



La Marche Manufacturing Company

[www.lamarchemfg.com](http://www.lamarchemfg.com)

# A12B

*"Constavolt"*  
Battery Charger / Power Supply



\*Standard A12B Battery Charger in #6 Enclosure Shown



\*A12B Battery Charger with Option 52E in #6 Enclosure Shown

## Installation and Operation Manual

This manual is subject to change without notice. You may obtain the newest version of the manual at [www.lamarchemfg.com](http://www.lamarchemfg.com)

## Important Safety Instructions

Before using this equipment, read all manuals and other documents related to this charger and other equipment connected to this charger. Always have a copy of a charger's manual on file nearby, in a safe place; if a replacement copy of a manual is needed, it can be found at [www.lamarchemfg.com](http://www.lamarchemfg.com).

### Electrical Safety



**WARNING:** Hazardous Voltages are present at the input of power systems. The output from chargers and from batteries may be low in voltage, but can have a very high current capacity that may cause severe or even fatal injury.

When working with any live battery or power system, follow these precautions:

- Never work alone on any live power system; someone should always be close enough to come to your aid.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Wear complete eye protection (with side shields) and clothing protection.
- Always wear gloves and use insulated hand tools.



**WARNING:** Lethal voltages are present within the power system. Parts inside the charger may still be energized, even when the charger has been disconnected from the AC input power. Check with a meter before proceeding. Do not touch any uninsulated parts.

- A licensed electrician should be used in the installation of any charger.
- Always disconnect the charger from the supply, batteries, and loads before performing maintenance, replacing parts, or cleaning.
- Always assume that an electrical connection is live and check the connection relative to ground.
- Be sure that neither liquids nor any wet material come in contact with any internal components.
- Do not operate this charger outside the input and output ratings listed on the charger nameplate.
- Do not use this charger for any purpose not described in the operation manual.

### Mechanical Safety

- This charger or parts of the charger may get very hot during normal operation, use care when working nearby and do not place any items on top of the charger.
- Do not expose equipment to rain or snow. Always install in a clean, dry location.
- Do not operate equipment if it has received a sharp blow, been dropped, or otherwise damaged in any way.
- Do not disassemble this charger. Incorrect re-assembly may result in a risk of electric shock or fire.
- If modifications to the enclosure are necessary, such as drilling for conduit fitting, ensure the interior is protected from metal shavings and debris. Additional precautions should be taken to remove any remaining debris from interior of charger prior to energizing.

### Battery Safety



**WARNING:** Follow all of the battery manufacturer's safety recommendations when working with or around battery systems. DO NOT smoke or introduce a spark or open flame in the vicinity of a battery. Some batteries generate explosive gases during normal battery operation.

- To reduce risk of arc, connect and disconnect the battery using procedure specified in Section 2.3.
- If it is necessary to remove battery connections, always remove the grounded terminal from the battery first.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Always wear rubber gloves, safety glasses, and a rubber lined vest/apron when working near a battery.
- Have plenty of fresh water and soap nearby in case the battery electrolyte contacts skin, clothing, or eyes.
- 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 seek medical attention immediately.
- Do not drop or place any materials on a battery. A spark or short-circuit could cause an explosion.

## Charger Location

- Allow at least 6 inches of free air on all vented surfaces for proper cooling.
- Allow sufficient clearance to open the front panel for servicing.
- Do not operate this charger in a closed-in area or restrict ventilation in any way.
- Do not place charger below battery.
- Never allow battery electrolyte to drip on this charger when reading the specific gravity or filling the battery.
- Never place this charger directly above a standard flooded battery. Gases from the battery will corrode and damage equipment.
- A sealed maintenance free or valve regulated lead acid (VRLA) battery may be placed below this equipment.

## Check for Damages

Prior to unpacking the product, note any damage to the shipping container and take pictures. Unpack the product and inspect the exterior and interior of product for damage. If any damage is observed, take pictures and contact the carrier immediately to file a damage claim. Contact La Marche for a Return Material Authorization number to have the charger sent back for evaluation and repair.



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

## Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is damaged/unavailable, make sure the product is packed with at least three inches of shock-absorbing material to prevent shipping damage. *La Marche is not responsible for damage caused by improper packaging of returned products.*

## Inspection Checklist

- Enclosure exterior and interior is not marred or dented.
- There are no visibly damaged components.
- All internal components are secure.
- Printed circuit boards and their connections are firmly seated.
- All hardware and connections are tight.
- All wire terminations are secure.
- All items on packing list have been included.

## Handling

Equipment can be very heavy with uneven distribution of weight. Use adequate manpower or equipment for handling. Until the equipment is securely mounted, care must be used to prevent equipment from being accidentally tipped over or dropped.

# Table of Contents

<b>Important Safety Instructions</b> .....	<b>i</b>
Electrical Safety.....	i
Mechanical Safety.....	i
Battery Safety .....	i
Charger Location .....	ii
Check for Damages .....	ii
Returns for Service .....	ii
Inspection Checklist.....	ii
Handling .....	ii
<b>Table of Contents</b> .....	<b>iii</b>
<b>Model Scope/General Description</b> .....	<b>1</b>
Understanding the Model Number .....	1
Optional Accessories Included in the Charger .....	1
<b>1 Equipment Handling</b> .....	<b>2</b>
1.1 Storing the A12B.....	2
1.2 Moving the A12B.....	2
<b>2 Installing the A12B</b> .....	<b>3</b>
2.1 Mounting the A12B.....	3
2.1.1 Wall-Mounting the A12B (#3, 6, and 7 Enclosures Only).....	4
2.1.2 Floor-Mounting the A12B (All Enclosures).....	5
2.2 AC Input Connections.....	6
2.3 DC Output Connections .....	7
2.3.1 Paralleling Connections .....	8
2.4 Alarm Connections .....	9
2.4.1 Standard Alarms.....	9
2.4.2 Alarm Connection Procedure .....	9
2.5 External Temperature Compensation (Option 11W/11Y).....	10
2.6 Additional Option Connections .....	10
<b>3 Operation</b> .....	<b>11</b>
3.1 Starting the A12B.....	11
3.1.1 Checking the Installation.....	11
3.1.2 Power Up/Power Down Sequence.....	11
3.2 Front Panel .....	12
3.3 Charging Modes .....	12
3.4 Adjusting Parameters .....	13
<b>4 Frequently Asked Questions</b> .....	<b>14</b>
<b>5 Service</b> .....	<b>15</b>
5.1 Performing Routine Maintenance.....	15
5.2 Troubleshooting Procedure .....	16
Ordering Replacement Parts.....	16

5.3	Troubleshooting Chart .....	17
5.3.1	Ground and Short Circuit Test .....	19
5.3.2	Checking Capacitors .....	19
5.3.3	Troubleshooting and Replacing Power Silicon Diodes/Modules.....	20
<b>Appendix A: A12B Specifications .....</b>		<b>21</b>
<b>Appendix B: A12B Current Draw (12VDC / 24VDC Systems) .....</b>		<b>22</b>
<b>Appendix C: A12B Current Draw (48VDC / 130VDC Systems) .....</b>		<b>23</b>
<b>Appendix D: A12B Heat Losses (Single Phase) .....</b>		<b>24</b>
<b>Appendix E: A12B Heat Losses (Three Phase).....</b>		<b>26</b>
<b>Appendix F: Manufacturer’s Standard Warranty .....</b>		<b>28</b>
<b>Appendix G: Manufacturer’s Extended Parts Warranty.....</b>		<b>29</b>
<b>Appendix H: Document Control and Revision History .....</b>		<b>30</b>
<b>Appendix I: Additional Support Documentation.....</b>		<b>30</b>
-	Option Instructions .....	30
-	Schematic Diagram .....	30
-	Dimensional Drawing .....	30
-	Bill of Material Listing .....	30
-	Recommended Spare Parts List.....	30
-	Product Datasheet .....	30

