actual value being monitored, perform Step 26 and stop. If the displayed value is not close to the actual value being monitored, adjust the potentiometer on the 4 to 20 mA EIA module until the displayed value equals the actual value being monitored. Proceed to Step 26 and stop.

[ ] 26. The analog sensor has been installed, programmed, and calibrated. Complete the probe data sheet (Table F-1) in Appendix F by entering the new parameters.

[ ] 27. Enter: #, 4, SC, 5, 4 on the LCD keyboard to access the Modify Gain/Offset screen. Enter the 3-digit probe number assigned to the analog sensor probe. If the probe number is a 2-digit number, enter a leading 0 (Example: 046, 053). The screen automatically displays the present value of the probe.

[ ] 28. Select the Inc Gain Slow (option 2) or the Dec Gain Slow (option 4) and continue selecting the option until the displayed probe value is equal to the value being monitored by the probe. When they are equal, press the "#" key to return to the Main Menu.

[ ] 29. The analog sensor has been installed, programmed, and calibrated. Complete the probe data sheet (Table F-1) in Appendix F by entering the new parameters.

4.6 H7317-KC TEMPERATURE SENSOR

The H7317-KC temperature sensor is connected to the PDS+ unit through a previously installed RSU box. It is a wall-mounted unit that is used to measure the surrounding ambient temperature.

4.6.1 Technical Description

The H7317-KC temperature sensor converts temperature to a current value for transmission to the RSU box.

- Minimum current of 0 mA represents a temperature of $0^{o}C$ ($32^{o}F$).
- Maximum current of 10 mA represents a temperature of $40^{o}C$ ($104^{o}F$).

The temperature EIA module installed in the RSU box converts the current from the temperature sensor unit to a voltage level that can be used by the PDS+ unit to represent present temperature.

The gain/offset parameters of the probe must be programmed to display temperature as:

- Maximum of 5 V = $40^{o}C$ ($104^{o}F$)
- Minimum of 0.9 V = $0^{o}C$ ($32^{o}F$)

After programming the probe, the temperature value displayed on the PDS+ LCD should be equal to the temperature measured in the vicinity of the temperature sensor unit. If the displayed value is off, adjust the potentiometer on the temperature EIA module until the displayed value is equal to the actual measured value.

4.6.2 Installation

This section contains the procedures for installing the H7317-KC temperature sensor, connecting the temperature sensor to the RSU box, programming the probe, and calibrating the displayed temperature value. The customer is responsible for mounting the temperature sensor unit in the desired location, routing the 2-wire cable (customer supplied Belden 8761 or 88761, or equivalent) from the sensor unit to the RSU box location, and drilling any access holes in the RSU box that are required for cable entry. Digital Customer Services is responsible for connecting the 2-wire cable to the RSU box, installing the EIA card, programming the probe, and calibrating the displayed temperature value to the actual measured temperature value.

Use the following procedure for installing the H7317-KC temperature sensor.

[ ] 1. Unpack the H7317-KC temperature sensor, ensuring that the temperature sensor unit and temperature EIA module are present.

[ ] 2. Remove the cover on the temperature sensor unit and mount the unit on the wall in the desired location. Connect <u>one</u> end of the 2-wire connecting cable to the two terminals in the temperature sensor unit (one color to + and the other color to -). Replace the cover on the temperature sensor unit.

[ ] 3. Adjust the potentiometer on the temperature EIA module to the center of its adjustable range.

[ ] 4. Install the temperature EIA module in one of the available slots (S1-S20) in the RSU box. The EIA module is installed with the component side facing away from the data collector board.

[ ] 5. Connect <u>the other</u> end of the 2-wire connecting cable to the two terminals on TB2 of the RSU box that correspond to the slot number in which the EIA module is installed.

CAUTION

Polarity must be observed. Connect the colored wire that is connected to the + terminal in the temperature sensor unit to the terminal on TB2A(+) that corresponds to the EIA slot number. Also, connect the other colored wire to the terminal on TB2B(-) that corresponds to the EIA slot number.

Programming and Calibrating the Temperature Sensor
The temperature sensor is programmed as an analog probe. Use the following procedure to program and calibrate the temperature sensor. The only tool needed is an accurate thermometer.

[ ] 1. Power up the PDS+ unit.

[ ] 2. Place the maintenance switch on the I3 interface board to the MAINTENANCE position (see Figures 6-2 and 6-3).

[ ] 3. Enter: #, 4, SC, 5, 2 on the LCD of the PDS+ unit to access the Add Probe Menu. The system automatically displays the number of the next available probe.

[ ] 4. The screen asks the question, "Is The New Probe Analog?" Enter a "1" for YES.

[ ] 5. The next display is Modify Probe Location and asks what probe box. Enter the number that corresponds to the port and box configuration of the RSU box to which the probe is being connected. Refer to Figure 4-6.

Example: RSU 0-2 is Port 0 and box 2
RSU 0-3 is Port 0 and box 3
RSU 1-0 is Port 1 and box 0
RSU 1-1 is Port 1 and box 1
RSU 1-2 is Port 1 and box 2
RSU 1-3 is Port 1 and box 3

[ ] 6. The cursor advances to the bottom of the display and asks for slot number. Enter the slot number in which the EIA module was installed and press the "*" key to save the change and advance to the next screen.

[ ] 7. The next display is Modify Name. This display is used to enter the probe name (Example: TEMPERATURE PROBE 1). A built-in dictionary of commonly used environmental terms is available to create names. A name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name is not five words long, the cursor can be advanced through the remaining word positions with the "*" key. To save the name and advance to the next display, press the "*" key.

[ ] 8. The next display is Assign New Gain/Offset. Select the Calculate New Gain/Offset Value option by pressing the "1" key.

[ ] 9. The next display asks the question, "Minimum Reading?" Enter 0320 for Fahrenheit temperature or 0000 for Celsius temperature and press the "*" key to continue.

[ ] 10. The next question to appear on the display is, "DC Voltage For Min Reading?" Enter 09 and press the "*" key.

[ ] 11. The next question to appear is, "Maximum Reading?" Enter 1040 for Fahrenheit temperature or 0400 for Celsius temperature and press the "*" key to continue.

[ ] 12. The next question to appear is, "DC Voltage For Max Reading?" Enter 500 and press the "*" key to return to the Assign New Gain/Offset screen. Press the "*" key again to advance to the next display.

[ ] 13. The next display is Modify Averaging. This allows a probe's values to be averaged before displaying. Data displays of unstable waveforms produce fluctuations on the screen unless they are averaged. Averaging is not necessary for probes that monitor stable signals. Press the "1" key if averaging is desired or the "0" key if averaging is not desired. Press the "*" key to advance to the next display.

[ ] 14. The next display is Modify Nominal. Press the "8" key to scan forward or the "9" key to scan backward until the desired value is displayed (72 for Fahrenheit temperature or 20 for Celsius temperature). Press the "*" key to save the displayed value and advance to the next display.

[ ] 15. The next display is Modify Limits. This screen allows the probe's four alarm-threshold limits to be set. Limits are displayed in both percentages and actual values. The values are based on the nominal value selected on the previous display. Press the "8" key to scan forward or the "9" key to scan backward until the desired limits are displayed. Press the "*" key to save the displayed limits and advance to the next screen.

[ ] 16. The next display is Modify Action. Enter a "1" for YES to the question, "Automatic Reset?" and press the "*" key to advance to the next screen.

[ ] 17. The next display allows an action table to be selected. This table determines what actions occur for each of the four limits when an alarm condition exists. Use the "8" key to scan forward or the "9" key to scan backward through the possible tables until the desired table is displayed. Unless otherwise specified by the customer, select the table with Alarm-Yes, Relay1-No, Relay2-No, Relay3-No, and Trip-No for each of the four threshold limits. When the desired table is displayed, press the "*" key to store the table and advance to the next screen.

[ ] 18. The next display is Global Action. Global Action can be used only on multiple-unit configurations. If Global Action is desired by the customer, refer to page 3-44 for a detailed explanation. If Global Action is not desired, press the "*" key to advance the cursor through the three questions, ensuring that the answer to "Send?" and "Receive?" is NO, and advance to the next screen.

[ ] 19. The next display is Modify Delay. This screen is used to select the number of seconds or minutes an alarm condition must exist for each of the four threshold limits before any action is taken. The cursor appears underneath the 2nd Stg High. Use the "8" key to scan forward or the "9" key to scan backward until the desired time is shown (a munimum delay of one second should be selected). Press the "*" key to save that time and advance the cursor to the next stage (1st Stg High). After times have been selected for all stages using the above procedures, press the "*" key to save the times and advance to the next screen.

[ ] 20. The next display is Modify Display Group. This screen allows a group number to be assigned to the probe. The group number determines with which display group the probe is displayed when the Scan Probe Data Menu is accessed. Enter the group number (0 to 7) and press the "*" key to save the change and advance to the next screen.

[ ] 21. The next display is Enable/Disable Probe. Enter a "1" for YES to enable the probe and press the "*" key to return to the Add Probe Menu. Press the "#" key to return to the Main Menu.

[ ] 22. At this time, the temperature sensor probe has been installed and programmed. The probe's displayed value on the PDS+ LCD screen needs to be calibrated to the value of temperature being detected by the temperature sensor.

[ ] 23. With an accurate thermometer, measure the temperature at the temperature sensor's location and record the value.

[ ] 24. Enter: #, 5, 1 on the LCD keyboard to access the Display Probe Data screen. Enter the 3-digit probe number assigned to the temperature sensor probe. If the probe number is a 2-digit number, enter a leading 0 (Example: 046, 053). The screen automatically advances to the next display.

[ ] 25. The next display shows the probe number, the probe name assigned in Step 7, and the present temperature value the probe is detecting. The probe value is continuously updated on this screen which indicates that the probe and the PDS+ unit are communicating properly.

[ ] 26. If the displayed temperature value does not equal the actual temperature measured in Step 23, adjust the potentiometer on the temperature EIA module until the displayed value equals the actual value.

[ ] 27. If the displayed value can be adjusted to the actual value being monitored with the potentiometer on the temperature EIA module, perform Step 28 and stop. If the displayed value cannot be adjusted to the actual value being monitored with the potentiometer on the temperature EIA module, proceed to Step 29 and continue.

[ ] 28. The temperature sensor has been installed, programmed, and calibrated. Complete the probe data sheet (Table F-1) in Appendix F by entering the new parameters.

[ ] 29. Adjust the potentiometer on the temperature EIA module to the center of its adjustable range.

[ ] 30. Enter: #, 4, SC, 5, 4 on the LCD keyboard to access the Modify Gain/Offset screen. Enter the 3-digit probe number assigned to the temperature sensor probe. If the probe number is a 2-digit number, enter a leading 0 (Example: 046, 053). The screen automatically displays the present value of the probe.

[ ] 31. Select the Inc Gain Slow (option 2) or the Dec Gain Slow (option 4) and continue selecting the option until the displayed probe value is equal to the value being monitored by the probe. When they are equal, press the "#" key to return to the Main Menu.

[ ] 32. The temperature sensor has been installed, programmed, and calibrated. Complete the probe data sheet (Table F-1) in Appendix F by entering the new parameters.

4.7 WATER DETECTOR

The water detector is used to detect water under raised floors or in areas where water could damage equipment.

4.7.1 Technical Description

The water detector is activated by liquid bridging the gap between two brass adjustable sensors. The unit can detect a water film from zero height (with the brass adjustable sensors adjusted to make contact with the floor) to 1/8 inch height (with the brass adjustable sensors adjusted all the way in).

NOTE

It is recommended that a small gap be set between the sensors and the floor so that undesired activation, caused by dampness or a dirt film, does not occur.

The three pads on the bottom edge of the water detector provide a gap between the case and the floor. This allows water to flow under the unit for detection. If the pads are removed, the unit may form a seal with the floor and prevent the sensors from detecting water.

The water detector contains an alarm that sounds when water bridges the gap between the brass adjustable sensors.

4.7.2 Installation

This section contains the procedure for installing the water detector, connecting the water detector to the RSU box, programming the probe, and testing the water detector probe. The customer is responsible for installing the water detector in the desired location, routing the 2-wire cable (customer supplied Belden 8761 or 88761, or equivalent) from the detector to the RSU box location, and drilling any access holes in the RSU box that are required for cable entry. Digital Customer Services is responsible for connecting the 2-wire cable to the RSU box, programming the probe, and testing the probe for proper operation.

Use the following procedure for installing the water detector.

[ ] 1. Unpack the water detector, ensuring that the water detector and a 5 V EIA module are present.

[ ] 2. Place a straight edge across the pads on the bottom of the water detector case, located on either side of the adjustable brass sensors. Adjust the sensors until the distance between the sensors and the straight edge is equal to the desired water detection level.

[ ] 3. Connect the battery leads to the battery terminals. This unit requires two customer supplied 9 V alkaline batteries (NEDA size 1604A). Batteries should be replaced once a year by the customer.

[ ] 4. Insert the batteries into the retainer clips.

[ ] 5. Test the unit by wetting your finger and placing it across the adjustable brass sensors. The built-in alarm should sound. Remove your finger and the alarm should stop.

[ ] 6. Connect one end of the 2-wire connecting cable to the two wires inside the water detector. To ensure a tight mechanical connection, twist the lead from the connecting cable and the lead from the water detector together, and then screw on the wire nut.

If two or more water detectors are located in the same room, they can be connected in parallel and connected to the RSU box as one probe (Figure 4-10). When one of the water detectors detects water, the PDS+ unit indicates an alarm condition and the detector causing the alarm can be located by the built-in audible alarm.

[ ] 7. Mount the water detector in the desired location.

[ ] 8. Install the 5 V EIA module in one of the available slots (S1-S20) in the RSU box. The EIA module is installed with the component side facing away from the data collector board.

[ ] 9. Connect the other end of the 2-wire connecting cable to the two terminals on TB3 or TB4 of the RSU box that correspond to the slot in which the EIA module is installed.

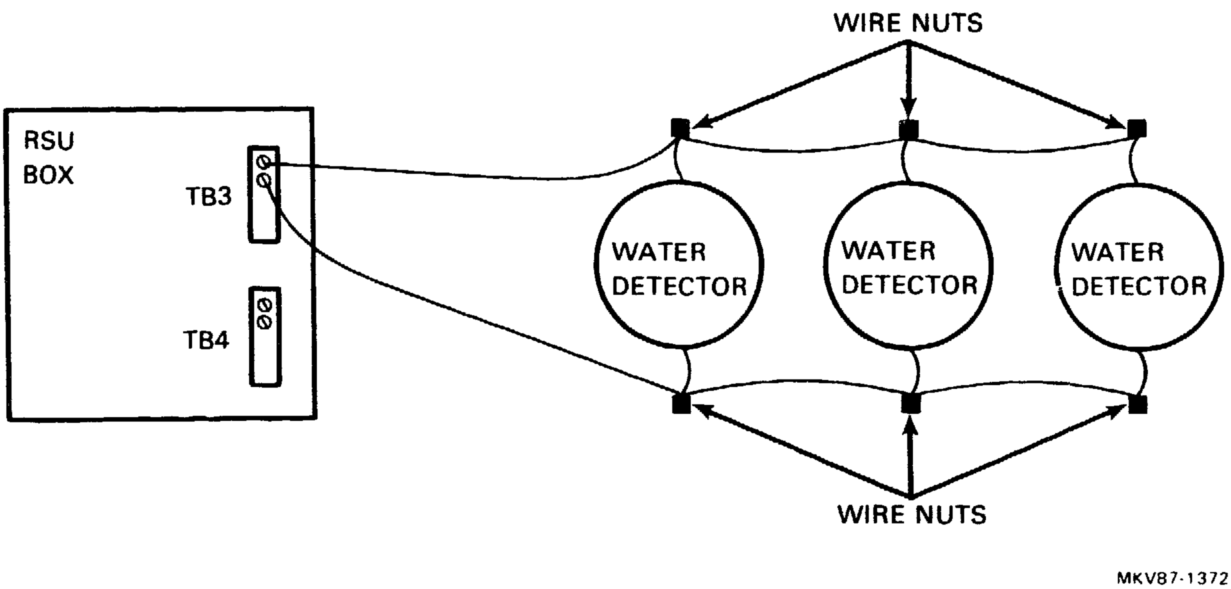

Figure 4-10 Multiple Water Detector Connection Diagram

Programming and Testing the Water Detector

The water detector is programmed as a digital probe. Use the following procedure to program and test the water detector.

[ ] 1. Power up the PDS+ unit.

[ ] 2. Place the maintenance switch on the I3 interface board to the MAINTENANCE position (see Figures 6-2 and 6-3).

[ ] 3. Enter: #, 4, SC, 5, 2 on the LCD of the PDS+ unit to access the Add Probe Menu. The system automatically displays the number of the next available probe.

[ ] 4. The screen asks the question, "Is The New Probe Analog?" Enter a "0" for NO.

[ ] 5. The next display is Modify Probe Location and asks what probe box. Enter the number that corresponds to the port and box configuration of the RSU box to which the probe is being connected. Refer to Figure 4-6.

Example: RSU 0-2 is Port 0 and box 2
RSU 0-3 is Port 0 and box 3
RSU 1-0 is Port 1 and box 0
RSU 1-1 is Port 1 and box 1
RSU 1-2 is Port 1 and box 2
RSU 1-3 is Port 1 and box 3

[ ] 6. The cursor advances to the bottom of the display and asks for slot number. Enter the slot number in which the EIA module was installed and press the "*" key to save the change and advance to the next screen.

[ ] 7. The next display is Modify Active Name. The active name describes the alarm condition (Example: WATER DETECTOR 1 ALARM). A built-in dictionary of commonly used environmental terms is available to create names. A name can consist of five words, a total of thirty characters, maximum. Press the "8" key to scan forward or the "9" key to scan backward through the word list until the desired word is found. When the desired word is found, enter its assigned number. The cursor advances to the next word position. If the entire name is not five words long, the cursor can be advanced through the remaining word positions with the "*" key. To save the change and and advance to the next display, press the "*" key.

[ ] 8. The next display is Modify Inactive Name. The inactive name describes the normal condition (Example: WATER DETECTOR 1 OK). Scan the built-in dictionary to select words for the inactive name using the procedure in Step 7.

[ ] 9. The next display is Modify Normally Open/Closed. Enter a "0" for closed and press the "*" key to advance to the next display.

[ ] 10. The next display is Modify Action. Enter a "1" for YES to the question, "Automatic Reset?" and press the "*" key to advance to the next screen.

[ ] 11. The next display allows an action table to be selected. This table determines what actions occur when an alarm condition exists. Use the "8" key to scan forward or the "9" key to scan backward through the possible tables until the desired table is displayed. Unless otherwise specified by the customer, select the table with Alarm-Yes, Relay1-No, Relay2-No, Relay3-No, and Trip-No. When the desired table is displayed, press the "*" key to store the table and advance to the next screen.

[ ] 12. The next display is Global Action. Global Action can be used only on multiple-unit configurations. If Global Action is desired by the customer, refer to page 3-51 for a detailed explanation. If Global Action is not desired, press the "*" key to advance the cursor through the three questions, ensuring that the answer to "Send?" and "Receive?" is NO, and advance to the next screen.

[ ] 13. The next display is Modify Delay. This screen is used to select the number of seconds or minutes an alarm condition must exist before any action is taken. Use the "8" key to scan forward or the "9" key to scan backward until the desired time is shown (**a delay of zero seconds must be selected for the water detector**). Press the "*" key to store the time and advance to the next screen.

[ ] 14. The next display is Modify Display Group. This screen allows a group number to be assigned to the probe. The group number determines with which display group the probe is displayed when the Scan Probe Data Menu is accessed. Enter the group number (0 to 7) and press the "*" key to save the change and advance to the next screen.

[ ] 15. The next display is Enable/Disable Probe. Enter a "1" for YES to enable the probe and press the "*" key to return to the Add Probe Menu. Press the "#" key to return to the Main Menu.

[ ] 16. Enter: #, 5, 1 on the LCD keyboard to access the Display Probe Data screen. Enter the 3-digit probe number assigned to the water detector probe. If the probe number is a 2-digit number, enter a leading 0 (Example: 046, 053). The screen automatically advances to the next display.

[ ] 17. The next display shows the probe number and the inactive name that was assigned in Step 8. This indicates that the probe and the PDS+ unit are communicating properly.

[ ] 18. Go to the water detector and place a wet finger across the brass sensors.

[ ] 19. The built-in alarm in the water detector should sound, the ALARM ON indicator on the PDS+ unit should light, the alarm on the PDS+ unit should sound, and the probe name should change to the active name that was assigned in Step 7.

[ ] 20. Remove your finger from the sensors, replace the water detector, and press the RESET key on the PDS+ unit.

[ ] 21. The water detector has been installed and communications have been established. Complete the probe data sheet (Table F-1) in Appendix F by entering the new parameters.

4.8 RELAY MODULES (H7317-KV/KW)

The H7317-KV or H7317-KW relay module can be installed in an RSU box. The relay modules can be activated by user-programming of the probe alarm actions in the PDS+ unit to control other equipment (such as turning off the air conditioner if a low temperature alarm occurs).

4.8.1 Technical Description

There are two types of relay modules available for use in the RSU box. One type (H7317-KV) is a normal relay that energizes when an enable signal is received, and deenergizes when the enable signal is removed. The other type (H7317-KW) is a mechanical latching relay that energizes when an enable signal is received and remains energized after the enable signal is removed. To deenergize the latching relay, press the RESET switch on the PDS+ unit. These relay modules can be activated by user-programming of the probe alarm actions in the PDS+ unit. Both relay modules have four poles of normally open/normally closed contacts (see Figure 4-11) that can be used to control other equipment (such as turning off the air conditioner if a low temperature alarm occurs). The contacts are rated for 5 amps at 30 Vdc.

WARNING

The relay module should NOT be used to control any life safety systems (for example, halon sprinklers). The relay contacts should be utilized for voltages of less than 42 volts.

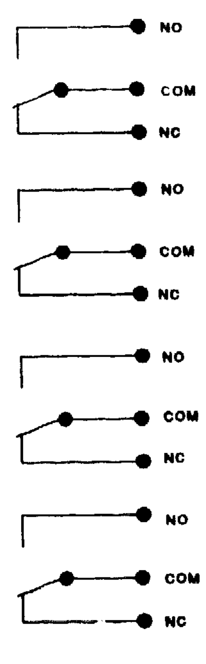

Figure 4-11 H7317-KV/KW Relay Module Contacts

Slot S21 on the RSU motherboard is for installing the relay module. J1 on the motherboard is connected to J3 on the data collector board to provide relay control for the relay module installed in slot S21.

There are three jumpers on the data collector board that must be configured when a relay module is installed in the RSU box (see Figure 4-5). Jumpers JP1, JP2, and JP3 are used to assign a logical relay number to the relay module installed in slot S21 on the motherboard. A jumper installed on JP1 designates the relay module as relay 1. A jumper on JP2 designates relay 2, and a jumper on JP3 designates relay 3. Only one relay jumper can be installed in each RSU box.

NOTE

The RSU relay can be assigned a logical relay number of 1, 2, or 3. If a logical relay number of 1 is assigned, and an alarm condition occurs for any probe with a Relay1 action selected, the RSU relay will energize and relay K1 in the BIA box will also energize since they are both designated as logical relay 1.

4.8.2 Installation

This section contains the procedure for installing the H7317-KV or H7317-KW relay module in the RSU box, installing the logical relay jumper, and connecting the control outputs for controlling other equipment. The customer is responsible for drilling any holes in the RSU box for connecting wire access, routing the connecting wires from the RSU box to the equipment being controlled, and connecting the connecting wires to the equipment being controlled. Digital Customer Services is responsible for installing the relay module, connecting the connecting wires to the relay module, and installing the jumper to assign the relay module it's logical relay number.

Use the following procedure to install and connect the relay module.

[ ] 1. Remove the screws holding the cover on the RSU box and remove the cover.

[ ] 2. Plug the relay module into slot S21 on the motherboard.

[ ] 3. Ensure that the cable from J3 on the data collector board is connected to J1 on the motherboard. J3 Pin 1 on the data collector board is 12 Vdc and connects to J1 Pin 9 on the motherboard. J3 Pin 2 on the data collector board connects to J1 Pin 1 on the motherboard.

[ ] 4. Connect the connecting wires from the equipment being controlled to the desired normally open/normally closed contacts on the relay module.

[ ] 5. On the data collector board, connect a jumper on JP1, JP2, or JP3 to assign a logical relay number to the relay module (JP1=Relay 1, JP2= Relay 2, JP3=Relay 3). Refer to Figure 4-5 for the jumper location.

[ ] 6. Reinstall the cover on the RSU box.

4.9 COMMUNICATIONS INTERFACE

Communications with the PDS+ unit is accomplished through the interface plate located on the back of the PDS+ unit (see Figure 4-12).

Up to eight PDS+ units can be daisy chained together to form a monitoring network. The PDS+ units are connected through the RS-422 interface jacks on the interface plate. When two or more PDS+ units are connected together, one unit (Unit 0) is assigned as the master control unit and all communication goes through this unit.

The PDS+ unit can be connected to a VT100-compatible terminal for displaying and programming the LCD screen through the RS-232-C interface jack on the interface plate. See the keyboard function chart listed below.

