



# E12

## CONSTAVOLT® FLOAT BATTERY CHARGER

Including optional accessories  
**18B - Digital Combination Alarm Package**  
And  
**010 - AC and DC Circuit Breakers**

ECN/DATE

**CPN109298**

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106 BRADROCK DRIVE  
DES PLAINES, IL. 60018  
(847)299-1188  
FAX:(847)299-3061

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## **IMPORTANT SAFETY INSTRUCTIONS**

### ***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 AC 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, DO NOT drop metal onto a battery. It might spark or short-circuit the battery or 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 these items causing severe burns.
8. NEVER charge a frozen battery.

### **PREPARING TO CHARGE**

1. If it is necessary to remove the battery connections, always remove grounded the 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 standard flooded 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 any battery on top of this unit.

### **DC CONNECTION PRECAUTIONS**

Connect and disconnect DC output cables only after setting all of this unit's switches to off position and removing AC 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.**

## **\*\*\*CAPACITOR PRE-CHARGE INSTRUCTIONS\*\*\***

**WARNING: READ INSTRUCTIONS BEFORE CONNECTING BATTERY**

To prevent the DC output fuse from blowing when connecting the battery, connections to the power supply and batteries should be done in the following order (single power supply).

- Connect AC input line to the terminal block provided. Be sure the units' AC circuit breaker is off.
- Observe the polarity of the battery cables, charger output, and relay rack terminals. Connect the proper battery cable to the ground bar or battery charger output terminal.
- Energize the power supply by turning on the units' AC breaker. This will charge the capacitors inside the power supply and eliminate heavy arcing when the remaining battery cable is connected. After approximately one (1) minute, turn off the power supply and immediately connect the remaining battery cable.
- Connect loads.
- Turn on the power supply again and the charger will commence charging the batteries and powering the load. (NOTE: For units equipped with a low-voltage disconnect panel, the "Load On" switch must be put in the "Load On" position.)

## **INSTALLATION AND OPERATING INSTRUCTIONS FOR THE LaMARCHE E12 CONSTAVOLT® FLOAT BATTERY CHARGERS**

The Constavolt® Float Rectifier is designed to operate on a specific number of cells. The nameplate on the charger indicates the type and number of cells required. Once properly installed and adjusted, the rectifier should maintain the battery in a fully charged condition. Install the rectifier so that the flow of air through the ventilators is not obstructed. Binding posts with wire lug connectors are provided within the unit, for the AC & DC connections.

To operate the charger, connect the AC power to the terminals marked "AC INPUT". Connect the battery to the terminals marked "DC OUTPUT". Connect the DC load to the terminals marked "DC OUTPUT" or "LOAD". Before connecting the AC power, loads, or battery leads, observe the proper polarity, and be sure that the battery type, number of cells, and the AC input agree with the nameplate data.

**Note: Customer to provide AC Input protection on 208Vac or 240Vac units.**

### **OPERATION**

Upon installation, the desired float/equalize voltage may be obtained by adjusting the potentiometers on the front of the unit. (See ADJUSTMENTS) The charger will charge to its maximum rate and taper to a trickle charge when the battery reaches its float voltage. Check the battery manufacturers specification for the proper float, equalize voltage setting and equalize cycle.

When a battery is discharged or standing idle, the battery voltage will be less than the float or equalize voltage. Therefore, when the charger is put into operation, it will immediately begin to charge the battery. The charger will charge the battery at its rated output to a predetermined setting. It is necessary to trickle charge the battery at a very low rate in order to keep the battery fully charged. Therefore, after the charge has brought the battery to full charge, it shuts down to a small continuous charge preserving charge.

### **CHARGER COMPONENTS**

The charger has four (4) basic components: a transformer, saturable reactor, silicon rectifier stacks, and control unit. The basic operation of these units is as follows:

The transformer transforms the incoming AC voltage to the required level to charge the battery. The transformer also isolates the incoming power from the output. The saturable reactor regulates the power output of the transformer continuously over the charge cycle. The rectifier stacks are made up of silicon diodes to rectify the secondary AC power to DC power. The control senses the condition of the battery and controls the reactor, which in turn regulates the power output of the transformer.