## Model Scope/General Description

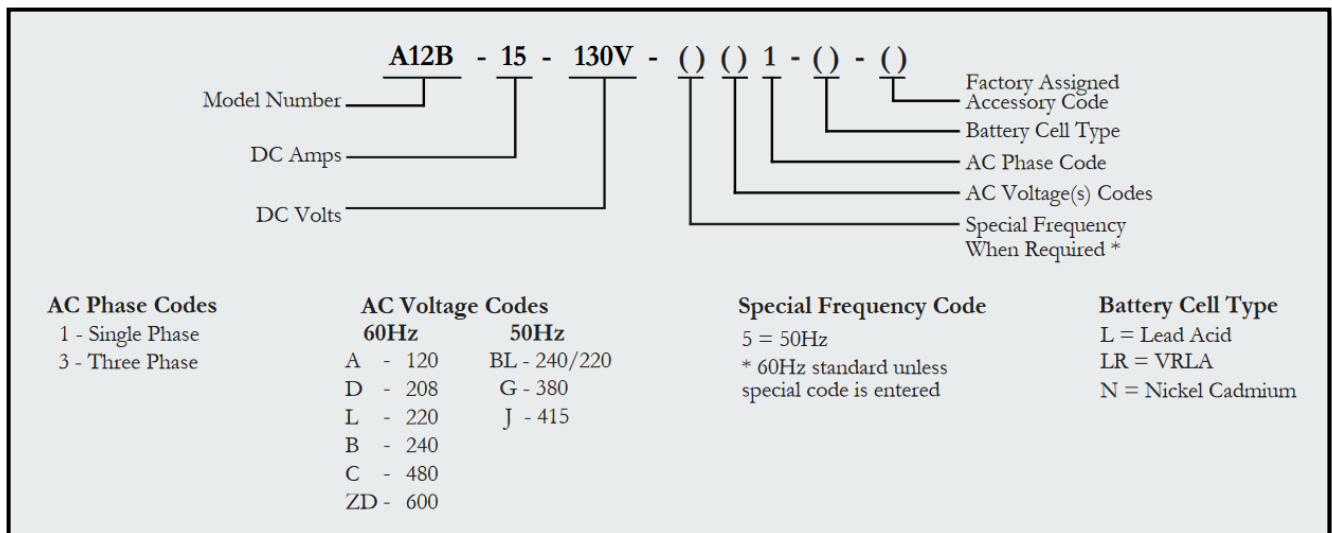
The La Marche model A12B Series Filtered Battery Chargers / Power Supplies are engineered for the demanding requirements of Switchgear applications, Process Controls, and Communications. The magnetic amplifier circuitry is designed to carry continuous and intermittent loads up to the maximum rated output. Its robust design, customizable features, and unmatched reliability have made this workhorse the standard in the industry.

In normal operation, the A12B Battery Charger maintains a constant battery voltage from no load up to 115% its rated load capacity as indicated by the nameplate. If the external loads exceed nameplate capacity, the charger will attempt to carry the excess load up to its current limiting capacity. Beyond this point, the battery will carry the excessive loads. If the battery is discharged, the charger will recharge the battery on a taper curve from its current limiting capacity to full charge.

The battery 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 +/- 10% of the nominal AC voltage specified on the nameplate.

## Understanding the Model Number

The A12B model number is coded to describe the features that are included. Find the model number on the nomenclature nameplate of the charger. Follow the chart below to determine the configuration of the battery charger.



## Optional Accessories Included in the Charger

This charger may have been outfitted with a number of optional accessories or option packages. To determine the options included (if any), refer to the cover page of the manual package. If the manual package that is included with the charger is no longer available, contact La Marche and provide the model or serial number of the charger to receive a list of the included accessories.

# 1 Equipment Handling

## 1.1 Storing the A12B

If the A12B is to be stored for more than a few days after delivery, it should be stored within its shipping container. The location chosen for storage should be within an ambient temperature of -40 to 185°F (-40 to 85°C) with a non-condensing relative humidity of 0 to 95%. Storage should not exceed 2 years due to the limited shelf life of the DC filter capacitors when they are not in service.

## 1.2 Moving the A12B

After careful inspection and upon verification that the A12B is undamaged, identify the enclosure style and weight of the A12B charger. Case sizes are shown for standard 60Hz units and may differ with optional accessories included or 50Hz input. Consult factory when dimensions are critical. Refer to the tables below:

Output Voltage	Ampere Rating									
	3 ADC	6 ADC	10 ADC	15 ADC	20 ADC	25 ADC	30 ADC	35 ADC	40 ADC	50 ADC
12 VDC	7 Case	7 Case	7 Case	3 Case	3 Case		3 Case		6 Case	6 Case
	60 lbs	70 lbs	80 lbs	90 lbs	95 lbs		105 lbs		155 lbs	170 lbs
	27.2 kg	31.8 kg	36.3 kg	40.8 kg	43.1 kg		47.6 kg		70.3 kg	77.1 kg
24 VDC	7 Case	3 Case	3 Case	3 Case	3 Case	3 Case	3 Case	6 Case	6 Case	6 Case
	70 lbs	85 lbs	95 lbs	100 lbs	120 lbs	135 lbs	145 lbs	190 lbs	205 lbs	240 lbs
	31.8 kg	38.6 kg	43.1 kg	45.4 kg	54.4 kg	61.2 kg	65.9 kg	86.2 kg	93.0 kg	109.0 kg
48 VDC	7 Case	3 Case	3 Case	3 Case	6 Case	6 Case	6 Case		6 Case	8A Case
	85 lbs	90 lbs	140 lbs.	180 lbs	205 lbs	240 lbs	265 lbs		275 lbs	355 lbs
	38.6 kg	40.8 kg	63.5 kg	81.7 kg	93 kg	108.9 kg	120.2 kg		124.7 kg	161 kg
130 VDC	3 Case	3 Case	6 Case	6 Case	*6 Case	8A Case	8A Case	72 Case	72 Case	72 Case
	140 lbs	140 lbs	225 lbs	250 lbs	270 lbs	390 lbs	430 lbs	580 lbs	625 lbs	645 lbs
	63.5 kg	63.5 kg	102.1 kg	113.4 kg	122.5 kg	177.0 kg	196.0 kg	264.0 kg	283.5 kg	292.6 kg

\*8A case is used for three phase input

**Table 1 – Case Type and Weight Table (3-50 ADC)**

Output Voltage	Ampere Rating									
	60 ADC	75 ADC	100 ADC	125 ADC	150 ADC	175 ADC	200 ADC	250ADC	300ADC	400 ADC
12 VDC	6 Case	6 Case	8A Case				70 Case			
	180 lbs	225 lbs	325 lbs				500 lbs			
	81.7 kg	102.1 kg	147.4 kg				227.0 kg			
24 VDC	6 Case	70 Case	70 Case	70 Case	70 Case		27 Case	27 Case	27 Case	47 Case
	265 lbs	400 lbs	450 lbs	525 lbs	630 lbs		825 lbs	880 lbs	940 lbs	1350 lbs
	121.0 kg	181.4 kg	204.1 kg	238.1 kg	285.8 kg		374.2 kg	399.2 kg	426.4 kg	612.4 kg
48 VDC	8A Case	72 Case	72 Case	72 Case	27 Case	27 Case	27 Case	47 Case	47 Case	47 Case
	400 lbs	525 lbs	625 lbs	700 lbs	850 lbs	1000 lbs	1150 lbs	1400 lbs	1700 lbs	1800 lbs
	181.4 kg	238.1 kg	283.5 kg	317.5 kg	385.6 kg	453.6 kg	521.6 kg	635 kg	771.1 kg	816.5 kg
130 VDC	27 Case	27 Case	27 Case	47 Case	47 Case	47 Case	47 Case	47 Case	47B Case	57 Case
	865 lbs	930 lbs	1040 lbs	1500 lbs	1800 lbs	1950 lbs	2100 lbs	2300 lbs	2400 lbs	2550 lbs
	392.4 kg	421.9 kg	471.7 kg	680.4 kg	816.5 kg	884.5 kg	952.6 kg	1043.3 kg	1088.6 kg	1156.7 kg

**Table 2 – Case Type and Weight Table (60-400 ADC)**

## 2 Installing the A12B

### 2.1 Mounting the A12B

When mounting the A12B in any configuration, consider the size and weight of the charger. The wall and/or floor must be able to support the weight of the charger, as well as an additional safety factor. Refer to data sheet to verify the weight of the charger and the method of mounting using the table below. The following considerations should be taken:

- The location chosen for the charger should be within an ambient temperature range of 32°F to 122°F (0°C to 50°C) with a non-condensing relative humidity no higher than 95%.
- The charger should be mounted in an area free of explosive materials and away from any liquids.
- The A12B utilizes convection cooling, so a clearance of at least 6 in (152 mm) of free air must be maintained on the top, bottom, left and right side for cooling air.
- Maintain 36 in (914 mm) or more of clearance at the front of the charger to allow for operation and maintenance.
- The bolts or screws used to secure the charger should be sufficient length to assure a vibration-free mounting.
- The preferred fastener is a machine bolt backed with a flat washer, lock washer, and nut. All hardware should be corrosion resistant.

