SM50F48PM (-48V)

Rectifier Module

Part Number: SM50F48PMPD

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Referenced Information

EQUIPMENT

Equipment Nomenclature	Part Number	Manufacturer
Digital Multimeter	Fluke 87	John Fluke Mfg. Co. Inc., Everett, WA

Standard Shop Tools

TECHNICAL DOCUMENTATION OR SPECIFICATIONS

Nomenclature	ID Number	Manufacturer
N/A		

CONSUMABLES

Nomenclature	Part Number	Manufacturer
N/A		

RECOMMENDED SPARES

Nomenclature	Part Number	Manufacturer
N/A		

Contact Information

Phone: +1 877 546-3243

Email: PE.TechSupport@ge.com

Web site: www.gecriticalpower.com

Product Information

Please take a moment when the product is new to fill in this information.

First, locate the product information label. This is typically located on the upper front of the equipment frame, or on the rear of the frame. Fill in the part number, as it appears on the label, in the space below.

PART NUMBER	**DATE CODE:**
SERIAL NUMBER	**ECN Level: 860 _ _ _ _ P**

AGENCY APPROVALS:

Warnings

1. Electrical shock hazard. Do not attempt to remove, maintain, or install this equipment with power applied. Personnel that attempt to work on this equipment with the power applied may subject themselves or others to electrical shock that may cause serious injury or death.

2. The use of this equipment by unauthorized or untrained personnel should not be attempted. Personnel that work on this equipment without the proper training may subject themselves or others to electrical shock that may cause serious injury or death.

3. Do not attempt to work on this equipment if it is, or has been, exposed to a high moisture condition. It is recommended the equipment be returned to GE to be properly tested. Working on this equipment during a high moisture condition subjects the user to electrical shock that may cause serious injury or death.

4. Use of an attachment other than one approved by GE will void any and all warranties, implied or other, and will increase risk of fire, or may possibly cause electrical shock, injury, or death to personnel.

5. Do not operate this equipment if it has been dropped or otherwise damaged. Trying to operate this equipment if it has been damaged subjects yourself or others to electrical shock that may cause serious injury or death.

6. Before you proceed, ensure the input source is not live and the input circuit breaker(s)/fuse(s) has been tripped or removed. If these procedures have not been followed and the input/output power is live, serious personnel injury or death may occur.

7. A rack/shelf may contain several operating systems. If there is another system in the general area you want to install this system, be cautious of any exposed connectors or wires and, with permission, remove power to the other systems. Failure to take the necessary safety precautions subjects the installer or maintenance personnel to severe electrical shock that may cause serious injury or death.

8. This equipment may connect to lead-acid batteries. Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. **Wash hands after touching batteries.**

Cautions

1. Follow proper grounding instructions.

2. If connecting batteries, remove the battery-box-fuse or trip the circuit breaker. Check batteries and connections for proper polarity and power before connecting the batteries to the system

3. To remove the circuit breakers or fuses, the DC and/or AC input to the system will need to be disconnected, thereby disabling the system output to the load(s). Take the necessary precautions and inform the plant engineer that the system output power to the loads will be disabled.

4. Before performing any maintenance, ensure AC or DC power is not applied to the system.

5. Fuse holders, fuses, and circuit breakers are not to be loaded to more than 80 percent of their ampere rating.

SECTION 1: GENERAL INFORMATION

1.1 GENERAL.

The paragraphs that follow contain information that is intended to help the user with the understanding of the Rectifier Module. This Rectifier is a -48 VDC 50 Amp self contained unit. The Rectifier is a fully regulated, DC isolated output Switchmode Rectifier designed to charge batteries while supplying power to telecommunication equipment. The Rectifier can also operate as a Battery Eliminator not requiring external batteries. The Rectifier is of modular design for easy upgrading or replacement in a GE shelf configuration.

1.2 SPECIFICATIONS.

The following information is intended to give the user a quick reference to information that is necessary to install and operate the system. Included are input requirements, output signal characteristics, size, weight, and generated system noise.