The standard float charger is provided with a potentiometers for adjusting the float and equalizing voltage level and a float/equalize switch for transferring the output of the charger from float charge to equalize charge.

#### **AUTOMATIC CHARGE CONTROLS (TYPE AC41)**

The charge rate is completely controlled by the saturable reactor and sensing control (AC41). The battery voltage is sensed by the AC41 Control Panel. An op-amp conducts into the base of a transistor and the transistor operates to shunt the saturating coil of the reactor. When the battery is discharged, the battery voltage is low and the reactor saturating coil saturates the reactor. The impedance change of the reactor due to the core saturating shifts more voltage to the primary of the transformer which in turn increases the induced voltage in the secondary of the transformer, thus, increasing the charge rate to maximum rated output. When the battery voltage reaches its float voltage, the control begins to operate to reduce the charge rate. The op-amp begins to conduct into the transistor and begins to shunt the current from the saturating coil to the reactor. The reactor begins to de-saturate increasing the impedance, and the voltage to the transformer primary begins to drop, thus decreasing the output.

#### **AC LINE COMPENSATION**

The float charger has a specially designed transformer/reactor combination, which inherently compensates for variations in the incoming AC power. The impedance balance of the transformer/reactor combination compensates for a line voltage variation of  $\pm 10\%$  of the nominal AC voltage specified on the nameplate.

#### **AUTOMATIC CURRENT LIMITING**

The float charger will charge to its maximum current capacity and begin to current limit if overloaded. The automatic current limiting feature limits the output of the charger to a maximum of 105% rated load. The control panel is preset and factory adjusted to the required current limiting. The current limiting is accomplished by limiting the saturating current to the reactor, thus, controlling the maximum current output of the unit.

#### **AC POWER FAILURE**

A power failure relay is provided to disconnect the automatic control from the battery and, therefore, limit the drain on the battery. One (1) set of normally open and closed contacts from this relay is connected to terminals for connection to a remote power failure alarm. The charger will automatically resume charging upon return of AC power.

#### **ADJUSTMENTS/MAINTENANCE**

The charger is factory tested and preset so that no field adjustments are necessary. Potentiometers are provided for adjusting the float and equalizing voltages to the required levels. Because of the stable, rugged, and static design of this unit, very little maintenance is required. Occasional blowing out of dust and tightening of connections are the only maintenance requirements.

Float / Equalize lights indicate the charge mode of the rectifier.

#### **FILTERING E12 UNITS**

Additional filtering is provided on E12 units. Standard filtering is 100 MV-RMS when connected to a battery with an amp hour capacity of four (4) times the capacity of the charger at rated output.

**POWER CABLING FORMULAS**

SIZE AWG.	AREA CIR. MILS	SIZE AWG. MCM*	AREA CIR. MILS	SIZE MCM*	AREA CIR. MILS
18	1620	1	83690	600	600000
16	2580	1/0	105600	700	700000
14	4110	2/0	133100	750	750000
12	6530	3/0	167800	800	800000
10	10380	4/0	211600	900	900000
8	16510	250	250000	1000	1000000
6	26240	300	300000	1250	1250000
4	41740	350	350000	1500	1500000
3	52620	400	400000	1750	1750000
2	66360	500	500000	2000	2000000

\*DENOTES ALL SIZES LARGER THAN =0000 ARE EXPRESSED IN MCM.

**TABLE OF CONVENTIONS**

- CMA = Cross section of wire in circular MIL area
- A = Ultimate drain in amperes
- LF = Conductor loop feet
- MAX AMP = Maximum allowable amperes for given voltage drop
- AVD = Allowable voltage drop
- K = 11.1 Constant factor for commercial (TW type) copper wire (KS5482-01)
- = 17.4 for aluminum (KS20189)

**Calculating Wire Size Requirements**

$$CMA = \frac{A \times LF \times K}{AVD}$$

**Calculating Current carrying capacity of wire**

$$\text{Max Amp} = \frac{CMA \times AVD}{LF \times K}$$

Source: Handbook 100-National Bureau of Standards

NOTE: All Wire #6 and larger is stranded.