**NOTE:** Please refer to the specific enclosure drawing provided with unit manual for greater detail.

Enclosure Number	Cable Entry		Standard Mounting
	AC Input	DC Output	
3	Right	Left	Wall/Floor
6	Right/Top/Bottom	Left/Top/Bottom	Wall/Floor
7	Right	Left	Wall/Floor
8A	Right/Top/Bottom/Side	Left/Top/Bottom/Side	Floor
27	Top	Top	Floor
47	Top/Bottom	Top/Bottom	Floor
47B	Top/Bottom	Top/Bottom	Floor
57	Bottom	Bottom	Floor
72	Right/Bottom	Bottom	Floor

**Table 3 – Mounting Methods**

**NOTE:** Enclosure sizes may differ depending on optional accessories and / or 50Hz input. Please consult factory when dimensions are critical. Dimensions shown above are overall footprint. Detailed dimensions drawings are available for mounting purposes.

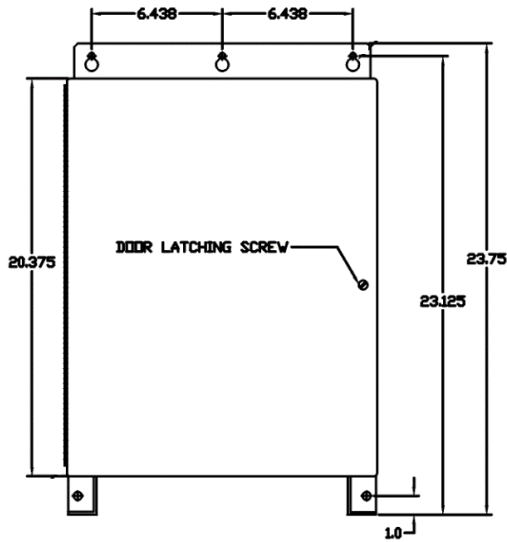


## 2.1.1 Wall-Mounting the A12B (#3, 6, and 7 Enclosures Only)

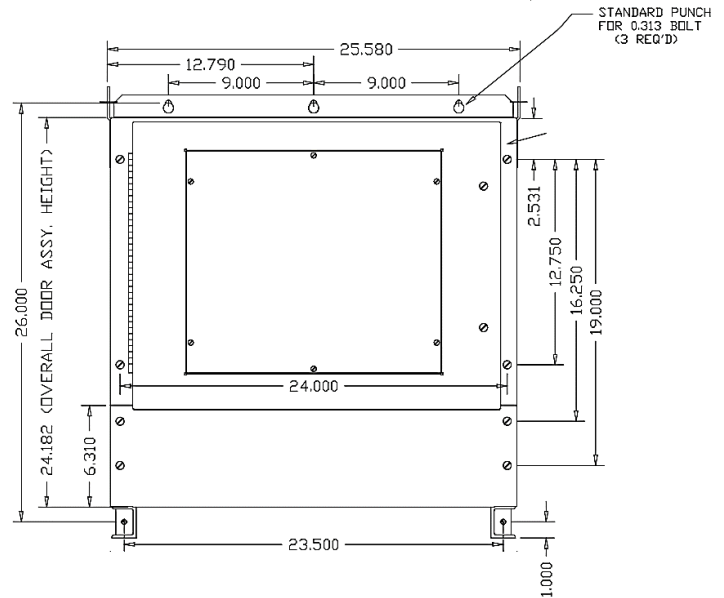
### Wall-Mounting Procedure

To wall-mount the A12B, install bolts on the wall rated to support the charger's weight plus a safety factor of at least four times. Refer to Tables 1 and 2 for charger weight specifications. Secure the charger on bolts, add appropriate mounting hardware, and tighten securely. Refer to the figures below for mounting dimensions.

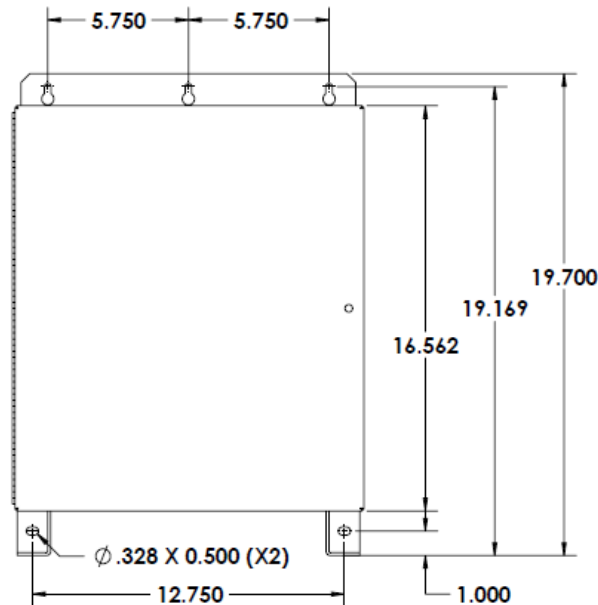
**NOTE:** All dimensions are in inches. For further A12B enclosure information, see the outline drawings online at <http://www.lamarchemfg.com/info/enclosure-drawings.html>



**Figure 1** – Enclosure No. 3 Bolt Pattern



**Figure 2** – Enclosure No. 6 Bolt Pattern

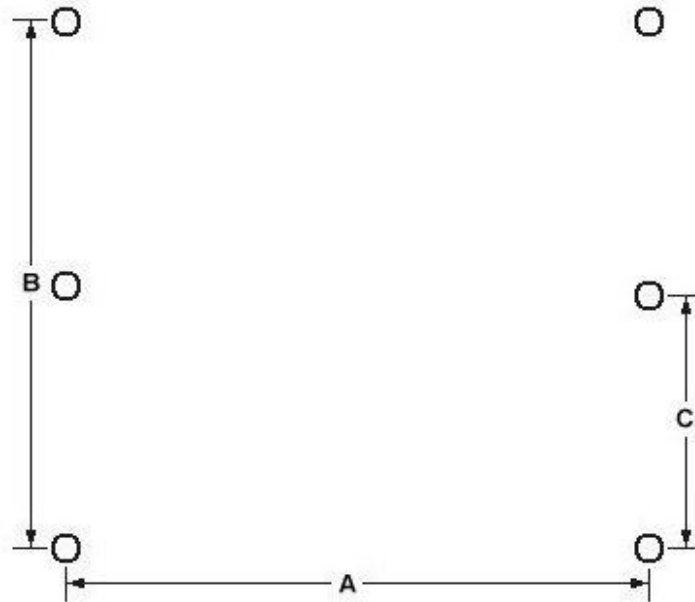


**Figure 3** – Enclosure No. 7 Bolt Pattern

## 2.1.2 Floor-Mounting the A12B (All Enclosures)

### Floor-Mounting Procedure

To floor-mount the A12B, install four to six anchor bolts into the floor. Place the charger on the anchor bolts, add appropriate mounting hardware onto the floor-mounting anchor bolts, and tighten securely. Refer to Figure below for hardware specifications and floor-mounting dimensions. All dimensions are given in inches.



Enclosure Size	A	B	C	Bolt Diameter
<b>3</b>	13.875	8.000	N/A	.312
<b>6</b>	23.500	8.875		
<b>7</b>	12.750	7.750		
<b>72</b>	25.750	17.500	10.000	.406
<b>27</b>	29.250	20.000	N/A	.406
<b>8A</b>	25.350	10.875		
<b>47</b>	37.500	31.500		
<b>47B</b>	37.500	37.500	10.000	.562
<b>57</b>	57.500	20.000		

**Figure 4 – A12B Enclosure Footprint**

## 2.2 AC Input Connections

Before beginning any work inside the charger, ensure the following:

- Verify all incoming AC supply is de-energized.
- Verify that no voltage is present inside the case by using a voltmeter at all input and output terminals.
- Check that the source voltage and frequency match the charger front nameplate specifications.
- Confirm if charger is multi or single input by referring to charger nameplate.
- If charger is confirmed to be a multi-input charger, refer to corresponding charger schematic or AC input wiring chart inside charger for transformer tap settings.

Select wire size using the table below. This is based on an overload **current of 110-115%** of the input current listed on the charger nameplate.

**NOTE:** Feeder breaker should be sized to match the size of the AC protection used in charger. If multi-tap charger is set for 120VAC input configuration, feeder breaker should be double the size of the AC protection. 120VAC configured multi-tap chargers use both breaker poles in parallel.

