laMARCHE®

# A76

*HIGH FREQUENCY*
*FLOAT CHARGER*

*FOR*

*TELECOMMUNICATIONS POWER SYSTEMS*

# INSTRUCTION MANUAL

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# **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 one 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. Gasses 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.

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# 1.0 General

The La Marche Model A76 High Frequency Float Charger has many inherent advantages: Voltage Regulation, Current Limiting Circuitry, High Efficiency and High Power Factor. The Model A76's compact size and lightweight (less than 40 lbs.) provides a small system footprint and ease of service.

These chargers provide separate adjustable voltages for floating or equalizing lead-acid or nickel cadmium cells. A float/equalize selector switch is located on the front of the charger.

The Model A76 was designed to be mounted in a cabinet which will fit in a 23 inch relay rack. The cabinet will hold up to three (3) LaMarche Model A76 chargers with the same output voltage. The A76 in the cabinet was designed for a "Hot" plug-in which allows addition or removal of units without requiring a system shutdown. Cover plates are provided for cabinet bays, which are not used.

*Note: There are no serviceable parts within the A76 Cabinet. Should the A76 stop operating correctly, contact the La Marche Service Department for a Return Authorization Number.*

# 2.0 Output Ratings

## *2.1 D.C. Voltage*

The A76 series provide separate voltages for Floating or Equalizing lead or nickel cadmium cells. The float or equalize mode of operation is selected by a switch located on the front of the rectifier.

The factory settings are as follows:

| ***Float voltage*** | ***Equalize voltage*** |
|---|---|
| 2.25 volts/cell (Lead) | 2.35 volts/cell (Lead) |
| 1.40 volts/cell (N.C.) | 1.55 volts/cell (N.C.) |

## *2.2 D.C. Voltage Range*

| ***Float*** | ***Equalize*** |
|---|---|
| 2.12-2.30 volts/cell +/-.1 volts (Lead) | 2.25-2.4 volts/cell +/-.1 volts (Lead) |
| 1.39-1.45 volts/cell +/-.1 volts (N.C.) | 1.5-1.6 volts/cell +/-.1 volts (N.C.) |

## *2.3 D.C. Current Ratings*

The A76 is available in the following output ratings:

| **24 VOLT** | **48 VOLT** |
|---|---|
| 25 amps | 12 amps |
| 50 amps | 25 amps |
| 100 amps | 50 amps |

### *2.4 Regulation*

Steady state output voltage remains within +/- 1/2% of the setting from no load to full 100% load and for a.c. input voltages variations of +/- 10%.

### *2.5 Filtering*

A76 chargers are internally filtered to 32 DBRN ("C" Message Weighted) for all condition of rated input voltage at rated output with ripple voltage not exceeding 30 milli-volts RMS when connected to a battery whose capacity is four (4) times the rated output of the charger.

## 3.0 Input Ratings

### *3.1 A.C. Voltage*

The A76 is designed for 190 - 264 v a.c..

### *3.2 Input Frequency Range*

Range - 45 to 75 HZ

### *3.3 Input Current*

Refer to Table 1

### *3.4 Power Factor*

The A76 is provided with Power Factor correction circuitry that corrects the a.c. input power factor to approximately +/-.9.

## 4.0 Typical Electrical Specifications

| MODEL NUMBER | AC INPUT | PROTECTION |
|---|---|---|
| A76-50-24V-V1 | 9 | 15 |
| A76-100-24V-V1 | 18 | 25 |
| | | |
| A76-25-48V-V1 | 9 | 15 |
| A76-50-48V-V1 | 18 | 25 |

*TABLE 1*

## 5.0 Standard Features

### *5.1 Input Protection*

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

## *5.2 Output Protection*

### 5.2.1 Current limiting

A circuit adjustable from 90% to 105% of rated output limits the d.c. output current. This is factory set at 105%.

Should the internal heatsink temperature exceed a preset value the A76 will current limit to a 30% output and a fan failure indication will appear on the status LED's.

## *5.3 Selective High Voltage Shutdown*

The a.c. circuit breaker trips if the output voltage exceeds a preset d.c. value. Blocking diodes that are provided in each unit prevents parallel units from being affected.