INPUT REQUIREMENTS

Voltage/ Current	Single Phase, 176-265 Volts AC47-63 Hz, 13.7 Aac (Nom), 18.5 Aac (Max).
TIF	Telephone Influence Factor of the AC current wave has a typical I.T. product less than 500 at 230VAC.
Efficiency	88 to 90% at 50-100% Load 54.5VDC @50ADC.
Power Factor	0.90 Lagging 10-100% Output Load 0.95 to 0.99 Lagging Typical.
AC Input Protection	20Amp Fuse in series with AC Input line (Fuse is not Field Replaceable).

OUTPUT

Voltage	Float Adjust (Minimum 50 to 55 VDC) Equalize Adjust (0-6 VDC above Float-Not to exceed 60.0 VDC).
Voltage Regulation	Static: ±1% for all AC input, output load, and temperature conditions. Dynamic: Voltage transient is less than 5% and will return and stay within the 1.0% band within 300MS when a 50% load step is applied or removed within the Rectifier load range of 10% to 100% load.
Noise	Measured at the Battery with an AH rating of four (4) times the Rectifier's rated output for all AC input and output load condition. Voice Band: Maximum of 32 dBrn C-message weighing (Typical max 28 dBrn). Wide Band: Maximum of 250 millivolts peak-to-peak over a bandwidth of (10 Hz-100MHz). Maximum of 100 millivolts RMS in any 3 KHz band between 10KHz and 100 KHz.

Over Voltage An individual Rectifier, with an output load of greater than 10%, will shutdown. Rectifiers, when operated in parallel, will selectively shutdown if the output voltage reaches 58.0 VDC (factory setting).

Protection Output: Electronic Current Limit limits the output current to 51.0 Amps or 102% of rated output.(Factory setting)
Short Circuit: Electronic Current Limited (Internal fuse if the electronic current limit fails).

Mechanical Specifications Size: 5.10 in. wide x 9.36 in. high x 13.00 in. deep.
Weight: 18.00 Lbs.

No. of Modules	Shelf Output Current	BTU/HR
1	50 Amp	1122

1.3 STANDARD FEATURES.

The Rectifier Module comes with many standard features. These features are detailed in the following paragraphs.

1.3.1 Voltage Control. The Float/Equal switch, located on the front panel, selects float or equalize modes of operation. The FL and EQ adjust potentiometers are provided to make adjustments for each voltage requirements.

1.3.2 Remote Sensing. Negative Sense lead can be connected to the batteries for optimum regulation.

1.3.3 Load Sharing. A circuit is provided so Rectifiers can proportionally share the load with other like Rectifiers within ±2% of rated Load.

1.3.4 Current Walk-In. Upon "turn-on" of the Rectifier, the output current will gradually increase to it's required output load in approximately eight (8) seconds.

1.3.5 Meter (Digital). Selectable Voltmeter/Ammeter, located on the front panel, accuracy is +/- 1%. This is not provided on the PM-3 version of the rectifier.

1.3.6 Over Temperature. Rectifier will shutdown due to an internal over temperature condition. This could be the result of a fan failure or other abnormal condition.

1.3.7 Alarm Indication. Any condition resulting in Rectifier failure, including AC "turn-off" or a "fan failure" will provide a signal to the Office Alarm terminals and will light the RFA LED (RED), located on the front panel.

1.4 CONTROLS, ALARM FEATURES, AND INDICATORS.

The Rectifier alarm features and indicators, located on the front panel of each Rectifier, are contained in the following section.

1.4.1 Test Points. Test Points are available to monitor the Rectifiers Voltage and Current with respect to the COM Test Point.

1.4.2 Test LED. The Test LED(Amber) will light when the Rectifier has an open (-) Negative Sense lead. When the Test Lamp is "ON", the Rectifier will be in a Local Sense Mode.

1.4.3 Standby/ON Switch. The Standby/ON Switch puts the Rectifier in a "stand-by" condition.

1.4.4 GO LED. The GO LED(Green) will light when AC input voltage (>180V) is present.

1.4.5 Float Adjust. The Float Adjust(FL) pot is used to adjust the float voltage output of the Rectifier.

1.4.6 Equalize Adjust. The Equalize Adjust(EQ) pot is used to adjust the equalize voltage output of the Rectifier.

1.4.7 Current Limit. The Current Limit(CL) pot is sealed and must not be adjusted. This is for factory setting only.

1.4.8 High Voltage. The High Voltage(HV) pot is used to adjust the high voltage setting of the Rectifier.

1.4.9 Float/Equalize. The EQ LED(Amber) will light when the Float/EQ switch is in the "equalize" position.

1.4.10 Fail LED. The Fail LED(Red) will light when the Rectifier fails to operate.

1.4.11 Select Switch. The Select Switch turns Rectifier Output meter to either "A" (Amps) or "V" (Volts) reading**.**

1.5 AGENCY APPROVALS.

UL Recognized-UL 1950 (Information Technology Equipment).