UCC Keyboard	VT100 Keyboard
RESET	Shift A
ALARM SILENCE	Shift B
PRINTER ON LINE	Shift C
PAPER ADVANCE	Shift D
*	Shift *
#	Shift #
Numeric 0-9	Numeric 0-9

REMOTE EMERGENCY POWER OFF switches are connected to the REPO IN jack and daisy chained to other PDS+ units on the network through the REPO OUT jack on the interface plate.

The RSU box for Port 0 is connected to the RSU 0 jack and power is supplied to the first RSU box on Port 0 through the RSU power jack. The second RSU box is daisy chained to the first RSU box and requires a separate power adapter/battery back-up option for power. The four RSU boxes for Port 1 are daisy chained together and connected to the RSU 1 jack. Each of these RSU boxes require a separate power adapter/battery back-up option for power.

The EM & REPO and the BIA boxes are connected to the EMS jack and the BIA jack respectively on the interface plate.

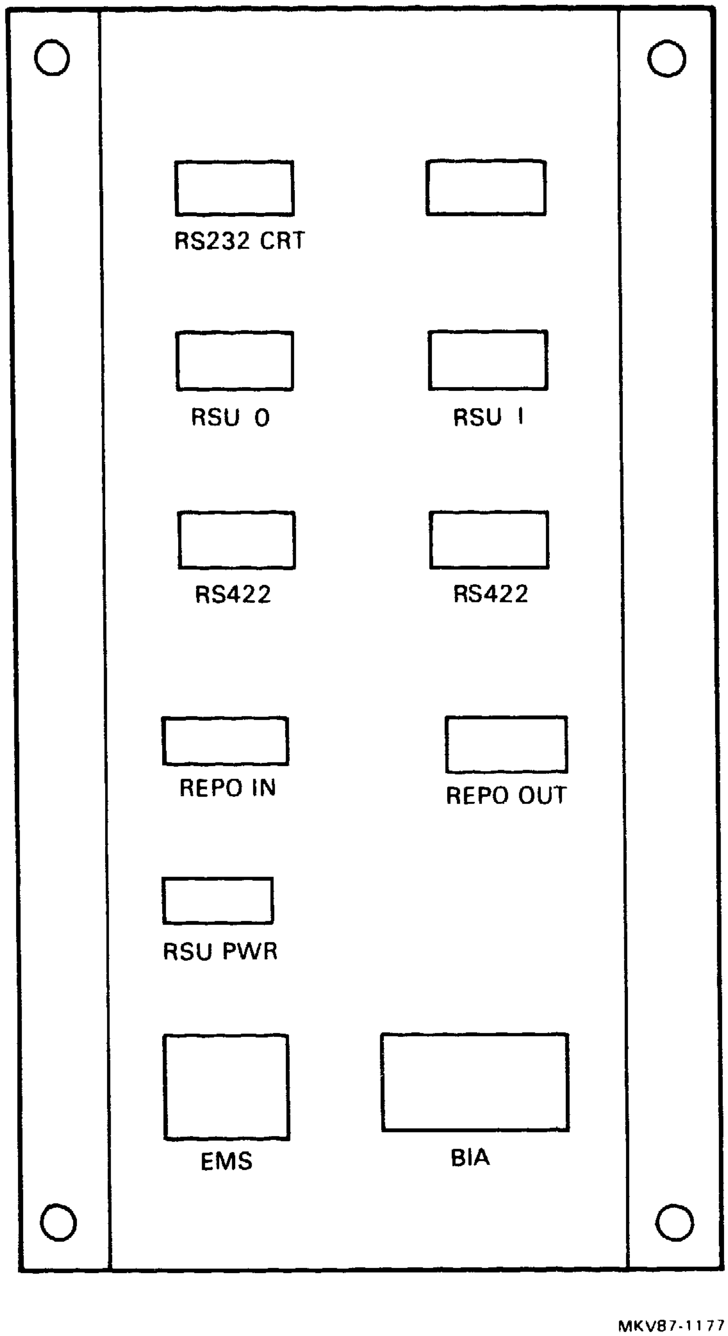

Figure 4-12 Interface Plate

CHAPTER 5

5.1 GENERAL

This chapter provides complete operating instructions for the PDS+ unit. Five types of operations are covered. They are:

- Normal powerup (Section 5.2)
- System checkout and log procedures (Section 5.3)
- Normal powerdown (Section 5.4)
- Resetting the IMCB (Section 5.5)
- Emergency Power Off (Section 5.6)

An Operator's Troubleshooting Guide (Table 5-1) is located at the end of the chapter to help isolate the cause of an alarm or malfunction during normal PDS+ operation.

5.2 POWERUP (NORMAL USE)

Operating the PDS+ unit consists of turning ON or OFF power to the main transformer, and applying or removing power to the attached computer equipment. Usually the PDS+ unit is left ON, which keeps the transformer energized. Damage to the PDS+ unit will not occur if power is turned ON and OFF on a daily basis.

CAUTION

Only use the ALL UNITS POWER OFF, LOCAL EMERGENCY POWER OFF (LEPO), or REMOTE EMERGENCY POWER OFF (REPO) switches under emergency conditions.

Apply power to the system as follows (Figures 1-3, 1-4, and 2-1).

1. Set the IMCB on the PDS+ unit to the ON position.
2. Press ALARM SILENCE on the User Control Center.
3. Press RESET on the User Control Center.
4. Set the PDS+ output main circuit breaker(s) to the ON position.
5. Set the PDS+ output distribution circuit breakers to the ON position.

NOTE

The computer equipment attached to the PDS+ unit may require a sequential order for applying power. Turn all equipment ON according to instructions.

6. Turn ON the attached computer equipment.

5.3 OPERATIONAL CHECKOUT AND SYSTEM LOG PROCEDURES

During normal use, record the following readings in the system log once a week.

- Operating voltages
- Battery voltage
- Operating current
- kVA

A LCD display is located on the User Control Center. If an alarm condition occurs, record the time, the alarm condition, and the following readings in the system log by accessing the Scan Probe Data Menu.

References

- Figure 1-3 User Control Center (UCC)
- Figure 2-1 PDS+ Components (Front View)

Operating Voltages
Record the output voltages (Line 1-N, Line 2-N, Line 3-N, Phase A, Phase B, and Phase C), the input voltages (Phase A, Phase B, and Phase C), the 15 V supply, and the 5 V supply in the system log.

Battery Voltage
Record the battery charging voltage in the system log.

Current
Record the output currents (Line 1, Line 2, and Line 3), neutral current, and ground current in the system log.

kVA
Record the apparent power (kVA) reading in the system log.

5.4 POWERDOWN (NORMAL USE)

Refer to Figure 2-1 for circuit breaker locations.

1. Turn OFF the attached computer equipment.

   CAUTION
   The attached equipment may require a sequential powerdown. Turn the equipment OFF according to instructions.

2. Set the PDS+ output distribution circuit breakers to OFF.
3. Set the PDS+ output main circuit breaker(s) to OFF.
4. If desired, set the IMCB to the OFF position.

5.5 RESETTING THE INPUT MAIN CIRCUIT BREAKER (IMCB)

This sequence must be followed or the IMCB trips when an attempt is made to reset the PDS+ unit. Perform the following steps to reset the PDS+ unit (from the tripped status) after an automatic shutdown or emergency trip.

1. Turn OFF the attached computer equipment.

2. Set the output distribution circuit breakers to OFF.

3. Set the output main circuit breaker(s) to OFF.

4. Reset the IMCB as follows:

   a. Place the IMCB on the PDS+ unit to the OFF position.

   b. Place the IMCB on the PDS+ unit to the ON position.

      If the IMCB does not stay in the ON position (if it trips OFF), there is still a problem in the system.

      CAUTION
      Damage may result if the IMCB is continually reset.

5. Press the RESET key on the User Control Center.

6. Verify that the following conditions are observed on the Local Control Panel.

   a. The green POWER ON indicator is illuminated.

   b. The red ALARM ON indicator is extinguished.

   c. The red ALL UNITS POWER OFF switch and the yellow LEPO switch are illuminated.

7. Set the PDS+ output main breaker(s) to the ON position.

8. Set the output distribution circuit breakers to the ON position.

9. Power on the attached equipment according to instructions for that computer system.

5.6 EMERGENCY POWER OFF

In an emergency, shut OFF the power to the PDS+ unit at one of the following locations.

- The LOCAL EMERGENCY POWER OFF switch (labeled LEPO) on the front of the PDS+ unit,
- The ALL UNITS POWER OFF switch (labeled ALL UNITS Power Off) on the front of the PDS+ unit,
- The optional REMOTE EMERGENCY POWER OFF switch (labeled REPO) at a customer-specified location,
- The input main circuit breaker (IMCB), or
- The building circuit breaker for the junction box (J-Box).

5.7 OPERATOR TROUBLESHOOTING GUIDE

Table 5-1 is a guide to help the operator troubleshoot PDS+ malfunctions and alarms. See Appendix A for definitions of the abbreviations used in Table 5-1.

Table 5-1 Operator's Troubleshooting Guide

Symptom	Probable Cause	Corrective Action
LCD is blank.	R27 (contrast) on M4 board is mis-adjusted.	Adjust R27.
	Plug 5A on M4 board is disconnected.	Reseat Plug 5A.
	LCD has been dis-abled through Communications Menu.	On UCC keyboard enter #, 4, SC, 3, 4, 4.
PDS+ is dead.	PDS+ is turned OFF.	Power up PDS+ unit, referring to Section 5.2.
	No power from building is going to the junction box (J-Box).	Call building main-tenance to restore power.

Table 5-1 Operator's Troubleshooting Guide (Cont)

Symptom	Probable Cause	Corrective Action
Specific output circuit is dead.	Output circuit breaker is OFF.	Reset circuit breaker.
	Output circuit is not connected to a computer device.	Call Digital Customer Services.
No output from PDS+, but UCC and LCP are ON.	IMCB, output main circuit breaker, or output distribution circuit breaker is OFF.	See Section 5.2 or 5.4.
PDS+ is shut down, some LCP indicators are ON, and alarm is sounding.	A shunt trip of IMCB occurred for one of the following reasons:	
	• ALL UNITS PO, LEPO, or REPO was pressed.	Reset IMCB (Section 5.5).
	• External signal was received from BIA, RSU, or EM probe with shunt trip action.	Correct the alarm condition. Reset IMCB (Section 5.5).
	• Overtemp shutdown has occurred.	See Overtemp indicator symptom in this table.
	• IMCB is defective.	Call Digital Customer Services.
IMCB keeps tripping when turned ON.	PDS+ unit is still in shunt trip status.	Correct indicated alarm condition and reset IMCB (Section 5.5).
	IMCB defective.	Call Digital Customer Services.
	Short circuit occurred in PDS+ unit.	Call Digital Customer Services.

Table 5-1 Operator's Troubleshooting Guide (Cont)

Symptom	Probable Cause	Corrective Action
IMCB or output main circuit breaker periodically trips without alarms.	PDS+ unit overloaded and is operating above rating. kVA probe will alarm at 10% overload.	Read and record kVA, then call Digital Customer Services.
	Phase currents are not balanced.	Read and record operating currents, then call Digital Customer Services.
	IMCB or output main circuit breaker defective.	Call Digital Customer Services.
One or more output circuits periodically trip secondary breakers in output panel board.	Individual circuit has overloaded.	Call Digital Customer Services.
	Circuit breaker is defective.	Call Digital Customer Services.
Continuous buzzing or humming from lower part of PDS+ unit.	Transformer may be vibrating.	Problem does not indicate a component failure. Condition can exist until Digital Customer Services evaluates problem.
Overtemp condition exists and alarm sounds.	Unit is overloaded.	Read and record kVA, then call Digital Customer Services.
	Air conditioner has failed.	Repair air conditioner.
	Air intake vents are blocked.	Clean area around bottom air vents.
	Fan is defective.	Call Digital Customer Services.
Burning odor comes from PDS+ unit or J-Box.	High temperature is causing possible burning of cable insulation.	Power down PDS+ unit and related equipment as a safety precaution. Call Digital Customer Services.

Table 5-1 Operator's Troubleshooting Guide (Cont)

Symptom	Probable Cause	Corrective Action
PDS+ alarm is sounding.	Alarm condition or faulty signal is causing alarm to sound.	Press ALARM SILENCE. Record time and display the Alarm Condition Menu. Correct the alarm condition and press RESET.
Unresettable phase alarm and phase-sensitive equipment (disks) are affected.	Phase rotation is reversed.	Have electrician reverse two input phase leads in J-Box.
LEPO, ALL UNITS PO, and REPO switches do not function and no shunt trips are possible.	Shunt trip harness (P6 from the I3 interface board to the shunt trip relay) is disconnected.	Reconnect shunt trip harness.

CHAPTER 6

6.1 GENERAL

All testing, maintenance, and calibration procedures are done with no load on the PDS+ unit.

Before performing any troubleshooting or repair on the high voltage section of the PDS+ unit, read Section 7.1 through Section 7.4 for a technical description and overview of this section.

This chapter is divided into the following sections:

- Safety -- Section 6.2
- Fuses and Circuit Breakers -- Section 6.3
- Maintenance Switches and Test Points -- Section 6.4
- Customer Services Troubleshooting -- Section 6.5
- Main Transformer Tap Adjustments -- Section 6.6
- Power Isolator Assembly Replacement -- Section 6.7
- LED Indicators -- Section 6.8
- Door Electronics Calibration -- Section 6.9
- Printer -- Section 6.10
- PDS+ Printed Circuit Board Replacement -- Section 6.11
- Preventive Maintenance -- Section 6.12

6.2 SAFETY

The PDS+ unit contains HIGH VOLTAGE. The procedures outlined in this chapter are intended for **trained maintenance personnel only.**

To power down the PDS+ unit for troubleshooting and repair, proceed as follows:

1. Turn OFF any attached equipment using the proper sequences.

2. Turn OFF the output distribution circuit breakers.

3. Turn OFF the output main circuit breaker(s).

4. Turn OFF the input main circuit breaker.

5. Unplug the power cable from the J-Box.

During power-on troubleshooting and testing, keep all panels and protective devices in place whenever possible. Wear safety glasses at all times when conducting power-on tests.

6.3 FUSES AND CIRCUIT BREAKERS

The PDS+ unit has extensive circuit protection. This section contains a summary of the protection devices.

6.3.1 Input AC Protection

Input ac protection is provided by the input main circuit breaker (IMCB) (Figure 6-1). A complete shutdown of the PDS+ unit indicates that the IMCB has been shunt tripped or tripped by an overcurrent condition.

Reference

- Figure 2-1 PDS+ Components (Front View)

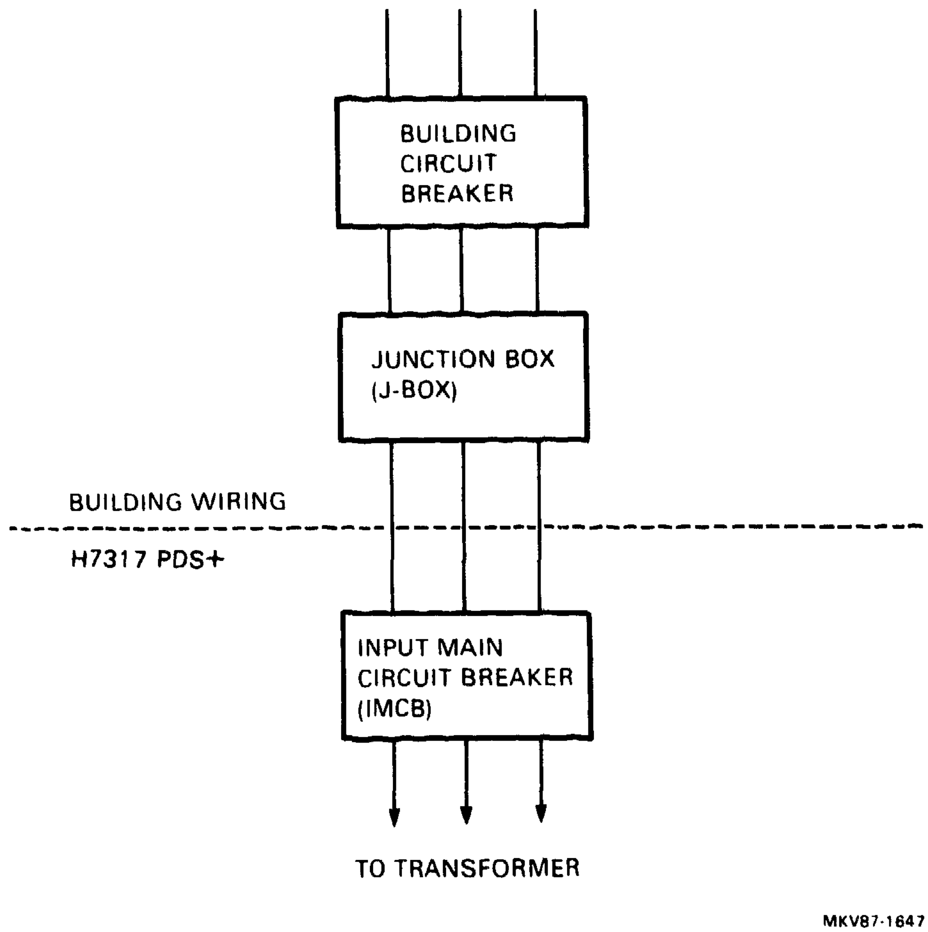

Figure 6-1 Input Protection

6.3.2 Internal Protection

References

- Figure 2-1 PDS+ Components (Front View)
- Figure 2-10 Battery Connection

Device	Circuit	Symptom
F1(P/I Assy.)	Power Isolator Assy.	LEDs on M4 and M3 are out; LCD screen blank.
TP Fuses	Power Isolator Assy.	No voltage at test points.
F1(Batt)	Battery	Battery charging voltage is correct, but battery back-up is inoperative.

6.3.3 Output Protection

Reference

- Figure 2-1 PDS+ Components (Front View)

Device	Circuit	Symptom
Output Main Circuit Breaker	Output distribution	All or half of attached equipment dead.
Output Circuit Breaker(s)	Individual output circuit	Single device dead.

6.4 MAINTENANCE SWITCH AND TEST POINTS

The PDS+ unit has one switch and several test points that are used during troubleshooting and checkout procedures. This section contains a summary of the maintenance switch and test points.

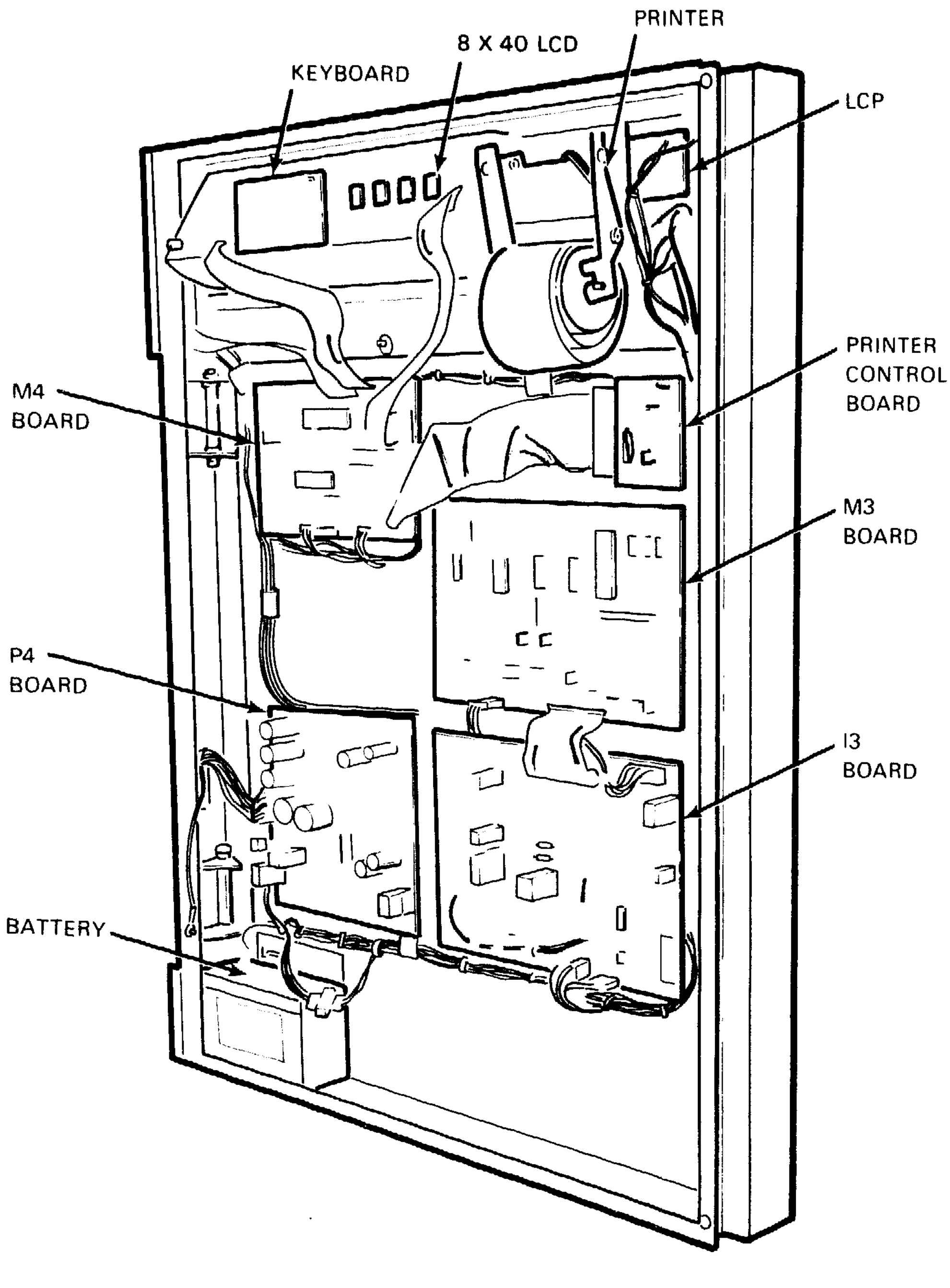

Figure 6-2 Monitoring Logic Parts Location

6.4.1 I3 Interface Board

References

- Figure 6-2 Monitoring Logic Parts Location
- Figure 6-3 I3 Interface Board

Maintenance Mode Switch
The maintenance mode switch prevents accidental shunt trips from occurring when setting up or changing probe parameters. Placing the switch in the MAINTENANCE position illuminates the yellow Maintenance mode indicator on the LCP and prevents any alarms that have a trip action from tripping the IMCB. Pressing the ALL UNITS POWER OFF, the LEPO, or the REPO switch overrides the Maintenance mode and allows a shunt trip of the IMCB to occur. To return to normal operation, place the switch to the NORMAL position and press the RESET key on the UCC.

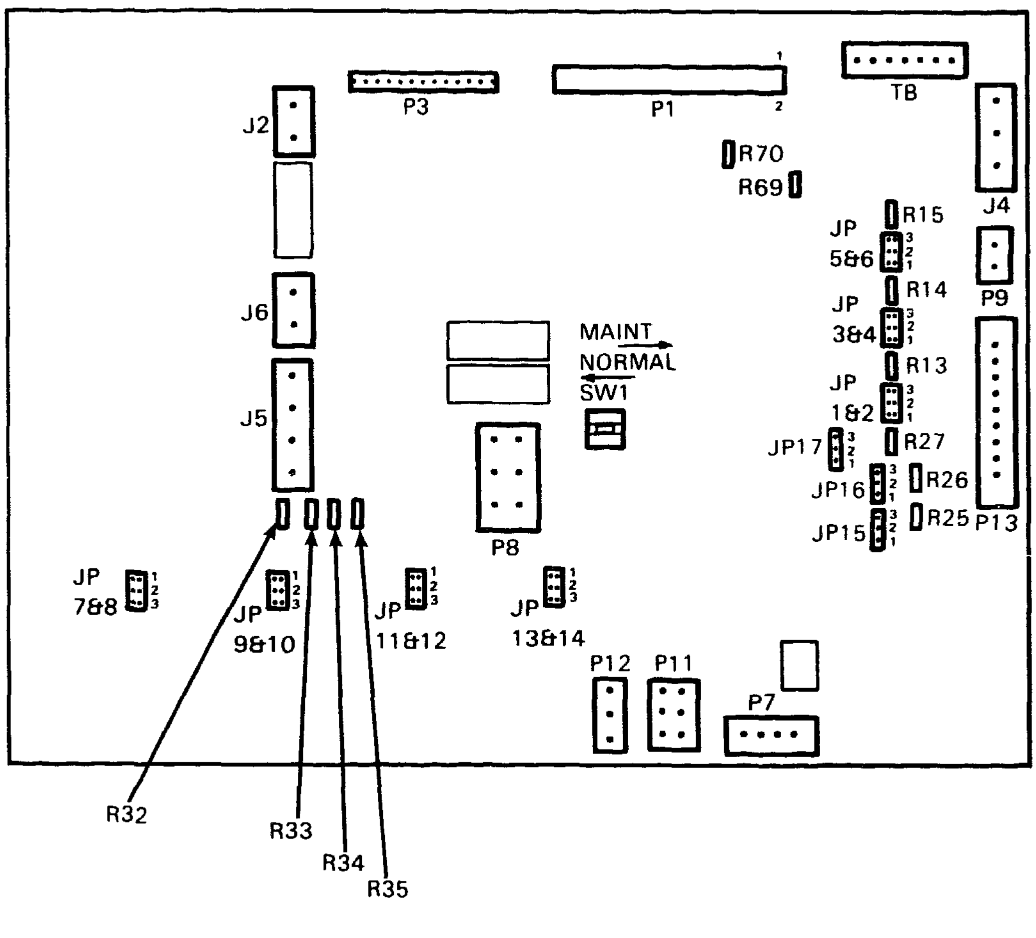

Figure 6-3 I3 Interface Board

6.4.2 Power Isolator Assembly

Reference

- Figure 2-1 PDS+ Components (Front View)

Test Points
The power isolator assembly has seven test points that are used for measuring the input voltage and output voltage. These test points are used for maintenance and calabration.

