TOTAL POWER MODULE

(TPM)

HIGH FREQUENCY

FLOAT CHARGER / BATTERY ELIMINATOR

WITH UNIVERSAL INPUT

USED WITH A

TOTAL POWER CAGE

(TPC)

FOR

TELECOMMUNICATIONS POWER SYSTEMS

INSTRUCTION MANUAL

ECN/DATE

CPN100389

		15349-04 – 05/02	13521 - 11/99
	15411 – 6/02	14575 – 02/01	11362 – 12/97

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ISSUE DATE: 10866 – 4/97

INSTRUCTION DRAWING NUMBER:

P25-**LTPM-2**

IMPORTANT SAFETY INSTRUCTIONS

FOR THE

LA MARCHE POWER CONVERSION EQUIPMENT

SAVE THESE INSTRUCTIONS

This manual contains important safety and operating instructions for the La Marche Power Conversion Equipment.

Before using this equipment, read all instructions and cautionary markings on (1) unit, (2) battery, and (3) product using the battery.

CAUTION: To reduce risk of injury and/or damage to the batteries, use only the type of batteries specified on the charger.

Do not expose equipment to rain or snow.

Do not operate equipment if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.

Do not disassemble this unit; take it to a qualified serviceman when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.

To reduce risk of electric shock, disconnect this unit from the a.c. supply, or batteries and loads before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

WARNING – THERE IS A RISK OF EXPLOSIVE GASSES AND WORKING IN THE VICINITY OF A BATTERY IS DANGEROUS. SOME BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE USING THIS UNIT, YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.

To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and manufacturer of any equipment you intend to use in the vicinity of the battery.

Review cautionary marking on all products .

PERSONAL PRECAUTIONS:

1. Someone should be within range of your voice or close enough to come to your aid when you work near a battery.
2. Have plenty of fresh water and soap nearby in case the battery electrolyte contacts skin, clothing, or eyes.
3. Wear complete eye protection and clothing protection. Avoid touching eyes while working near a battery.
4. If the battery electrolyte contacts skin or clothing, wash immediately with soap and water. If the electrolyte enters the eye, immediately flood the eye with running cold water for at least ten (10) minutes and get medical attention immediately.
5. Never smoke or allow a spark or flame in vicinity of a battery.
6. Be extra cautious to reduce risk of dropping a metal tool onto a battery. It might spark or short-circuit the battery or other electric part that may cause an explosion.
7. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a battery. A battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
8. NEVER charge a frozen battery.

PREPARING TO CHARGE

1. If necessary to remove the battery connections, always remove grounded terminal from the battery first. Make sure all loads are disconnected and unit is off, so as not to cause an arc.
2. Be sure the area around the battery is well ventilated while the battery is being charged.
3. When cleaning battery terminals, be careful to keep corrosion from coming in contact with eyes.
4. Study all the battery manufacturer's specific precautions such as removing or not removing cell caps while charging, recommended rates of charge, and maintenance procedures.

UNIT LOCATION

- Never place this unit directly above the battery. Gases from the battery will corrode and damage equipment. A sealed maintenance free or valve regulated lead acid (VRLA) may be placed below this equipment.
- Never allow the battery electrolyte to drip on this unit when reading the specific gravity or filling the battery.
- Do not operate this unit in a closed-in area or restrict ventilation in any way.
- Do not set a battery on top of this unit.

D.C. CONNECTION PRECAUTIONS

Connect and disconnect d.c. output cables only after setting all of this unit's switches to off position and removing a.c. input supply.

GROUNDING INSTRUCTIONS

This battery charger should be connected to a grounded, metal, permanent wiring system; or an equipment grounding conductor should be run with circuit conductors and connected to equipment-grounding terminal or lead on battery charger. Connections to battery should comply with all local codes and ordinances.

CAUTION: DO NOT PULL ON OUTPUT CABLES WHEN DISCONNECTING CHARGER FROM BATTERY.

RECEIVING INSTRUCTIONS
AND
GENERAL EQUIPMENT INFORMATION

CAUTION: To ensure safe installation and operation, the information given in the instruction manual should be read and understood before installing or using the equipment.

RECEIVING INSTRUCTIONS

Unpacking and Inspection: Examine the shipping crate upon arrival. If there is obvious damage, describe on the receiving documents. Within a few days after delivery, the equipment should be uncrated and carefully inspected for hidden damages. When removing packaging material, be careful not to discard any equipment, parts, or manuals. If any damage is detected you should:

1. File a claim with the carrier within five (5) days.
2. Send a copy of the claim to La Marche Mfg. Co.
3. Call La Marche Mfg. For a RETURN MATERIAL AUTHORIZATION NUMBER.

