LONWORKSTM MODULE
POWER SUPPLY

This Instruction contains installation and servicing procedures for the LonWorks module(s) listed in the table below. Acromag, Inc. manufactures the module(s). The table provides the module description, the Moore part number, and the equivalent Acromag model number.

<table>
<thead>
<tr>
<th>MODULE DESCRIPTION</th>
<th>MOORE P/N</th>
<th>ACROMAG MODEL NUMBER</th>
</tr>
</thead>
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<tr>
<td>Power Supply, 115 Vac Input, 15 Vdc Output, 1.6A</td>
<td>27005-17</td>
<td>1854-PS-1</td>
</tr>
<tr>
<td>Power Supply, 230 Vac Input, 15 Vdc Output, 1.6A</td>
<td>27005-18</td>
<td>1854-PS-2</td>
</tr>
<tr>
<td>Power Supply, 24 Vdc Input, 15 Vdc Output, 1.6A</td>
<td>27005-19</td>
<td>1854-PS-3</td>
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Two major sections are found in this Instruction. General information on a LonWorks module ordered from Moore is located in this section. The Acromag User’s Manual for the module is the second section.

Go to the Acromag section of this Instruction to install or calibrate a module. For product support or repair, read the following paragraphs. These statements supersede or amend similar information in the Acromag section.

PRODUCT SUPPORT

Product support can be obtained from a Technical Information Center (TIC). Each regional TIC is a customer service center that provides direct telephone support on technical issues related to the functionality, application, and integration of all products supplied by Moore. Regional TIC contact information is provided in the following table. Your regional TIC is the first place you should call when seeking product support information. When calling, it is helpful to have the following information ready:

- Caller ID number or name and company name - When you call for support for the first time, a personal caller number is assigned. Having the number available when calling for support will allow the TIC representative taking the call to use the central customer database to quickly identify the caller’s location and past support needs.

- Product part number or model number and version

- If there is a problem with product operation:
  - Whether or not the problem is intermittent
  - The steps performed before the problem occurred
  - Any error messages or LED indications displayed
  - Installation environment

Customers that have a service agreement (ServiceSuite or Field Service Agreement) are granted access to the secure area of our Web site (www.mooreproducts.com/techservices). This area contains product support information. To log on, you will be prompted to enter your username and password.
TIC North America also offers a free faxback service called FaxRequest. You can dial-in to this service to access documents such as press releases, product information sheets, and training schedules. The service is completely automated and available 24 hours a day. To access this service, call the FaxRequest number listed in the tables below. The first document you should request is the directory (document number 9999). This document is updated as new documents are added. Each document has a number code assigned to it that you enter along with your fax number (area code entry is always required). Upon completing your entry, the FaxRequest computer automatically calls your fax machine and sends the requested documents.

<table>
<thead>
<tr>
<th>TIC NORTH AMERICA</th>
<th>Tel: +1 215 646 7400, extension 4842, option 1</th>
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<td>Fax: +1 215 283 6343</td>
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<tr>
<td>E-mail: <a href="mailto:tiegroup@mpco.com">tiegroup@mpco.com</a></td>
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<tr>
<td>FaxRequest: +1 215 646 7400, extension 4842, option 2</td>
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<td>Bulletin Board Service: +1 215 283 4968</td>
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<td>Hours of Operation: 8 a.m. to 6 p.m. eastern time</td>
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<td>E-mail: <a href="mailto:uktic@mpco.com">uktic@mpco.com</a></td>
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<tr>
<td>Hours of Operation: 8:30 a.m. to 5:15 p.m. GMT/BST</td>
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<tr>
<td>Secure Web Site: <a href="http://www.mooreproducts.com/techservices">www.mooreproducts.com/techservices</a></td>
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RETURN FOR REPAIR
This section modifies the General Maintenance section in the Acromag User’s Manual.

During the warranty period, remove a failed instrument from service and proceed as follows to return it to Moore for repair. For out of warranty repair, return the module to either Moore or Acromag.