Test Point	Function
TP A (Brown)	Input voltage Phase 1
TP B (Orange)	Input voltage Phase 2
TP C (Yellow)	Input voltage Phase 3
TP 1 (Black)	Output voltage Phase 1
TP 2 (Red)	Output voltage Phase 2
TP 3 (Blue)	Output voltage Phase 3
TP N (White)	Neutral

6.5 CUSTOMER SERVICES TROUBLESHOOTING

The power cabinet portion of the PDS+ unit contains HIGH VOLTAGE and formal training of maintenance personnel is mandatory.

Tables 6-1 and 6-2 are guides to help correct basic malfunctions and alarm conditions.

Before troubleshooting the PDS+ unit, record (in the system log) the malfunction and the time shown on the LCD screen. Also record all operating currents and voltages.

NOTES

1. **The PDS+ unit may be operated without monitoring functions to the attached equipment during a service delay. See Table 6-1 for information about disabling.**

   Ensure that all logic functions are enabled before you leave the site.

2. **See Appendix A for definitions of the abbreviations used in Table 6-1 and Table 6-2.**

Table 6-1 Disabling Monitoring Functions

Function to Disable	Procedure
Individual alarm/monitoring circuit inputs	Access the Modify Probe Menu and enter the probe number for the alarm to be disabled. Select Enable/Disable Probe and disable the probe.
All alarms/monitoring circuit inputs	Place the maintenance switch on the I3 interface board to the MAINTENANCE position. The alarm still sounds, but a shunt trip cannot occur.
Defective alarm circuits	Access the Modify Probe Menu and enter the probe number for the alarm circuit to be disabled. Select Enable/Disable Probe and disable the probe.
Shunt trip	Place the maintenance switch on the I3 interface board to the MAINTENANCE position.
ALL UNITS POWER OFF, LEPO, and REPO	Disconnect the shunt trip harness (P6 on the I3 interface board). **WARNING** **With P6 disconnected, ALL UNITS POWER OFF, LEPO, and REPO will not function. Never leave the unit unattended in this condition.**

Table 6-2 Customer Services Troubleshooting Guide

Symptom	Probable Cause	Corrective Action
LCD goes blank immediately when PDS+ unit is powered down.	Discharged battery.	Reset IMCB and let battery recharge. If battery does not take charge (below 11.5 V), replace battery.
	Open battery fuse or disconnected battery.	Replace battery fuse F1 or reconnect battery.
LCD is blank with PDS+ unit powered up.	J5A connection on M4 board.	Reconnect J5A
	LCD disabled through the Communications Menu.	On the keyboard enter "#", 4, SC, 3, 4, 4. (See Section 4.9 for terminal keyboard codes.)
	Contrast.	If LEDs on M4 board are normal, adjust R27 on M4.
	Bad LCD.	If LEDs on M4 board are normal, replace LCD.
	Power isolator assembly fuse or power isolator assembly.	If LEDs on M4 board are out, press DC BACK UP. If LEDs on M4 board and the LCD light, check P41 on the P4 board for +15 Vdc. If voltage on P41 is present, replace P4 board. If voltage on P41 is not present, replace power isolator assembly fuse. If voltage on P41 is still not present, replace power isolator assembly.
No lights on LCP and no LEDs lit on M4 board.	P4 board.	If 12v is missing at J2 on I3 board or 5v is missing at J7A on M4 board, replace P4 board.
	M4 board.	If 12v and 5v are present, replace M4 board.

Table 6-2 Customer Services Troubleshooting Guide (Cont)

Symptom	Probable Cause	Corrective Action
LCD does not turn ON when DC BACK UP switch is pressed.	Battery is disconnected.	Connect battery.
	Battery fuse is open.	Replace battery fuse.
LEDs on M4 board are not normal.	Various.	See Table 6-5 for troubleshooting.
Audible alarm does not sound.	Alarm.	Replace LED display assembly.
	J1 on LCP is disconnected.	Reconnect J1.
Ground current alarm sounds when computer equipment is powered ON.	Ground current leakage in computer equipment on powerup.	Repair unit causing alarm.
Phase alarm is ON all the time and all phase voltage readings are correct.	Incorrect phase in J-Box.	Contact building engineer or electrical contractor.
Printer does not operate.	Printer not enabled.	Enable printer through Communications Menu.
	Printer bad.	Replace printer.
	Printer control board bad.	Replace printer control board.
Low voltage alarm.	I3 interface board.	If one or more input or output voltages are displayed as missing, but are actually present when measured, replace the I3 board.

Table 6-2 Customer Services Troubleshooting Guide (Cont)

Symptom	Probable Cause	Corrective Action
No shunt trip occurs for alarm condition (delay or immediate), and alarm is working.	Maintenance mode switch on I3 interface board.	Place Maintenance mode switch to NORMAL position.
	P6 on I3 board disconnected.	Reconnect P6.
	Programming.	Action for the probe may not have trip selected. Change action to select trip if desired.
	IMCB.	Replace IMCB.
No shunt trip occurs for REPO, LEPO, or ALL UNITS POWER OFF.	P6 on I3 board disconnected.	Reconnect P6.
	IMCB.	Replace IMCB.
Continuous shunt trip occurs.	Shorted REPO switch.	Replace REPO switch assembly.
	Shorted LEPO switch.	Replace LEPO switch.
	Shorted ALL UNITS POWER OFF switch.	Replace ALL UNITS POWER OFF switch.
	Faulty IMCB.	Replace IMCB.
	Overheated shunt trip mechanism.	Wait five (5) minutes and then reset IMCB.
	Transformer thermal sensor.	If transformer temperature is alright, replace sensor assembly.
Computer devices do not power up, PDS+ phase rotation is correct, and voltage is present on output cables.	Incorrect wiring connection in computer equipment.	Have computer device checked for correct phase rotation sequence.
	Computer device.	Repair computer device.

Table 6-2 Customer Services Troubleshooting Guide (Cont)

Symptom	Probable Cause	Corrective Action
Some voltage or current readings indicate zero, while others indicate correct voltage or current. No alarm sounds.	I3 board.	Replace I3 board.
Output circuit breaker trips.	Short circuit on output or faulty circuit breaker.	Clear short-circuit condition or replace faulty circuit breaker.

6.6 MAIN TRANSFORMER TAP ADJUSTMENTS

Input voltage variations can be compensated for by adjusting the primary tap setting on the main transformer. Tap increments are in 2 1/2 percent increments. Moving the jumper apart by one tap provides a 2 1/2 percent voltage increase on the phase-to-phase (nominal) secondary. Moving the jumper closer by one tap provides a 2 1/2 percent voltage decrease on the phase-to-phase (nominal) secondary.

NOTE

Tap numbers and percent voltage changes will be applicable to any other input voltages.

Tables 6-3 and 6-4 list the acceptable tap settings for 50/60 Hz units. The final adjusted voltage should be within 3 percent of the desired phase-to-phase voltage at full load. Ignore any voltage increase during the unloaded unit operation. All three transformer taps must have the same setting.

Table 6-3 Acceptable Primary Tap Settings (60 Hz)

Uncorrected Phase-to-Phase Output Voltage (Factory Setting)	Correction Tap Numbers	Voltage Changes (Percent)
208 Volt Secondary		
218	4-5	-5
213	4-6	-2 1/2
208	3-5 (Factory Setting)	0
203	3-6	+2 1/2
198	2-6	+5
192	3-7	+7 1/2
187	2-7	+10

Table 6-4 Acceptable Primary Tap Settings (50 Hz)

Uncorrected Phase-to-Phase Output Voltage (Factory Setting)	Correction Tap Numbers	Voltage Changes (Percent)
380 Volt Secondary		
399	4-5	-5
389	4-6	-2 1/2
380	3-5 (Factory Setting)	0
370	3-6	+2 1/2
361	2-6	+5
351	3-7	+7 1/2
342	2-7	+10
415 Volt Secondary		
436	4-5	-5
425	4-6	-2 1/2
415	3-5 (Factory Setting)	0
405	3-6	+2 1/2
394	2-6	+5
384	3-7	+7 1/2
373	2-7	+10

Use the following procedure to change the tap settings.

[ ] 1. Power up the PDS .

[ ] 2. At full load, measure the phase-to-phase output voltages (1 to 2, 2 to 3, and 1 to 3) and calculate the average voltages from the three readings.

[ ] 3. Determine the number and direction (increase or decrease) of increments necessary to change the output voltage to measure the desired phase-to-phase voltage. (Refer to Table 6-3 or 6-4 and Figure 6-4).

[ ] 4. If a tap change is required, power down the PDS+ (Section 5.4), set the IMCB to the OFF position, and unplug the input power cable from the J-Box.

[ ] 5. Remove the transformer tap access cover on the front of the PDS+ unit.

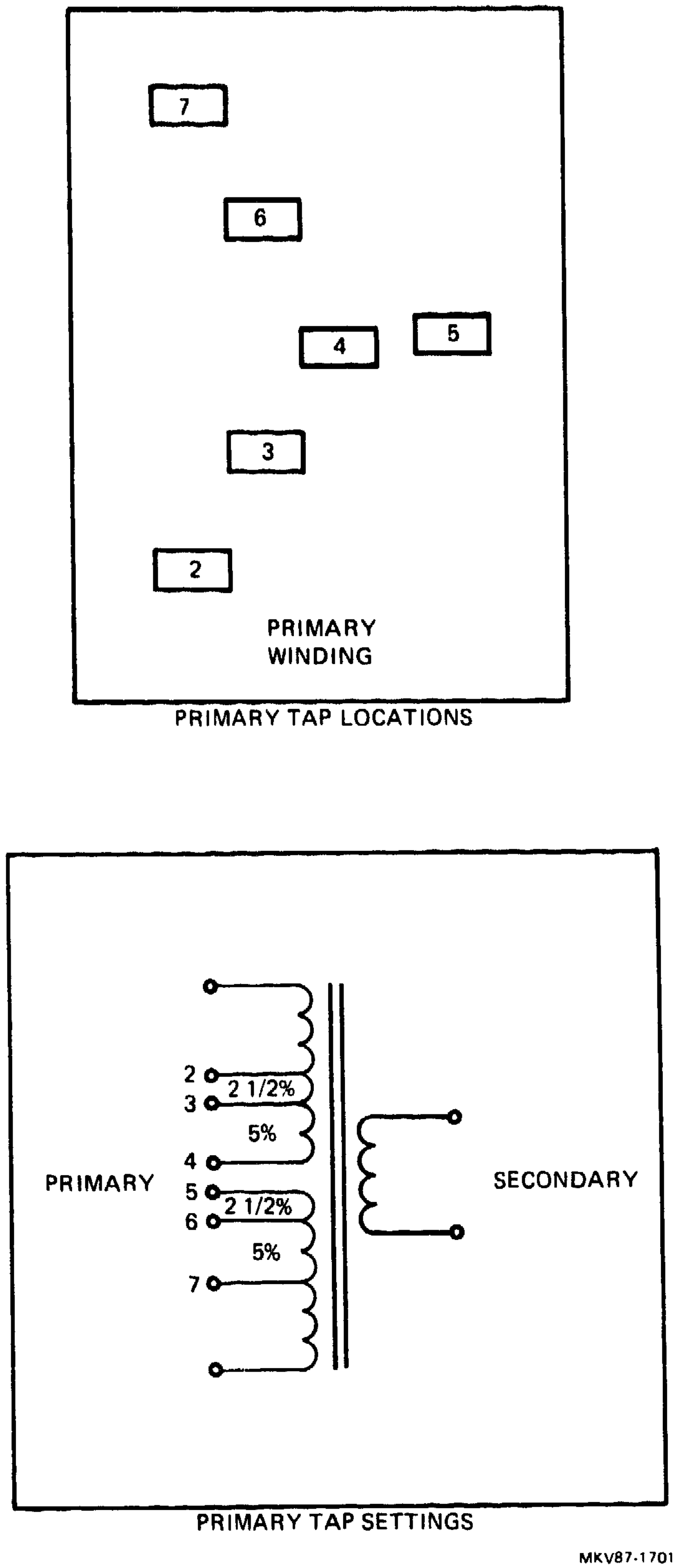

Figure 6-4 Primary Tap Locations and Settings

[ ] 6. Change the jumper position on the taps the correct number of increments. (Refer to Table 6-3 or 6-4 and Figure 6-4).

NOTE

All primary taps must be set to the same setting.

CAUTION

Use two wrenches to avoid stressing the taps on the transformer.

[ ] 7. Replace the transformer tap access cover.

[ ] 8. Connect the input power cable to the J-Box.

[ ] 9. Power up the PDS+ (Section 5.2).

[ ] 10. At full load, measure the phase-to-phase output voltages to confirm that the desired output voltage has been attained.

6.7 POWER ISOLATOR ASSEMBLY REPLACEMENT

References

- Figure 2-1 PDS+ Components (Front View)

Tools Needed

- Phillips screwdriver

Removal Procedure

1. Power down the PDS+ unit.

2. Set the IMCB to the OFF position and disconnect the input power cable from the J-Box.

3. Open the front door of the PDS+ unit.

4. Remove the four (4) screws holding the power isolator assembly in place.

5. Disconnect the harness connectors from the power isolator assembly.

6. Remove the power isolator assembly.

Replacement Procedure

1. Connect the harness connectors to the new power isolator assembly.

CAUTION
When installing the new power isolator assembly, care must be taken to ensure that the harness is not crimped between the power isolator assembly and the chassis.

2. Install the new power isolator assembly by replacing the four (4) screws to hold it in place.

3. Close the front door of the PDS+ unit.

4. Connect the input power cable to the J-Box.

6.8 LED INDICATORS

There are five LED indicators on the M4 main processor board and one LED indicator on the M3 processor board that are used for troubleshooting. This section covers each LED function, its status, conditions, indications, and the corrective actions to take if a problem exists.

6.8.1 M4 Main Processor Board

Use the status of the five LED indicators on the M4 main processor board (Figure 6-5) and Table 6-5 to troubleshoot and isolate logic problems in the PDS+ unit.

NOTE

When any LED on the M4 main processor board is not indicating a normal status, the first action to take is to press the RESET switch on the M4 board. If, after a minimum of 20 seconds, the LED still indicates that a problem exists, use the LED status and Table 6-5 to isolate the problem.

Table 6-5 M4 Main Processor Board LED Indicators

LED Number Function/Status	Conditions	Indication	Corrective Action
LED 1 RS-232-C Communications			
Blinking Red	Terminal Connected	Normal	None
Solid Red	Terminal Connected	Problem	Terminal not talking. Change terminal.
OFF	Terminal Connected	Problem	Access Terminal Type Menu to verify that the correct terminal type and baud rate is selected. If it is, then change M4 board. If it is not, then select the correct terminal type and baud rate.
OFF	No Terminal Connected	Normal	None

Table 6-5 M4 Main Processor Board LED Indicators (Cont)

LED Number Function/Status	Conditions	Indication	Corrective Action
LED 2 Unit-to-Unit Communications			
OFF	No Units Connected	Normal	None
OFF	Units Connected	Problem	Access Network Configuration Status Menu to verify that communications is enabled with other units. If it is, then change M4 board. If it is not, then enable communications with other units.
Blinking Red/Green	Units Connected	Normal	None
Solid Red	Units Connected	Problem	Check daisy chained unit-to-unit cables. Check to see if other units are designated as unit 0.
LED 3 Processor Dead			
OFF		Normal	None
Red		Problem	Change M4 board.

Table 6-5 M4 Main Processor Board LED Indicators (Cont)

LED Number Function/Status	Conditions	Indication	Corrective Action
LED 4 RSU Port 1 Communications			
Blinking Red/Green	RSU Box(es) Connected	Normal	None
Steady Red/Green	No RSU Box Connected	Normal	None
OFF	RSU Box(es) Connected	Problem	Disconnect the RSU cable from Port 1 of the PDS+ unit and see if LED 4 lights. If it does not light, change the M4 board. If it does light, then the problem is in one of the RSU boxes or RSU cables. Disconnect the outermost RSU box. If LED 4 lights, then the problem is in the outermost RSU box. If LED 4 does not light, then work your way toward the PDS+ unit disconnecting each successive RSU box until LED 4 lights. The last RSU box disconnected contains the problem.
Blinking Red/Green	RSU Box(es) Connected	Two RSU Boxes Do Not Communicate	The jumpers inside the two RSU boxes are configured the same, indicating that both units are unit 1 or unit 2, and so on. Change the jumpers to give each unit a different configuration.

Table 6-5 M4 Main Processor Board LED Indicators (Cont)

LED Number Function/Status	Conditions	Indication	Corrective Action
LED 5 RSU Port 0 Communication/ M3-M4 Processor Communication			
Blinking Red/Green	With or Without RSU Box(es)	Normal	None
Solid Red	With or Without RSU Box(es)	Problem	The M3 board is not talking to the M4 board. Change the M3 board.
OFF	RSU Box(es) Connected	Problem	Disconnect the RSU cable from Port 0 of the PDS+ unit and see if LED 5 lights. If it does not light, change the M4 board. If it does light, the problem is in one of the two RSU boxes. Disconnect the outermost RSU box. If LED 5 lights, the problem is in the outermost RSU box. If LED 5 does not light, the problem is in the innermost RSU box.

6.8.2 M3 Processor Board

The M3 processor board (Figure 6-6) has one LED (LED 1) that is used for trouble isolation. LED 1 is the Processor Dead indicator. If the M3 board is functioning normally, LED 1 will be OFF. If LED 1 is lit (red), the M3 board is dead and should be replaced. Before replacing the M3 board, press the RESET switch on the M3 board. If, after a minimum of 20 seconds, LED 1 is still lit, then the M3 board should be replaced.

6.9 DOOR ELECTRONICS CALIBRATION

This section contains the calibration procedures for the boards within the door electronics. Each procedure lists the tools and test equipment needed to perform that adjustment.

6.9.1 M4 Main Processor Board

References

- Figure 6-2 Monitoring Logic Parts Location
- Table 6-6 M4 Board Jumpers (RS-232-C Port Configuration)
- Figure 6-5 M4 Main Processor Board

Tools Needed

- Trim potentiometer adjusting tool

Calibration Procedure

There are four jumpers on the M4 board that must be installed to ensure that the RS-232-C port is configured properly for the PDS+ unit installed. During initial installation, and whenever the M4 board is replaced, these jumpers must be verified and installed in accordance with Table 6-6 for proper RS-232-C port configuration.

Table 6-6 M4 Board Jumpers (RS-232-C Port Configuration)

Jumper	Modem With Handshaking*	Modem Without Handshaking*	Terminal Direct
JP-1	A-B	A-B	B-C
JP-2	A-B	JP2-A to JP4-A	A-B
JP-3	A-B	A-B	B-C
JP-4	A-B	JP2-B to JP4-B	A-B

* Handshaking means the PDS+ unit raises a Request To Send signal and the modem must return a Clear To Send signal before data can be transferred.

Potentiometer R27 on the M4 board controls the contrast of the LCD on the User Control Center. Adjust R27 until the LCD screen is easy to read.

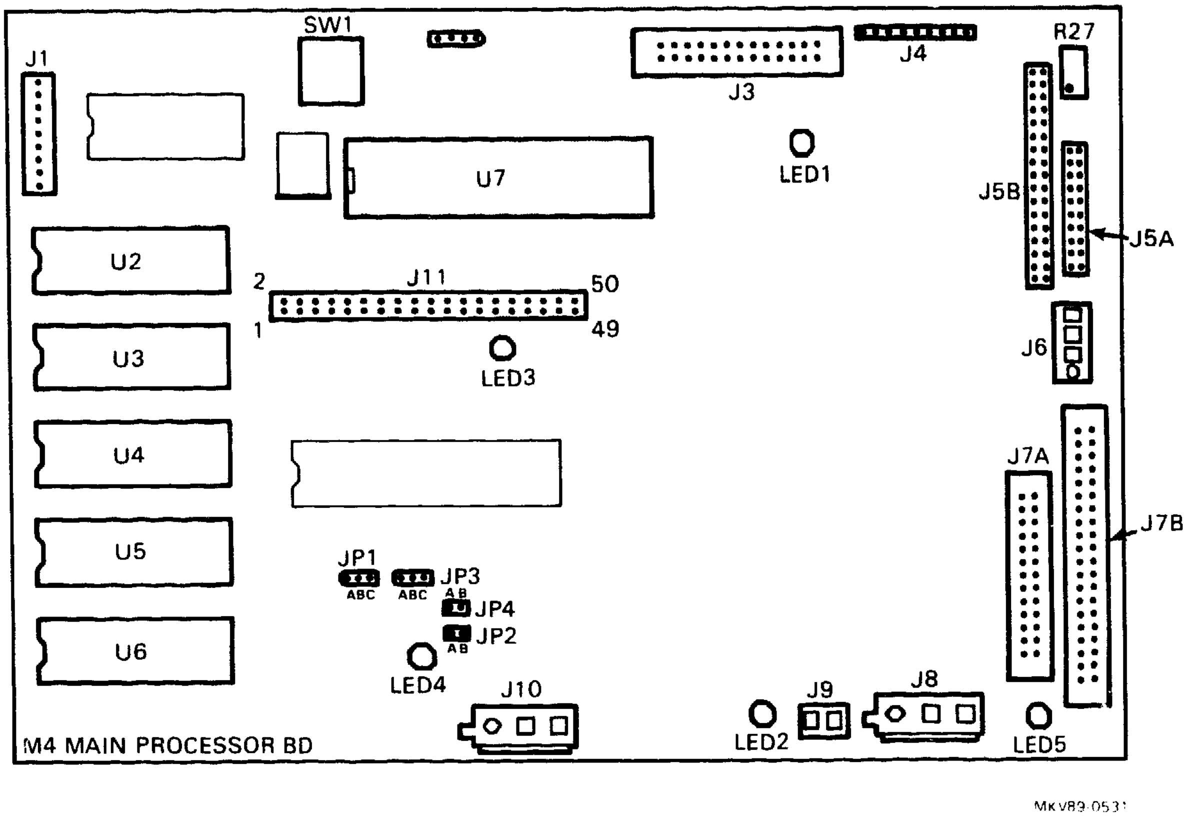

Figure 6-5 M4 Main Processor Board

6.9.2 M3 Processor Board

References

- Figure 6-2 Monitoring Logic Parts Locatio.
- Table 6-7 M3 Board Jumpers
- Figure 6-6 M3 Processor Board

Tools Needed

- Trim potentiometer adjusting tool

Calibration Procedure

There are eight jumpers on the M3 board that must be installed to correspond to the kVA, input voltage, output voltage, and frequency ratings of the PDS+ unit. There are also ten jumpers that must be installed to enable watchdog timer, clock interrupts, on-board memory, on-board I/O select, CMOS memory power select, unit address, and communications type. During initial installation, and whenever the M3 board is replaced, these jumpers must be verified and installed in accordance with Table 6-7 to ensure proper PDS+ operation.

Potentiometer R27 on the M3 board controls the displayed value of the line frequency (Probe 18). Adjust R27 until the displayed line frequency value is correct (60 Hz or 50 Hz).

Table 6-7 M3 Board Jumpers

	Jumper Numbers																	
Unit Rating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
kVA Rating																		
15 kVA	I	I	I	I														
30 kVA	I	I	O	O														
50 kVA	I	O	I	O														
75 kVA	I	O	O	I														
100 kVA	I	O	O	O														
Input Voltage																		
208 V						O	O											
480 V						O	I											
600 V						I	O											
Frequency																		
50 Hz								I										
60 Hz								O										
Output Voltage																		
120/208					O													
220/415					I													
Enable Watchdog Timer									I									
Enable Clock Interrupts										O								
Enable On-board Memory											O							
Enable On-board I/O Select													I					
Select Memory Power Source												+5						
Unit Address														O	O	O		
Communications Type																	I	I

Ensure that jumpers 9 through 18 are installed according to the above table. Jumper 12 should be connected between the center pin and the +5 V pin.