## *5.4 Remote Sensing*

Sensing for each module is wired to a terminal strip in the cabinet with jumpers wiring the sensing to the d.c. buss at the bay. To remote sense at the load or battery remove the jumpers and wire to the sensing terminals.

## *5.5 Status/Alarm Indicators*

### 5.5.1 A.C. "ON" Indicator

A green LED illuminates to indicate a.c. voltage is present to the rectifier.

### 5.5.2 Equalize Indicator

A yellow LED illuminates to indicate that the rectifier is in the equalize mode of operation.

### 5.5.3 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
High Voltage Shutdown
Fan Failure

### 5.5.4 Low Voltage Indicator

A red LED illuminates to indicate that the rectifier output has dropped below a preset voltage point. The preset voltage point is as follows:

2.0 volts/cell (Lead)

1.3 volts/cell (NC)

This setting will also trip the rectifier failure contacts.

### 5.5.5 High Voltage Indicator

A red LED illuminates to indicate the rectifier output has exceeded the preset high voltage set voltage. The preset voltage point is as follows:

2.4 volts/cell (Lead)

1.6 volts/cell (NC)

This setting will also trip the rectifier failure contacts.

### 5.5.6 High Voltage Shutdown Indicator

A red LED illuminates to indicate the rectifier output has exceeded a preset set point and the unit has been shutdown by breaking the a.c. circuit breaker. The preset voltage point is as follows:

2.5 volts/cell (Lead)

1.65 volts/cell(NC)

To reset the unit after a High Voltage Shutdown the unit must be removed from the cabinet for a minimum of 10 seconds, then reinserted, and the a.c. breaker reset.

This setting will also trip the rectifier failure contacts

### 5.5.7 Fan Failure Indication

A red LED illuminates to indicate the fan has failed or the unit heatsink has exceeded a preset temperature. Should a fan failure occur or the heatsink exceed the preset temperature the unit will automatically cut the output current back to approximately 30% output current, at this time the fan failure will be indicating.

## *5.6 Paralleling*

This rectifier will parallel with any other La Marche A76 charger with the same output voltage. Up to three A76's are paralleled in the La Marche A76 Cabinet and multiple cabinets may be paralleled for additional output current.

## *5.7 Load Sharing*

Forced load sharing is not provided on the model A76 charger.

Balanced operation may be obtained by:

1.) Turn off all but one (1) charger.
2.) Set the one charger for the required output voltage.
3.) Turn on all other chargers and apply approximately 50% of the system load.
4.) Adjust the output voltage of the chargers until the load is balanced between all chargers. (do not adjust the first charger with the required voltage setting)

**NOTE: DO NOT ADJUST FLOAT/EQUALIZE POTENTIOMETERS WHEN UNITS ARE AT FULL OUTPUT, ONLY ADJUST POTENTIOMETERS WHEN BATTERY IS FULLY CHARGED.**

## *5.8 Current Walk In*

Output current will gradually increase after the charger is initially turned on reducing d.c. current and voltage surges.

### *5.9 Test Terminals*

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.

### *5.10 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.

### *5.11 Meters*

The A76 is equipped with a digital ammeter/voltmeter at +/- 1% accuracy at full scale. The meter is selected via a switch on the front panel. The meter reads the individual unit output current and voltage.

### *5.12 Mounting*

The A76 is designed to be mounted in the A76 Power Cabinet. Up to three (3) A76 chargers may be mounted in the cabinet. Cover plates are provided for any unused bay. The Power Cabinet is designed to be mounted in a 23-inch wide relay rack with EIA standard mounting centers spaced 1-3/4 inches apart. Any number of Power Cabinets may be paralleled, provided they are all the same output voltage.

### *5.13 "Hot" Plug-In*

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

**The units should be plugged in with the a.c. breaker in the off position.**

When the unit is plugged into the cabinet, the A76 will go through a lamp test where all the LED's will flash and the meter display will display numbers 0000 thru 9999. While going through the lamp test, the unit should be "locked" into place. When the lamp test is complete and the unit is "locked" into place, the a.c. breaker may be switched to the on position.