Failure to properly file a claim for shipping damages, or provide a copy of the claim to La Marche Mfg., may void warranty service for any physical damages reported for repair.

HANDLING

WARNING: **Equipment can be very heavy, and top-heavy. Use adequate manpower or equipment for handling. Until the equipment is securely mounted, care must be used to prevent the equipment from being accidentally tipped over.**

NOMENCLATURE PLATES

Each piece of La Marche Mfg. Equipment shipped is identified by part number on the nomenclature plate.

ADJUSTMENTS

All equipment is shipped from the factory fully checked and adjusted. Do not make any adjustments unless the equipment has been powered-up and the settings have been determined to be incorrect.

SPARE PARTS

To minimize downtime during installation or normal service, it is advisable to purchase spare fuses, circuit boards and other recommended components. Please refer to the list of recommended spare parts and their La Marche Mfg. Part numbers included with the instruction manual. It is recommended that spare fuses be ordered for all systems.

To order spare parts, please contact La Marche Mfg. (847)-299-1188 during business hours and ask for the Parts Department.

Table of Contents

1.0 General

LaMarche's **Total Power Module TPM Series** utilizes the latest state of the art switching technology to provide filtered, modular power to fit the needs of today's telecommunications applications.

Designed to operate with or without battery backup, TPM systems provide hot plug-in and disconnect from the front of the Total Power Cage (TPC), mounting shelf. With its micro-compact size, the TPM offers unmatched flexibility in portability and ease of use and installation. TPM Systems are factory configured with a minimum of one modules, maximum of four modules or a four module split buss (2+2) which allows simultaneous use of both 24 and 48 volt units from a single TPC mounting shelf.

TPM Series rectifiers have built-in Power Factor Correction Circuitry, N+1 Growth and a Stand-Alone Design Hierarchy.

Note: There are no serviceable parts within the TPM unit. Should the TPM stop operating correctly, contact the La Marche Service Department for a Return Authorization Number (RMA).

1.1 Circuit Description

The TPM is a high frequency off line switchmode battery charger/eliminator designed with a Power Factor Correction Circuit and with a Double-Ended (Two Transistor) Forward Converter topology.

The TPM provides an active power factor correction (PFC), circuit. The circuit optimally corrects the input power-line current to a sinusoidal shape while minimizing line current distortion. The circuit uses average current-mode control to accomplish fixed-frequency current control with stability and minimal response to noise transients.

The TPM is controlled by a current mode controller which is constantly monitoring the current into the switching MOSFETs, this provides instantaneous current limit protection and improved transient response to large load changes.

All wiring internal to the TPM is very critical and because of this most of the internal wiring is done via circuit boards. It is not recommended that the charger case be opened for any reason.

2.0 Input/Output Ratings

2.1 A.C. Voltage

The TPM is designed for 102 - 264 v a.c.

2.2 Input Frequency Range

Range - 47 to 63 HZ

2.3 Input Current

Refer to Table 1

2.4 Power Factor

The TPM is provided with Power Factor correction circuitry which corrects the a.c. input power factor greater than 0.95. (20% to 100% rated load)

2.5 Output Ratings

The d.c. current and voltage is specified on the units' nameplate located on the side of the unit.

3.0 Typical Electrical Specifications

MODEL	AC INPUT (AMPS)	PROTECTION (AMPS)
TPM-15-48V-U1	9.5	12
TPM-30-12V-U1	5	12
TPM-30-24V-U1	9.5	12
TABLE 1		

4.0 Standard Features

4.1 Input Protection

A two pole circuit breaker opens both sides of the a.c. service. Refer to Table 1 for values.

4.2 Output Protection

4.2.1 Current limiting

The current limit is factory set at 105%.

4.2.2 Thermo - Protection

Should the internal heatsink temperature exceed a preset value the TPM will current limit to a 50% output.

4.2.3 High Voltage Shutdown

The unit shuts down if the output voltage exceeds a preset d.c. value. The unit can be reset by turning the a.c. breaker on the TPC to the "off" position and then to the "on" position. Blocking diodes provided in each unit prevents parallel units from being affected. 12V units shut down at 15 volts d.c.; 24V units shut down at 30 volts d.c.; 48V units shut down at 60 volts d.c..

THESE SETTINGS ARE NOT ADJUSTABLE.