Breaker Size/ Fuse Size - Amps	AWG Minimum Wire Size Requirement for Customer Connection	AWG Minimum Wire Size for Equipment Grounding
3	#14	#14
5	#14	#14
10	#14	#14
15	#14	#14
20	#12	#12
25	#10	#12
30	#10	#10
40	#8	#10
50	#8	#10
60	#6	#10
70	#6	#8
80	#4	#8
90	#4	#8
100	#4	#8
125	#2	#6
150	#1	#6
175	#1/0	#6
200	#2/0	#6
250	#4/0	#4
300	250 MCM	#4
400	400 MCM	#2
500	600 MCM	#2

**Table 4 – AC/DC & Ground Wire Size Minimum Requirements**  
(All wires specified in the table are rated at 90 °C or 194 °F)

**NOTE:** These are recommended sizes per La Marche Standards. The National Electrical Code (NEC) and Local Wiring Codes must be followed.

### AC Connection Procedure

First, connect an adequate earth ground lead (use table above for sizing) to the terminal marked ground. Install input AC cables to the AC input terminals of the charger. Refer to the schematic diagram for AC input connections.

### 2.3 DC Output Connections

Before making any of the DC output connections, make sure you read and fully understand the DC Connection Procedure below, including Section 3.1. Select proper size for the DC wires using Table 4. If the distance between the charger's DC output and the battery/load exceeds 10 feet, use the instructions below to minimize the voltage drop across the wire distance.

**NOTE:** It is recommended to use a battery disconnect breaker between charger and battery bank; helpful during battery or charger maintenance.

Use the following formulas and table to determine proper wire size for minimal voltage drop. At distances exceeding 10 feet, the DC wire size should be chosen to keep the voltage difference between the charger's DC output terminals and the battery at less than 1/2 volt when the charger is fully loaded.

#### Table of Conventions:

- CMA* = Cross section of wire in circular MIL area
- A* = Ultimate drain in amperes
- LF* = Conductor loop feet
- MaxAmp* = Maximum allowable amperes for given voltage drop
- AVD* = Allowable voltage drop
- K* = 11.1 for commercial (TW) copper wire  
= 17.4 for aluminum

#### Calculating Wire Size Requirements:

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

Size (AWG)	Area CIR.MILS	Size (MCM)	Area CIR.MILS
18	1620	250	250000
16	2580	300	300000
14	4110	350	350000
12	6530	400	400000
10	10380	500	500000
8	16510	600	600000
6	26240	700	700000
4	41740	750	750000
3	52620	800	800000
2	66360	900	900000
1	83690	1000	1000000
0	105600	1250	1250000
00	133100	1500	1500000
000	167800	1750	1750000
0000	211600	2000	2000000

Table 5 – Wire Size/Area Table

#### Calculating Current Carrying Capacity of Wire:

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

**EXAMPLE:** If the charger being used has a max ampere output of 33 Amps and 30 loop feet of copper wire cable is required with an allowable voltage drop of 0.5 Volts, the wire size calculation will be:

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

$$A = 33$$

$$LF = 30$$

$$K = 11.1$$

$$AVD = 0.5$$

$$CMA = \frac{33 \times 30 \times 11.1}{0.5} = \mathbf{21978 \text{ or } \#6AWG \text{ wire}}$$

### **DC Connection Procedure (for chargers with DC fuse not using battery disconnect)**

To prevent the DC fuse from blowing when connecting the battery, connections should be done in the following order:

1. Make sure that the incoming power to the charger is turned off.
2. Connect the negative battery cable to the charger's DC output terminals. ***OBSERVE PROPER POLARITY.***
3. Energize the charger by supplying AC voltage. This will charge the capacitors inside the charger and eliminate heavy arcing when the battery is connected.
4. After 30 seconds, turn off the AC power and immediately connect the remaining positive battery cable.
5. Connect the DC loads. ***OBSERVE PROPER POLARITY.***
6. Turn on the charger again by supplying AC voltage; it will commence charging the batteries and powering the load.

### **DC Connection Procedure (for chargers with DC fuse and battery disconnect)**

To prevent the DC battery disconnect breaker from tripping when connecting the battery, connections should be done in the following order:

1. Make sure that the incoming voltage to the charger is turned off.
2. Make sure the battery disconnect breaker is open.
3. Connect the battery cables to the charger's DC output terminals. ***OBSERVE PROPER POLARITY.***
4. Energize the charger by supplying AC voltage and turning on/closing the charger's AC breaker. This will charge the capacitors inside the charger.
5. After 30 seconds, turn on/close the DC battery disconnect breaker.

### **DC Connection Procedure (for chargers with DC circuit breaker)**

To prevent the DC circuit breaker from tripping when connecting the battery, connections should be done in the following order:

1. Make sure that the incoming voltage to the charger is turned off.
2. Turn off/open the charger's AC and DC circuit breakers.
3. Connect the battery cables to the charger's DC output terminals. ***OBSERVE PROPER POLARITY.***
4. Energize the charger by supplying AC voltage and turning on/closing the charger's AC breaker. This will charge the capacitors inside the charger and eliminate heavy arcing when the battery is connected.
5. After 30 seconds, turn on/close the DC breaker.

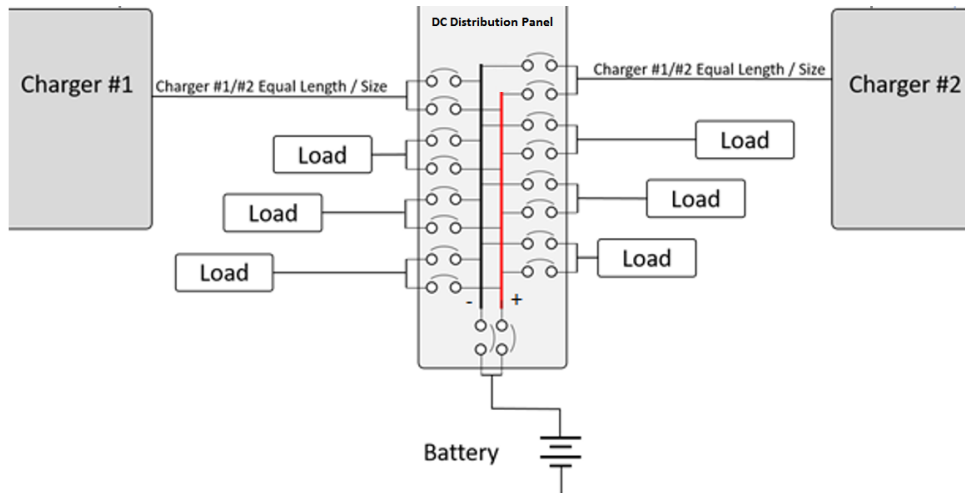
#### **2.3.1 Paralleling Connections**

A12B battery chargers have the capability to be installed in parallel for redundant applications. Take into consideration, the chargers being setup for paralleling MUST be of the same DC output rating and should all be A12B model chargers. Please confirm each charger model on the nameplate on front prior to making connections. Please follow the steps below:

***NOTE:*** *Ground Detection should only be enabled on one charger when paralleling. Verify options included on charger to confirm ground detection is available. To disable Ground Detection, please refer to corresponding option manual.*

1. Power up the chargers prior to making any connections to the DC output.
2. Adjust the Float and Equalize output voltages of each individual charger to same desired level.
3. Turn off all chargers.
4. Connect the DC output of all chargers in parallel to the same DC load/battery, refer to figure 5.
5. Turn on all chargers.
6. After a short period of time, one charger may assume more of the load. Readjust the lower output charger so the current is half the load.

***NOTE:*** *Since there is no interconnecting circuitry, and the chargers are completely isolated, both units regulate by sensing buss voltage. At the no load trickle charge rate, one charger may assume all the trickle current rate, with the other charger at zero current. When heavier loads are applied, the lower output unit will share the load.*



**Figure 5 – Example Paralleling Diagram**

**NOTE:** Paralleling is not to be confused with load sharing. If load sharing is desired, confirm if charger has load sharing option included and refer to the corresponding option manual.

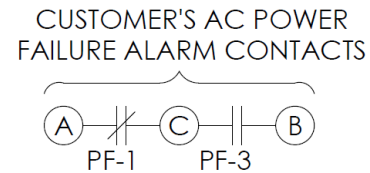
## 2.4 Alarm Connections

### 2.4.1 Standard Alarms

An AC 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 (NO) and normally-closed (NC) contacts from this relay is connected to terminals for connection to a remote power failure alarm; refer to Figure below. The charger will automatically resume charging upon return of AC power.