TO RETURN EQUIPMENT

- Call Moore Products Co. at (215) 646-7400, ext. 4RMA (4762) weekdays between 8:00 a.m. and 4:45 p.m. Eastern Time. If outside of North America go, to www.mooreproducts.com for the address and telephone and FAX numbers of your nearest Moore Products Co. subsidiary. Ask for an RMA (Return Material Authorization) number and be sure to mark the RMA number prominently on the outside of the shipment.

When calling for an RMA number, provide the reason for the return. If returning equipment for repair, failure information (e.g., error code, failure symptom, installation environment) will be requested. A purchase order number will also be needed.

MATERIAL SAFETY DATA SHEET

- A Material Safety Data Sheet (MSDS) must be included with each item being returned that was stored or used anywhere hazardous materials were present.

PACKAGING

- Package assembly in original shipping materials. Otherwise, package it for safe shipment or contact the factory for shipping recommendations.

An electronic module must be placed inside a static shielding bag to protect it from electrostatic discharge.

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Moore Products Co. assumes no liability for errors or omissions in this and any attached documents or for the application and use of information included in this and any attached documents. The information herein is subject to change without notice.

Procedures in this document have been reviewed for compliance with applicable approval agency requirements and are considered sound practice. Neither Moore Products Co. nor these agencies are responsible for repairs made by the user.
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IMPORTANT SAFETY CONSIDERATIONS

It is very important for the user to consider the possible adverse effects of power, wiring, component, sensor or software failures in designing any type of control or monitoring system. This is especially important where economic property loss or human life is involved. It is important that the user employ redundancy, and comprehensive failure analysis to insure a safe and satisfactory overall system design. It is agreed between the Buyer and Acromag, that this is the Buyer's responsibility.

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INTRODUCTION:

These instructions cover the power supply model types listed below. Supplementary sheets are attached if unit has special options or features. For information concerning the Series 1800 concept, or location of the power terminal strip on the various cages, please refer to the Series 1800 System and Card Cage Instructions.

Table 1

<table>
<thead>
<tr>
<th>MODEL</th>
<th>POWER REQUIREMENT</th>
<th>DC OUTPUT</th>
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<tbody>
<tr>
<td>1854-PS-1</td>
<td>115V AC +10%, 50/60 HZ</td>
<td>+15V DC</td>
</tr>
<tr>
<td>1854-PS-2</td>
<td>230V AC ±10%, 50/60 HZ</td>
<td>±15V DC</td>
</tr>
<tr>
<td>1854-PS-3</td>
<td>24V DC (–)10% TO (+)30%</td>
<td>±15V DC</td>
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</table>

DESCRIPTION:

The 1854-PS power supply is designed specifically for the Series 1800 system cages. It provides plus and minus 15V DC and is capable of supplying power to 16 modules or more (function of current requirements of the modules used). Each power supply has over-voltage protection, current limiting circuitry, and may be connected in parallel if automatic redundancy in the power system is required. Four of these power supplies may be mounted side by side on a 19 inch panel (1854-MP), refer to Drawing No. 4500-279 for details. A power LED, visible on the front of the power supply, indicates when power is being applied and when the internal fuses are good. A simplified schematic of the power supply appears on Drawing 4500-386.

AC powered units have power isolation. DC powered units are directly coupled; the power and output circuits share the same common.

Switching regulator circuits, in both the plus and minus supplies, reduce the heat sinking requirements and the resulting temperature rise in the enclosure. The plus 15V DC supply has a constant frequency, pulse-width, type of regulator, while the minus 15V DC supply has an inverting regulator with a constant on-time mode of operation.

The overvoltage limiter continuously senses the output voltage. If a failure occurs, causing the output voltage to rise above a preset limit, it internally supplies a low resistance (crowbar) path to the power supply common. The increased current opens the DC circuit to the regulator by blowing a replaceable fuse (F201).
Any over-current is sensed by the voltage drop across a resistor inserted in series with the load. This voltage drop is the input to a current limiting circuit which overrides the regulating amplifier. It limits the output current to a pre-determined value, even if the output is accidentally short-circuited. This circuit is also necessary for parallel connection of power supplies.