**NOTE: These are recommended wire size. All National and Local Wiring Codes must be followed.**

The table lists the AC input and the DC output minimum wire size requirements. At distances exceeding 10 feet, the DC wire size should be chosen to keep the voltage difference between the units DC output terminals and the battery at less than 1/2 volt when the unit is fully loaded. If the distance between the units DC output and the battery exceeds 10 feet, use the Power Cable Formula to determine wire size.

**WIRE GAUGE TABLE**

FUSE SIZE	WIRE SIZE REQUIREMENT CUSTOMER CONNECTION	EQUIPMENT GROUNDING CONDUCTOR MINIMUM	FUSE SIZE	WIRE SIZE REQUIREMENT CUSTOMER CONNECTION	EQUIPMENT GROUNDING CONDUCTOR MINIMUM
1	#14	#14	150	#1	#6
3	#14	#14	175	#1/0	#6
4	#14	#14	200	#2/0	#6
5	#14	#14	225	#2/0	#4
6	#14	#14	250	#4/0	#4
10	#14	#14	300	250-MCM	#4
15	#12	#12	350	350-MCM	#2
20	#12	#12	400	400-MCM	#2
25	#10	#12	450	500-MCM	#2
30	#10	#10	500	600-MCM	#2
35	# 8	#10	600	900-MCM	#1
40	# 8	#10	700	1500-MCM	1/0
45	# 8	#10	800	2/500-MCM	1/0
50	# 8	#10	1000	2/800-MCM	4/0
60	# 6	#10	1200	2/1000-MCM	4/0
70	# 6	# 8	1600	2/2000-MCM	4/0
80	# 4	# 8	2000	250-MCM	
90	# 4	# 8	2500		350-MCM
100	# 4	# 8	3000		400-MCM
110	# 2	# 6	4000		500-MCM
125	# 2	# 6	5000		700-MCM
130	# 2	# 6	6000		800-MCM

TABLE #1 - E12 HEAT LOSSES (SINGLE PHASE) (based on 75% eff. at rated load)

<b>DC AMPS-DC VOLTS</b>	<b>WATTS IN</b>	<b>WATTS OUT</b>	<b>WATTS LOST</b>	<b>BTU/HR.</b>
3- 24V	106	79	26	91
6- 24V	211	158	53	182
10-24V	352	264	88	303
15-24V	528	396	132	455
20-24V	704	528	176	607
25-24V	880	660	220	759
30-24V	1056	792	264	910
35-24V	1232	924	308	1062
3-48V	211	158	53	182
6-48V	422	317	106	364
10-48V	704	528	176	607
15-48V	1056	792	264	910
20-48V	1408	1056	352	1214
30-48V	2112	1584	528	1821
35-48V	2816	2112	704	2428
3-130V	572	429	143	493
6-130V	1144	858	286	986
10-130V	1907	1430	477	1644
15-130V	2860	2145	715	2466
20-130V	3813	2860	953	3287
30-130V	5720	4290	1430	4931
35-130V	7627	5720	1907	6575

## PARALLELING PROCEDURE INSTRUCTIONS

### HIGH FLOAT SWITCH IN FLOAT POSITION

1. Chargers to be paralleled must be of the same voltage rating.
2. Turn one (1) charger on. Charge the battery to full charge. Set the voltage control potentiometer so the desired float voltage is maintained at a trickle charge rate.
3. Apply the DC load. The charger should maintain the voltage constant while carrying the load providing the load does not exceed the charger current rating.
4. Turn No. 1 charger off and turn on No. 2 charger. Set the voltage control potentiometer to float charger as per 2. Apply load as per 3.
5. Turn both chargers on and apply load.
6. Adjust the potentiometers of both units until the load is shared equally at the desired float voltage.
7. After a short period of time, one unit may assume more of the load. Readjust the lower output charger so the current is half the load.
8. Once properly set, the charger should load share when the load is varied, from no load to full load.
9. Since there is no interconnecting circuitry, and the units are completely isolated, both units regulate by sensing buss voltage. At the no load trickle charge rate, one charger may assume all of the trickle current rate, with the other charger at zero current. When heavier loads are applied, the lower output unit will share the load.
10. When two (2) chargers of the same rating are paralleled without a load sharing circuit, one unit may carry a greater percentage of the load over a period of time.