Alarm Relay	Relay Logic	Contact Ratings
AC Power Failure	De-Energize on Fail	16A @ 250VAC 10A @ 28VDC

**Table 5 – Alarm Relay Information**



**Figure 6 – AC Power Failure Contacts**

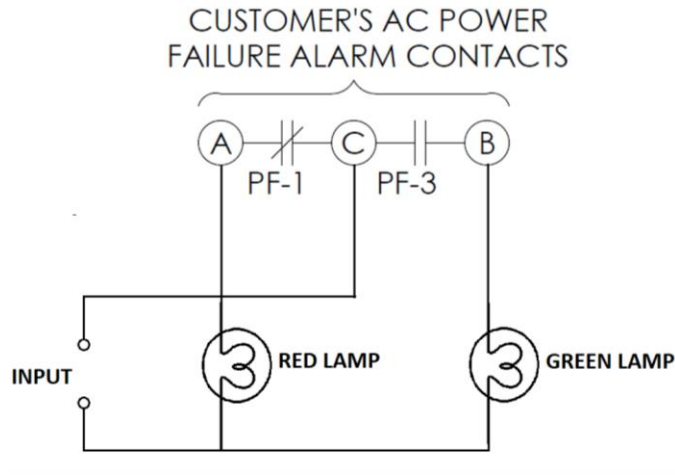
**NOTE:** The A12B battery charger may have an alarm combination package equipped which relocates the AC power failure alarm and includes additional alarms. Confirm if charger is equipped with an alarm package option. Refer to the respective option manual for details.

### 2.4.2 Alarm Connection Procedure

Before making any connections to the A12B, ensure that the AC power is off at the main breaker box and that both charger's fuses/breakers are disconnected/off. Verify that no voltage is present by using a voltmeter at all input and output terminals.

If it is desired that the annunciator be active until the AC Power Failure alarm triggers, connect the annunciator/power leads to the **NO** and **C** contacts of the Power Failure alarm contacts. If it is desired that the annunciator be inactivate until the AC Power Failure alarm triggers, connect the annunciator/power leads to the **NC** and **C** contacts of the Power Failure alarm contacts.

**EXAMPLE:** A customer wants a green lamp to be illuminated when the charger has AC power and wants a red lamp to illuminate when the charger loses AC power. The customer would make the connections to the NO and C contacts between the green lamp and power supply and would connect the NC and C contacts between the red lamp and power supply. Refer to Figure 7.



**Figure 7 – Power Failure Example Connections**  
(Customer Provided Equipment)

## 2.5 External Temperature Compensation (Option 11W/11Y)

The natural voltage of a battery changes as a function of temperature change. As the battery temperature rises, the effective voltage of the battery decreases. Without Temperature Compensation, the battery charger will always produce a set constant output voltage. As the battery temperature increases, this constant voltage will then induce a higher output current from the charger. This higher current can result in overcharging the battery, which in turn can result in damage to the batteries.

Temperature Compensation combats this overcharging by adjusting the charger's output voltage based on the temperature read by the temperature probe. To increase the accuracy of the temperature compensation, the external probe can be used to measure the temperature of the battery.

Option 11W includes the compensation circuit and a 24-foot-long temperature probe. Option 11Y includes the compensation circuit and a 100-foot-long temperature probe.

**NOTE:** If option 11W or 11Y is included, please refer to appropriate option manual for instructions.

## 2.6 Additional Option Connections

The A12B charger may have been outfitted with several optional accessories or option packages. To determine the options included (if any) and the suggested connections, refer to the cover page of the manual package and the option instructions included with the A12B charger instruction manual.

### **3 Operation**

#### **3.1 Starting the A12B**

All equipment is shipped from the factory fully inspected and adjusted to manufacturer defined default values based on the model number. Do not make any adjustments unless the equipment has been energized and the settings have been determined to be incorrect. Check with battery manufacturer for recommended settings.

##### **Factory Settings**

The adjustable factory settings of the A12B are based on the model number, unless otherwise specified. All chargers are set at the factory with the following settings:

<b>Float Voltage:</b>	2.17 V/C for LA 2.25 V/C for VRLA 1.40 V/C for NC
<b>Equalize Voltage:</b>	2.33 V/C for LA 2.27 V/C for VRLA 1.55 V/C for NC
<b>Current Limit:</b>	115% of rated DC output current

**NOTE:** V/C – Volts per Cell, LA – Lead Acid, VRLA – Valve Regulated Lead Acid, NC – Nickel Cadmium

##### **3.1.1 Checking the Installation**

Before attempting to start the A12B, check and verify the following:

- Verify all connections are correct.
- Check all terminations are tightened securely.
- Check for any loose connection or unsecured components in the charger.
- Check that the transformer input taps are set correctly for desired input voltage.
- Verify the AC input and battery/load voltages match the voltages on the nameplate of the charger.
- Verify AC feeder breaker matches charger input protection rating.

If the A12B battery charger is being powered up for the first time and battery connections have not been made, please follow the appropriate DC Connection Procedure on Section 2.3 which corresponds to the charger. Once proper connections are established, follow the Start-Up Sequence which corresponds to the charger.

##### **3.1.2 Power Up/Power Down Sequence**

**NOTE:** Assure all AC and DC breakers tied to the A12B battery charger are opened/off before proceeding. Also, verify the installation checks have been performed. Refer to Section 3.1.1 for details.

##### **For A12B chargers with AC and DC fuses:**

To power up the A12B charger, simply close the AC feeder breaker. To power down the A12B charger, simply open the AC feeder breaker.

##### **For A12B chargers with AC and DC breaker:**

To power up the A12B charger, close the AC feeder breaker, then close the charger AC breaker. After about 30 seconds, close the DC breaker. To power down the A12B charger, first open the charger AC breaker, then open the charger DC breaker(s).



### 3.2 Front Panel

The standard A12B comes with an analog voltmeter and ammeter, as well as a float/equalize rocker switch, and a set of float/equalize potentiometers for output adjustment.



**Figure 8 – Standard A12B Front Panel (#3 Enclosure Shown)**

After the A12B has completed the startup sequence, LED indicators on the front panel will be lit according to the system's status as pictured in the figure above. The analog voltmeter and ammeter will show both the charger's DC output voltage and DC output current.

**NOTE:** The A12B may be equipped with options, such as a digital display and/or additional LED indicators, buttons, or switches. Refer to the option manuals included for reference on operation instructions and further details.

### 3.3 Charging Modes

The A12B charger has two modes for DC output voltage; Float mode and Equalize mode. Float charging mode is used for all normal battery charging needs or to directly power DC loads. Equalize mode is used when it is necessary to equalize (or balance) the level of charge across all cells present in the battery. Refer to battery manufacturer for recommended equalize schedule.

On a standard A12B charger, a Float/Equalize toggle switch is provided on the front panel to alternate between charging modes. Two LEDs are also included, which indicate the present mode of the charger. The green LED indicates Float mode and the amber LED indicates Equalize mode. The charger will maintain the specified mode while the switch is in the corresponding position until it is manually changed. The operator is responsible for manually changing modes, depending on battery manufacturer recommendations.

If any options are included, refer to appropriate option manual for description of selecting charging modes and equalize timer settings.

### 3.4 Adjusting Parameters

The output voltage of the A12B charger is set to a default value, refer to Section 3.1, but should be adjusted to meet the battery manufacturer recommendations. There are two adjustment potentiometers located on the front of the charger (as shown on Figure 8).

**NOTE:** *The A12B may be equipped with options, such as a digital display and/or additional LED indicators, buttons, or switches. Refer to the option manuals included for reference on operation instructions and further details.*

The Float Adjustment potentiometer (shown as **FLOAT**) allows the user to fine tune the Float Mode output voltage. This adjustment should be done without the batteries connected to the charger DC output terminals, if possible.

The Equalize Adjustment potentiometer (shown as **EQUALIZE**) allows the user to fine tune the Equalize Mode output voltage. This adjustment should be done without the batteries connected to the charger DC output terminals, if possible.

#### **NOTES:**

1. *When making output voltage adjustments with batteries connected, the immediate change will be reflected on the output current and NOT the voltage due to the voltage difference between the output and the batteries.*
2. *In parallel systems, each charger MUST be isolated to properly perform output voltage adjustments.*

#### **Raising Output Voltage with Batteries Connected**

Note the DC load prior to making output adjustments. Adjust the respective potentiometer a quarter turn clockwise. The output current will rise and gradually drop to its steady load current. Meanwhile, the output voltage will slowly rise to its setpoint. Once steady, repeat the previous step until the desired setpoint is reached.

**NOTE:** *Immediate change in voltage might not be seen due to the back-feed of the battery voltage.*

#### **Lowering Output Voltage with Batteries Connected**

Note the DC load prior to making output adjustments. Adjust the respective potentiometer a quarter turn counterclockwise. The output current will drop and gradually rise to its steady load current. Meanwhile, the output voltage will slowly lower to its setpoint. Once steady, repeat the previous step until the desired setpoint is reached.