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

## 6.0 Environmental Ratings

### *6.1 Operation Ambient Temperature*

0 to 50 degrees C (32 to 104 degrees F)

### *6.2 Storage Temperature*

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

### *6.3 Humidity*

0 to 95% relative humidity, non-condensing

### *6.4 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.

### *6.5 Vibration*

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

### *6.6 Altitude*

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

### *6.7 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.

### *6.8 Audible Noise*

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

## 7.0 Installation Information

The A76 was designed to be mounted in a cabinet provided by LaMarche. Up to three (3) units are mounted in the cabinet.

### *7.1 Minimum Wire Sizes*

All wire sizes and cabling should be sized for three (3) chargers.

### *7.2 National Codes*

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

## 8.0 Electrical Connections & Field Wiring ( DRAWING D76C SHEET 1 & 2)

### *8.1 A.C. Input*

Terminals are provided in the back of the cabinet for all a.c. connections. Each charger has its own set of a.c. terminals.

### *8.2 D.C. Output*

All charger outputs are paralleled and brought to the cabinet d.c. buss.

### *8.3 Remote Sensing (DRAWING D76C - SHEET 2)*

Remote sensing is provided by removing the jumper bars between terminals 2&3 and 4&5 of the remote sensing terminal strip and connecting leads between terminal 2 to the battery or load positive and connecting terminal 5 to the battery or load negative.

## 9.0 Operation (DRAWING D76C SHEET 3 OF 3)

### *9.1 START UP*

When all connections have been made to the cabinet, plug all chargers into the cabinet and turn the locking screws. **Be sure the a.c. breakers are off until all lamp tests are complete.** Place all a.c. breakers to the "on" positions.

## 10.0 Adjustments

Float and Equalize voltage adjustments are provided on the front of each unit along with a current limit output current adjustment. Adjusting the potentiometers in the clockwise direction will increase the setting and counter clockwise will decrease the setting.

There are no other user adjustments that can be made.

## 11.0 Circuit Description

(SEE DRAWING E76-2)

The A76 float charger is a high frequency off line switch mode battery charger that is designed in the asymmetrical half bridge forward converter topology.

The a.c. input voltage is rectified to a d.c. level, filtered, regulated, and switched creating a square wave into the primary of the power transformer. The power transformer steps down the voltage to the required a.c. voltage which in turn is rectified to a d.c. level, regulated, and filtered to provide the d.c. output.

The A76 is controlled by a current mode controller that is constantly monitoring the current into the switching MOS-FETS, this provides instantaneous current limit protection and improved transient response to large load changes.

All alarms and charger status is monitored and controlled by a microprocessor. This circuit is monitoring the d.c. voltage and current and displaying it as the ammeter and voltmeter display. It is also comparing the unit input and output against preset values which cause high and low voltage indication, low current indication, high voltage shut down, over temperature (fan failure) indication and current cutback.

All wiring internal to the A76 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.

## 12.0 Troubleshooting

Be sure all connections to the cabinet are correct. Check 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 high voltage shutdown (HVSD) LED is on, unplug the charger, lower the float & equalize settings by adjusting their respective potentiometers counter clockwise, 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.

If the Fan Failure LED is on and the unit is only allowing 1/3 output, reset the charger as above, check to see if the fan is on. If not the unit output will again reduce to 1/3 output when the internal temperature increases. The unit can run at this output without a fan indefinitely. The fan is the only user serviceable part on the A76. The fan may be changed without opening the A76 cabinet. Cut the leads of the fan long enough to work with and remove the fan. Install the new fan (airflow to pull air through the charger) connect the new fan leads to the old fan leads observing the proper polarity (these are d.c. operated fans). Insulate the connections.

If the Fan Failure LED is on and the fan is still operating, the room ambient may be too high. The unit output will cut back to 1/3 output and operate there.

There are no user serviceable parts internal to the A76. Should the A76 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. La Marche 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 one (1) year from date of purchase under normal use.

If the equipment proves defective within a one 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.

INSERT DRAWINGS – D-76C-2 PAGES 1 THRU 3
CAD#D76C-2$1.DWG
CAD#D76C-2$2.DWG
CAD#D76C-2$3.DWG