C-UL Recognized-CSA C22.2 NO. 950-95 (ITE).

CE/CB Scheme to IEC950 (ITE).

CISPR22 class B (ITE).

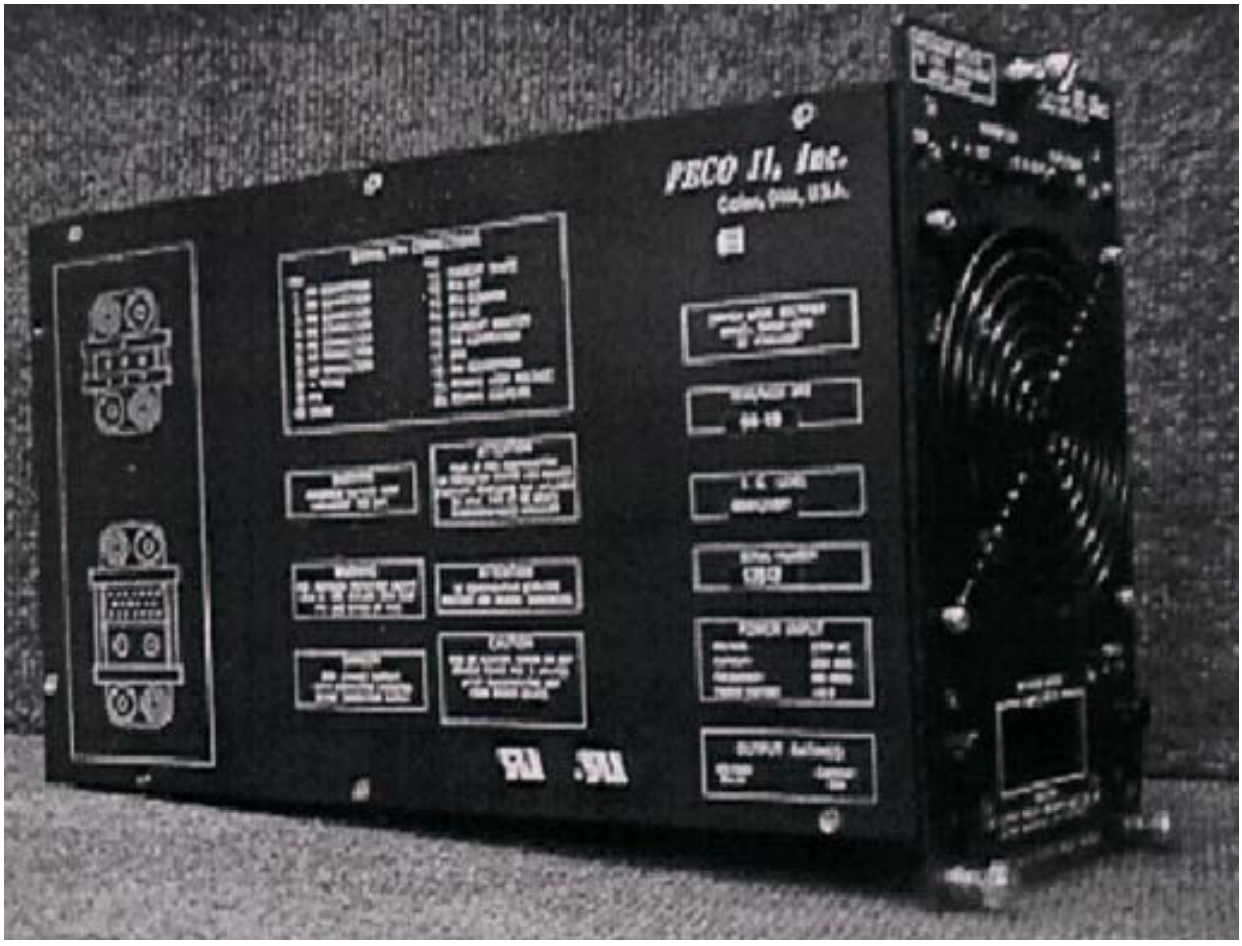
1.6 ENVIRONMENTAL SPECIFICATIONS.