I = IN/O = OUT

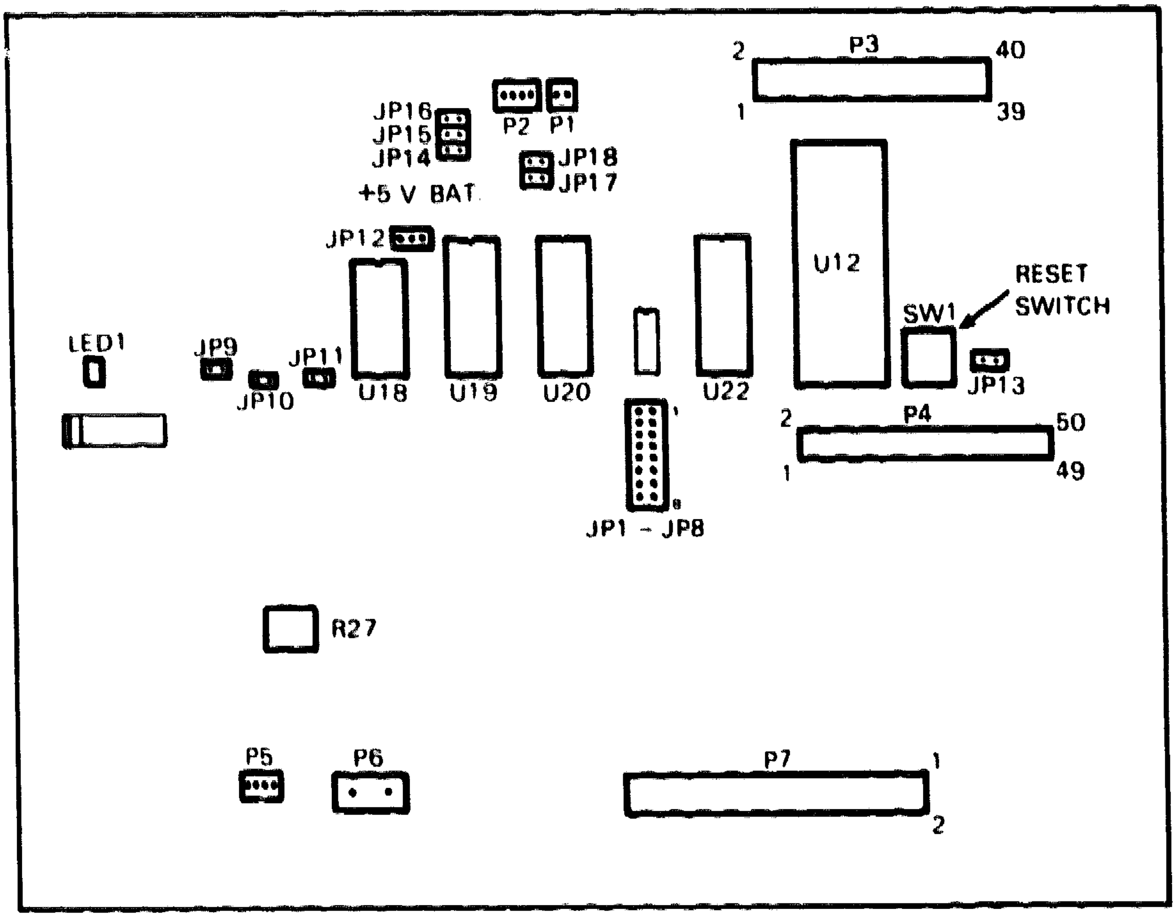

Figure 6-6 M3 Processor Board

6.9.3 I3 Interface Board

References

- Figure 6-2 Monitoring Logic Parts Location
- Figure 6-3 I3 Interface Board
- Table 6-8 I3 Board Jumpers
- Table 6-9 I3 Calibration Potentiometers

Tools Needed

- Digital multimeter (DMM) with true RMS capability and Clamp-on ampmeter (29-27932-01)
- Trim potentiometer adjusting tool

Calibration Procedures

There are 17 jumpers on the I3 board that must be installed to correspond to the input voltage, output phase and ground current, and output phase to neutral voltage ratings of the PDS+ unit. During initial installation, and whenever the I3 board is replaced, these jumpers must be verified and installed in accordance with Table 6-8 to ensure proper PDS+ operation.

Table 6-8 I3 Board Jumpers

	Jumper Numbers									
Unit Rating	**1&2**	**3&4**	**5&6**	**7&8**	**9&10**	**11&12**	**13&14**	**15**	**16**	**17**
Input Voltage										
208	1	1	1							
415	2	2	2							
480	2	2	2							
600	3	3	3							
Output Phase and Ground Current										
210 A or less*				1	1	1	1			
420 A or less (100 kVA, 60 Hz)				2	2	2	2			
Output Phase to Neutral Voltage										
120 V								1-2	1-2	1-2
240 V								2-3	2-3	2-3

* All PDS+ units except the 100 kVA 60 Hz units require this jumper setting for output phase and ground current.

Table 6-9 I3 Calibration Potentiometers

Probe Number	Displayed Probe Name	Potentiometer
1	Output Voltage Line 1-N	R25
2	Output Voltage Line 2-N	R26
3	Output Voltage Line 3-N	R27
7	Input Voltage Phase A	R13
8	Input Voltage Phase B	R14
9	Input Voltage Phase C	R15
10	Output Current Line 1	R32
11	Output Current Line 2	R33
12	Output Current Line 3	R34
14	Ground Current	R35
28	EMS Temperature	R70
29	EMS Humidity	R69

NOTE

Total neutral current is the algebraic sum of the three output line currents and the ground current. If these currents are not adjusted correctly, a false neutral current will result. Ground current should be less than 1 ampere.

The following procedure should be used when adjusting the displayed values of input voltages, output voltages, output currents, and EMS temperature and humidity listed in Table 6-9.

WARNING

With the covers removed and power applied to the PDS+ unit, HIGH VOLTAGE is present. All appropriate safety precautions must be taken to ensure the safety of personnel. Remove all rings and jewelry, and wear safety glasses at all times.

1. Remove the top trim plate on the rear of the PDS+ unit by disengaging the fasteners.

2. Power up the PDS+ unit and the attached computer equipment using the procedures listed in Section 5.2.

3. Measure the input voltage Phase A (1 to 2), input voltage Phase B (2 to 3), and input voltage Phase C (1 to 3) at the test points on the power isolator assembly (TP A is Phase 1, TP B is Phase 2, and TP C is Phase 3) and record the measured values in Table 2-5. Refer to Figure 2-1 for test point locations on the power isolator assembly.

4. Measure the output voltage line 1-N, output voltage line 2-N, and output voltage line 3-N between each output phase test point (TP 1 is Phase 1, TP 2 is Phase 2, and TP 3 is Phase 3) and the neutral test point (TP N is neutral) on the power isolator assembly. Record the measured values in Table 2-5.

5. Measure the output current line 1 (phase 1), output current line 2 (phase 2), output current line 3 (phase 3), and ground current at the rear of the PDS+ cabinet where the cables connect to the output main circuit breaker(s). A true RMS voltmeter is required in association with the clamp-on ampmeter. If only one output panel board is used, attach the clamp-on ampmeter to each phase cable and the ground cable and record the measured values in Table 2-5. If both output panel boards are used, turn the circuit breakers OFF on one panel board and measure the currents on the other output main circuit breaker and record the measured values in Table 2-5.

6. Individually access each of the ten probes, whose values were measured in Step 3 through Step 5, by going through the Main Menu, Display Menu, Probe Data Menu, and entering the corresponding probe number.

NOTE

A minimum current of 20 Amps per phase is necessary for accurate calibration.

   a. Select probe number 7 (Input Voltage Phase A) and adjust R13 on the I3 interface board until the displayed value is equal to the actual value measured in Step 3.

   b. Select probe number 8 (Input Voltage Phase B) and adjust R14 on the I3 interface board until the displayed value is equal to the actual value measured in Step 3.

   c. Select probe number 9 (Input Voltage Phase C) and adjust R15 on the I3 interface board until the displayed value is equal to the actual value measured in Step 3.

d. Select probe number 1 (Output Voltage Line 1-N) and adjust R25 on the I3 interface board until the displayed value is equal to the actual value measured in Step 4.

e. Select probe number 2 (Output Voltage Line 2-N) and adjust R26 on the I3 interface board until the displayed value is equal to the actual value measured in Step 4.

f. Select probe number 3 (Output Voltage Line 3-N) and adjust R27 on the I3 interface board until the displayed value is equal to the actual value measured in Step 4.

g. Select probe number 10 (Output Current Line 1) and adjust R32 on the I3 interface board until the displayed value is equal to the actual value measured in Step 5.

h. Select probe number 11 (Output Current Line 2) and adjust R33 on the I3 interface board until the displayed value is equal to the actual value measured in Step 5.

i. Select probe number 12 (Output Current Line 3) and adjust R34 on the I3 interface board until the displayed value is equal to the actual value measured in Step 5.

j. Select probe number 14 (Ground Current) and adjust R35 on the I3 interface board until the displayed value is equal to the actual value measured in Step 5.

7. If an Environmental Monitoring and REPO Station (optional) has been installed and calibrated, use the following procedure to adjust the displayed values of EMS temperature and EMS humidity to correspond to the actual values displayed on the LCD of the EMS unit.

   a. Display the EMS temperature by going through the Main Menu, Display Menu, Probe Data Menu, and selecting probe number 28.

   b. Adjust R70 on the I3 interface board until the displayed value on the PDS+ unit is equal to the value displayed on the EMS unit.

   c. Display the EMS humidity by going through the Main Menu, Display Menu, Probe Data Menu, and selecting probe number 29.

d. Adjust R69 on the I3 interface board until the displayed value on the PDS+ unit is equal to the value displayed on the EMS unit.

6.10 PRINTER

A 40-column impact printer is installed in the PDS+ unit. The printer is installed on the inside of the front door between the User Control Center and the Local Control Panel. A printer control board is also installed inside the front door above the M3 board.

The printer is used to provide hard copy of alarm conditions or probe status and data, and is enabled through the Setup Menu.

Troubleshooting

If the printer fails to operate, check the software through the Setup Menu to ensure that it has been enabled. If it has been enabled and still fails to operate, check the connectors between the M4 board, the printer controller board, the P4 board, and the printer. If the connectors are good and it fails to operate, check for +5 Vdc between pins 1 and 2 of P50 on the P4 board. If the +5 Vdc is not present on P50, change the P4 board. If the +5 Vdc is present on P50, change the printer since most problems with the printer are mechanical. If it still fails to operate, change the printer controller board (see Section 6.11).

Replacement of Printer Mechanical Assembly

Replace the printer mechanical assembly using the following procedure. Refer to Figure 6-7.

[ ] 1. Disconnect the printer cable assembly from the printer controller board.

[ ] 2. Remove the four bolts that attach the printer bracket to the paper bracket.

[ ] 3. Remove the four screws that attach the printer mechanical assembly to the printer bracket.

[ ] 4. Attach the new printer mechanical assembly to the printer bracket using the four screws removed in Step 3.

[ ] 5. Attach the printer bracket, with the printer mechanical assembly already attached, to the paper bracket with the four mounting bolts removed in Step 2. Ensure that the cable assembly from the printer is located on the top of the printer mechanical assembly.

[ ] 6. Connect the printer cable assembly to the printer controller board.

[ ] 7. Install the roll of printer paper on the paper shaft. Feed the paper up through the printer between the print head and the paper advance roller. Continue by feeding the paper through the slot in the printer access plate located on the front of the door.

[ ] 8. Install the ribbon cartridge by removing the printer access plate on the front door and snapping the cartridge into place. The ribbon goes between the paper and the print head.

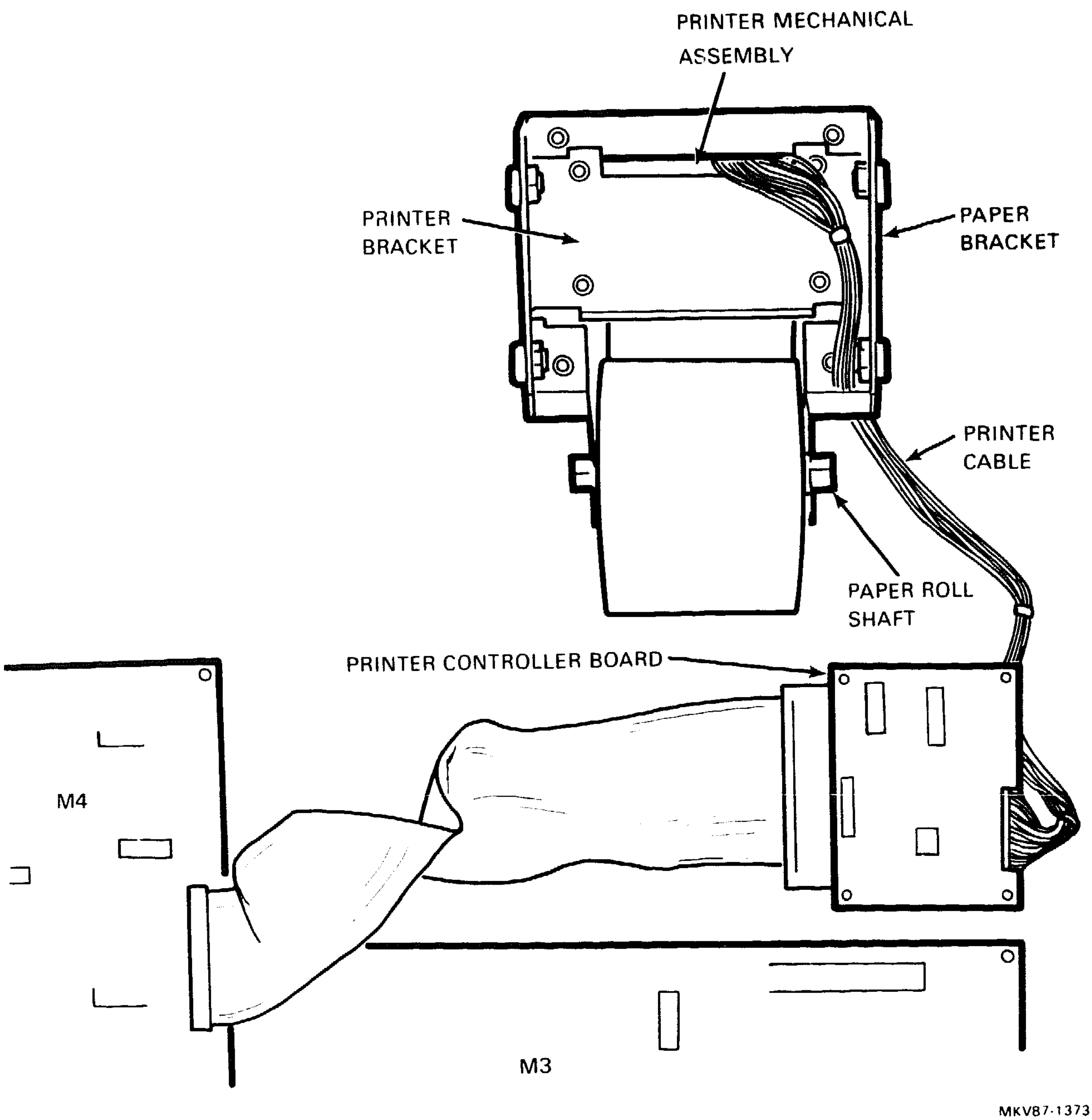

Figure 6-7 Internal Printer

6.11 PDS+ PRINTED CIRCUIT BOARD REPLACEMENT

The following procedures are for replacing the M4, M3, I3, P4, and the printer controller boards in the PDS+ door electronics. There are two procedures given for replacing the printed circuit boards. One procedure is for replacing the board with power removed from the PDS+ unit and the other procedure is for replacing the board with power applied to the PDS+ unit.

If the attached computer equipment can be turned OFF, use the "Power Removed Procedure". If the attached computer equipment cannot be turned OFF, use the "Power Applied Procedure".

Power Removed Procedure

The following procedure is for replacing a printed circuit board in the PDS+ door electronics with power removed from the PDS+ unit.

[ ] 1. Turn OFF the attached computer equipment in the proper sequence.

[ ] 2. Set the PDS+ output distribution circuit breakers to OFF.

[ ] 3. Set the PDS+ output main circuit breaker(s) to OFF.

[ ] 4. Set the IMCB to the OFF position.

[ ] 5. Disconnect the red battery lead.

[ ] 6. Disconnect the connectors on the board being replaced. Ensure that they are properly labled for reconnection.

[ ] 7. Remove the board from the stand-offs.

[ ] 8. Replace the new board on the stand-offs.

NOTES

1. **If the board being replaced is the M4, M3, or I3 board, ensure that the jumpers on the new board are installed to match the way they were installed on the old board. If in doubt, see Tables 6-6, 6-7, or 6-8.**

2. **If the board being replaced is the M4 board, chip U6 should be removed from the old board and installed in the proper location on the new board to retain all previous probe programming.**

[ ] 9. Connect the connectors that were disconnected in Step 6.

[ ] 10. Reconnect the red battery lead.

[ ] 11. Perform the normal powerup sequence in Section 5.2.

NOTE

If the board that was replaced was the I3 board, proceed to Section 6.9.3 and perform the I3 board calibration procedure.

Power Applied Procedure
The following procedure is for replacing a printed circuit board in the PDS+ door electronics with power applied to the PDS+ unit.

[ ] 1. Place the maintenance switch on the I3 interface board to the MAINTENANCE position.

NOTE
If the PDS+ unit is connected to a multiple-unit system, place the maintenance switch on each unit to the MAINTENANCE position.

[ ] 2. Disconnect P6 on the I3 board.

CAUTION
With P6 disconnected, REPO and LEPO will not function. DO NOT leave the unit unattended in this condition.

[ ] 3. Disconnect the red battery lead.

[ ] 4. Disconnect P41 on the P4 board. At this time all power has been removed from the door electronics.

[ ] 5. Disconnect the connectors on the board being replaced. Ensure that they are properly labled for reconnection.

[ ] 6. Remove the board from the stand-offs.

[ ] 7. Replace the new board on the stand-offs.

NOTES
1. If the board being replaced is the M4, M3, or I3 board, ensure that the jumpers on the new board are installed to match the way they were installed on the old board. If in doubt, see Tables 6-6, 6-7, or 6-8.

2. If the board being replaced is the M4 board, chip U6 should be removed from the old board and installed in the proper location on the new board to retain all previous probe programming.

[ ] 8. Connect the connectors that were disconnected in Step 5.

[ ] 9. Reconnect P41 on the P4 board.

[ ] 10. Reconnect the red battery lead.

CAUTION

Ensure that all alarms are cleared, with the exception of the Maintenance switch, before continuing. If the unit is part of a multiple-unit system, ensure that all alarms on all the units are clear before continuing.

[ ] 11. Reconnect P6 on the I3 board.

NOTE

If the board that was replaced was the I3 board, proceed to Section 6.9.3 and perform the I3 board calibration procedure.

[ ] 12. Place the maintenance switch on the I3 interface board to the NORMAL position and press the RESET switch on the UCC.

6.12 PREVENTIVE MAINTENANCE

Preventive maintenance is the process of making repairs, adjustments, or performing other service to a properly functioning unit for the purpose of preventing it from failing.

Preventive maintenance should be performed on the PDS+ unit annually. This maintenance must be scheduled because the PDS+ unit and all attached computer equipment must be deenergized.

The preventive maintenance procedures consist of a physical inspection, an electrical inspection, and a J-Box inspection. The procedures for these inspections are listed below. Digital Customer Services engineers cannot perform service on the J-Box. The J-Box inspection must be performed by the customer's electrician.

If any problems are discovered during the inspections, they must be corrected or repaired before continuing.

Physical Inspection

Use the following procedure to perform the physical inspection.

[ ] 1. Turn OFF the attached computer equipment using the appropriate sequence.

[ ] 2. Set all of the output distribution circuit breakers to the OFF position.

[ ] 3. Set the output main circuit breaker(s) to the OFF position.

[ ] 4. Set the IMCB to the OFF position.

[ ] 5. Disconnect the input power cable from the J-Box.

[ ] 6. Inspect all printed circuit boards for visual damage.

[ ] 7. Ensure that the plug connectors on the following circuit boards are properly seated.

  a. M4 main processor board
  b. M3 processor board
  c. P4 power supply board
  d. I3 interface board
  e. Printer controller board
  f. Local control panel

[ ] 8. Remove both side panels, the output panel board cover, and the upper trim plate on the back of the PDS+ unit.

[ ] 9. Tighten the following high-current cable-connecting screws, bolts, and nuts.

   a. Main transformer connections

   b. Output main circuit breaker(s) cable securing screws

   c. Output distribution circuit breakers cable securing screws

   d. Ground bus securing screws

   e. Neutral bus securing screws

   f. The three input cable securing screws and the three output cable securing screws on the IMCB

[ ] 10. Tighten all cabinet screws, bolts, and nuts.

[ ] 11. Cycle the IMCB, the output main circuit breaker(s), and each output distribution circuit breaker ON and OFF several times.

[ ] 12. Replace both side panels, the output panel board cover, and the upper trim plate on the back of the PDS+ unit.

[ ] 13. Connect the input power cable to the J-Box and proceed to the electrical inspection procedure.

Electrical Inspection
Use the following procedure to perform the electrical inspection.

[ ] 1. Perform the following checkout procedures.

a. Direct Trip Check (Section 2.6.1)
b. Maintenance Mode Disable Check (Section 2.6.2)

[ ] 2. Perform the I3 interface board calibration (Section 6.9.3).

[ ] 3. If EM & REPO station(s) is/are installed, perform the calibration procedures for that option.

[ ] 4. If any other options are installed, perform the proper calibration and checkout procedures for that option.

NOTE
If water detectors are installed, their batteries should be replaced (annually) by the customer.

[ ] 5. Perform Main Transformer Tap Adjustments (Section 6.6).

[ ] 6. If the J-Box inspection has already been performed by the customer's electrician, proceed to Step 7. If the J-Box inspection has not been performed, have the customer's electrician do the J-Box inspection and perform Step 7.

[ ] 7. Perform the normal powerup procedure in Section 5.2.

J-Box Inspection
Digital Customer Services engineers cannot perform service on the J-Box. **This must be done by the customer's electrician.** Use the following procedure to perform the J-Box inspection.

[ ] 1. Set the IMCB on the PDS+ unit to the OFF position.

[ ] 2. Set the building power circuit breaker that supplies power to the J-Box to the OFF position.

[ ] 3. Remove the J-Box cover.

[ ] 4. Visually inspect the inside of the J-Box for any signs of arcing.

[ ] 5. Check the torque on the screws securing the power cables within the connector and to the terminal block. Use the torque values listed in the chart below that correspond to the current rating of the J-Box.

J-Box Rating (Amps)	**Terminal Block Screw Torque (Inch-Pounds)**	**Connector Screw Torque (Inch-Pounds)**
30	35	15
60	45	26
100	120	50
200	350	100

[ ] 6. Replace the J-Box cover.

[ ] 7. Set the building power circuit breaker that supplies power to the J-Box to the ON position.

CHAPTER 7

7.1 GENERAL

The PDS+ unit automatically monitors and distributes ac power for electronic data processing (EDP) equipment. The PDS+ unit can be programmed to automatically shut down in emergency and alarm situations (Figures 7-2, 7-3, and 7-4).

7.2 INPUT POWER

The PDS+ input voltage must be within -27 to +15 percent of the specified PDS+ input voltage for proper operation (see Tables D-12 and D-13). The input voltage may be at a frequency of 50 or 60 Hz. This voltage is a 3-phase delta-connected voltage with a separate ground (3-wire plus ground). Neutral is not used if a wye source is used. The wire size of this ground is the same as the wire size for each of the 3-phase wires.

CAUTION

An error in the system input voltage may cause permanent damage to the isolation transformer. To prevent this, measure the input voltage available at the site when configuring a power system.

7.2.1 Input Power Circuitry

The 3-phase 4-wire (three hot leads and one ground) input voltage is provided through the junction box and terminates at the input main circuit breaker (IMCB). The IMCB provides overcurrent protection for the PDS+ unit and all main circuitry (Figure 7-1). The rating of the circuit breaker is determined by the capacity of the unit.

7.2.2 Input Main Circuit Breaker (IMCB)

This circuit breaker removes input power from the PDS+ unit in the following ways:

- Manually,
- By the shunt-trip mechanism, or
- By overloading.

Manual Trip

The IMCB serves as the power ON/OFF switch for the PDS+ unit during normal operation. The IMCB may also be manually tripped in the event of an emergency.

Shunt-Trip Mechanism
The IMCB has a shunt mechanism that allows the monitoring logic to shut down the PDS+ unit in an emergency or alarm condition. Input power to the transformer is disconnected by the shunt-trip mechanism under the following conditions:

- A LOCAL EMERGENCY POWER OFF (LEPO) activation,
- A REMOTE EMERGENCY POWER OFF (REPO) activation,
- ALL UNITS POWER OFF activation,
- kVA exceeds 120% of capacity for 20 minutes, or
- A transformer overtemperature.

During normal use, the shunt-trip coil is at +12 Vdc. The trip mechanism is activated by the control circuits on the I3 interface board. These circuits control relay K1 which applies -12 Vdc to the other side of the shunt-trip coil when energized. This 24 Vdc difference of potential energizes the shunt-trip coil and trips the IMCB.

Overloading
If the kVA rating of the PDS+ unit is exceeded by 120% for 20 minutes, the input main circuit breaker trips. The excessive load must be removed for proper operation.

7.2.3 Main Transformer
The main transformer is a double-shielded, computer-grade isolation transformer with three phases and having seven taps per phase. Its primary is delta-connected and its secondary is wye-connected.

