

**PS-4100
POWER SUPPLY
MANUAL**

Manual Part Number 180-0573

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1. INTRODUCTION

1.0. General

The American Mine Research PS-4100 Power Supply is AC powered and it contains a power supply PC board that provides DC power to mine monitoring system sensors and other devices. The power supply also charges standby batteries that provide emergency power in the event of loosing AC power. The backup batteries will provide a minimum of 4 hours of operation. The PS-4100 also uses a communications processor PC board to monitor and control the power supply PC board from the mine monitoring system Master Station.

1.1. Features

The features of the PS-4100 Power Supply are summarized below:

1.1.1. Power

- 120 VAC @ 0.2 amperes with fully charged battery.
- A 120 VAC to 24 VAC @ 2 amperes transformer provides power to the Power Supply PC board.
- AC and DC power ON/OFF switches and indicators.
- Power may be remotely removed “Killed” from the Master Station.
- A Kill Enable/Disable switch to allow selection of the “Kill” feature.
- Momentary push-button Power Reset switch.

1.1.2. Battery Backup

- Two each sealed rechargeable lead-acid 12 volt, 7 amp-hour batteries connected in series provide a minimum of four hours of operation in the event AC power is interrupted.
- The Power Supply PC board provides “fast” and “trickle” charging of the two batteries. A completely discharged set of batteries will require a minimum of 7 hours to fully recharge.

1. INTRODUCTION (cont.)

1.1.3. Power Supply (253-0349) PC Board

- 3/4 amp fused 120 VAC and 120 VAC Return.
- 27 VDC @ 1 amperes available to recharge the batteries.
- 24 VDC @ 1 amperes available to power the Gateway PC board and to power the three Gateway output ports.
- Outputs to illuminate AC and DC power indicators.
- AC power ON/OFF digital status output to the Gateway PC board.
- 0 to 3 VDC analog voltage output to the Gateway PC board.
- “Kill” digital input from the Gateway PC board.

1.1.4. Processor (253-0350) PC Board

- Operates from 15 VDC to 28 VDC at 40 milliamperes.
- RS-485 communications input line with Tx and Rx LED.
- 19200/38400 baud rate selector switch.
- BCD Switch Addressable from 1-99.
- Kill Remote if the S4 Kill Enable switch is ON.
- Processor Data available at the Master Station.
 - 1) DC battery voltage.
 - 2) AC power ON.

2. SPECIFICATIONS

2.1. Enclosure

- Size, 14 in. x 12 in. x 6.5 in. (outside dimensions).
- Dual, snap latch hinged cover.
- NEMA Type 4, 4X, 12 construction.
- Molded fiberglass reinforced polyester construction.
- Closed cell neoprene cord encased gasket.

2.2. Transformer

- Size, 2 5/8 in. x 4 in. x 2 3/8 in..
- 120 VAC primary.
- 24 VAC @ 2 amperes secondary.
- 1500 VRMS insulation test.

2.3. Battery

- Quantity, 2 each.
- Size each battery, 3.8 in. x 6 in. x 2.6 in.
- Voltage, 12 VDC.
- Current capacity, 7 amp-hours.

2.4. Power Supply PC Board (253-0349)

- Size, 6 in. x 6 in..
- Fuses, 2 each, 250 volt @ 3/4 amperes.
- Input Voltage, 120 VAC and 24 VAC.
- Output Power to Batteries, 27 VDC @ 1 amperes.
- Digital Status Output, AC Voltage ON/OFF.
- Battery Monitor Voltage Output, 0 to 3 VDC.
- Kill Power Input, 100 milliampere current sink.
- Indicator, AC Power ON/OFF.
- Indicator, DC Power ON/OFF.

2. SPECIFICATIONS (cont.)

2.5. PS-4100 Processor PC Board (253-0350)

- PCB Size, 6 in.x 6 in.
- Operating Voltage, +15VDC to +28VDC.
- Operating Current, 40 ma. At 28VDC.
- MC-4000 System Baud Rate, 38400.
- Modbus Baud Rate, 19200.

3. INSTALLATION

The PS-4100 Power Supply is completely assembled and ready for service. The user simply connects 120 VAC power and connects the RS-485 copper cable. The following instructions provide details for installation and setup of the PS-4100 Power Supply.

Note 1: Use Figure 1, PS-4100 Power Supply Interconnect Drawing; Figure 2, PS-4100 Power Supply Showing the Processor PCB Connections; and Figure 3, PS-4100 Power Supply Showing the Power Supply PCB Connections as an aid in making connections.