**NOTE:** *Immediate change in voltage might not be seen due to the back-feed of the battery voltage.*

The approximate adjustable ranges are as follows:

**Float Adjustment Range:**                    2.12 – 2.35 V/C (LA) (VRLA)  
    1.35 – 1.45 V/C (NC)

**Equalize Adjustment Range:**                2.20 – 2.45 V/C (LA) (VRLA)  
    1.5 – 1.6 V/C (NC)

## **4 Frequently Asked Questions**

### **Q: How can I tell what options are included on my A12B charger?**

A: Every charger will have a dedicated manual cover sheet included with the charger manual, which lists all the options included. If the manual that is shipped with the charger is no longer available, call La Marche and provide the five-digit accessory code at the end of the model number.

### **Q: Can two A12B chargers be connected in parallel?**

A: Yes, two or more A12B chargers can be connected in parallel as long as they are of the same output voltage rating. Chargers in parallel are not designed to load share, unless the load sharing option (10G) is included. Refer to specific option manual for more information. Paralleling is to not be confused with load sharing.

### **Q: What is the use of the potentiometers on the electronic control panel?**

A: The control panel has two potentiometers, labeled P1 CURRENT and P2 HI-VOLT. The P1 potentiometer is used to adjust the electronic current limit and the P2 potentiometer is used to adjust the high voltage clamp. It is not recommended to adjust the potentiometers; the potentiometers are factory tested and preset so that no field adjustments are necessary.

### **Q: Can the A12B charger settings be changed to accommodate charging Nickel Cadmium batteries instead of the intended Lead Acid battery, or vice versa?**

A: The necessary adjustments can be made, but are dependent on model and number of cells that will be used. The change that will be necessary for every model type is the output voltage adjustment; call La Marche to verify that the charger in question will have the necessary output range. If alarm accessories are installed, alarm thresholds will also need to be changed to the desired battery type defaults, refer to appropriate option manual for procedure and default values.

### **Q: Can the alarm contact reference on the charger schematic be used for determining connections? (if applicable)**

A: Not completely. The charger schematic, for a charger with the option included, will show an alarm relay board with contact indication. However, all the contacts are shown in resting state, which is not true when the charger is energized. The charger schematic should also include an alarm contact table that specifies which relays are energized during normal operation, and which are not. Refer to the appropriate option manuals for more information.

### **Q: Why is there a Low Current alarm and can it be disabled? (if applicable)**

A: A Low Current alarm can be triggered by various conditions, but not all are considered to be severe. A common condition encountered is the batteries reaching nominal voltage and being fully charged with no constant load present. At this point, the charger is providing trickle charge to the batteries with minimal current draw and indicating a known low current condition. If this is the case, refer to the option manual for disabling instructions. More severe conditions include charger failure, loss of AC power, maladjustment of output voltage, and possible disconnection of DC loads. If this is the case, other alarms will also be present.

## 5 Service

All work inside the A12B charger should be performed by qualified personnel. La Marche is not responsible for any damages caused by an unqualified technician.



Before working inside the A12B, ensure the AC power is off at the main breaker box and the battery has been removed from the charger's DC output terminals, either by removing the battery cables or exercising the battery disconnect. Verify that no voltage is present by using a voltmeter at all input and output terminals.

### 5.1 Performing Routine Maintenance

Although very little maintenance is required on the A12B charger, routine checks and adjustments are recommended to ensure optimum system performance.

**NOTE:** When ordering replacement parts, provide model number and serial number.

#### Yearly

1. Confirm air vents are open. Remove dust and debris from interior of charger.
2. Verify all connections are tight.
3. Perform a visual inspection on all internal components.
4. Check front panel meters for accuracy and LED operation.
5. Measure the output ripple:
  - Without interrupting a live system, measure ripple at the output terminals of the charger with a True-RMS multimeter in the AC-Voltage setting. If the ripple reading is higher than the specified value in the table below, the capacitors are recommended to be replaced.

Charger Nominal Output	AC Ripple Limit
12VDC – 48VDC	30mV RMS
130VDC	100mV RMS
260VDC	200mV RMS

#### Every 7 Years

1. If the charger is consistently operated in higher temperature environments, all capacitors are recommended to be replaced.

#### Every 10 Years

1. Check magnetics, components and wiring for signs of excessive heat.
2. Replace capacitors if not done at the 7-year interval.

## 5.2 Troubleshooting Procedure

Troubleshooting should be performed only by trained service personnel or experienced electricians. Before setting up any complicated testing or making any conclusions, inspect the charger using the guide below.

Check the following:

1. Check DC output cables, connections, battery type, and number of cells against the charger's rating.
2. Verify charger specifications against customer order.
3. Check input connections, input voltage, and feeder breaker size.
4. Inspect for shipping damage, loose connections, broken wires, etc.
5. Certain failures can be caused by defective batteries and customer loads; make sure batteries and loads are free from defects.

If the problem is not found with the preliminary checks above, use the troubleshooting chart on section 5.3 as a guideline.

**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.*

La Marche Service Technicians are available to help with troubleshooting or with scheduling charger service. When calling for a service inquiry or for troubleshooting assistance, be sure to have all of the following information on hand:

1. Equipment model number and serial number.
2. The measured AC input voltage.
3. The measured DC output voltage with and without the battery.
4. The measured DC output current, measured with battery and load connected to charger.

**NOTE:** *When ordering replacement parts, drawings, or schematics, provide model number, serial number, and description of problem, if available.*

La Marche Phone Number: (847) 299-1188  
24-hour **emergency** number: (847) 296-8939

### Ordering Replacement Parts

Contact La Marche to place an order for spare or replacement parts. To order replacement parts; please provide the model and serial number of the battery charger, the part needed and the quantity required.

### 5.3 Troubleshooting Chart



Isolate from all power sources prior to performing any interior verifications or part replacements.

Symptom	Possible Cause	Action
1  AC Protection Opens Immediately (High Input Current)	Incorrect AC Input Voltage	Measure AC voltage and verify against charger nameplate.
	AC Input Taps on Power Transformer are Incorrectly Set	Verify tap settings using charger schematic or input table found on charger.
	Incorrect, Damaged, or Loose Cable/Harness Connections	Visually inspect and verify all internal wiring using charger schematic.
	High DC Output Voltage	Refer to Symptom 6
	Shorted Power Diodes/Diode Modules	Refer to Section 5.3.3
	AC-DC Short/AC-Ground Short/DC-Ground Short	Refer to Section 5.3.1
2  DC Protection Opens Immediately (High Output Current)	Incorrect Battery Connected	Measure battery voltage and verify against charger nameplate.
	Reverse Polarity	Confirm polarity of DC cables with voltmeter.
	Incorrect, Damaged, or Loose Cable/Harness Connections	Visually inspect and verify all internal wiring using charger schematic.
	Shorted Output Cables	Inspect DC cables for shorts
	Shorted Battery Cells or Customer Equipment	Remove all loads and batteries from charger and confirm charger functionality.
	Shorted Power Diodes/Diode Modules	Refer to Section 5.3.3
3  No Display and No LEDs (If Applicable)	No AC Voltage Applied to Charger	Measure and confirm input voltage.
	Charger AC protection is open	Refer to Symptom 1
	Incorrect, Damaged or Loose Cable/Harness Connections	Visually inspect and verify all internal wiring using charger schematic.
	Defective LEDs/Display Card	Contact La Marche Service Department for further troubleshooting instructions.
4  Meter Reading Incorrect Voltage or Current	Incorrect, Damaged or Loose Cable/Harness Connections	Visually inspect and verify all internal wiring using charger schematic.
	Defective Analog Voltmeter (if applicable)	Measure DC voltage across the voltmeter and verify meter is displaying correct voltage.
	Defective Analog Ammeter (if applicable)	Measure current output with clamp ammeter. Verify meter is displaying correct current.
	Incorrect Display Calibration on Display Card (if applicable)	Measure output voltage and current; compare to display readings. Refer to "Display Calibration" section of the corresponding option manual.
	Incorrect Software Settings on Display Card (if applicable)	Contact La Marche Service Department for further troubleshooting instructions.
	Defective Shunt (if applicable)	
	Defective Control Card	
	Defective Filtering Capacitors	Refer to Section 5.3.2