Automatic redundancy is where a spare power supply is available for instant backup as a part of the total system. If allowable "down time" is zero hours, then redundancy is the only available choice. The 1854-PS power supply uses a diode-coupled connection for obtaining redundancy. Any number of power supplies may be connected in parallel, the supply with the highest output will be the first to supply the load current. As load requirements increase, the supply with the next highest output will start up, and so on until the last supply is on-line. When all supplies are at full-load, any additional load causes all of them to go into current limiting until the load current requirement is reduced. Systems may be wired with (N+1) power supplies, thus providing an extra supply, ready to take over, in the event that one of the required power supplies is taken off-line.

There are two barrier strips on each power supply, one for primary power and ground, and one for the output DC power. Four connections must be made between the power supply and a Series 1800 card cage: plus and minus 15 volts DC, power supply common, and power supply reference common. The reference common connection allows the module's output amplifier to be directly referenced to the power supply. This lead bypasses the voltage drop developed in the power common lead, which carries large DC currents.

SPECIFICATIONS:

Function: To provide plus and minus 15V DC power for up to 16 Series 1800 modules, or more (function of current requirements of the modules used). The unit has current limiting and over-voltage protection. Power supplies may be connected in parallel if redundancy is required. Primary power options include: 115V AC, 230V AC and 24V DC.

Power Input (per model number):
1854-PS-1: 115V AC +10%, 50/60 Hz, 0.6 A.
1854-PS-2: 230V AC ±10%, 50/60 Hz, 0.3 A.
1854-PS-3: 21.6V to -32V DC, reverse polarity protected.
   I max. = 2.5 Amps DC. A crowbar circuit limits the input voltage to the regulator circuit to 36V DC. If this voltage is exceeded, a 4 Ampere fuse (F201) will blow opening the DC circuit to the regulator. Enclosure cover must be removed for access, fuse is 0.25 by 1.25 inch, 3AG, fast acting.

Power Output:
A. (+)15V terminal to common: (+)15V DC +10%, 1.6 Amps DC full load.
B. (-)15V terminal to common: (-)15V DC ±10%, 0.2 Amps DC full load.
Power Input Protection: Fuse F101, per below. Enclosure cover must be removed for access, fuse is 0.25 by 1.25 inch, 3AG, fast acting.

1854-PS-1: 2 Amp
1854-PS-2: 1 Amp
1854-PS-3: 5 Amp

Power Output Protection:
A. Overcurrent Protection: Both supplies are current limited and can sustain a continuous short circuit.
   1. (+)15V supply current limit value: 2.0 Amps nominal.
   2. (-)15V supply current limit value: 0.25 Amps nominal.
B. Overvoltage Protection: A crowbar circuit limits output voltage to +18V DC. If this voltage is exceeded, a 4 Ampere fuse (F201) will blow opening the DC circuit to the regulator. Enclosure cover must be removed for access; fuse is 0.25 by 1.25 inch, 3AG fast acting.

Redundancy: Diode-coupled connection configuration. Power supplies can be connected in parallel for systems requiring automatic redundancy.

Power Isolation: AC powered units have power isolation and can sustain a 1500V AC isolation breakdown test between power, output and chassis ground. Complies with test requirements outlined in ANSI C39.5-1974 for voltage ratings specified. DC powered units are directly coupled—the power and output circuits share the same common; isolated from chassis ground.

Power Indicator: An LED status light on the power supply indicates when power is applied. Loss of power or blown fuses extinguish the light.

Reference Test Conditions: Output loading: (+)15V supply; 10 ohms, resistive; (-)15V supply; 100 ohms, resistive; 77°F (25°C); nominal power input.

Ambient Temperature Range: 32°F to 158°F (0 to 70°C).