Each winding of the 3-phase transformer is double-shielded. The first shield is electrically connected to the primary winding and the second shield is connected to chassis ground. Both shields are between the primary and secondary portions of each isolated winding. The shields greatly reduce interwinding capacitance and help in the attainment of the 90 dB common mode attenuation.

A copper strap provides a high-frequency grounding pad for the main transformer core. The transformer uses a UL-listed 220° Celsius insulation system.

7.2.4 Ground Bus
All grounding is referenced to the ground bus at the back of the PDS+ unit. The neutral, the transformer shield, and core are also referenced to this point. Auxiliary grounds can be connected to the ground bus or the auxiliary ground stud on the back of the PDS+ unit.

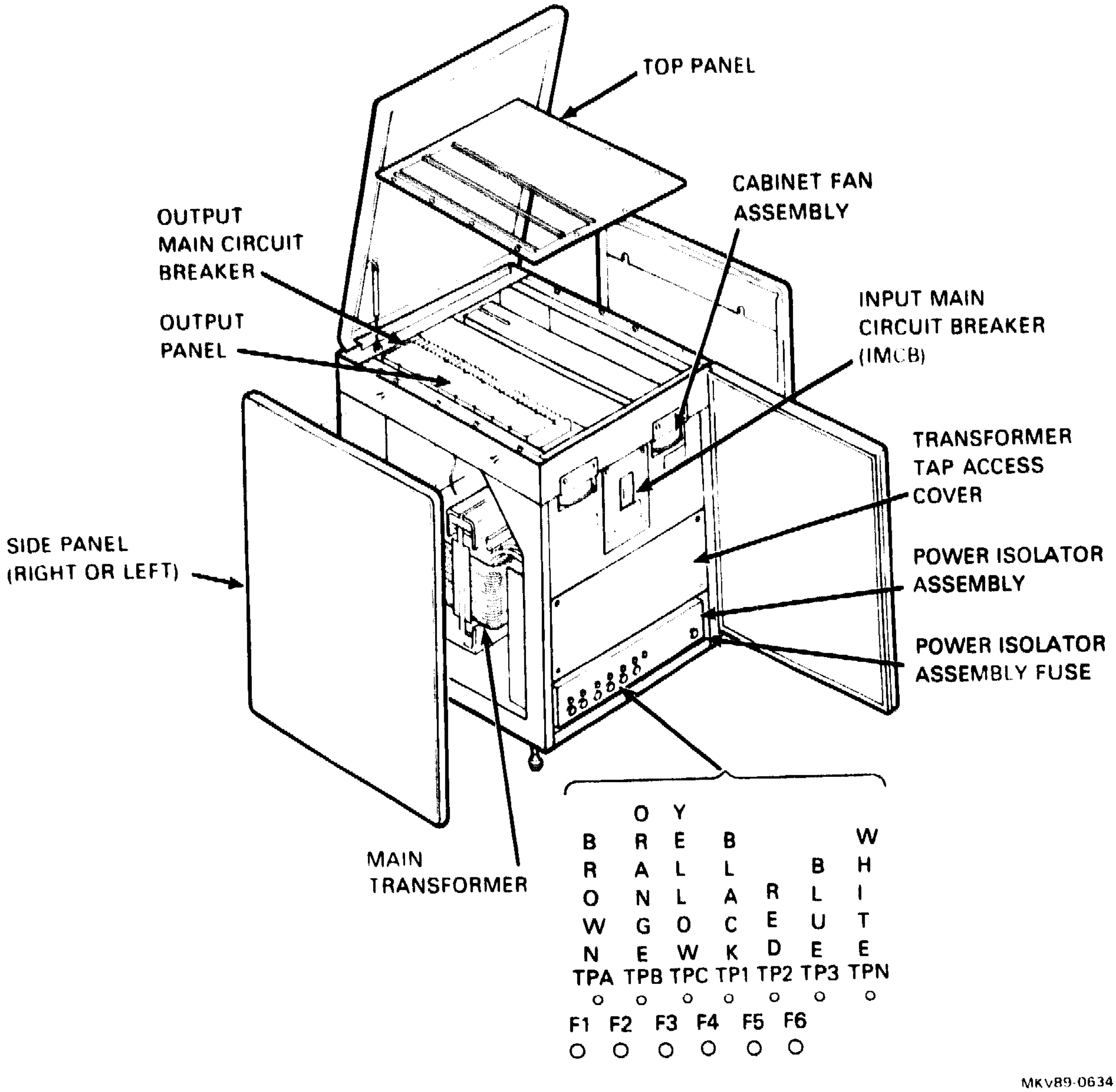

Figure 7-1 PDS+ Configuration

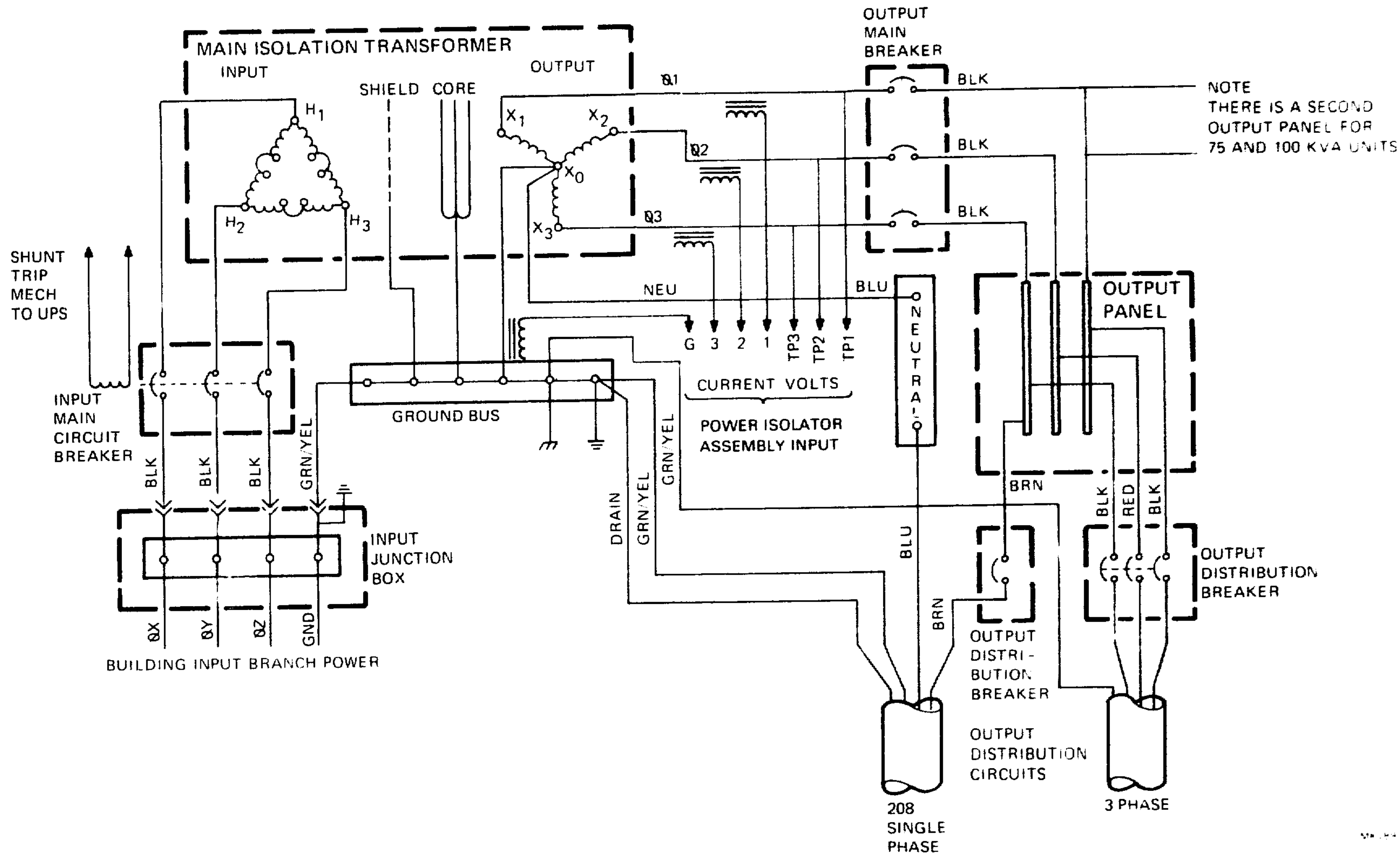

Figure 7-2 Power Block Diagram

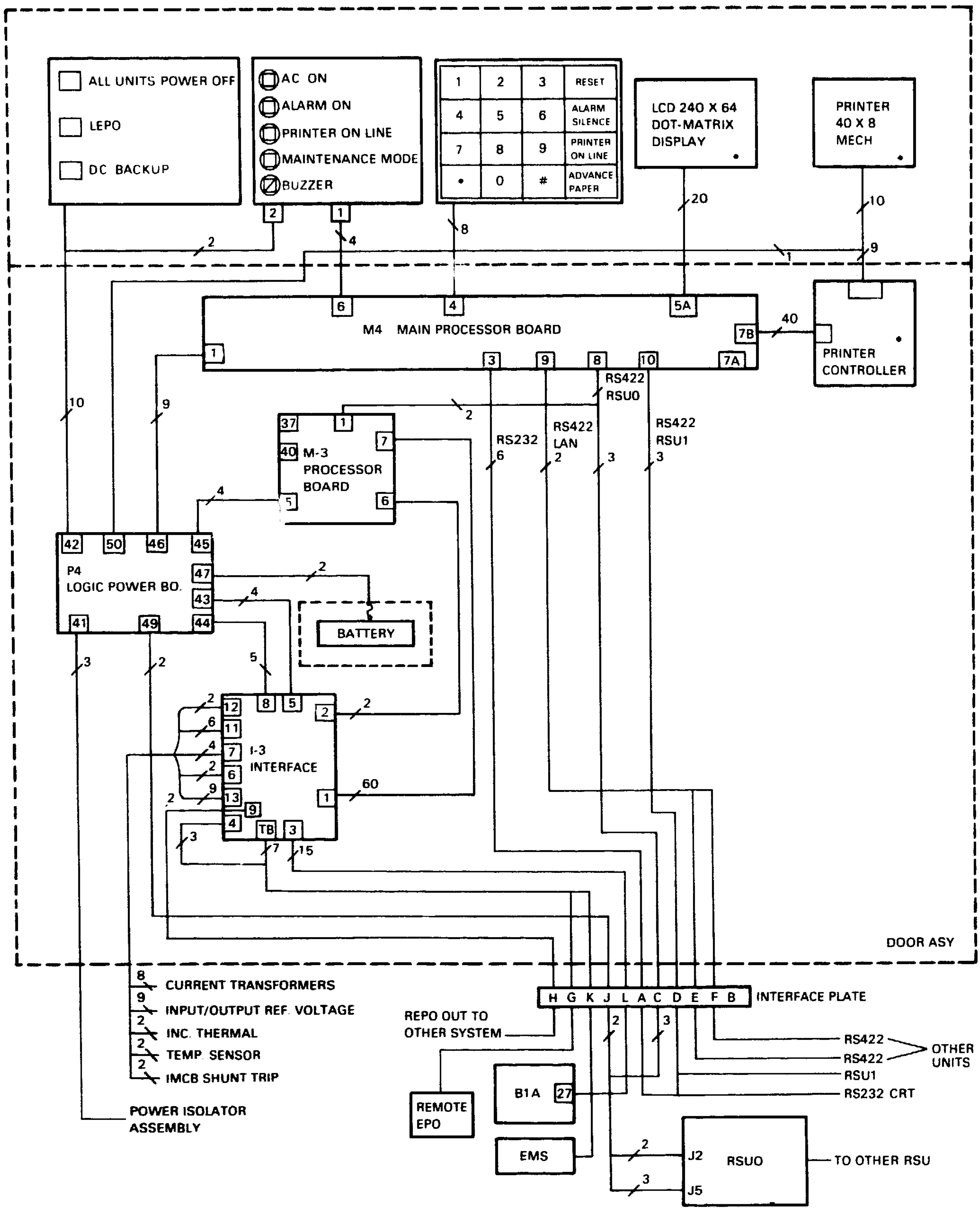

Figure 7-3 PDS+ Integration Diagram

7.3 POWER ISOLATOR ASSEMBLY

Located in the front of the PDS+ unit, the power isolator assembly performs the following functions.

- Supplies regulated +15 Vdc to the P4 power supply board.
- Provides the input and output reference voltages to the I3 interface board.
- Provides input and output test points.

Primary power to the power isolator assembly is supplied from the secondary of the main transformer. A regulated power supply provides +15 Vdc that is sent to the P4 power supply board.

There are six reference transformers in the power isolator assembly. These center-tap secondary transformers provide the input and output reference voltages for the I3 interface board.

7.4 OUTPUT CIRCUITS

The configuration of the output circuits is determined by the attached equipment.

7.4.1 Output Voltage (60 Hz)

The PDS+ nominal output voltage is 3-phase wye-connected, grounded neutral, 120/208 V. This output voltage may be supplied as single phase or multiphase to the appropriate receptacles.

7.4.2 Output Voltage (50 Hz)

The PDS+ nominal output voltage is 3-phase wye-connected, grounded neutral, 380/220 or 415/240 V. This output voltage may be supplied as single phase or multiphase to the appropriate receptacles.

7.4.3 Output Panel Board (60 Hz)

The output panel assembly consists of a 42-pole position panel board (2 panel boards, or 84 positions for some 50 kVA and all 75 and 100 kVA units). The panel board includes the circuit breakers for individual output circuits and the output main circuit breaker. The output panel board is covered by a trim plate.

7.4.4 Output Panel Board (50 Hz)

The output panel assembly consists of a 66-pole position panel-board. The panel board includes the circuit breakers for individual output circuits and the output main circuit breaker. The output panel board is covered by a trim plate.

WARNING

Unused breaker positions are covered with insulating paper to prevent hazards due to the voltages present.

7.4.5 Output Main Circuit Breaker(s)

This 50 to 250 A, 3-pole circuit breaker, mounts on the output panel board and provides a current limit for the total output distribution circuit loading (Tables D-14 and D-15).

The output main (secondary) breaker limits each phase current through the output panel board to a value within the specified range for the particular PDS+ unit. The output phase currents must be balanced to fully load the PDS+ unit.

7.4.6 Output Distribution Circuit Breakers

These circuit breakers are part of the output circuit. The rating and size of the breakers depend on the system configuration (Tables D-8 through D-11).

7.4.7 Output Circuits

Output circuits provide secondary voltages in single-phase, 2-phase, or 3-phase output for the computer system and its peripherals. Each output circuit consists of a standard electrical circuit breaker, wiring, an appropriate length of flexible conduit, and a power receptacle in a grounded outlet box. The size of the circuit breaker and the receptacle are determined as a unit for each peripheral and system as required.

The length of each circuit is determined by the right-angle computer-room distance between the PDS+ unit and the powered device (Tables D-8 through D-11).

Secondary Voltages

50 Hz	60 Hz
220-240/380-415 V	120/208 V

7.5 CONTROLS AND INDICATORS

This section describes the use and operation of each control and indicator available to the PDS+ operator.

7.5.1 Local Control Panel

The Local Control Panel (Figure 1-4) contains three illuminated power function switches and four status indicators.

ALL UNITS POWER OFF Switch (RED)

The ALL UNITS POWER OFF switch is a power off function switch. Pressing this switch trips the input main circuit breaker (IMCB) on all power units tied together using REPO IN/OUT cabling. In an emergency, this disconnects the PDS+ units from input power. This switch is illuminated when power is applied to the unit.

LOCAL EMERGENCY POWER OFF Switch (YELLOW)

The LOCAL EMERGENCY POWER OFF (LEPO) switch is a power function switch. Pressing this switch trips the IMCB on the PDS+ unit on which the switch is located. In an emergency, this disconnects the PDS+ unit from input power. It has no effect on the other units that are connected together. This switch is illuminated when power is applied to the unit.

BATTERY BACKUP Switch (GREEN)

The BATTERY BACKUP (DC BACK UP) switch provides power for the microprocessor, the indicator lights, the options, and the LCD screen for five minutes when the main power is OFF. After five minutes the screen displays the "Automatic Power Disconnect" message and goes blank. Pressing the switch again gives another five minutes of power to the front door electronics. This switch is not illuminated in either position.

POWER ON Indicator (GREEN)

The POWER ON indicator illuminates when the unit's main power is ON. It does not illuminate if the unit is not receiving input power or if the unit has been turned OFF.

ALARM ON Indicator (RED)

The ALARM ON indicator illuminates when an alarm condition occurs. Correcting the alarm condition and pressing the RESET key extinguishes the light unless a continuing alarm exists.

PRINTER ON LINE Indicator (YELLOW)

The PRINTER ON LINE indicator illuminates when the printer is active. The PRINTER ON LINE key on the User Control Center activates the printer if the printer has been enabled through the Communication Menu.

MAINTENANCE MODE Indicator (YELLOW)

The MAINTENANCE MODE indicator illuminates when the maintenance switch on the I3 interface board is in the MAINTENANCE position. Placing the maintenance switch to the NORMAL position, then pressing RESET on the User Control Center, extinguishes the indicator.

7.5.2 REMOTE EMERGENCY POWER OFF (REPO) Switches

The optional REMOTE EMERGENCY POWER OFF (REPO) switches provide the ability to manually shut down the PDS+ from a remote location. The REPO stations are wall-mounted units with power OFF switches. The stations may be placed at convenient points around the computer room. Each station has one switch and comes with a 15.24 m (50 ft) cable.

REPO stations may be daisy chained so that operating any REPO switch immediately trips the IMCB (see Section 4.2).

7.5.3 User Control Center (UCC)

The User Control Center consists of a 16-key keypad and a liquid crystal display (LCD) screen.

The LCD screen has the capacity of displaying 8 lines of data with a maximum of 40 characters per line.

The keypad contains 10 numeric keys and 6 function keys. These keys are described below.

RESET Key

The RESET key resets the operating electronics after an alarm condition has been corrected. It also returns the screen to the Idle Menu.

CAUTION

Do not use the RESET key to access the Idle Menu, as this causes alarm condition data to be erased.

Press the "*" key from the Main Menu screen or discontinue user activity for a period of 10 minutes and the screen reverts to the Idle Menu.

ALARM SILENCE Key

As soon as a probe detects an alarm condition, the PDS+ unit sounds an alarm. The ALARM SILENCE key silences the audible alarm for 15 minutes. If the alarm condition still exists after 15 minutes, the alarm sounds again. If a different alarm occurs after the alarm is silenced, the system overrides the alarm silence and sounds the alarm again. The ALARM ON indicator on the Local Control Panel remains lit until the alarm condition is corrected and the RESET key is pressed.

PRINTER ON LINE Key
This key is only functional if the printer is enabled through the Communication Menu. Under these conditions, this key turns the printer ON and OFF. Pressing the PRINTER ON LINE key turns the printer ON and lights the PRINTER ON LINE indicator on the Local Control Panel. Pressing the PRINTER ON LINE KEY again turns the printer OFF and extinguishes the PRINTER ON LINE indicator. If the printer is on-line and the Auto/Alarm mode is enabled, the printer automatically prints a hard copy of alarm data when an alarm queue is displayed.

PAPER ADVANCE Key
The PAPER ADVANCE key is used to advance paper in the printer. The printer must be enabled through the Communication Menu to use this key.

Pound "#" Key
The "#" key returns the user to the Main Menu screen on the LCD.

Asterisk "*" Key
The "*" key functions as a "continue" command. It performs the following functions.

- Moves the cursor from field to field in a screen, acting as a TAB key.
- Stores data that has been entered and returns the user to the previous screen.
- Advances display screens manually if Auto Page is not enabled and the Alarm Condition Menu or the Scan Probe Data Menu is selected.
- Advances through the display screens of the menu as selections are made.

Numeric Keys (0-9)
The numeric keys are used to enter probe numbers, probe group numbers, unit numbers, security codes, and data.

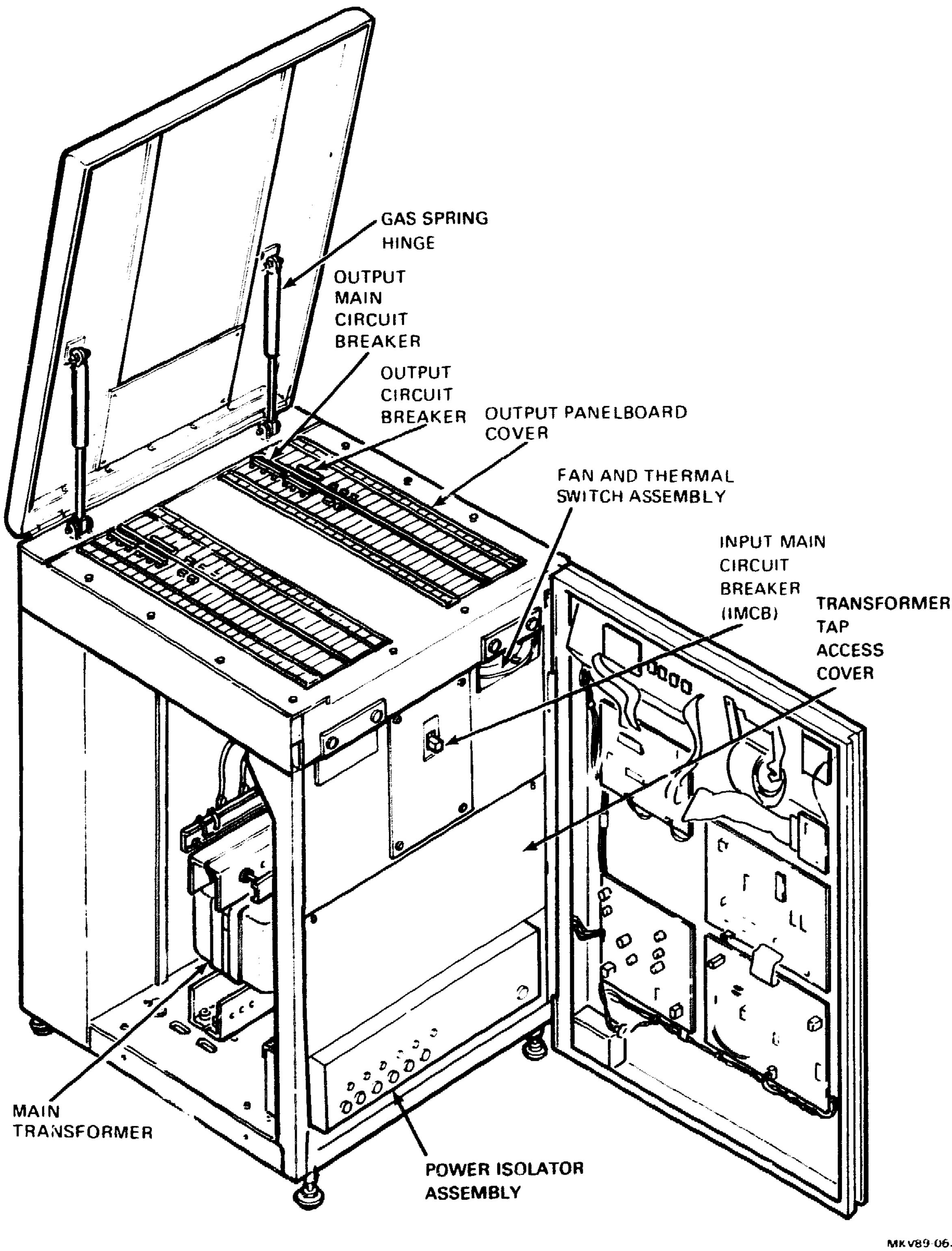

Figure 7-4 PDS+ Components (Sheet 1 of 3)