### IN EQUALIZE POSITION

1. Follow the same procedure for setting the potentiometers as described in "float position".

## TROUBLESHOOTING

### GENERAL INFORMATION

This troubleshooting guide should be used by trained service personnel or an experienced electrician.

**CAUTION: Hazardous AC and DC voltages are present within the units' enclosure.**

Equipment: The only equipment required is a multi-scale volt-ohm meter, and a standard tool kit.

Before setting up any complicated testing or jumping to any conclusions, give the unit a general inspection. Check the following:

- Check DC output cables, connections, battery type, and number of battery cells with charger rating.
- Check unit specifications with customer order.
- Check input connections, input voltage, and line breaker size.
- Check for shipping damage, loose connections, broken wires, etc.
- Certain failures can be caused by defective batteries and customer loads; make sure batteries and loads are free from defects.

NOTE: If the problem is found to be located in the printed circuit boards, the board should be replaced. No attempt should be made to repair circuit boards in the field.

Information you should have when calling in for troubleshooting assistance:

- Equipment model number and serial number.
- The actual AC input voltage.
- The DC output voltage with and without battery.
- Result of check of AC breaker and DC output fuse.
- DC output amps when measuring the DC output voltage with battery and load connected to rectifier.

### TROUBLESHOOTING CONSTAVOLT® BATTERY CHARGER AND POWER SUPPLIES

SYMPTOM	POSSIBLE CAUSE	PROCEDURE
Open AC input fuse	1. Incorrect AC input 2. Shorted diodes	1. Compare AC input voltage with voltage on unit's nameplate. 2. See "Troubleshooting and Diode Replacement Sheet"
Open DC output fuse	1. Defective or wrong voltage battery 2. Shorted connector 3. Shorted or reverse output 4. Shorted diodes	1. Compare battery voltage with unit nameplate. 2. Check with volt-ohmmeter 3. Check with volt-ohmmeter 4. See "troubleshooting and Diode Replacement Sheet"
Charger will not taper to finish rate	1. Defective battery 2. Defective control panel	1. Check for defective cells on battery. 2. To check control panel, disconnect and separate blue and black wires going to pin one on the control panel. If the unit shuts down, the control panel may be defective.
TYPE(AC41)CONTROL PANEL:		
SYMPTOM		
Charger operates, but will not charge battery	1. Defective power failure relay 2. Defective control panel	1. Measure voltage from Pin 5 on control panel to negative DC output terminal. If voltage is zero, the power failure relay may be defective. 2. To check control panel on units (without a power stage) turn off unit and disconnect 12 Pin connector from AC41-2 Circuit Board, jump Pin 3 to 8 on connector. Power up unit if unit goes to high rate, electronic panel may be defective. Units with Power Stage, disconnect 12 Pin connector, power up unit.

	3. Open float/equalize potentiometer	3. Check continuity of float/equalize potentiometer with volt-ohmmeter. An open circuit from its slider to the control Pin 2 will cause low unit output.
	4. Shorted transistor on power stage AC7-(B1)(D1)	4. Remove power transistors from heatsink and check with ohmmeter. A shorted transistor will cause low unit output.
Charger will not taper to finish rate	1. Defective battery	1. Check for defective cells in battery.
	2. Defective electronic panel	2. Jump center coil on saturable reactor if unit runs low; problem may be control panel.
	3. Open float/equalize potentiometer or switch	3. Check continuity of float/equalize potentiometer and float/equalize switch. An open switch or potentiometer may cause the unit to run high than normal.

### **TROUBLESHOOTING AND DIODE REPLACEMENT**

The silicon diode may be a source of trouble. The function of the diode is to allow the flow of current through it in one direction only. If the polarity of the conducting current is reversed, the diode will block the current flow. Thus, the diode has a low resistance to current flow in one direction, and a high resistance to current flow in the other direction. Therefore, a simple ohmmeter may be used to test the diode. The procedure for checking the silicon diode is as follows:

1. Isolate one end of the diode by disconnecting the wires attached to the nipple (or pigtail) end of the diode (only one end of the diode must be disconnected).
2. Clip one lead of the ohmmeter to the nipple (or pigtail) lead of the diode. Clip the other ohmmeter lead to the aluminum heatsink (if a portable multimeter is used, set the switches on ohms, DC and scale RX100).
3. Note the ohmmeter reading, then reverse the leads to the diode. Again, note the ohmmeter reading. If the diode is good, the meter will indicate a high resistance in one direction, and a low resistance with the leads reversed. If the diode is shorted, the meter will read full scale, or "0" resistance with the leads in either direction. If the diode is "open", the ohmmeter needle will not indicate or show infinite resistance, indicating an open circuit with the ohmmeter leads in either direction.
4. All diodes must be checked in the event that more than one diode is defective.
5. If the diode is defective, remove the defective diode from the heatsink and replace with a new diode. When installing a new diode, be sure to note if the old diode was insulated from the heatsink. If the diode should be insulated from the heatsink, care should be taken so that the mica insulating washer is placed properly on each side of the heatsink with insulating bushing between the diode mounting stud and the aluminum heatsink.

**WHEN ORDERING REPLACEMENT PARTS, SCHEMATICS, OR REQUESTING SERVICE INFORMATION, ALWAYS GIVE MODEL NUMBER, SERIAL NUMBER AND AC INPUT VOLTAGE.**

### **BATTERY CELL TYPES AND VOLTAGES**

The LaMarche Float Chargers are designed specifically to charge lead acid (L), valve regulated lead acid (LR) or nickel cadmium (N) batteries. These chargers float the batteries at 2.17 Vpc (LA), 2.25 Vpc (LR), 1.4 Vpc (N). The equalizing charge setting for the batteries are 2.33 Vpc (L), 2.27 Vpc (LR) or 1.55 Vpc (N). The potentiometer adjustment allows for a  $\pm 5\%$  adjustment from the nominal float/equalize voltages. The charger nameplate indicates the type of battery and the number of cells the charger is designed to charge.

\* It should be noted that for proper battery selection, the battery must be rated to deliver the load current for the required discharge period. Amp-hour capacity ratings are usually dependent on the rate of discharge. The battery manufacturer should be consulted to assure that these ratings will be valid for the load currents, discharge times and any other salient conditions.

## General Maintenance Procedure

### Yearly

1. Blow out rectifier/inverter with a low-pressure air hose.
2. Make sure all connections are tight.
3. Perform a visual check on all internal components.
4. Check front panel meters and alarms for accuracy.

### 4th Year

**REPEAT** ABOVE WITH THE ADDITION OF:

1. Check relay contacts for pitting or corrosion.
2. Check capacitors for leakage.

### 7th Year

**REPEAT** ALL, WITH THE ADDITION OF:

1. Filter, resonating capacitors and control relays should be replaced.

### 10th Year

**REPEAT** ALL WITH THE ADDITION OF: (except replacing capacitors and control relays, they should be replaced every 7 years)

1. Check magnetics, components and wiring for signs of excessive heat.

## 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 year from date of purchase. In addition to the standard one (1) year warranty, La Marche warrants its magnetics and power diodes on a parts replacement basis only for four (4) more years under normal use.

Any part or parts of the equipment (except fuses, DC connectors and other wear-related items) that prove defective within a one (1) year period shall be replaced without charge providing such defect, in our opinion, is due to faulty material or workmanship and not caused by tampering, abuse, misapplication or improper installation. Magnetics and power diodes are warranted for five (5) years after date of purchase. During the last four (4) years of this five (5) year warranty period, the warranty covers parts replacement only, and no labor or other services are provided by La Marche, nor is La Marche obligated to reimburse the owner or any other person for work performed.

Should a piece of equipment require major component replacement or repair during the first year of the warranty period, these can be handled in one of two ways:

1. The equipment can 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 or parts to the factory, the customer or sales representative must obtain 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 first year. Transportation charges or duties shall be borne by purchaser.
2. If the purchaser elects not to return the equipment to the factory and wishes a factory service representative to make adjustments and/or repairs at the equipment location, La Marche's field service labor rates will apply. A purchase order to cover the labor and transportation cost is required prior to the deployment of the service representative.

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 only.

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.