A. STORAGE AMBIENT TEMPERATURE: -40EC to +85EC (-40EF to +185EF)

B. OPERATING AMBIENT TEMPERATURE:

Sea Level to 4800 ft:	0EC to +50EC (+32EF to +122EF)
4800 ft to 7000ft:	0EC to +45EC (+32EF to +113EF)
7000 ft to 10, 000 ft:	0EC to +40EC (+32EF to +104EF)
Humidity:	95% Non-condensing (Maximum).

C. COOLING: Forced Air - Keep ventilating passage ways to the unit unobstructed to insure adequate cooling during operation. Otherwise over temperature protection alarm may be activated.



5.10"Wx9.36"Hx13.00"L

Figure 1-1. Rectifier Module

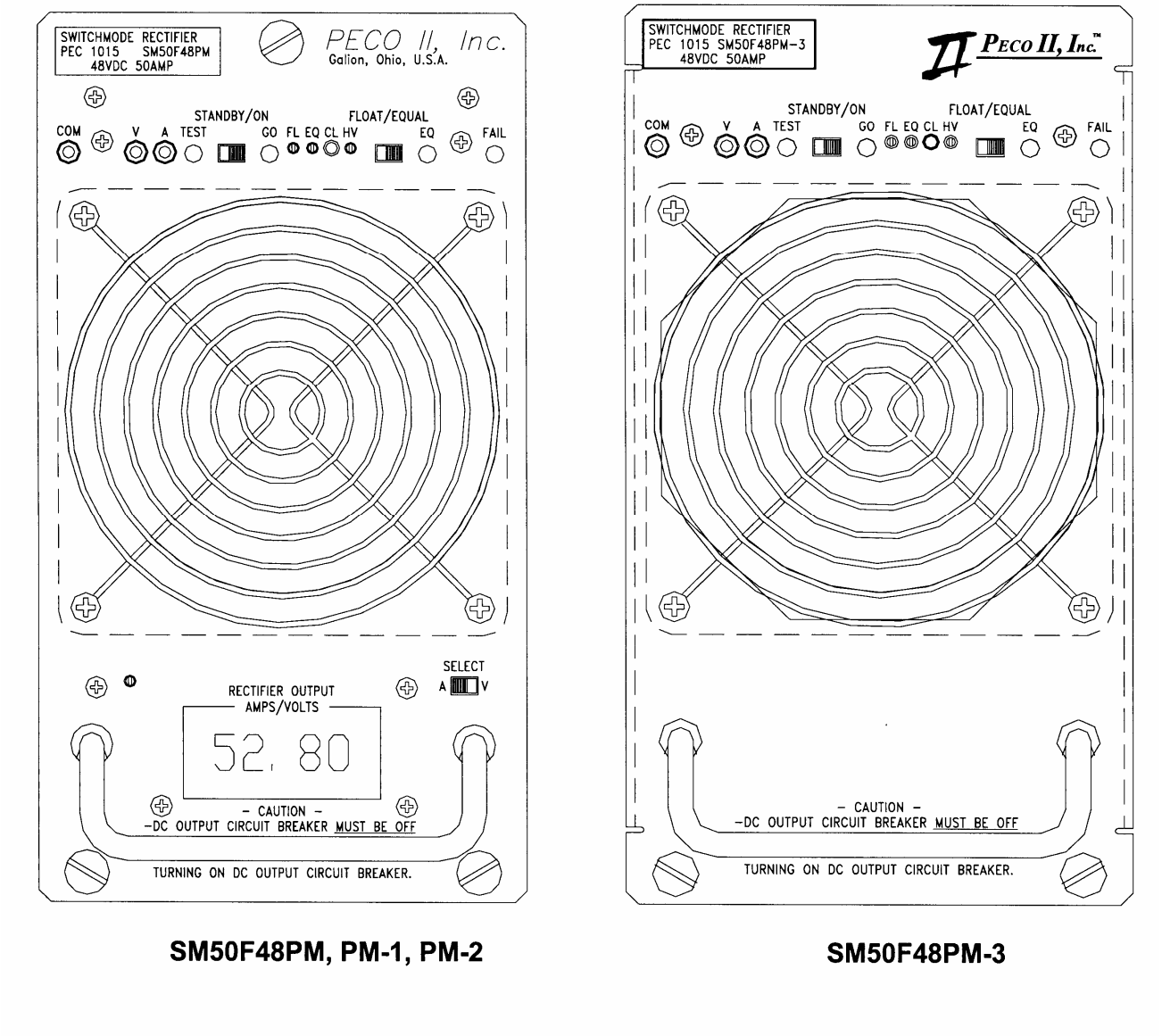


Figure 1-2. Rectifier Module(Front View)

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SECTION 2: RECTIFIER MODULE INSTALLATION

2.1 GENERAL.

This section gives the procedures to install the Rectifier Module. Included are all installer interfaces and associated reference material to be used when installing the equipment.

The Rectifier's Input and Output connections are plugable connectors for the purpose of paralleling and "HOT" Insertion into a working system (See Figure 2-1).

2.2 INSTALLATION.

A. AC Input Connections (See Figure 2-1).

- Input Connections ("A" Module):
- L1 connects to AC Input Line 1
- CHAS GRD connects to AC Ground (Earth GRD)
- L2 connects to AC Input Line 2

B. Output Connections.

1. Output Power Connections ("B" Module):

Pin Number
(+) Positive Power Output connection.
(-) Negative Power Output connection.

2. Alarm & Control connections ("B" Module):

Pin Number

1-		Vacant
2-		Vacant
3-		Vacant
4-		Vacant
5-		Vacant
6-		Vacant
7-		Vacant
8-	(-S)	NEGATIVE SENSE lead. It is used by the chop secondary control to regulate its output to that Sense Point.
9-	PSI	POWER SUPPLY INHIBIT (Remote Restart and Shutdown). By applying a ground signal to this lead, the Rectifier can be remotely shutdown and restarted from a remote location or remotely controlled.