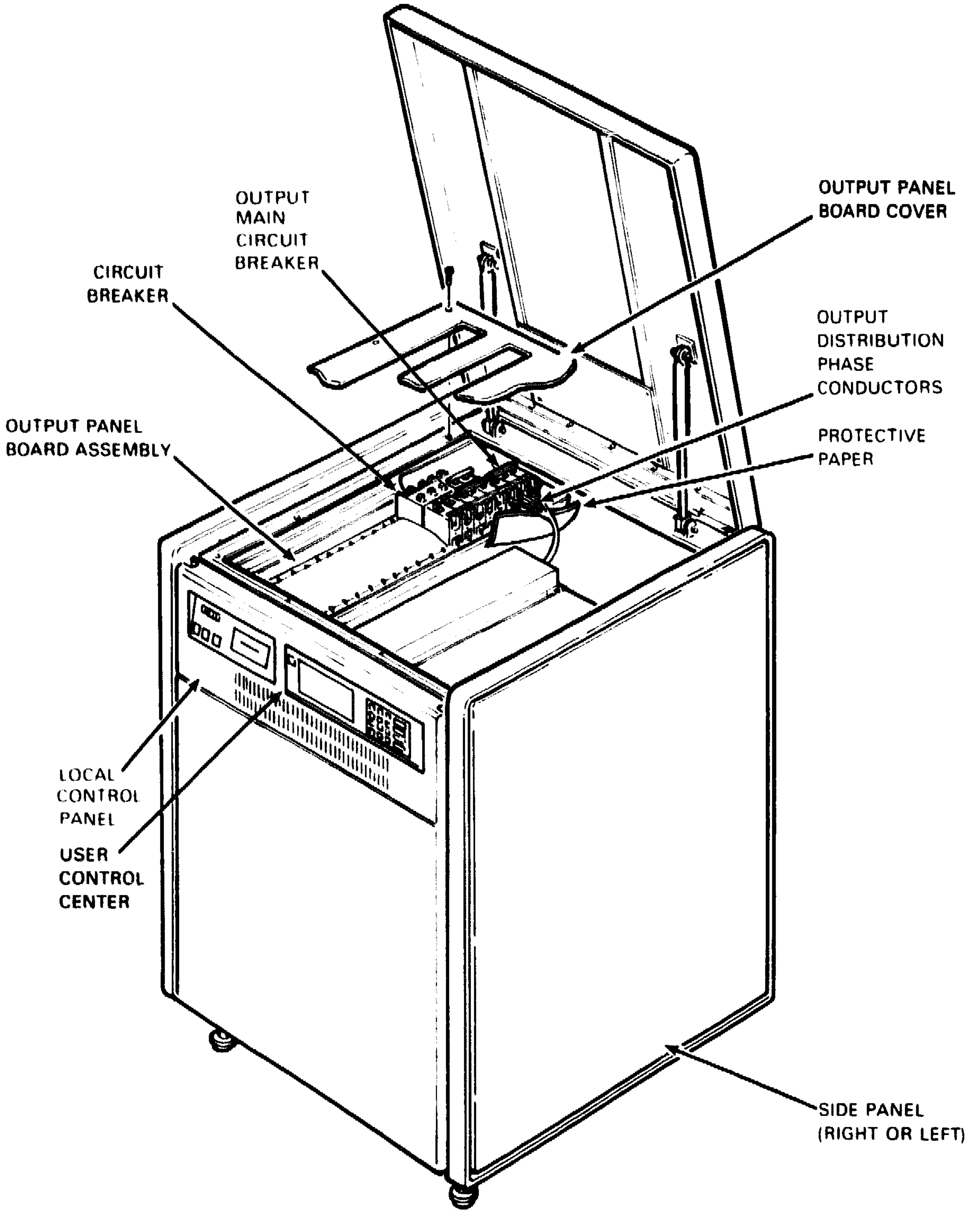

Figure 7-4 PDS+ Components (Sheet 2 of 3)

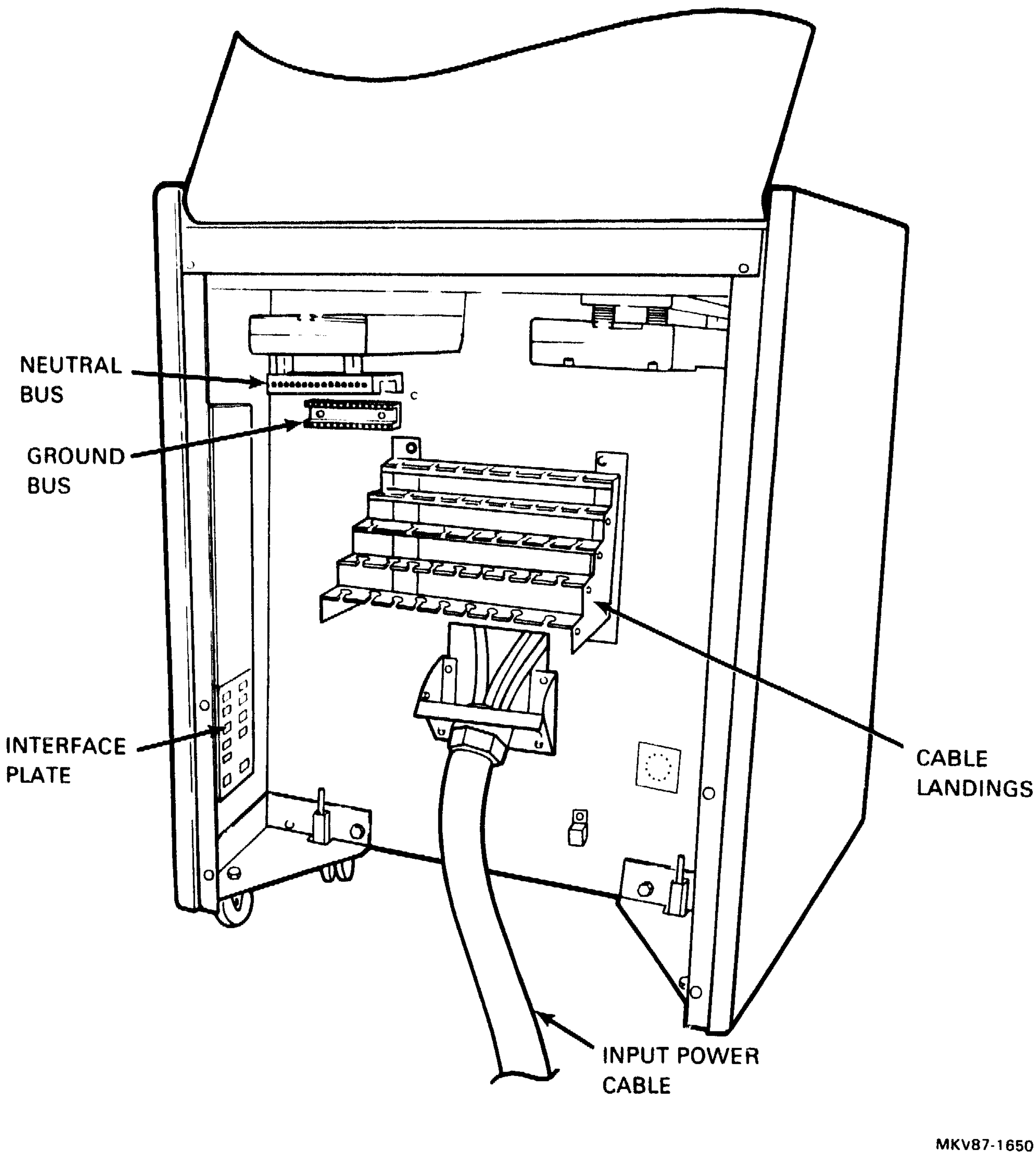

Figure 7-4 PDS+ Components (Sheet 3 of 3)

7.6 MONITORING LOGIC

The PDS+ monitoring logic is located on the cabinet door.

7.6.1 M4 Main Processor Board

The M4 board is the main processor of the PDS+ unit. It handles all external communications with other units, RSU boxes, and VAX systems. It also contains the programming for the connected probes and the parameters associated with them.

Chip U7 on the M4 board is the processor chip. Chips U2 and U3 are the EPROMs that contain the operating program for the PDS+ unit and the factory-set probe parameters. Chips U4 and U5 are the RAMs that are loaded with the contents of the EPROMs and the EAROM for interface with the processor chip. Chip U6 is the EAROM that contains the probe configuration data and any configuration changes. Chip U29 is the input buffer for the keyboard and chip U33 is the output latch for the LED indicators on the Local Control Panel.

Chip U13 is a dual communications device. One section of the chip controls the RS-232-C communication for a VAX system or a remote terminal. The other section controls the communication with other units over the RS-422 network. The RS-422 network operates at a 10.4 kilo-baud rate. LED 1 indicates activity on the RS-232-C line and LED 2 indicates activity on the RS-422 network.

The RSU communication ports are directly controlled by the processor. LED 5 indicates activity on RSU Port 0 and M3 to M4 communication. LED 4 indicates activity on RSU Port 1. RSU communication rate is 9600 baud.

Jack J1 is the power connector for the M4 board. Jack J3 is the RS-232-C interface connector and J9 is the RS-422 interface connector. Jack J4 is the keyboard connector. J5A is the LCD connector. Jack J6 is the connector to the LED indicators on the Local Control Panel. Jack J7B is the interface connector between the M4 board and the internal printer control board. Jack J8 is the interface connector for RSU Port 0 and J10 is the interface connector for RSU Port 1.

Switch SW1 is the master reset switch for the M4 board. Potentiometer R27 is the contrast adjustment for the LCD.

Jumpers JP1 through JP4 are used to configure the RS-232-C communications port (see Table 6-6).

7.6.2 M3 Processor Board

The M3 board processes all the internal probe analog data from the I3 board, converts it to digital data, and transfers it to the M4 board. This includes the information from the BIA box and the EM & REPO station. The M3 board is seen as RSU 0-0 and RSU 0-1 by the M4 board.

Chip U12 is the processor for the M3 board. Chip U22 is the EPROM that contains the programming for the M3 board. Chip U19 is the static RAM that is used for temporary storage during system operation. Chip U18 is the A/D converter for all analog signals from the internal probes.

The watchdog timer circuit is located on the M3 board. The board is programmed to reset this timer at a regular interval. If the timer times out, LED 1 lights and a reset signal is sent to the processor to try and restart operation. If operation cannot be restarted, LED 1 remains lit, indicating that the M3 processor board is dead. The phase-error circuit checks the three output voltage signals for proper phase sequence. If the signals are not in phase, a signal is generated to indicate a phase-rotation error. The neutral current is generated by the M3 board using the algebraic sum of the three output line currents and the output ground current. The ground current is monitored by a current transformer and reported to the M3 board from the I3 interface board. The circuit for generating the true power reading (kW) is also located on the M3 board.

Plug P1 on the M3 board is for RS-422 communication with the M4 board. P2 is the connector for the RS232 port. A test cable (P/N 29-28507-01) can be connected from P2 to a terminal for system troubleshooting. P5 is the connector for battery voltage, battery charge voltage, and ALL UNITS POWER OFF signal from plug P45 on the P4 board. Connector P6 is for the unregulated +12 Vdc that comes from jack J2 on the I3 board. Plug P7 is the connector for the interface cable from jack J1 on the I3 board.

Switch SW1 is the master reset switch for the M3 board.

Jumpers JP1 through JP18 are used to configure the kVA rating, input voltage, frequency, output voltage, enable watchdog timer, enable clock interrupts, enable on-board memory, enable on-board I/O select, select memory power source, select unit address, and select communications type (see Table 6-7). Any reconfiguration of these jumpers requires that the master reset switch (SW1) on the M3 and M4 boards be pressed in order to update the values that are stored in each board's memory.

7.6.3 I3 Interface Board

The I3 interface board is the interface between the M3 board and the power cabinet, BIA box, and EM & REPO station. The I3 board receives input reference voltages, output reference voltages, output currents, ground current, and cabinet temperature from the power cabinet. It receives temperature, humidity, and REPO signals from the EM & REPO station that is connected to the EMS jack on the interface plate, and BIA signals from the BIA box. These signals are then sent to the M3 board. The I3 board also contains the maintenance switch which, when in the MAINTENANCE position, interrupts the shunt trip drive signal from the M3 board and sends the maintenance signal to the M3 board.

Table 7-1 provides a list of connectors on the I3 interface board and the signals associated with each.

Table 7-1 I3 Board Connectors and Signals

Connector	Pin(s)	Signal
P1	1 & 2	Output 1-N reference voltage to M3 board
	3 & 4	Output 2-N reference voltage to M3 board
	5 & 6	Output 3-N reference voltage to M3 board
	7 & 8	Output current line 1 to M3 board
	9 & 10	Output current line 2 to M3 board
	11 & 12	Output current line 3 to M3 board
	13 & 14	Ground current to M3 board
	15 & 16	Input Phase A reference voltage to M3 board
	17 & 18	Input Phase B reference voltage to M3 board
	19 & 20	Input Phase C reference voltage to M3 board
	21 & 22	Cabinet temperature to M3 board
	23 & 24	Not used
	25 & 26	EM & REPO humidity signal to M3 board
	27 & 28	EM & REPO temperature signal to M3 board
	29	BIA1 signal to M3 board
	30	BIA2 signal to M3 board
	31	BIA3 signal to M3 board
	32	BIA4 signal to M3 board
	33	BIA5 signal to M3 board
	34	BIA6 signal to M3 board
	35	BIA7 signal to M3 board
	36	BIA8 signal to M3 board
	37	Not used - spare line to M3 board
	38	ANY RELAY1 ALARM signal from M3 board

Table 7-1 I3 Board Connectors and Signals (Cont)

Connector	Pin(s)	Signal
P1 (Cont)	39	ACI signal from M3 board
	40	LEPO signal to M3 board
	41	REPO signal to M3 board
	42	MAINTENANCE signal to M3 board
	43	SHUNT TRIP DRIVE signal from M3 board
	44	TRANSFORMER THERMAL signal to M3 board
	45	+15 Vdc to M3 board
	46	±15 Vdc return to M3 board
	47	-15 Vdc to M3 board
	48 & 49	Not used
	50	RELAY RESET signal from M3 board
	51 & 52	Average Phase A reference volt to M3 board
	53 & 54	Average Phase B reference volt to M3 board
	55 & 56	Average Phase C reference volt to M3 board
	57 - 60	Not used
J2	1	+12 Vdc to M3 board
	2	+12 Vdc return to M3 board
P3	1	BIA1 signal from BIA box
	2	BIA2 signal from BIA box
	3	BIA3 signal from BIA box
	4	BIA4 signal from BIA box
	5	BIA5 signal from BIA box
	6	BIA6 signal from BIA box
	7	BIA7 signal from BIA box
	8	BIA8 signal from BIA box

Table 7-1 I3 Board Connectors and Signals (Cont)

Connector	Pin(s)	Signal
P3 (Cont)	9	Not used - spare line from BIA box
	10	ANY RELAY1 ALARM signal to BIA box
	11	ACI signal to BIA box
	12	+12 Vdc to BIA box
	13 & 14	+12 Vdc return to BIA box
	15	RELAY RESET signal to BIA box
J4	1	REPO signal from REPO switch
	2	Ground to REPO switch
	3	+15 Vdc to REPO switch
J5	1 & 2	LEPO SWITCH normally open contacts from P4 board
	3 & 4	LEPO SWITCH normally closed contacts from P4 board
J6	1	+12 Vdc to the shunt trip coil in IMCB
	2	-12 Vdc to other side of shunt trip coil in IMCB if LEPO is pressed or shunt trip relay K1 is energized
P7	1	+12 Vdc to cabinet temperature sensor
	2	CABINET TEMPERATURE signal from cabinet temperature sensor
	3 & 4	From normally closed contacts of transformer thermostat
P8	1	+18 Vdc from P4 board
	2	±18 Vdc return from P4 board
	3	-18 Vdc from P4 board
	4	+12 Vdc from P4 board
	5	+12 Vdc return from P4 board
	6	Not used

Table 7-1 I3 Board Connectors and Signals (Cont)

Connector	Pin(s)	Signal
P9	1	REPO OUT signal to other units
	2	REPO OUT signal return
P11	1 & 2	Output current line 1 from power cabinet
	3 & 4	Output current line 2 from power cabinet
	5 & 6	Output current line 3 from power cabinet
P12	1 & 2	Ground current from power cabinet
	3	Not used
P13	1 & 4	Output Voltage Line 1-N reference voltage from power cabinet
	2 & 4	Output Voltage Line 2-N reference voltage from power cabinet
	3 & 4	Output Voltage Line 3-N reference voltage from power cabinet
	5	Not used
	6 & 9	Input Voltage Phase A reference voltage from power cabinet
	7 & 9	Input Voltage Phase B reference voltage from power cabinet
	8 & 9	Input Voltage Phase C reference voltage from power cabinet
TB	1	REPO signal from the EM & REPO station
	2 & 3	Return and ground line for the EM & REPO station
	4	+15 Vdc to the EM & REPO station
	5	Return line for the temperature and humidity signals from the EM & REPO station
	6	Temperature signal from the EM & REPO station
	7	Humidity signal from the EM & REPO station

There are 17 jumpers on the I3 board that must be installed to match the unit ratings. Jumpers JP1 through JP6 are installed to specify the input voltage. Jumpers JP7 through JP14 are installed to match the output phase and ground current of the unit. Jumpers JP15 through JP17 are installed to match the output phase to neutral voltage of the unit (see Table 6-8).

There are 12 potentiometers for adjusting the displayed values of input voltage, output voltage, output current, ground current, EMS temperature, and EMS humidity (see Table 6-9).

7.6.4 P4 Power Supply Board

The P4 power supply board (Figure 7-5) provides the regulated voltage required by all other logic boards in the PDS+ unit. The input to the P4 board is a regulated +15 Vdc from the linear power supply in the power isolator assembly. This input goes to the voltage regulator circuit on the P4 board. The output of the circuit is 13.5 Vdc which is used to charge the battery.

The switching-supply circuit on the P4 board, which consists of VR2 and T1, provides the following outputs.

- Isolated +5 Vdc (from T1 through VR3) to the M4 board
- +5 Vdc to the M4 board
- ± 18 Vdc to the I3 board

When power is applied to the PDS+ unit and the M4 processor initializes, the signal PWR ON1 from the M4 board is sent to the P4 board to energize relay K1. When relay K1 is energized, closed contacts 3 to 5 provide a path for 13.5 Vdc to be applied to the battery as charge voltage. When power is removed from the PDS+ unit, relay K1 remains energized to allow the battery to supply +12 Vdc to the door electronics. At the end of a preset period of time (five minutes), the M4 board sends the signal PWR OFF1 to the P4 board to deenergize relay K1 and remove battery back-up power from almost all of the door electronics. The battery continues supplying +5 Vdc standby to the M4 board to maintain the Time of Day and the kWH registers.

NOTE

Any options that are powered through the interface plate (RSU, EM & REPO, and BIA) will lose power when relay K1 is deenergized.

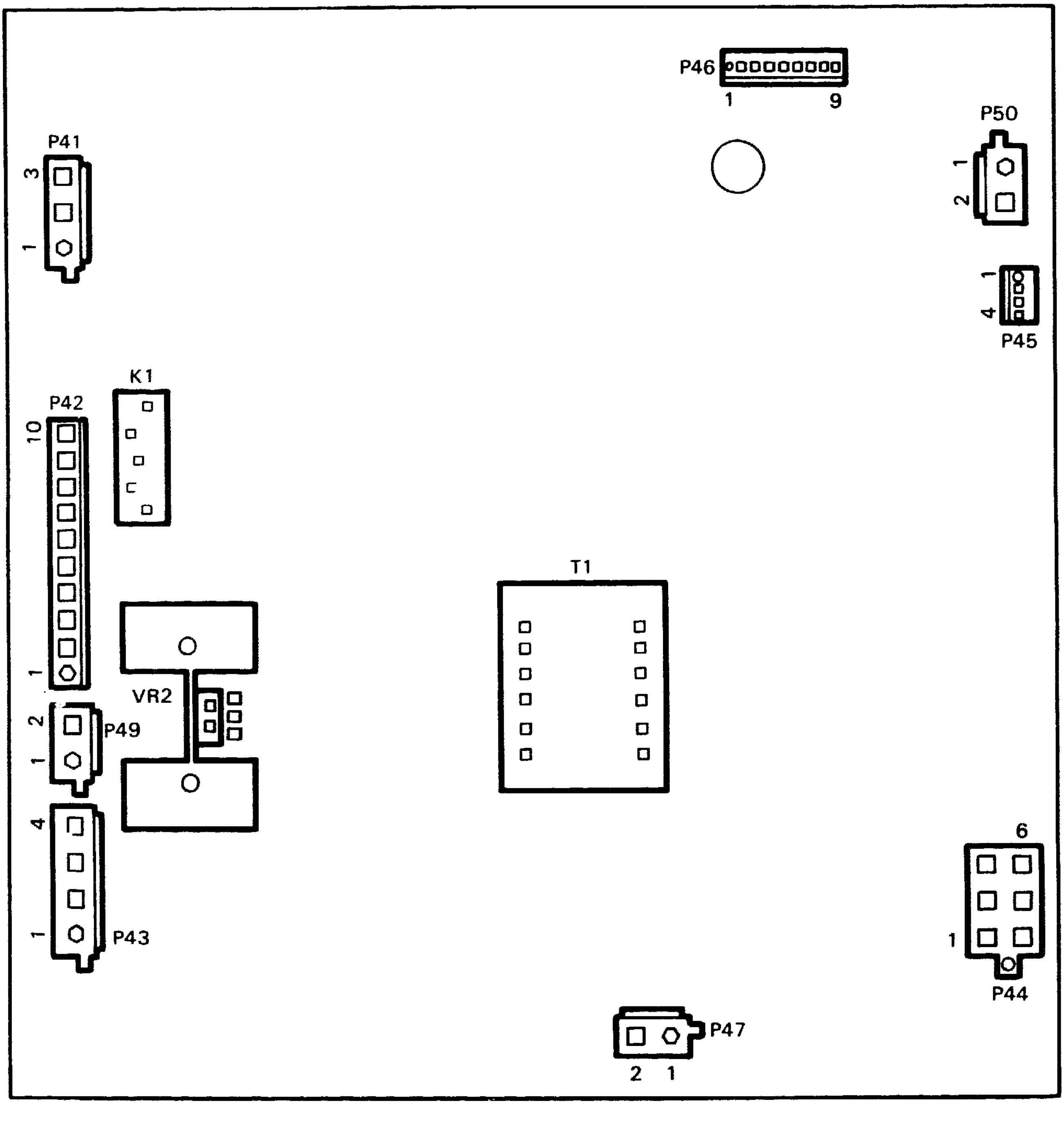

Figure 7-5 P4 Power Supply Board

Table 7-2 provides a list of connectors on the P4 power supply board and the signals associated with each.

Table 7-2 P4 Board Connectors and Signals

Connector	Pin(s)	Signal
P41	1	+15 Vdc from power isolator assembly
	2 & 3	+15 Vdc return
P42	1 & 2	From LEPO switch normally open contacts
	3 & 4	From LEPO switch normally closed contacts
	5	+12 Vdc to the lamps in the LEPO, ALL UNITS POWER OFF, and BATTERY BACKUP switches
	6	From ALL UNITS POWER OFF switch normally open contacts
	7 & 8	From BATTERY BACKUP switch normally open contacts
	9	Lights the POWER ON indicator on the LED display
	10	+12 Vdc to the LED display board
P43	1 & 2	From LEPO switch normally open contacts to the I3 interface board
	3 & 4	From LEPO switch normally closed contacts to the I3 interface board
P44	1	+18 Vdc to I3 board
	2	±18 Vdc return to I3 board
	3	-18 Vdc to I3 board
	4	+12 Vdc to the I3 board
	5	+15 Vdc return to I3 board
	6	+15 Vdc to I3 board

Table 7-2 P4 Board Connectors and Signals (Cont)

Connector	Pin(s)	Signal
P45	1	Battery charging voltage to M3 board
	2	Battery voltage to M3 board
	3	ALL UNITS POWER OFF signal to M3 board
	4	ALL UNITS POWER OFF signal return
P46	1	Regulated +5 Vdc to M4 board
	2	+5 Vdc standby voltage to M4 board
	3	+12 Vdc to M4 board
	4	Regulated +5 Vdc return to M4 board
	5	Isolated +5 Vdc return to M4 board
	6	Isolated +5 Vdc to M4 board
	7	PWR ON1 signal from M4 board
	8	PWR OFF1 signal from M4 board
	9	PWR FAIL signal to M4 board
P47	1	+12 Vdc from battery
	2	+12 Vdc return from battery
P49	1	+12 Vdc to RSU power connector on interface plate
	2	+12 Vdc return to RSU power connector on interface plate
P50	1	+5 Vdc to internal printer
	2	+5 Vdc return from printer controller board

7.6.5 DC Battery

The 12 Vdc battery provides back-up power to the door electronics and the LCD for five minutes after a loss of power or when the PDS+ unit is shut OFF. It also provides back-up power for five minute periods when power is removed from the PDS+ unit and the BATTERY BACKUP switch on the LCP is pressed. When power is removed from the PDS+ unit, the battery provides +5 Vdc standby voltage to maintain the Time of Day and kWH registers. During normal operation, when power is applied to the PDS+ unit, the battery receives 13.5 Vdc charge voltage from the P4 board in order to maintain a full charge.