5	No AC Input Voltage Applied to Charger	Measure and confirm input voltage.
	Incorrect Battery Connected	Measure battery voltage and verify against charger nameplate.
	Incorrect, Damaged or Loose Cable/Harness Connections	Visually inspect and verify all internal wiring using charger schematic.
	Incorrect Float/Equalize Voltage Settings	Refer to Section 3.4 for output adjustment instructions.
	Low Output Voltage Condition: Charger is in Current Limit	Measure output current and verify against charger nameplate. If found to be in current limit, wait for batteries to charge or remove loads.
	Low Output Current Condition: Batteries are Fully Charged	Confirm by changing to Equalize mode; current should increase.
	Meter Reading Incorrect Voltage or Current	Refer to Symptom 4
	Defective Control Panel WITH Power Stage: Refer to schematic or parts list to confirm if power stage is used.	Chargers with Power Stage, power down charger. Disconnect the 12 pin connector from the Electronic Control Panel. Remove J1 connector from S2A-225A/S2A-225C display board. Start the charger. If charger goes into high rate, the electronic panel may be defective.
	Defective Control Panel WITHOUT Power Stage: Refer to schematic or parts list to confirm if power stage is used.	Chargers without Power Stage, power down charger. Disconnect the 12 pin connector from the Electronic Control Panel and jump pin 3 to 8 of the connector. Remove J1 connector from S2A-225A/S2A-225C display board. Start the charger. If charger goes into high rate, the electronic panel may be defective.
	Defective Control Relay	Measure voltage from Pin 5 on Electronic Control Panel to negative DC output terminal. If voltage is zero, the power failure relay may be defective.
	Open RC Resistors	Measure resistance of component. If open, the resistor may be defective.
	Shorted Power Diodes/Diode Modules	Refer to Section 5.3.2
Defective Batteries	Check battery cells.	
6	Incorrect, Damaged or Loose Cable/Harness Connections	Visually inspect and verify all internal wiring using charger schematic.
	Incorrect Battery Connected	Measure battery voltage and verify against charger nameplate.
	Incorrect Float/Equalize Voltage Settings	Refer to Section 3.4 for output adjustment instructions.
	Open Potentiometers on S2A-199 Assembly	Contact La Marche Service Department for further troubleshooting instructions.
	Defective Control Panel	Power down charger. Place jumper across center coil on saturable reactor. Remove J1 connector from S2A-225A/S2A-225C display board. Start the charger. If charger runs low, the problem may be the Electronic Control Panel.
	Defective Batteries	Check battery cells.
Low Output Voltage or Current		
High Output Voltage or Current		

7  Ground Detection Fault	Ground Fault Present on Charger or DC System	Isolate charger from DC system by removing all wires from charger output terminal. If ground fault on charger clears, problem may be on external DC loads, battery, or wires. If ground fault is still present on charger, contact La Marche Service Department for further troubleshooting.
---------------------------------	--	--

### 5.3.1 Ground and Short Circuit Test

A simple ohmmeter check can be performed to check the charger for a short to ground, primary to secondary breakdown, AC-DC short, or DC ground. Before installation of a new charger, the above checks should be made before installing. If a short of this type is suspected on a charger in service, check as follows:

1. Disconnect AC input power to the charger. Disconnect the DC battery and loads from the charger.
2. Set ohmmeter scale on ohms scale RX100. Measure from one terminal of the input to one terminal of the output. Meter should not indicate. If the meter reads full scale deflection, this indicates an AC-DC short. During shipping, an AC wire may rub against the DC lugs, terminals, etc. and cause a short. These problems may be eliminated by being very careful in inspecting the wiring to assure the AC wires are not touching the DC wiring.
3. Check the input terminals to ground and check the output terminals ground. If the meter indicates full scale deflection, a wire is touching a metal part of the charger. Look for wires that are near any metal part and inspect for possible breakdown caused by shipping. The heatsink of the diodes and the control charger are insulated from ground through the mounting legs.

### 5.3.2 Checking Capacitors

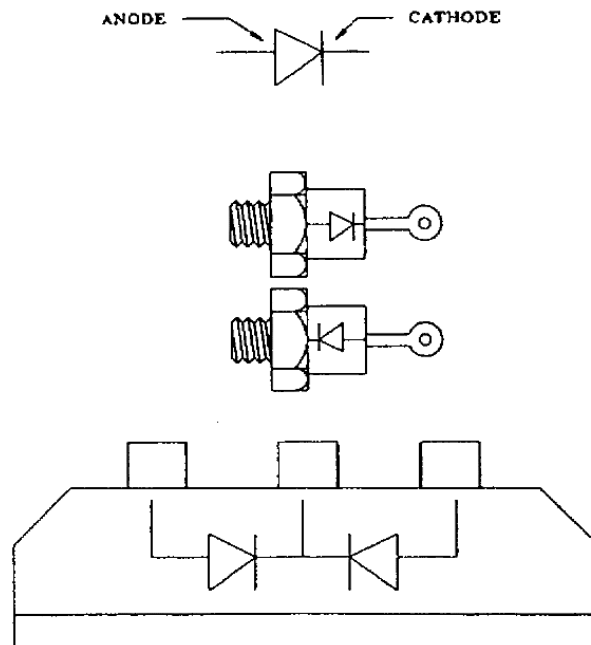
1. When checking capacitors, assure all AC power is turned off and battery is isolated from charger. Check capacitors with DC voltmeter to see that DC voltage is at near 0VDC.
2. Momentarily short circuit the capacitor leads to assure complete discharge.
3. Connect the meter test leads to the capacitor leads or terminals and observe indicated resistance.
4. A good capacitor will indicate an initial low resistance and gradually increase as the capacitor charges. The final resistance of a good capacitor is usually several hundred thousand ohms approaching a megaohm.
5. Initial high resistance approaching infinity indicates an open capacitor. Initial and continued low resistance readings indicate a shorted capacitor.



### 5.3.3 Troubleshooting and Replacing Power Silicon Diodes/Modules

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 heat sink.
3. Note the ohmmeter reading. Then, reverse the leads between the diode and heat sink assembly. Again, note the ohmmeter reading. If the diode is good, the ohmmeter will indicate a high resistance in one direction and a low resistance with the leads reversed. If the diode is shorted, the ohmmeter will read near (0) resistance with the leads in either direction. If the diode is open, the ohmmeter will show infinite resistance, indicating an open circuit with the ohmmeter leads in either direction.
4. All diodes must be checked if more than one diode is defective.
5. If the diode is defective, contact La Marche for complete heat sink replacement.



**Figure 9 – Diode (Schematic Symbol and Package Variations)**

## Appendix A: A12B Specifications

<b>ELECTRICAL</b>	
<b>AC Input Voltages</b>	Single Phase 60Hz: 120, 208, 220, 240, 480 or 600 Single Phase 50Hz: 220/240, 380 or 415 Three Phase 60Hz: 208, 240, 480 or 600 Three Phase 50Hz: 220/240, 380 or 415 Voltage Range: $\pm 10\%$ from nominal Frequency Range: $\pm 5\%$
<b>DC Output Amps and Voltages</b>	DC Amps: 3 - 400 Amperes DC Volts: 12, 24, 48, 130VDC (Others available such as 32, 36, & 260VDC)
<b>DC Output Filtering</b>	Standard - 30mV RMS for single phase models Standard - 100mV RMS for three phase models Option 11F - 30mV RMS for three phase models
<b>DC Voltage Regulation</b>	$\pm 0.5\%$ from no load to full load over the specified input voltage, frequency and ambient temperature range.
<b>Meters</b>	Standard – Analog DC Ammeter & DC Voltmeter $\pm 2\%$ Accuracy 16, 46, and 52 Series – Digital DC Ammeter & DC Voltmeter $\pm 1\%$ Accuracy
<b>PROTECTION</b>	
<b>Current Walk-In</b>	The output current will gradually increase after the charger is turned on, eliminating surges and overshoot
<b>Current Limit</b>	DC Current limiting circuitry
<b>Input/ Output</b>	Standard - AC and DC Fuse Optional - AC and DC Breaker
<b>Emergency Restoration</b>	The battery charger may be connected to a battery which is heavily discharged and recharge it without clearing any protective devices.
<b>ENVIRONMENTAL</b>	
<b>Audible Noise</b>	Less than 65dBA at any point 5 feet from any vertical surface
<b>Operating Temperature</b>	32 to 122° F (0 to 50° C)
<b>Storage Temperature</b>	-40 to 185° F (-40 to 85° C)
<b>Relative Humidity</b>	0 to 95% (non-condensing)
<b>Cooling</b>	Convection Cooled
<b>Shock</b>	The battery charger in its shipping container withstands shock developed when one edge of the container is dropped six inches while the opposite edge is resting on the ground, or it is dropped two inches without any physical damage or degradation of the electrical performance.
<b>Vibration</b>	The battery charger in its shipping contained, withstands vibration encountered in shipping without physical damage or degradation of the electrical performance.
<b>Altitude</b>	This battery charger is capable of operation at altitudes up to 10,000 feet at an ambient temperature of up to +40° C.
<b>Ventilation</b>	The charger should be mounted so that ventilating openings are not blocked and air entering the cabinet does not exceed 50° C (122° F).