4.3 Status/Alarm Indicators

4.3.1 Rectifier Failure Alarm and Indicator

A red LED illuminates to indicate that a failure has occurred which may disable the rectifier. The conditions which will produce a rectifier failure include:

- Low Voltage
- High Voltage Shutdown

A set of form "C" contacts rectifier failure are provided for customer connection, on the backplane board, S2A-216L0-XXXX and S2A-216R-XXXX. These contacts are labeled A-B-C and are rated at .4 amps @120Vac or 1.25A @ 24 Vdc..

4.4 Paralleling

This rectifier will parallel with any other LaMarche TPM charger with the same output voltage. Up to four TPM's are paralleled in the LaMarche TPC Cabinet and multiple cabinets may be paralleled for additional output current.

4.5 Test Terminals

Voltage and Current test terminals are located on the front panel of each rectifier to allow connection of a portable voltmeter. These test terminals measure the output voltage of the charger before the blocking diodes, not the buss voltage. To check the output current connect a voltmeter into current terminals, 1.0 d.c. volt equals full rated output current.

4.6 Load Sharing

Forced load sharing is not provided on the model TPM charger.

Balanced output current operation may be obtained by the following procedure:

1. Turn off all but the first unit.
2. Connect a voltmeter to the front panel voltage test jacks of the first unit.
3. Using the voltage adjustment potentiometer adjust the voltage to the required output. **DO NOT** re-adjust output voltage of the first unit.
4. Turn on rest of the units, and apply the full load.
5. Move both voltmeter probes to the test jacks marked “current” on front panel of each TPM. Select mV scale on the voltmeter.
6. Measure the output current of each unit. Adjust the output voltage of second, third and fourth unit using voltage adjustment potentiometer until all four currents are in balance (equal).

4.7 Current Walk In

Output current will gradually increase after the charger is initially turned on.

4.8 Emergency Restoration

This charger may be connected to a battery which has been heavily discharged and recharge it without clearing any protective devices while powering d.c. loads.

4.9 Mounting

The TPM is designed to be mounted in the True Power Cabinet (TPC). Up to four (4) TPM chargers may be mounted in the cabinet. The captive screw on the front panel should be tightened, finger tight with a maximum torque of 10 inch pounds. Cover plates are provided for any unused bay. The TPC mounting shelf is designed to be mounted in a 19 or 23-inch wide relay rack with EIA standard mounting centers spaced 1-3/4 inches apart. Any number of TPC mounting shelves may be paralleled provided they are all the same output voltage. The TPC mounting shelf can be mid or flush mounted.

(Refer to TPC design illustration included in manual.)

4.10 “Hot” Plug-In

The “hot” plug-in feature allows addition or removal of units without requiring a system shutdown.

Note: The units should be plugged in with the a.c. breaker in the “off “position.

To remove the unit, switch the a.c. breaker to the off position, unlock the charger and remove from the system.

5.0 Environmental Ratings

5.1 Operation Ambient Temperature

0 to 50 degrees C (32 to 122 degrees F)

5.2 Storage Temperature

-55 to +85 degrees C (-40 to +185 degrees F)

5.3 Humidity

0 to 95% relative humidity, non-condensing.

5.4 Shock

The charger in its shipping container, withstands shock developed when one edge of the container is dropped from six (6) inches while the opposite edge is resting on the ground, or its dropped two (2) inches on any surface without any physical damage or degradation of the electrical performance.

5.5 Vibration

The charger in its shipping container, withstands vibration encountered in shipping without physical damage or degradation of the electrical performance.

5.6 Altitude

This rectifier is capable of operation at altitudes to 10,000 feet at an ambient temperature of up to +40 degrees C.

5.7 Ventilation

The chargers are fan cooled, the relay rack should be mounted so that the ventilating openings are not blocked and air entering the cabinet does not exceed +50 degrees C.

5.8 Audible Noise

Less than 55 dBA at any point 3 feet from any vertical surface of the charger.

6.0 Installation Information

The TPM was designed to be mounted in a TPC, provided by LaMarche. Up to four (4) units are mounted in the cabinet.

6.1 Minimum Wire Sizes

All wire sizes and cabling should be sized for four (4) chargers.

6.2 National Codes

All wiring should be done following the National Electric Code and all local building and electrical codes.

7.0 Electrical Connections & Field Wiring

7.1 A.C. Input

Line cords are provided in the back of the cabinet for all a.c. connections. Customer provides line cord plug. Each power cord provides power for two TPM units.

7.2 D.C. Output

All charger outputs are paralleled and brought to the TPC cabinet terminal block, located on the back of the TPC cabinet.