Ambient Temperature Effect: Each voltage, less than +0.01% of output per °F (+0.018% per °C), over ambient temperature range and reference test conditions.

RFI Resistance: Less than +0.5% of output effect with RFI field strengths up to 10V/meter at frequencies of 27, 151, and 467 MHz.

EMI Resistance: Less than +0.25% of output effect with switching solenoids or commutator motors.

Surge Withstand Capability (SWC): Output terminations rated per ANSI/IEEE C37.90-1978. Unit is tested to a standardized test waveform that is representative of surges (high frequency transient electrical interference), observed in actual installations.
Construction:
Enclosure: Chassis is aluminum painted with a baked on black epoxy paint (Polane). Cover is aluminum with a clear anodized finish.

Printed Circuit Board: Military grade FR-4 epoxy glass circuit board.

Size: Refer to mechanical outline Drawing 4500-278.

Connections: Barrier-type terminal strip using No. 6 screws and clamp plates. Wire range 12 to 18 AWG.

Shipping Weight: 5 pounds (2.25 kg.) packed.

INSTALLATION:

The Series 1854 power supply is designed to be installed in any convenient location suitable for general purpose electronic equipment. Use an auxiliary enclosure to protect against unfavorable environments and locations. Maximum operating ambients should not exceed 32° to 158°F (0 to 70°C) for satisfactory performance. It is recommended that the power supply and cage be mounted and wired before the modules are installed.

Mounting:
The power supply is designed for surface mounting, see Mechanical Drawing 4500-278 for mounting and clearance dimensions. Power supplies should be mounted as close as possible to the Series 1800 card cage. To mount multiple power supplies as a group, refer to Drawing 4500-279 for maximum density information.

Electrical Connections:
1. Power/Ground: Connect the AC or DC power and GROUND wires as indicated next to the power barrier strip, use suitable wire per applicable codes. Label on unit specifies the power required for the particular unit being installed. On DC powered units, inadvertant reverse connection will not damage unit. Connect the "HOT" input power lead to the terminal marked "L1" or "DC+" and the "COMMON" lead to the terminal marked "N", "L2", OR "DC-". Incorrect wiring will defeat the fuse and cause a safety hazard. Connect the terminal marked "G" to a suitable earth ground. After the power wiring is complete, replace the plastic shield to prevent accidental contact with the power terminals. A LED on the power supply lights when power is applied. Loss of power or blown fuses will extinguish the light.

2. DC Power Output: The power supply provides power for up to 16 modules in any cage combination (such as four four-channel cages, one sixteen-channel cage, etc.). Connect the DC power output terminals from the power supply to the Series 1800 cage power barrier strip marked TB-5. For location of TB-5 and terminal assignment, refer to Series 1800 System and Cage Instructions. DC wiring should be at least 18 gauge wire in all installations. With power runs that exceed 10 feet, larger diameter wire should be used. Barrier strips on the Series 1800 cages can accommodate 14 to 20 gauge wire. Connection Drawing 4500-387, illustrates the method for wiring one supply to multiple cages. This drawing also supplies details for connecting power supplies in parallel for redundant power system applications.
GENERAL MAINTENANCE:

The power supply contains solid-state components and requires no maintenance except for periodic cleaning and output voltage verification. If the power supply is not operating properly, it should be removed and given a full bench checkout. Past experience indicates that most problems are in the field wiring and associated circuits rather than in the power supply itself. If the problem is traced to the unit itself, conventional electronic troubleshooting methods can be used.

In the event of a suspected failure, check the power supply power LED. If it is not on, check the condition of internal fuses (F202 & F201) and that power is being applied. Extra fuses are recommended as spare parts. Fault isolation at the component level requires proper test equipment and qualified technicians familiar with solid state analog/switching circuitry. If these facilities are not available, the units should be returned to the factory for repair.

If replacement parts must be ordered, the following information should be included:

A. Instrument model number.
B. Instrument serial number.
C. Component designation and value (e.g., R22, 20K, 1/8W, 1%).