APPENDIX A

APPENDIX A
TERM ABBREVIATIONS

BIA .... Building Interface Adapter

C .... Capacitor (that is, C5)

DMM .... Digital Multimeter

EAROM .... Electrically Alterable Read-Only Memory

EDP .... Electronic Data Processing

EIA .... Electrical Interface Adapter

EM .... Environmental Monitoring

EMS .... Environmental Monitoring Station

EPO .... Emergency Power Off

EPROM .... Erasable Programmable Read-Only Memory

GCM .... Ground Current Monitor

I .... Current (in amps)

IC .... Integrated Circuit

IMCB .... Input Main Circuit Breaker

J .... Jack (that is, J5)

J-Box .... Junction Box

kVA .... Kilo Volt-Ampere

LCD .... Liquid Crystal Display

LCP .... Local Control Panel

LED .... Light-Emitting Diode

LEPO .... Local Emergency Power Off

OT .... Over Temperature

P .... Plug (that is, P4)

PCB .... Printed Circuit Board

PDS+ .... Power Distribution System Plus

R	....	Resistor (that is, R4)
RAM	....	Random-Access Memory
REPO	....	Remote Emergency Power Off
RMS	....	Root Mean Square
RSU	....	Remote Sensor Unit
SC	....	Security Code
SCR	....	Silicon-Controlled Rectifier
TP	....	Test Point (that is, TP8)
UCC	....	User Control Center
V	....	Volts
Vac	....	Volts ac
Vdc	....	Volts dc

APPENDIX B

Table B-1 PDS+ Options

Option Number	Description
H7317-xx	Basic PDS+ unit -- The xx suffix indicates the ampacity and input voltage rating of the unit (see Table C-1). The basic unit includes a microprocessor monitoring system and an internal printer mounted inside the front door, an LCD screen and keypad, and RS-232-C and RS-422 communications interface.
H7317-KB	Building Interface Adapter (BIA) -- Each unit can have one BIA that accepts up to eight dry-contact switch sensors.
H7317-KC	Wall-mounted temperature probe with EIA.
H7317-KE	Remote Sensor Unit (RSU) -- Each PDS+ unit can have a maximum of six RSUs. This option includes a remote I/O processor board and a 20-sensor slot motherboard.
H7317-KF	Water detector with EIA.
H7317-KJ	EIA 1 -- Dry-contact switch sensor for use in RSU sensor slots.
H7317-KK	EIA 2 -- 1 mA current transducer for use in RSU sensor slots.
H7317-KL	EIA 3 -- 12 volt ac/dc interface for use in RSU sensor slots.
H7317-KM	EIA 4 -- 24 volt ac/dc interface for use in RSU sensor slots.
H7317-KN	EIA 12 -- Frequency interface for use in RSU sensor slots.
H7317-KP	EIA 15 -- 5 volt interface for use in RSU sensor slots.
H7317-KR	EIA 17 -- 4-to-20 mA analog current interface for use in RSU sensor slots.

Table B-1 PDS+ Options (Cont)

Option Number	Description
H7317-KS	EIA 8 -- Analog buffer (senses voltage changes from 0 to 12 volts ac) for use in RSU sensor slots.
H7317-KT	EIA 9 -- Isolated buffer (senses current changes from 0 to 5 amps ac) for use in RSU sensor slots.
H7317-KU	EIA 10 -- Environmental Monitoring and Remote Emergency Power Off station interface.
H7317-KV	Four-pole output relay for use in RSU.
H7317-KW	Four-pole output relay with mechanical latching for use in RSU.
H7317-KY	12 volt power adapter for RSU with battery back-up.
H7317-KZ	AC power adapter -- 120 V input/16 V output.
H7317-JA	Wall-mounted REPO button -- includes 15.2 m (50 ft) cable.
H7317-JB	Wall-mounted REPO with temperature monitoring -- includes 15.2 m (50 ft) cable.
H7317-JC	Wall-mounted REPO with temperature and humidity monitoring -- includes 15.2 m (50 ft) cable.
H7317-JD	Wall-mounted REPO with temperature reporting to PDS+ unit -- includes 15.2 m (50 ft) cable.
H7317-JE	Wall-mounted REPO with temperature and humidity reporting to PDS+ unit -- includes 15.2 m (50 ft) cable.
H7317-JF	Wall-mounted REPO with temperature reporting to RSU -- includes 15.2 m (50 ft) cable and one EIA 10 module.
H7317-JG	Wall-mounted REPO with temperature and humidity reporting to RSU -- includes 15.2 m (50 ft) cable and two EIA 10 modules.

Table B-1 PDS+ Options (Cont)

Option Number	Description
External Cables	
BC31A-50	RS-422 unit-to-unit communication [15.2 m (50 ft)]
BC31A-A0	RS-422 unit-to-unit communication [30.5 m (100 ft)]
BC31A-B0	RS-422 unit-to-unit communication [61 m (200 ft)]
BC31B-50	Unit-to-RSU, 4-wire data/power [15.2 m (50 ft)]
BC31B-A0	Unit-to-RSU, 4-wire data/power [30.5 m (100 ft)]
BC31B-B0	Unit-to-RSU, 4-wire data/power [61 m (200 ft)]
BC31C-50	Unit-to-unit REPO IN/OUT w/shutdown adapter [15.2 m (50 ft)]
BC31C-A0	Unit-to-unit REPO IN/OUT w/shutdown adapter [30.5 m (100 ft)]
BC31C-B0	Unit-to-unit REPO IN/OUT w/shutdown adapter [61 m (200 ft)]
BC31D-50	Unit-to-CRT [15.2 m (50 ft)]
BC31F-50	H7317-KE (RSU) to H7317-KE (RSU) [15.2 m (50 ft)]
BC31F-A0	H7317-KE (RSU) to H7317-KE (RSU) [30.5 m (100 ft)]
BC31F-B0	H7317-KE (RSU) to H7317-KE (RSU) [61 m (200 ft)]
Cable Connector Kits	
(Connectors and pins only -- customer supplies wires)	
H3280-A	RS-422 unit-to-unit communications
H3280-B	Unit-to-RSU
H3280-C	Unit-to-unit REPO IN/OUT
H3280-D	H7317-KE (RSU) to H7317-KE (RSU)

APPENDIX C

C.1 GENERAL

Every PDS+ unit needs an input power junction box (J-Box). The J-Box must be protected by a branch circuit breaker rated at not more than 125% of the full load amps of the PDS+.

This J-Box is part of the Regulatory (UL, CSA, IEC) Listing. The customer's electrical contractor must install the J-Box according to the following instructions to maintain its regulatory listing.

The J-Box must be placed within a 1.5 meter (5 foot) radius of the PDS+ unit. Avoid restricting the output cables, and allow easy access for checking connections. Never place the J-Box directly under the PDS+ unit.

Access to the J-Box is important. If installing the J-Box under a raised floor, center the box under a single floor tile.

NOTE

The input power cable is 3 meters (10 feet) long. Because the cable is very stiff, assume it is 1.5 meters (5 feet) long for preinstallation planning.

The size of the J-Box depends on the kVA rating of the PDS+ unit. See Table C-1 for specifications.

Figure C-1 shows the J-Box with its cover removed. The terminal board (TB1) is the location for the contractor's connections, including the 3-phase input power and the ground wire (Table C-2). For optimum system performance, Digital recommends that all wires be the same size. The ground must connect to the nearest safety ground that is referenced to the building service entrance, and to the computer facility ground.

NOTE

You can use the auxiliary ground on the back of the PDS+ unit to reference the PDS+ to a ground grid or to other computer power distribution equipment, including more PDS+ units.

Table C-1 J-Box and IMCB Specifications

kVA	Option Number	60 Hz Input Voltage	IMCB Ampacity	J-Box Amps	Dimensions (Inches) Width	Length	Height
15	H7317-AA	208	50	60	14	16	4 1/2
30	H7317-AB	208	100	100	14	16	4 1/2
50	H7317-AC	208	175	200	14	16	4 1/2
50	H7317-AJ	208	175	200	14	16	4 1/2
15	H7317-BA	220	50	60	14	16	4 1/2
30	H7317-BB	220	100	100	14	16	4 1/2
50	H7317-BC	220	150	200	14	16	4 1/2
50	H7317-BJ	220	150	200	14	16	4 1/4
15	H7317-CA	600	20 A	30 A	8 1/4	10 1/4	4 1/2
30	H7317-CB	600	40 A	60 A	8 1/4	10 1/4	4 1/2
50	H7317-CC	600	60 A	60 A	8 1/4	10 1/4	4 1/2
75	H7317-CD	600	90 A	100 A	14	16	4 1/2
100	H7317-CE	600	125 A	200 A	14	16	4 1/2
50	H7317-CJ	600	60 A	60 A	8 1/4	10 1/4	4 1/2
15	H7317-DA	240	50	60	8 1/4	10 1/4	4 1/2
30	H7317-DB	240	90	100	14	16	4 1/2
50	H7317-DC	240	150	200	14	16	4 1/2
50	H7317-DJ	240	150	200	14	16	4 1/2
15	H7317-EA	440	30	30	8 1/4	10 1/4	4 1/2
30	H7317-EB	440	50	60	14	16	4 1/2
50	H7317-EC	440	80	100	14	16	4 1/2
75	H7317-ED	440	125	200	14	16	4 1/2
100	H7317-EE	440	175	200	14	16	4 1/2
50	H7317-EJ	440	80	100	14	16	4 1/2
15	H7317-FA	460	20	30	8 1/4	10 1/4	4 1/2
30	H7317-FB	460	50	60	8 1/4	10 1/4	4 1/2
50	H7317-FC	460	80	100	14	16	4 1/2
75	H7317-FD	460	125	200	14	16	4 1/2
100	H7317-FE	460	150	200	14	16	4 1/2
50	H7317-FJ	460	80	100	14	16	4 1/2
15	H7317-HA	480	20	30	8 1/4	10 1/4	4 1/2
30	H7317-HB	480	50	60	8 1/4	10 1/4	4 1/2
50	H7317-HC	480	80	100	14	16	4 1/2
75	H7317-HD	480	125	200	14	16	4 1/2
100	H7317-HE	480	150	200	14	16	4 1/2
50	H7317-HJ	480	80	100	14	16	4 1/2

Table C-1 J-Box and IMCB Specifications (Cont)

kVA	Option Number	50 Hz Input Voltage	IMCB Ampacity	J-Box Amps	Dimensions (cm) Width	Length	Height
15	H7317-LA	380/415	30	30	21	26	12
30	H7317-LB	380/415	60	60	36	41	12
50	H7317-LC	380/415	90	100	36	41	12
75	H7317-LD	380/415	150	200	36	41	12
100	H7317-LE	380/415	200	200	36	41	12

NOTE

The customer's electrical contractor installs the input feeder to the junction box conduit. The connection must be watertight.

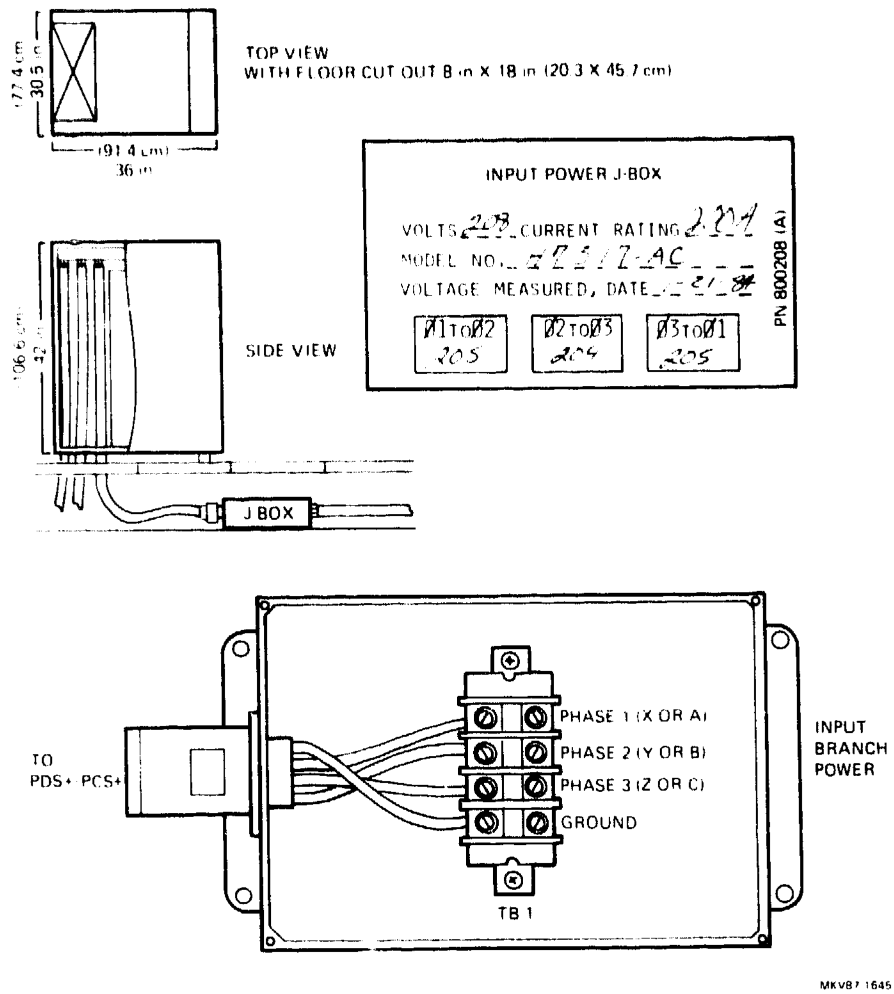

Figure C-1 J-Box and Nameplate

Table C-2 J-Box Wiring

Conductor	Connector Pin Location	Terminal Location	Conductor Identification
X	1	1	1
Y	2	2	2
Z	3	3	3
Ground	G(4)	Gnd	Green/Yellow

C.2 INSTALLATION

The customer's electrical contractor should install the J-Box as follows:

1. Place the J-Box under a single tile within 1.5 meters (5 feet) of the PDS+ unit and at least 1 meter (3 feet) from any wall.

2. Secure the J-Box by using the mounting flanges provided.

3. Install the conduit and conduit fittings for the branch circuit.

4. Install the branch circuit wiring sized according to the full load amps for the PDS+ unit (see the nameplate ratings) to be installed, and according to the National Electrical Code (NEC) requirements for branch circuits. Tighten the terminal block and connector screws to the torque values specified for the J-Box current rating. (see Table C-3).

NOTE

Digital recommends that all wiring (including the ground) be the same size.

5. Install the J-Box cover.

6. Turn on power to the branch circuit, then make sure the correct voltage and correct phasing are present. (See the nameplate ratings.)

7. Record the voltage and date on the nameplate (see Figure C-1).

Table C-3 J-Box Torque Values

J-Box Rating (Amps)	Terminal Block Screw Torque (Inch-Pounds)	Connector Screw Torque (Inch-Pounds)
30	35	15
60	45	26
100	120	50
200	350	100

APPENDIX D

Table D-1 Flexible Conduit Specifications (60 Hz Only)

Electrical Trade Size (Inches)	Inside Bend Diameter (Inches)	Allowable Stress (Tensile in Lbs)
3/8	6	200
1/2	7	200
3/4	10	200
1	12	375
1 1/4	14	375
1 1/2	11	450
2	14	450

Table D-2 Environmental Specifications

kVA Rating	Room Temp °C	Room Temp °F	Relative Humidity No Condensation (Percentage)	Air Conditioning Load (BTU/Hr)	Heat Dissipation (Watts)
15	10-40	50-104	10 - 90%	2081	610
30	10-40	50-104	10 - 90%	3501	1026
50*	10-40	50-104	10 - 90%	5459	1600
75	10-40	50-104	10 - 90%	7681	2260
100(60 Hz)*	10-40	50-104	10 - 90%	10242	3000

*Operation derated to 80% of kVA at 40°C (104°F).

Table D-3 Physical Specifications

kVA Rating	Shipping Weight (Average) kg	lbs	Height cm	in	Width cm	in	Depth cm	in
15	390	858	106.6	41.75	74.1	29	93.2	36.5
30	430	948	106.6	41.75	74.1	29	93.2	36.5
50	501	1103	106.6	41.75	74.1	29	93.2	36.5
75	550	1213	106.6	41.75	74.1	29	93.2	36.5
100(60 Hz)	641	1413	106.6	41.75	111.2	43.5	93.2	36.5

Table D-4 Unit Weight

kVA Rating	Weight (Average) kg	lb	Floor Loading kg/sq m	lb/sq ft
15	252	555	371	76
30	293	645	430	88
50	363	800	532	109
75	413	910	742	152
100	504	1110	474	97

Table D-5 Distribution Capacity (60 Hz)

Electrical kVA Rating	Conduit Pole Positions	Landing Capacity 1.3 cm (1/2 inch) Cable
15	42	42
30	42	42
50	42	42
50	84*	84*
75	84	84
100	84	84

*Optional

Table D-6 Capacity for Merlin Gerin Load Center (50 Hz)

kVA Rating	Maximum Pole Positions	Maximun Landing Capacity
15	66	66
30	66	66
50	66	66
50	66	66
75	66	66
100	66	66

Table D-7 Service Clearance (Minimums -- Facing Unit)

Front*		Rear		Both Sides**	
cm	in	cm	in	cm	in
76.6	30	91.9	36	91.9	36

NOTE
Do not allow obstructions closer than 15 cm (6 inches) from the back of the unit. They may restrict cooling airflow.

*Allow extra clearance for service exit while front door is open.

**For transformer access.

Table D-8 60 Hz Output Distribution Circuits (Single-Phase)

Output Voltage (Nominal)	Output Circuit Breaker	Output Poles Required	NEMA Receptacle Number	DIGITAL Cable P/N	Supplied Receptacle	Maximum Length (Feet)
120	15 A	1	5-15R	BC24J-xx	Single	100
120	15 A	1	5-15R	BC24K-xx	Double	100
120	15 A	1	5-15R	BC24L-xx	Quad	100
120	20 A	1	5-20R	BC24M-xx	Single	75
120	20 A	1	5-20R	BC24N-xx	Double	75
120	20 A	1	5-20R	BC24P-xx	Quad	75
120	20 A	1	5-20R	BC24R-xx	Two Quad Boxes, 10 Ft Apart	75
120	15 A	1	L5-15R	BC26F-xx	Single	100
120	30 A	1	L5-30R	BC24S-xx	Single	75
120	20 A	1	5-20R*	BC28D-xx	Single	75
120	20 A	1	5-20R*	BC28E-xx	Double	75
120	20 A	1	5-20R*	BC28F-xx	Quad	75
120	20 A	1	5-20R*	BC28G-xx	Two Quad Boxes	75

*Canada Only

Table D-9 50 Hz Output Distribution Circuits (Single-Phase)

Output Voltage	Current	Poles	DIGITAL Cable P/N	Supplied Receptacle	Where Used
220	10 A	1	BN29A-xx*	Duplex	Switzerland
220	10 A	1	BN29D-xx*	Duplex	UK, Ireland
220	10 A	1	BN29E-xx*	Quad	UK, Ireland
220	10 A	1	BN29F-xx*	Junction Box Terminal Strip	Europe
220	15 A	1	BN29H-xx*	Shuko Duplex	Continental Europe (except Switzerland)
220	15 A	1	BN29J-xx*	Shuko Quad	Continental Europe (except Switzerland)
220	15 A	1	BN29K-xx*	Junction Box Terminal Strip	Continental Europe (except Switzerland)
220	16 A	1	BN29L-xx*	Hubbell 320C6W or IEC309 Equiv.	Europe
220	20 A	1	BN29M-xx*	Junction Box Terminal Strip	Europe

*The last two digits denote the length of the cable:

-03 = 3 meters
-06 = 6 meters
-09 = 9 meters
-12 = 12 meters
-15 = 15 meters
-18 = 18 meters
-23 = 23 meters
-30 = 30 meters

Table D-10 60 Hz Output Distribution Circuits (Multiphase)

Output Voltage (Nominal)	Output Circuit Breaker	Output Poles Required	NEMA Receptacle Number	DIGITAL Cable P/N	Supplied Receptacle	Maximum Length (Feet)
208	20 A	2	L6-20R	BC24T-xx	Single	75
208	30 A	2	L6-30R	BC26E-xx	Single	75
120/208	20 A	2	L14-20R	BC24U-xx	Single	75
120/208	20 A	3	L21-20R	BC24V-xx	Single	75
120/208	30 A	3	L21-30R	BC24W-xx	Single	75
120/208	60 A	3	560C9W	BC29F-xx	Single	75
120/208	100 A	3	ZRLT-6C24-49 SR*	BC24X-xx	Single	75
120/208	30 A	2	L14-30R	BC28Z-xx	Single	75
120/208	60 A	3	DF6516FP	BC29A-xx	Single	50
120/208	60 A	3	560C9W	BC29B-xx	Single	75
120/208	100 A	3	5100C9W	BC29D-xx	Single	60
120/208	15 A	2	6-15R	BC29C-xx	Single	75
208	60 A	3	RS7428-78 (TX02)	BC26D-xx	Single	75
208	20 A	2	RS3913	BC28S-xx	Single	75
120	20 A	1	RS3913U1	BC28T-xx	Single	75
208	15 A	2	RS3913U2	BC28U-xx	Single	75
208	15 A	3	RS3914	BC28V-xx	Single	75
208	30 A	2	RS3933	BC28W-xx	Single	75
208	30 A	3	RS3934	BC28X-xx	Single	75
208	100 A	3	JCS1034	BC28Y-xx	Single	75

NOTE

Output cables rated 30 A and below use isolated ground (IG) receptacles. Because of this, two ground conductors (green/yellow) are used in the output cable assembly. The green taped conductor is an auxiliary ground. This conductor grounds the flexible conduit only. The untaped conductor is connected to the receptacle ground pin.

*For DECsystem-10.

Table D-11 50 Hz Output Distribution Circuits (Multiphase)

Output Voltage	Current	Poles	Wires	DIGITAL Cable P/N	Supplied Receptacle	Where Used
380/220 415/240	10	3	5	BN29N-xx*	Junction Box Terminal Strip	Europe
380/220 415/240	15	3	5	BN29P-xx*	Junction Box Terminal Strip	Europe
380/220 415/240	20	3	5	BN29R-xx*	Junction Box Terminal Strip	Europe
380/220 415/240	32	3	5	BN29S-xx*	Junction Box Terminal Strip	Europe
380/220 415/240	32	3	5	BN29W-xx*	Hubbell 532C6W or IEC309 Equiv.	Europe
380/220 415/240	16	3	5	BN29X-xx*	Hubbell 516C6W or IEC309 Equiv.	Europe
380/220 415/240	15	3	5	BN29Z-xx*	Russellstoll #DF34962	Europe
380/220 415/240	63	3	5	BN30A-xx*	Hubbell 563C7W or IEC309 Equiv.	Europe

*The last two digits denote the length of the cable:

-03 = 3 meters
-06 = 6 meters
-09 = 9 meters
-12 = 12 meters
-15 = 15 meters
-18 = 18 meters
-23 = 23 meters

Table D-12 Input Branch Power (60 Hz)

PDS+ Option Number	Voltage (Nominal)	Input Voltage Range*
H7317-AX	208	151.8 - 239.2
H7317-BX	220	160.6 - 253.0
H7317-DX	240	175.2 - 276.0
H7317-EX	440	321.2 - 506.0
H7317-FX	460	335.8 - 529.0
H7317-HX	480	350.4 - 552.0

*The input voltage frequency is 60 Hz (± 1 Hz).

Table D-13 Input Branch Power (50 Hz)

PDS+ Option Number	Voltage (Nominal)	Input Voltage Range*
H7317-LX	380/415 Vac	277.4 to 477.2 Vac

*The input voltage frequency is 50 Hz (± 1 Hz).

Table D-14 PDS+ Breaker Rating and Power Capacity (60 Hz)

PDS+ Option Number	Output Main (Secondary) Breaker Rating	kVA Capacity
H7317-XA	50 A per phase	15
H7317-XB	100 A per phase	30
H7317-XC	150 A per phase	50*
H7317-XD	225 A per phase	75
H7317-XE	225 A per phase	100
H7317-XJ	150 A per phase	50**

*Above 32°C (95°F), operation is derated to 80% kVA at 40°C (104°F).

**Two circuit breakers.

Table D-15 PDS+ Breaker Rating and Power Capacity (50 Hz)

PDS+ Option Number	Output Main (Secondary) Breaker Rating	kVA Capacity	Maximum Output Phase Current
H7317-LA	160 A per phase	15	23 A
H7317-LB	160 A per phase	30	45 A
H7317-LC	160 A per phase	50*	76 A
H7317-LD	250 A per phase**	75	114 A
H7317-LE	250 A per phase**	100*	152 A

*Above 32°C (95°F), operation is derated to 80% kVA at 40°C (104°F).

**Two circuit breakers.

APPENDIX E

APPENDIX E
PARTS LOCATION

Use Figures E-1, E-2, and E-3 to identify the various parts of a PDS+ unit. Order parts through normal channels using the supplied part numbers. Parts without Digital part numbers are available on special order.

NOTICE

Refer to the H7317/H7318 Power Distribution Systems Illustrated Parts Breakdown (EK-H731X-IP) for a complete parts listing and more detailed parts illustrations.

Table E-1 PDS+ Parts List (See Figure E-1)

Item	Description	Part Number
①	Input Main Circuit Breaker	
	20 Amp	29-26787-00
	20 Amp (FB frame size)	29-24349-00
	30 Amp	29-23790-00
	30 Amp (FB frame size)	29-26785-00
	40 Amp	29-26790-00
	50 Amp	29-23791-00
	50 Amp (FB frame size)	29-26788-00
	60 Amp	29-28784-00
	60 Amp (FB frame size)	29-24350-00
	80 Amp	133808-01*
	90 Amp	29-23792-00
	90 Amp (FB frame size)	29-26789-00
	100 Amp	29-23793-00
	125 Amp (FB frame size)	29-24351-00
	150 Amp (FB frame size)	29-23794-00
	175 Amp	29-23795-00
	200 Amp	29-24352-00
②	Cabinet Fan Assembly 60 Hz	29-26786-00
	Cabinet Fan Assembly 50 Hz	29-24343-00
③	Power Isolator Assembly	
	208-240 volt, 60 Hz	29-26760-00
	440-600 volt, 60 Hz	29-26761-00
	380-415 volt, 50 Hz	29-26762-00
	Pwr Supply Fuse, 3.2 Amp SLO BLO	29-26780-00
④	J-Boxes	
	30 Amp	29-23782-00
	60 Amp	29-23783-00
	100 Amp	29-23784-00
	200 Amp	29-23785-00
⑤	Input Cable	
	30 Amp	29-23786-00
	60 Amp	29-23787-00
	100 Amp	29-23788-00
	200 Amp	29-23789-00
	Digital Top Panel	29-26752-00
	Gas Spring	29-26765-00
	Digital Side Panel	29-26753-00

* Vendor part number from Emerson Computer Power.