OBSERVE PROPER D.C. POLARITY

The negative wire from the battery must be connected to the terminal marked "NEGATIVE" or "NEG" and the positive wire from the battery must be connected to the terminals marked "POSITIVE" or "POS" on the backplane boards in the TPC cabinet. (See details included in manual)

For proper wire sizing, refer to Wire Size Table, included in manual.

7.3 Rectifier Failure Alarm Terminal

TB1, located on the backplane, is a dry contact. This is the rectifier failure alarm terminal. A to B is normally closed. B to C is normally open. Use control wire to connect to the terminal block. Terminal blocks on each backplane must be used. The terminals on each backplane are not summed together. The contacts are rated at .4 amps @ 120Vac or 1.25A @ 24Vdc. The maximum wire size for the terminal block is 12 gauge.

8.0 Operation - Start up

When all connections have been made to the cabinet, plug all chargers into the cabinet and turn the locking screws. Place all a.c. breakers to the "on" positions.

9.0 Adjustments

A d.c. voltage adjustment is provided on the front of each unit. Adjusting the potentiometer in the clockwise direction will increase the voltage setting and counter clockwise will decrease the setting. There are no other user adjustments that can be made. 12V units are adjustable from 12 to 14Vdc. 24V units are adjustable from 24 to 28Vdc. 48V units are adjustable from 48Vdc to 56Vdc.

10.0 Troubleshooting

Be sure all a.c. and d.c. connections to the cabinet are correct. Check d.c. polarities. Check for loose connections. Be sure all units are locked into place. Check for correct a.c. input and d.c. output voltages.

If the a.c. breaker trips and the rectifier failure LED is on, unplug the charger, plug the unit back into the cabinet (unplugging and then plugging the charger back into the cabinet resets the charger), Lock the screws, and switch the a.c. breaker on. If the a.c. breaker trips again, return the unit to the factory after receiving a RMA.

If the fan fails or if the unit overheats, the unit will operate at a reduced output of approximately 375 watts, reset the charger, as above, check to see if the fan is on. If not the unit output will again reduce to 375 watts output when the internal temperature increases. The unit can run at this output without a fan indefinitely.

There are no user serviceable parts internal to the TPM. Should the TPM stop operating correctly, contact the LaMarche service department for a Returned Material Authorization (RMA) number and return the charger for repair.

To avoid damage caused by shipping the units must be returned in their original shipping container with the original packing material if available. LaMarche will not be responsible for damage when returned to factory.

MANUFACTURER'S WARRANTY

All La Marche Manufacturing Co. equipment has been thoroughly tested and found to be in proper operating condition upon shipment from the factory and is warranted to be free from any defect in workmanship and material that may develop within two (2) years from date of purchase under normal use.

If the equipment proves defective within a two year period, it shall be replaced without charge after examination at our factory, providing such defect in our opinion, is due to faulty material or workmanship and not caused by tampering, abuse, misapplication or improper installation.

Should the equipment require major replacement or repair, the equipment must be returned to the La Marche factory to have the inspections, parts, replacements and testing performed by factory personnel. Should it be necessary to return a piece of equipment to the factory, the customer or Sales representative must first obtain a RMA (Return Material Authorization) from the factory. If upon inspection at the factory, the defect was due to faulty material or workmanship, all repairs will be made at no cost to the customer during the warranty period.

All internal maintenance to be performed by La Marche. **Warranty is void if seal is damaged.**

La Marche reserves the right to honor the warranty with a replacement unit.

In accepting delivery of the equipment, the purchaser assumes full responsibility for proper installation, installation adjustments and service arrangements. Should minor adjustments be required, the local La Marche Sales Representative should be contacted to provide this service.

All sales are final. Only standard LaMarche units will be considered for return. A 25% restocking fee is charged when return is factory authorized. Special units are not returnable.

In no event shall La Marche Manufacturing Co. have any liability for consequential damages, or loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause. In addition, any alterations of equipment made by anyone other than La Marche Manufacturing Co. renders this warranty null and void.

La Marche Manufacturing Co. reserves the right to make revisions in current production of equipment, and assumes no obligation to incorporate these revisions in earlier models.

The failure of La Marche Manufacturing Co. to object to provisions contained in customers' purchase orders or other communications shall not be deemed a waiver of the terms or conditions hereof, nor acceptance of such provisions.

The above warranty is exclusive, supersedes and is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness. No person, agent or dealer is authorized to give any warranties on behalf of the Manufacturer, nor to assume for the Manufacturer any other liability in connection with any of its products unless made in writing and signed by an official of the manufacturer.