3.1. AC Power

Connect 120 VAC Line to TB1-1, 120 VAC Return to TB1-2 and the Ground to TB1-3.

3.2. Copper Wire RS-485 Input Port Cable

Connect the RS-485 communications Comm + wire to TB1-4 and the Comm - wire to TB1-5.

3.3. Setup Connections

Before applying power to the PS-4100 Power Supply, insure the following connects are made as shown in Figures 1, 2, and 3.

- 1) The wires to both batteries are connected.
- 2) Connectors J1, J2 and J3 are connected to the PS4100 Power Supply PC board.
- 3) Connectors J1, J2, and J6 are connected to the Processor PC board.

3.4. Power ON

- 1) Place the AC and DC power ON switches to the ON position.
- 2) The AC power ON lamp should be ON.
- 3) Place the Kill Enable/Disable switch to the Enable position.
- 4) Push and hold (one second) the Power ON Reset switch.
- 5) The DC Power ON lamp should be ON.
- 6) Measure 24 VDC between TB2-1 and TB2-2.

3. INSTALLATION (cont.)

3.5. Setting The Processor PC Board Address.

Each device on the mine wide monitoring system must have a different address. The address switches SW1 and SW2 are used to configure the desired address.

3.6. Verify Operation

- 1) Configure the Master Station to request data from the address selected for the PS-4100 Power Supply Processor PC board.
- 2) The Tx and Rx LEDs on the Processor PC board should blink each time data is requested from the Processor PC board.
- 3) The Master Station should now display data returned from the device.
- 4) Use the Master Station to “Kill” the PS-4100 Power Supply.

PLACE FIGURE 1 ON THIS PAGE

PLACE FIGURE 2 ON THIS PAGE

PLACE FIGURE 3 ON THIS PAGE

4. TROUBLESHOOTING

4.1. Getting Power To The PS-4100 Power Supply

- 1) Insure that the Power Supply is installed properly according to the manual installation section 3.
- 2) Insure that 120 VAC is supplied to the Power Supply TB1, the AC Power ON switch is ON and the AC lamp is ON.
- 3) Insure that the voltage output measured across both batteries is greater than 22 VDC and the DC Power ON switch is ON
- 4) Verify that the DC Power ON lamp turns ON when the Power ON Reset switch is momentarily pressed. If the DC Power ON lamp comes ON and then turns OFF when the Power ON Reset switch is released, place the Kill Enable/Disable switch to Disable and repeat step 4 again.
- 5) If the DC Power ON lamp stays ON (after repeating step 4), the Master Station has commanded the Power Supply OFF and placing the Kill switch to Disable bypasses the Master Station command to “Kill” power to the Power Supply. Be sure to place the Kill Enable/Disable switch to Enable once the Master Station has commanded the Power Supply ON.
- 6) After the DC Power ON lamp comes ON and stays ON, verify the following conditions:
 - a) The voltage measured across both batteries is either increasing (which means the batteries are being charged) or the battery voltage is greater than 27 VDC (which means the batteries are fully charged). This confirms the 253-0349 Power Supply PC board battery charging circuitry is functional.
 - b) Measure 24 VDC between TB2-1 and TB2-2 terminals. This confirms the 253-0349 Power Supply PC board 24 VDC power supply circuitry is functional.

4. TROUBLESHOOTING (cont.)

4.2. 253-0350 Processor PC board

1) Insure that the Power Supply PC board is installed properly according to Section 3 of this manual.

2) Insure that the Power Supply PC board has 24 VDC at connector J1-2 and J1-3.

NOTE: The Master Station “Kill” command may have been used to remove all power from the Power Supply PC board. Follow step 7 above to bypass the “Kill” command to establish power on the PC board.

3) Verify the RS-485 communications cable is connected to TB2-3 and TB2-4 terminals. Configure the Master Station to request data from the address selected for the PS-4100 Power Supply Processor PC board.

4) The Tx and Rx LEDs on the Processor PC board should blink each time data is requested from the Processor PC board.

5) The Master Station should now display data returned from the device.

5. REPLACEMENT PARTS

Part Number	Description
253-0350	PS-4100 Processor PC Board
253-0349	PS4100 Power Supply PC Board
275-0002	Rechargeable 12V, 7 AH, Battery
130-0007	Transformer
050-0001	Power ON Reset Switch
065-0008	120 VAC Power ON LED
065-0011	24 VDC Power ON LED