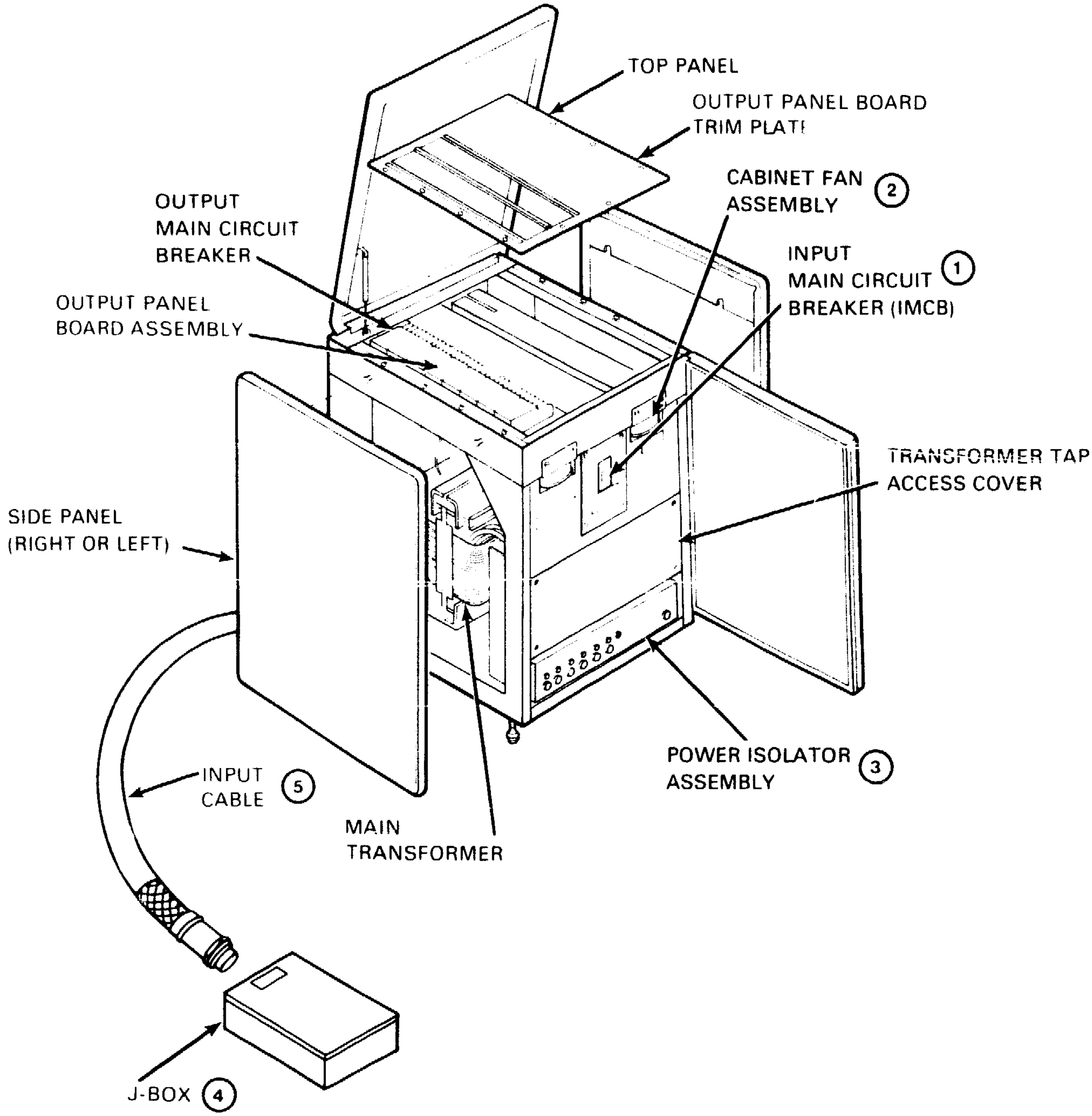

Figure E-1 PDS+ Parts Location

Table E-2 PDS+ Parts List (See Figure E-2)

Item	Description	Part Number
1	Output Main Circuit Breaker	
	50 Amp	29-23803-00
	100 Amp	29-23804-00
	150 Amp	29-23805-00
	225 Amp	29-26774-00
2	Output Panel Board Assembly	29-23801-00
3	Output Distribution Circuit Breaker	
	1 Pole -- 15 Amp, 60 Hz	12-21089-01
	1 Pole -- 20 Amp, 60 Hz	29-26769-00
	1 Pole -- 30 Amp, 60 Hz	29-26770-00
	1 Pole -- 15 Amp, 240 V -- 50 Hz	29-26768-00
	1 Pole -- 30 Amp, 240 V -- 50 Hz	29-26773-00
	2 Pole -- 20 Amp, 60 Hz	29-26767-00
	2 Pole -- 30 Amp, 60 Hz	12-21091-01
	3 Pole -- 20 Amp, 60 Hz	29-26771-00
	3 Pole -- 30 Amp, 60 Hz	29-26772-00
	3 Pole -- 60 Amp, 60 Hz	29-26766-00
	Local Control Panel Parts	
	LED Display Assembly	29-26759-00
	Control Push Button, Green	29-26776-00
	Control Push Button, Red	29-26775-00
	Control Push Button, Yellow	29-26777-00
	Switch (Local Control Panel Buttons)	29-26778-00
	Lamp (Local Control Panel Buttons)	29-26781-00
	Ground Bus	29-26783-00

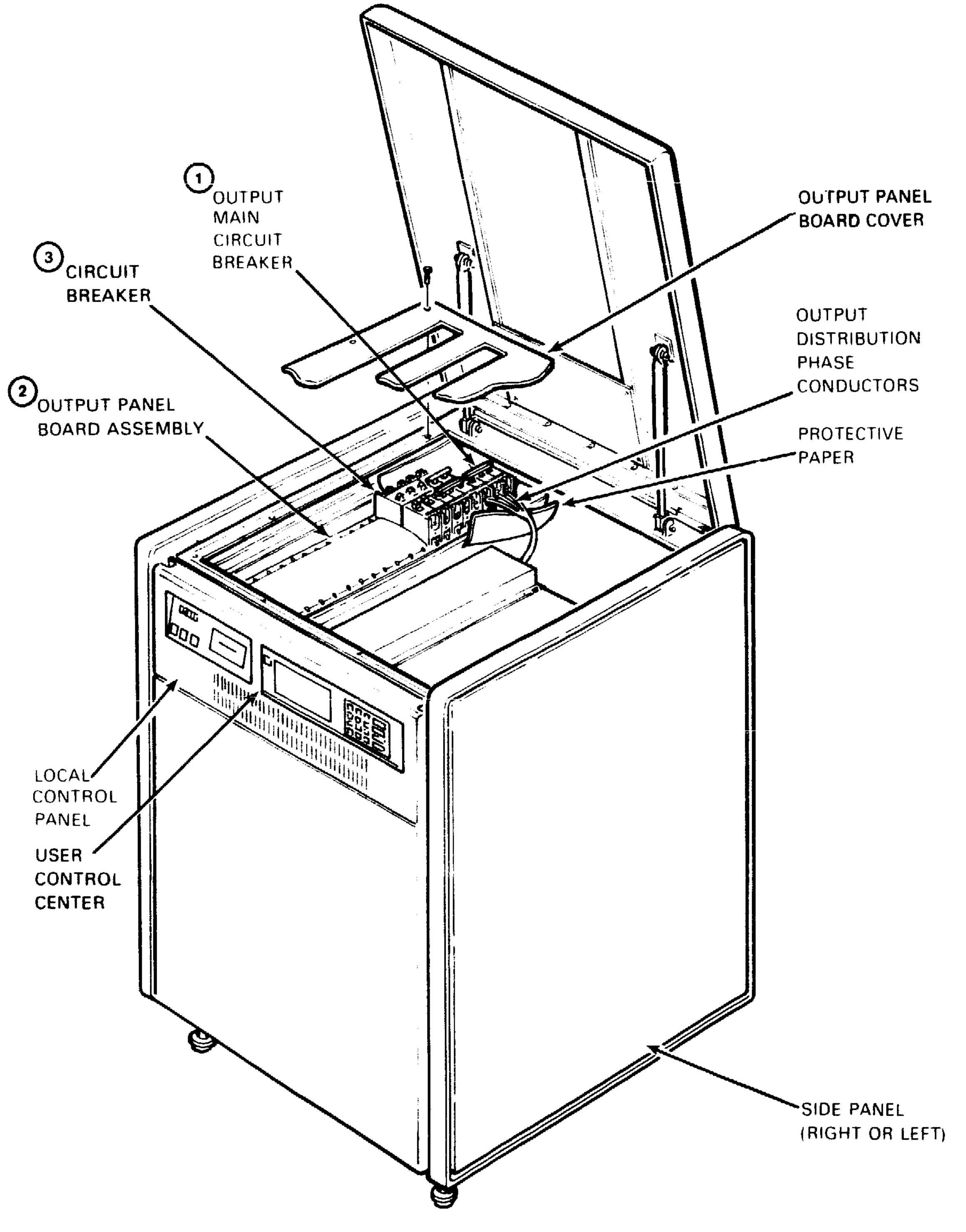

Figure E-2 PDS+ Parts Location

Table E-3 PDS+ Parts List (See Figure E-3)

Item	Description	Part Number
1	Battery, 12 Volt, 6 Amp Hr	29-23829-00
	Battery Fuse, 4 Amp, 250 V	90-07219-02
	Circuit Boards	
2	I3 Interface Board	29-26764-00
3	M3 Processor Board	29-26757-00
4	P4 Power Supply Board	29-26758-00
5	M4 Main Processor Board	29-26756-00
6	Printer Control Board	29-27279-01
7	Keyboard	29-26751-00
8	Liquid Crystal Display (LCD)	29-26763-00
	LCD Screen Cover	29-26754-00
9	Printer	29-27280-01
	Printer Access Plate	29-26755-00
	Printer Ribbon -- Epson ERC-15	
	Printer Roll Paper -- 2 3/4 inch	
	Front Door Hinge Assembly	29-26782-00

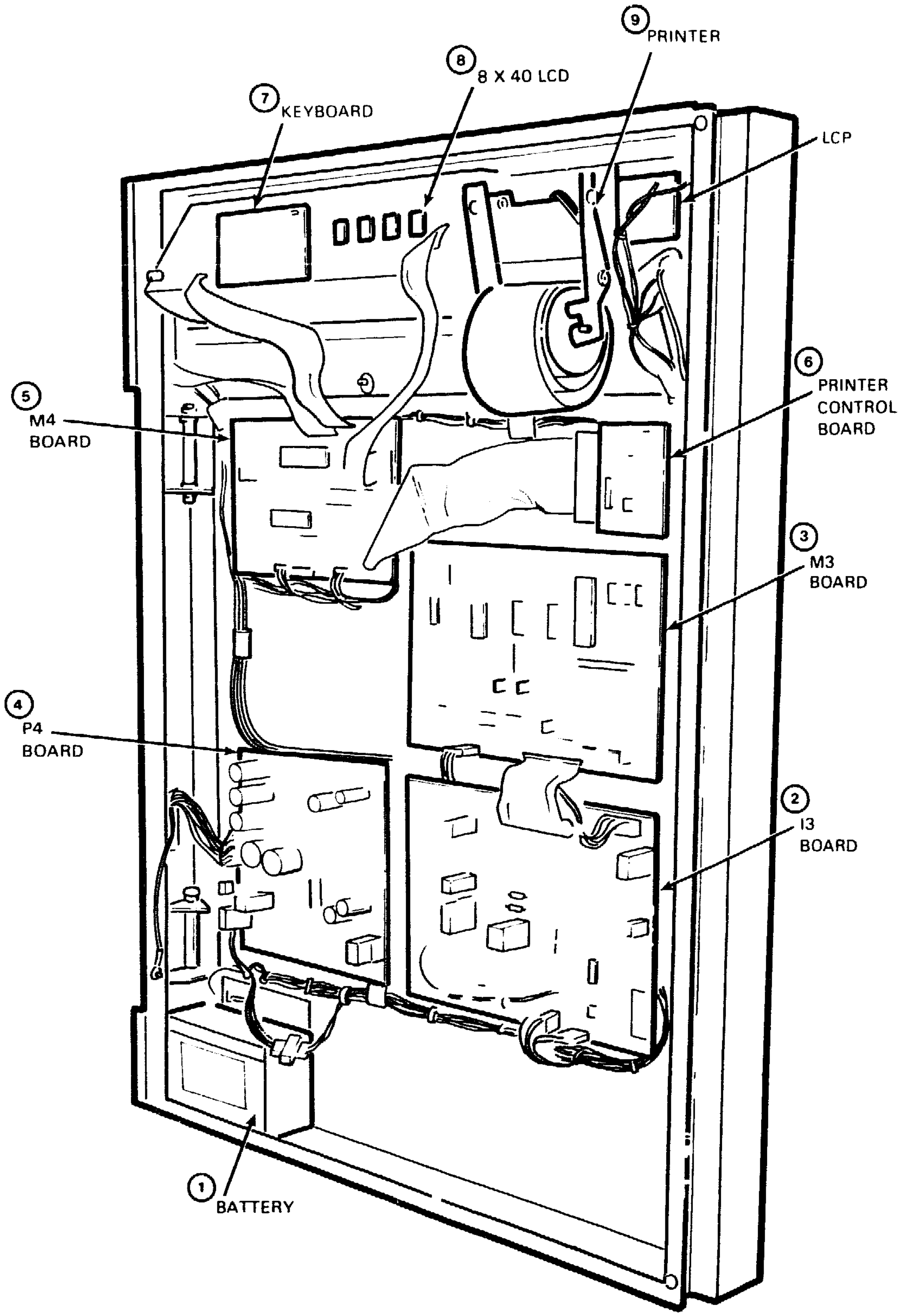

Figure E-3 PDS+ Parts Location

Table E-4 PDS+ Options Parts List

Description	Part Number
Remote Sensor Unit Option (H7317-KE)	
RSU Enclosure Box	29-26892-00
RSU Motherboard	29-26891-00
RSU Data Collector Board	29-26893-00
EIA 1, Dry-Contact (H7317-KJ)	22-00116-08
EIA 2, 1 mA Current (H7317-KK)	22-00116-09
EIA 3, 12 Volt AC/DC (H7317-KL)	22-00116-10
EIA 4, 24 Volt AC/DC (H7317-KM)	22-00116-11
EIA 12, Frequency (H7317-KN)	22-00116-12
EIA 15, 5 Volt (H7317-KP)	22-00116-13
EIA 8, Analog Buffer (0-12 Vac) (H7317-KS)	22-00116-14
EIA 9, Isolated Buffer (0-5 Amps) (H7317-KT)	22-00116-15
EIA 10, EMS Interface (H7317-KU)	22-00116-16
4-Pole Relay EIA (H7317-KV)	22-00116-17
4-Pole Latching Relay EIA (H7317-KW)	22-00116-18
EIA 17, 4 to 20 mA (H7317-KR)	22-00116-28
Relay Driver Cable	29-26894-00
RSU Data Interface Ribbon Cable	29-26895-00
Entry Fitting	29-26916-00
Remote Power Adapter Option (H7317-KY)	
Power Isolator Board	29-26896-00
AC Adapter	22-00116-20
Power Adapter Harness	29-26920-00
Battery, 1.5 Amp Hours	29-26919-00
Entry Fitting	29-26916-00
Building Interface Adapter Option (H7317-KD)	22-00116-02
BIA 12 Foot Cable	29-26898-00
Entry Fitting	29-26916-00
Environmental Monitoring & REPO Station	
REPO Only	22-00116-21
EMS/REPO with Temperature	29-26923-00
EMS/REPO with Temperature and Humidity	29-26924-00
Balun Ring	29-26927-00
EIA 10 (H7317-KU), EMS Interface	22-00116-16
EMS Power Adapter (H7317-KZ)	22-00116-20

Table E-4 PDS+ Options Parts List (Cont)

Description	Part Number
Temperature Sensor Assembly (H7317-KC)	
Temperature Probe	29-26918-00
Temperature EIA 16 Module	29-26917-00
Entry Fitting	29-26916-00
Water Detector (H7317-KF)	
Water Detector Probe	29-26921-00
EIA 15 (H7317-KP) 5 V Interface	22-00116-13
Entry Fitting	29-26916-00

APPENDIX F

APPENDIX F
PROBE DATA SHEETS

After initial installation of the PDS+ unit and after adding new probes, list the probes and their parameters in Table F-1.

Digital probes will have two names, an active name and an inactive name.

For digital probes, enter "open" or "closed" for nominal value.

Under the Action heading use "A" for alarm action, "K1" or "K2" or "K3" for relay actions, and "T" for trip action.

UNIT NUMBER ___

Table F-1 Probes And Paramaters

Probe Num	Probe Name	Nominal Value	Action High 2nd	Action High 1st	Action Low 1st	Action Low 2nd	Limits High 2nd	Limits High 1st	Limits Low 1st	Limits Low 2nd	Delay High 2nd	Delay High 1st	Delay Low 1st	Delay Low 2nd	Probe Location	Display Group	Global Action

UNIT NUMBER ___

Table F-1 Probes And Parameters (Cont)

Probe Num	Probe Name	Nominal Value	Action High 2nd	Action High 1st	Action Low 1st	Action Low 2nd	Limits High 2nd	Limits High 1st	Limits Low 1st	Limits Low 2nd	Delay High 2nd	Delay High 1st	Delay Low 1st	Delay Low 2nd	Probe Location	Display Group	Global Action

UNIT NUMBER ___

Table F-1 Probes And Parameters (Cont)

Probe Num	Probe Name	Nominal Value	Action High 2nd	Action High 1st	Action Low 1st	Action Low 2nd	Limits High 2nd	Limits High 1st	Limits Low 1st	Limits Low 2nd	Delay High 2nd	Delay High 1st	Delay Low 1st	Delay Low 2nd	Probe Location	Display Group	Global Action
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UNIT NUMBER ___

Table F-1 Probes And Parameters (Cont)

Probe	Probe	Nominal	Action				Limits				Delay				Probe	Display	Global
			High		Low		High		Low		High		Low				
Num	Name	Value	2nd	1st	1st	2nd	2nd	1st	1st	2nd	2nd	1st	1st	2nd	Location	Group	Action
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UNIT NUMBER ___

Table F-1 Probes And Parameters (Cont)

Probe Num	Probe Name	Nominal Value	Action High 2nd	Action High 1st	Action Low 1st	Action Low 2nd	Limits High 2nd	Limits High 1st	Limits Low 1st	Limits Low 2nd	Delay High 2nd	Delay High 1st	Delay Low 1st	Delay Low 2nd	Probe Location	Display Group	Global Action
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UNIT NUMBER ___

Table F-1 Probes And Parameters (Cont)

Probe Num	Probe Name	Nominal Value	Action High 2nd	Action High 1st	Action Low 1st	Action Low 2nd	Limits High 2nd	Limits High 1st	Limits Low 1st	Limits Low 2nd	Delay High 2nd	Delay High 1st	Delay Low 1st	Delay Low 2nd	Probe Location	Display Group	Global Action
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UNIT NUMBER ___

Table F-1 Probes And Parameters (Cont)

Probe Num	Probe Name	Nominal Value	Action High 2nd	Action High 1st	Action Low 1st	Action Low 2nd	Limits High 2nd	Limits High 1st	Limits Low 1st	Limits Low 2nd	Delay High 2nd	Delay High 1st	Delay Low 1st	Delay Low 2nd	Probe Location	Display Group	Global Action

Table F-2 Internal Probe Data

Probe Number	Probe Name	Assigned Display Group
0	Maintenance Switch Off	7
1	Output Voltage Line 1 N	0
2	Output Voltage Line 2 N	0
3	Output Voltage Line 3 N	0
4	Output Voltage Phase A	0
5	Output Voltage Phase B	0
6	Output Voltage Phase C	0
7	Input Voltage Phase A	5
8	Input Voltage Phase B	5
9	Input Voltage Phase C	5
10	Output Current Line 1	2
11	Output Current Line 2	2
12	Output Current Line 3	2
13	Neutral Current	2
14	Ground Current	2
15	Percent Capacity Phase A	3
16	Percent Capacity Phase B	3
17	Percent Capacity Phase C	3
18	Line Frequency	3
19	No Phase Sequence Error	3
20	Apparent Power -- kVA	3
21	True Power -- kW	3
22	Power Factor	3
23	Kilo Watts Hour Usage	3
24	Transformer Temperature Okay	0
25	LEPO Switch Not On	0
26	REPO Switch Not On	0
27	All Units Not Power Off	0
28	EMS Temperature	6
29	EMS Humidity	6
30	Building Alarm 1	6
31	Building Alarm 2	6
32	Building Alarm 3	6
33	Building Alarm 4	6
34	Building Alarm 5	6
35	Building Alarm 6	6
36	Building Alarm 7	6
37	Building Alarm 8	6
38	Local Communication Okay	7
39	15 Volts Supply	7
40	5 Volts A Supply	7
41	Battery Charging Voltage	7

Table F-3 Available Probe Limits

Index	High 2nd Stg	High 1st Stg	Low 1st Stg	Low 2nd Stg
00	0%	0%	0%	0%
01	115%	105%	95%	90%
02	125%	110%	---	---
03	125%	110%	90%	75%
04	105%	104%	95%	93%
05	107%	105%	95%	93%
06	110%	108%	95%	93%
07	112%	110%	95%	93%
08	115%	113%	95%	93%
09	105%	104%	92%	90%
10	107%	105%	92%	90%
11	110%	108%	92%	90%
12	112%	110%	92%	90%
13	115%	113%	92%	90%
14	105%	104%	89%	87%
15	107%	105%	89%	87%
16	110%	108%	89%	87%
17	112%	110%	89%	87%
18	115%	113%	89%	87%
19	105%	104%	89%	87%
20	107%	105%	---	---
21	110%	108%	---	---
22	112%	110%	---	---
23	115%	113%	---	---
24	120%	118%	---	---
25	125%	122%	---	---
26	---	---	95%	93%
27	---	---	92%	90%
28	103%	102%	98%	97%
29	110%	105.8%	86.2%	83%
30	120%	112%	92%	80%
31	125%	123%	62%	60%
32	160%	140%	60%	40%
33	150%	130%	---	---
34	140%	125%	75%	60%

NOTE
The percentages listed in this table are percents of the nominal value.

Table F-4 Available Probe Actions

Action	High 2nd Stg	High 1st Stg	Low 1st Stg	Low 2nd Stg
Alarm	No	No	No	No
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	Yes	Yes	Yes
Relay2	Yes	Yes	Yes	Yes
Relay3	Yes	Yes	Yes	Yes
Trip	Yes	Yes	Yes	Yes
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	No	No	No
Relay2	Yes	No	No	No
Relay3	Yes	No	No	No
Trip	Yes	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	Yes
Relay2	No	No	No	Yes
Relay3	No	No	No	Yes
Trip	No	No	No	Yes
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	No	No	Yes
Relay2	Yes	No	No	Yes
Relay3	Yes	No	No	Yes
Trip	Yes	No	No	Yes
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	Yes	No	No	No

Table F-4 Available Probe Actions (Cont)

Action	High 2nd Stg	High 1st Stg	Low 1st Stg	Low 2nd Stg
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	No	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	Yes	Yes	Yes
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	Yes	Yes	Yes	Yes
Relay3	No	No	No	No
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	Yes	Yes	Yes	Yes
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	Yes	Yes	Yes	Yes
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	Yes	Yes	Yes
Relay2	Yes	Yes	Yes	Yes
Relay3	No	No	No	No
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	Yes	Yes	Yes
Relay2	No	No	No	No
Relay3	Yes	Yes	Yes	Yes
Trip	No	No	No	No

Table F-4 Available Probe Actions (Cont)

Action	High 2nd Stg	High 1st Stg	Low 1st Stg	Low 2nd Stg
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	Yes	Yes	Yes
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	Yes	Yes	Yes	Yes
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	Yes	Yes	Yes	Yes
Relay3	Yes	Yes	Yes	Yes
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	Yes	Yes	Yes	Yes
Relay3	No	No	No	No
Trip	Yes	Yes	Yes	Yes
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	Yes	Yes	Yes	Yes
Trip	Yes	Yes	Yes	Yes
Alarm	Yes	Yes	Yes	Yes
Relay1	Yes	Yes	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	No	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	Yes	Yes	Yes	Yes

Table F-4 Available Probe Actions (Cont)

Action	High 2nd Stg	High 1st Stg	Low 1st Stg	Low 2nd Stg
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	Yes	No	No	No
Alarm	Yes	Yes	Yes	Yes
Relay1	No	No	No	No
Relay2	No	No	No	No
Relay3	No	No	No	No
Trip	Yes	No	No	Yes

NOTE

For the last choice, the screen asks if you want to "PRINT ONLY WITH NO ALARMS."

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