10-	SCOM	SECONDARY COMMON is the (-) minus output lead of the Rectifier.
11-	CLSO	CONTROLLED LOAD SHARE lead. When connected between other like Rectifiers Modules will Load Share within ±2% of rated load.

12- RFA-NO
13- RFA-COM
14- RFA-NC RECTIFIER FAILURE ALARM. (RFA). These leads are from a set of relay contacts called “Form C” contacts. The RFA relay alarm contacts are shown in their alarm state (De-energized). Relays release on alarm conditions, alarm circuits are energized in their “Normal” no alarm condition.
15- VI CURRENT MONITOR lead is provided for Remote Monitoring of the Rectifier’s output current. A 1.0 volt/10.0 Amp current signal referenced to the Negative Sense lead is provided for use with a remote Monitoring System.
16- Vacant
17- BTC BATTERY TEMPERATURECOMPENSATOR lead is provided to vary the output voltage of the Rectifier to compensate for battery temperature in the range of 10EC to 65EC.
18- Vacant
19- RHV REMOTE HIGH VOLTAGE lead will accept an external high voltage signal (Battery) from a system controller. If the Rectifiers output current is more than 10%, this signal will shut down the Rectifier Module.
20- RM-EQ REMOTE EQUALIZE lead will accept an external equalize signal (Ground) from a system controller or other external system to raise the plant battery voltage for the purpose of battery maintenance.

2.3 INITIAL TURN ON.

A. Make sure that the AC Input Circuit Breaker, located in the AC Power Service Cabinet or Shelf, for the new Rectifier is in the “OFF” position.

B. Make sure that the Output Circuit Breaker, located on shelf below the Rectifier, for the new Rectifier is “OFF”.

C. Insert the new Rectifier into the Rectifier Shelf.

D. If equipped, press and “hold” the Cap Charge switch, located on the shelf below the Rectifier, for five (5) seconds. Turn “ON” the Output Circuit Breaker.