## **MANUFACTURER'S EXTENDED PARTS WARRANTY**

**(THIS IS YOUR WARRANTY IF YOU HAVE PURCHASED THE EXTENDED PARTS WARRANTY AS SHOWN ON OUR INVOICE TO YOU OR IF YOU PURCHASE THE EXTENDED PARTS WARRANTY WITHIN 30 DAYS AFTER THE DATE OF OUR INVOICE)**

All La Marche Manufacturing Co. equipment has been thoroughly tested and found to be in proper operating condition upon shipment from the factory. Any part or parts of the equipment (except protective devices, DC connectors and other wear-related items) that prove defective within a one (1) year period from the date of our invoice to you shall be replaced without charge providing such defect, in our opinion, is due to faulty material or workmanship and not caused by tampering, abuse, misapplication or improper installation. Labor and parts are covered during this one (1) year period.

**For the next four (4) years after the expiration of the one-year warranty, on a parts replacement only basis, any part or parts of the equipment (except protective devices, DC connectors and other wear-related items) that prove defective within the additional four (4) year period shall be replaced providing such defect, in our opinion, is due to faulty material or workmanship and not caused by tampering, abuse, misapplication or improper installation. During this four (4) year period, the warranty covers parts replacement only, no labor or other services are provided by La Marche, nor is La Marche obligated to reimburse the owner or any other person for work performed.**

In addition, magnetics and power diodes are warranted for ten (10) years after the date of our invoice to you. The defect in the magnetics or power diodes must, in our opinion, be due to faulty material or workmanship and not caused by tampering, abuse misapplication, or improper installation. Labor and replacement magnetics and power diodes are covered during the initial one (1) year period from the date of our invoice to you. During the last nine (9) years of this ten (10) year warranty period for magnetics and power diodes, the warranty covers parts replacement only, no labor or other services are provided by La Marche, nor is La Marche obligated to reimburse the owner or any other person for work performed.

Should a piece of equipment require major component replacement or repair during warranty period, these can be handled in one of three ways:

1. If the Purchaser elects to take the responsibility of repairing the equipment and requests replacement part(s), Purchaser or Sales Representative must contact Factory for return authorization and a purchase order must be issued. Replacement part(s) will be promptly shipped and invoiced. After the defective part(s) are returned and inspected at the Factory, if the defect(s) were due to faulty material or workmanship, credit will be issued.
2. The equipment can 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 or parts to the factory, the customer or sales representative must obtain 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 first year. If the Extended Warranty is purchased, the parts required for repair will also be at no cost but La Marche will notify the Purchaser of the costs of Labor to replace the defective part(s). A Purchase Order to cover this labor is required before repairs will be initiated. Transportation charges or duties shall be borne by Purchaser.
3. If the purchaser elects not to return the equipment to the factory and wishes a factory service representative to make adjustments and/or repairs at the equipment location, La Marche's field service labor rates will apply. A purchase order to cover the labor and transportation cost is required prior to the deployment of the service representative.

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 only.

All sales are final. Only standard La Marche 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, SUPERCEDES 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, OR 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.**

# DIGITAL COMBINATION ALARM

## 18B OPTION

Description:

- ◆ Digital Display, selectable for DC voltage, DC current (amps), timer mode, and equalize time remaining (hours)
- ◆ Electronic equalize timer with amber light
- ◆ Summary Alarm with / 2 Sets of Form "C" contacts – alarm with high or low voltage one and two, high voltage shutdown or low current. (AC power failure and Low current alarm can be disabled when in the calibrate mode)
- ◆ AC Green pilot light with 2 sets of form (C) contacts
- ◆ Low DC Voltage Alarm 1 with light and 2 Sets of Form "C" contacts
- ◆ Low DC Voltage Alarm 2 with light
- ◆ High DC Voltage Alarm with light and 2 Sets of Form "C" contacts
- ◆ Low DC Current Alarm with light and 2 Sets of Form "C" contacts
- ◆ High DC Voltage Shutdown with light and 1 Sets of Form "C" contacts
- ◆ Reset pushbutton
- ◆ Equalize / select mode switch
- ◆ Selectable Ground Detection circuit with 1 set of Form "C" contacts (Yes - ACTIVE No - DISABLED)

The low DC volts , low current, high DC voltage alarms, the equalize timer mode and equalize time are all adjustable from the front door panel.