E. Turn “ON” the AC Circuit Breaker, located in the AC Power Service Cabinet or Shelf, for the new Rectifier.

F. Turn the STANDBY/ON switch, located on the front of the Rectifier, to the “ON” position.

G. The Rectifier will come “on line”. The GO LED (Green) will light. The digital meter, if equipped, will indicate the output voltage or current, depending on the position of the V/A switch (Volts/Amps), located to the right of the meter. Upon turn-on of the Rectifier, the output current will gradually increase to it’s required load, approximately eight (8) seconds to full output.

NOTE: If the Rectifier is connected to batteries that are discharged or new, the Rectifier may go into a Current Limit mode, during which the Rectifier gives a constant current, but the voltage will be something less than the adjusted voltage. As the batteries charge up, the voltage will increase up to the “normal” output voltage.

NOTE: The Rectifiers are Factory Set per Section 3.4. If other than factory settings are required refer to Section 3.2 Float/Equalize Adjust.

2.4 TOOLS REQUIRED.

NOTE: Double Insulated Tools with an Insulation Rating of 1000 Volts is required.

- ★ Digital Voltmeter
- ★ Slotted Screwdriver

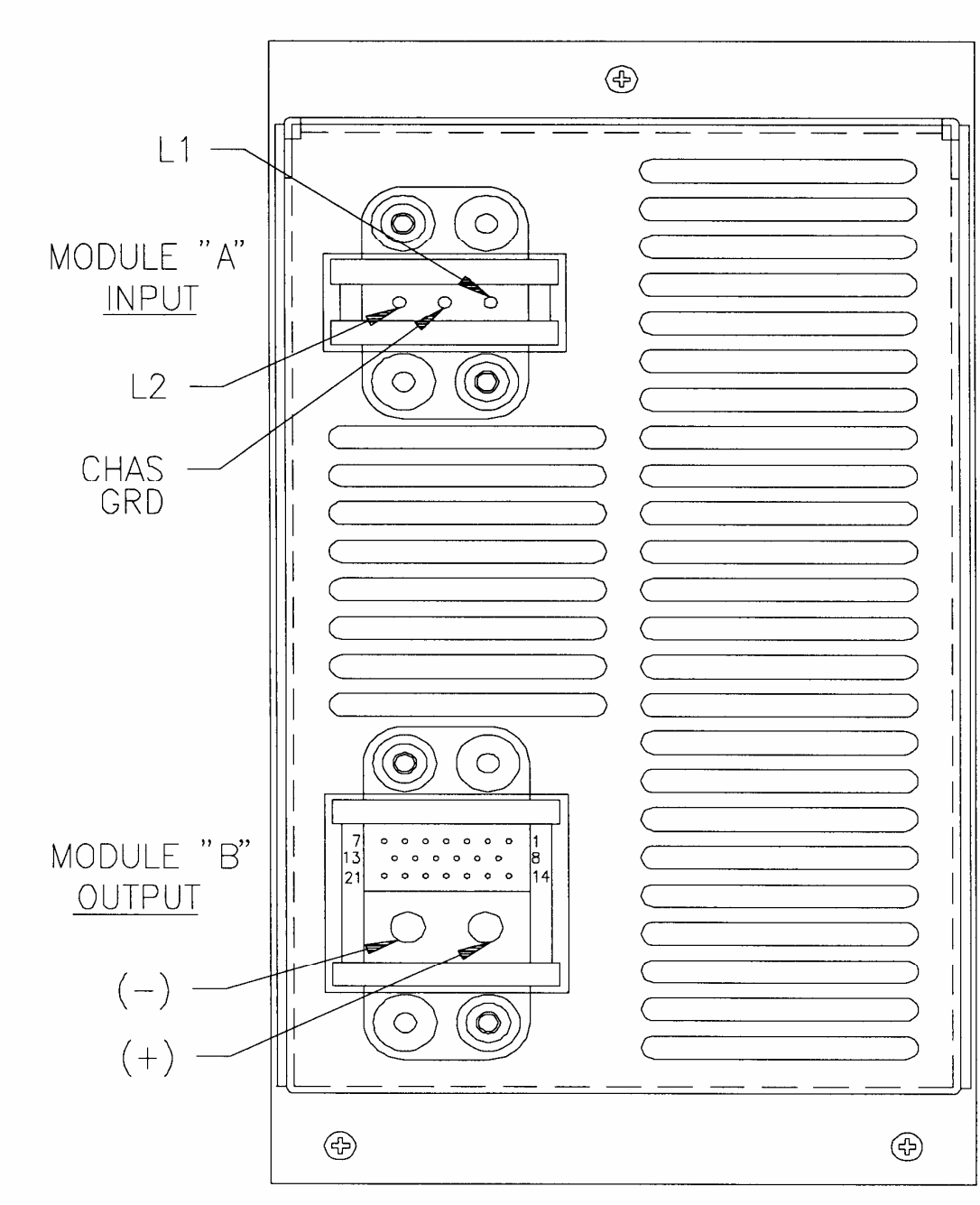

Figure 2-1. Rectifier Module (Rear View)