**NOTE: See schematic within manuals for customer alarm contacts. All contacts are dry "Form C".** Contact Data:

LOAD	RESISTIVE LOAD (p.f. = 1)
Rated load	0.60va at 120Vac 2A at 30Vdc
Contact material	Ag(Au clad)
Carry current	2A
Max. operating voltage	125Vac 125Vdc
Max. operating current	2A
Max. switching capacity	62.50Va 60W
Min. permissible load	10uA, 10mVdc

## **OPERATION**

Once the proper AC input and battery are connected to the system, the digital display will indicate the system output voltage, the DCV "LED" will light. Toggle the equalize/select switch down to the select position and the display will indicate system output amps and its "LED" will light. A third toggle and the time mode will indicate on the display and its "LED" will light. A fourth toggle and the equalize time remaining will indicate on the display.

To check or re-set the alarm settings, hold the equalize/select switch in equalize for approximately five (5) seconds, the low voltage "LED-1" will blink and the display will read the low voltage setting for approximately five (5) seconds, the "LED" will turn off and the LED-2 will blink. The remaining LED's are Timer Mode, Equalize Time, High Voltage Shutdown, High Voltage, and Low Current. The display will then indicate the symbol 9d (Ground Detection), followed by YES for "ACTIVE" Ground Detection circuit. To disable the Ground Detection circuit PUSH the select switch down and the display will read NO, followed by SAVE. The display and "LED" will change every five seconds. After going through one cycle, the display will return to the normal mode. The alarm settings, Timer Mode, or Equalize Time can be reset while their function is active (i.e. "LED" is blinking) by using the equalize select mode switch. Pushing the switch to up will raise the setting, while pushing the equalize select mode switch down will lower the setting. NOTE: The cycle must be allowed to complete in order to save any new settings.

To reset the time delay for the relay contacts or disable the ground detection circuit, hold the Equalize/Select mode switch down for 20 seconds. The alarm LED will blink and the display will indicate unit DC voltage and unit DC current shunt size. Then, the time delay in seconds. Move the Equalize/Select mode switch up to increase the time delay, down to decrease. The alarm LED will switch every 5 seconds.

Note: All alarm contacts are factory set for 5 seconds except the high voltage contacts they are set for 20 seconds.

**These alarm packages are shipped with the following factory settings unless otherwise specified.**

Low DC voltage (1): 1.98 Vpc L, LR  
Low DC voltage (2): 1.98 Vpc L, LR  
High DC voltage : 2.45 Vpc L, LR  
High DC voltage shutdown (HVSD): 2.5 Vpc L, LR  
Low DC current: .5 A  
Timer mode: Mode 0  
Equalize Time: 8 Hours

## **TIMER MODES**

**NOTE: IN ALL MODES, THE UNIT WILL RETURN TO FLOAT IF THE EQUALIZE SWITCH IS PUSHED.**

### **MODE 0**

#### ***DISPLAY indicates P00***

This is the standard timer mode. If the "EQUALIZE" switch is pushed the timer will switch the charger into the equalize mode and the equalize "LED" will indicate. The timer will automatically return the charger to the float mode when the equalize cycle is complete.

### **MODE 1**

#### ***DISPLAY indicates P01***

This mode of operation automatically starts an equalize cycle every 7 days after. The length of this cycle is again determined by the timer setting. After the equalize period the timer will wait for another 7 days and then restart.

### **MODE 2**

#### ***DISPLAY indicates P02***

This mode of operation automatically starts an equalize cycle every 14 days. The length of this cycle is again determined by the timer setting. After the equalize period the timer will wait for another 14 days and then restart.

### **MODE 3**

#### ***DISPLAY indicates P03***

This mode of operation automatically starts an equalize cycle every 30 days. The length of this cycle is again determined by the timer setting. After the equalize period the timer will wait for another 30 days and then restart.

### **MODE 4**

#### ***DISPLAY indicates P04***

This mode of operation automatically starts an equalize cycle when the DC voltage drops below the low voltage setting for 30 seconds or longer. The battery voltage must rise approximately 8% above the low voltage set point.

# **AC AND DC CIRCUIT BREAKERS**

## **010 OPTION**

Description:

- Single Pole AC Breaker - 120Vac
- Two Pole AC Breaker - 208 OR 240Vac
  
- Two Pole DC Breaker