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SECTION 3: MAINTENANCE AND ADJUSTMENTS

3.1 GENERAL.

This section gives the procedures to perform maintenance and adjustments on the Rectifier Module.

3.2 MAINTENANCE.

This section gives the procedures to perform maintenance on the Rectifier Module.

A. Inspect the Rectifier Module for obstructed airflow to the Module.
   1. Check to make sure fan is still operating.

   2. Check for any obstructions that may be impeding the Rectifier airflow.

   3. If needed, remove any obstructions blocking airflow.

B. Inspect the pins on the Rectifier for any signs of arching.\

   1. Remove the Rectifier from System.

   2. Check for any signs of arching on the pins of the Rectifier.

3.3 ADJUSTMENTS.

This section gives the procedures to perform adjustments on the Rectifier Module.

A. Float/Equalize Voltage Adjust. Operate the “STANDBY/ON” switch, located on the Rectifier, to the “STANDBY” position. Operate the Rectifier Shelf Breaker/Switch to the “OFF” position. Now operate the “STANDBY/ON” switch to the “ON” position.

   1. The Float Voltage is adjustable using the FLOAT ADJ (FL) pot, located on the front panel of the Rectifier.

NOTE: Before making adjustment of the FLOAT ADJUST (FL) pot, operate FLOAT/EQUAL switch to the “FLOAT” position. A clockwise (CW) direction will increase the Float Voltage and a counterclockwise (CCW) direction will decrease the Float Voltage setting.

   2. The Equalize Voltage is adjusted after the Float Voltage is set. The Equalize Voltage is adjustable using the EQUALIZE ADJ pot, located on the front panel of the Rectifier. Before making adjustment on the Equalize Adjust (EQ) pot, operate FLOAT/EQUAL switch to the “EQUAL” position. A clockwise (CW) direction will increase the Equalize Voltage and a counterclockwise (CCW) direction will decrease the Equalize Voltage setting.

B. Current Limit Adjust. The Current Limit Adjust is adjustable using the Current Limit Adj pot, located on the front panel of the Rectifier. The Current Limit is factory set at 51.0 Amps.

CAUTION: Do not adjust the output current limit to a value greater than 51.0 Amps or 102% of rated output. Also, do not adjust greater than 100% if the Rectifier is operating in parallel without any means for load sharing.

NOTE: It is not recommended that the Current Limit be adjusted. An external load would be required to reset the Current Limit.

3.4 FACTORY SETTINGS.

The following settings are factory set, and should not be adjusted unless necessary. If the need does arise for one or all to be changed, refer to Section III for the proper instructions.

Plant Setting	**PM, -1, -2**	**PM-3**
Float Voltage	54.00 VDC	54.48 VDC
Equalize Voltage	56.40 VDC	55.20 VDC
Current Limit	51.00 Amps	51.00 VDC
High Voltage Alarm	58.00 VDC	58.00 VDC

3.5 TOOLS REQUIRED.

- Digital Voltmeter
- Slotted Screwdriver (Fine Blade) or Tweaker

SECTION 4: TROUBLESHOOTING

4.1 GENERAL.

This section gives the procedures to troubleshoot the Rectifier Module.

4.2 TROUBLESHOOTING.

Troubleshooting of the Rectifier Module is limited to the presence of an RFA. If an RFA exists, reseat the Rectifier Module into the shelf. If the RFA terminates, monitor the Rectifier in operation for approximately an hour. If the RFA persists, contact GE Field Service at the numbers listed in the front matter of this manual.

4.3 TOOLS REQUIRED.

- ★ Digital Voltmeter
- ★ Slotted Screwdriver (Fine Blade) or Tweaker

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