## Appendix B: A12B Current Draw (12VDC / 24VDC Systems)

**NOTE:** Maximum current draw is 120% of ratings shown. External feeder breaker should be sized to match the charger's AC protection. Consult factory to confirm AC protection used on particular charger. Subject to change.

	Model Number	DC Amps	DC Fuse Size (Amps)	Phase	AC Input Current Draw @ 100% Load								
					60 Hz Units						50 Hz Units		
					120 (A)	208 (D)	220 (L)	240 (B)	480 (C)	575 (E)	240/220 (BL)	380 (G)	415 (J)
12 Volt Systems (6L, 9NC, or 10NC)	A12B-3-12V	3	10	1	0.8	0.4	0.4	0.4	---	---	0.4 / 0.4	---	---
	A12B-6-12V	6	15	1	1.5	0.9	0.8	0.8	---	---	0.8 / 0.8	---	---
	A12B-10-12V	10	20	1	2.5	1.4	1.4	1.4	---	---	1.3 / 1.4	---	---
	A12B-15-12V	15	25	1	3.8	2.2	2.1	2.1	---	---	1.9 / 2.1	---	---
	A12B-20-12V	20	30	1	5	2.9	2.7	2.7	---	---	2.5 / 2.7	---	---
	A12B-30-12V	30	40	1	7.5	4.3	4.1	4.1	1.9*	1.6*	3.8 / 4.1	2.4*	2.4*
	A12B-40-12V	40	60	1	10	5.8	5.5	5.5	2.5*	2.1*	5 / 5.5	3.2*	3.2*
	A12B-50-12V	50	80	1	13	7.2	6.8	6.8	3.1*	2.6*	6.3 / 6.8	4.0*	4.0*
	A12B-60-12V	60	80	1	15	8.7	8.2	8.2	3.8*	3.1*	7.5 / 8.2	4.7*	4.7*
	A12B-75-12V	75	100	1	19	11	11	11	4.7*	3.9*	9.4 / 11	5.9*	5.9*
	A12B-100-12V	100	150	3	---	7.5	7.1	7.1	3.3*	2.7*	6.5 / 7.1	4.1*	4.1*
24 Volt Systems (12L, 18NC, 19NC, or 20NC)	A12B-3-24V	3	10	1	1.5	0.9	0.8	0.8	---	---	0.8 / 0.8	---	---
	A12B-6-24V	6	15	1	3	1.7	1.6	1.6	---	---	1.5 / 1.6	---	---
	A12B-10-24V	10	20	1	5	2.9	2.7	2.7	---	---	2.5 / 2.7	---	---
	A12B-15-24V	15	25	1	7.5	4.3	4.1	4.1	1.9*	1.6*	3.8 / 4.1	2.4*	2.4*
	A12B-20-24V	20	30	1	10	5.8	5.5	5.5	2.5*	2.1*	5 / 5.5	3.2*	3.2*
	A12B-25-24V	25	35	1	13	7.2	6.8	6.8	3.1*	2.6*	6.3 / 6.8	4.0*	4.0*
	A12B-30-24V	30	40	1	15	8.7	8.2	8.2	3.8*	3.1*	7.5 / 8.2	4.7*	4.7*
	A12B-35-24V	35	50	1	18	11	9.6	9.6	4.4*	3.7*	8.8 / 9.6	5.5*	5.5*
	A12B-40-24V	40	60	1	21	12	11	11	5*	3.2*	10 / 11	6.3*	6.3*
	A12B-50-24V	50	80	1	26	15	14	14	6.3*	5.2*	13 / 14	7.9	7.9
	A12B-60-24V	60	80	1	31	18	17	17	7.5	6.3*	15 / 17	9.5	9.5
	A12B-75-24V	75	100	1	38	22	21	21	9.4	7.8	19 / 21	12	12
	A12B-100-24V	100	150	1	51	29	28	28	13	11	26 / 28	16	16
	A12B-125-24V	125	200	3	---	19	18	18	8.1	6.8*	17 / 18	11	11
	A12B-150-24V	150	200	3	---	23	22	22	9.8	8.2	20 / 22	13	13
	A12B-200-24V	200	250	3	---	30	29	29	13	11	26 / 29	17	17
	A12B-250-24V	250	300	3	---	38	36	36	17	14	33 / 36	21	21
A12B-300-24V	300	400	3	---	46	43	43	20	17	40 / 43	25	25	
A12B-400-24V	400	600	3	---	61	57	57	26	22	53 / 57	33	33	

\* When equipped with AC Breaker, a series fuse is included.

## Appendix C: A12B Current Draw (48VDC / 130VDC Systems)

	Model Number	DC Amps	DC Fuse Size (Amps)	Phase	AC Input Current Draw @ 100% Load								
					60 Hz Units					50 Hz Units			
					120 (A)	208 (D)	220 (L)	240 (B)	480 (C)	575 (E)	240/220 (BL)	380 (G)	415 (J)
48 Volt Systems (24L, 36NC, 37NC or 38NC)	A12B-3-48V	3	10	1	3	1.7	1.6	1.6	---	---	1.5 / 1.6	---	---
	A12B-6-48V	6	15	1	6	3.5	3.3	3.3	---	---	3 / 3.3	---	---
	A12B-10-48V	10	20	1	10	5.8	5.5	5.5	2.5*	2.1*	5 / 5.5	3.2*	3.2*
	A12B-15-48V	15	25	1	15	8.7	8.2	8.2	3.8*	3.1*	7.5 / 8.2	4.7*	4.7*
	A12B-20-48V	20	30	1	21	12	11	11	5*	4.2*	10 / 11	6.3*	6.3*
	A12B-25-48V	25	35	1	26	15	14	14	6.3*	5.2*	13 / 14	7.9	7.9
	A12B-30-48V	30	40	1	31	18	17	17	7.5	6.3*	15 / 17	9.5	9.5
	A12B-40-48V	40	60	1	41	24	22	22	10	8.4	21 / 22	13	13
	A12B-50-48V	50	80	1	51	29	28	28	13	11	26 / 28	16	16
	A12B-60-48V	60	80	3	---	18	17	17	7.8	6.5*	16 / 17	9.9	9.9
	A12B-75-48V	75	100	3	---	23	22	22	9.8	8.2	20 / 22	13	13
	A12B-100-48V	100	150	3	---	30	29	29	13	11	26 / 29	17	17
	A12B-125-48V	125	200	3	---	38	36	36	17	14	33 / 36	21	21
	A12B-150-48V	150	200	3	---	46	43	43	20	17	40 / 43	25	25
	A12B-175-48V	175	250	3	---	53	50	50	23	19	46 / 50	29	29
	A12B-200-48V	200	250	3	---	61	57	57	26	22	53 / 57	33	33
	A12B-250-48V	250	300	3	---	76	71	71	33	28	66 / 71	42	42
A12B-300-48V	300	400	3	---	91	86	86	40	33	79 / 86	50	50	
A12B-400-48V	400	600	3	---	121	114	114	53	44	105 / 114	66	66	
130 Volt Systems (54 through 60L, 92 through 97NC)	A12B-3-130V	3	10	1	7.5	4.3	4.1	4.1	---	---	3.8 / 4.1	---	---
	A12B-6-130V	6	15	1	15	8.7	8.2	8.2	---	---	7.5 / 8.2	4.7*	4.7*
	A12B-10-130V	10	20	1	26	15	14	14	6.3*	5.2*	13 / 14	7.9	7.9
	A12B-15-130V	15	25	1	38	22	21	21	9.4	7.8	19 / 21	12	12
	A12B-20-130V	20	30	1	51	29	28	28	13	11	26 / 28	16	16
	A12B-25-130V	25	35	1	63	37	35	35	16	14	32 / 35	20	20
	A12B-30-130V	30	40	1	76	44	41	41	19	16	38 / 41	24	24
	A12B-35-130V	35	50	1	---	27	25	25	12	9.5	44 / 25	15	15
			50	3	88	51	48	48	22	19	23 / 48	28	28
	A12B-40-130V	40	60	1	101	58	55	55	26	21	51 / 55	32	32
			60	3	---	30	29	29	13	11	26 / 29	17	17
	A12B-50-130V	50	80	3	---	38	36	33	17	14	33 / 36	21	19
	A12B-60-130V	60	80	3	---	46	43	43	20	17	40 / 43	25	25
	A12B-75-130V	75	100	3	---	57	54	54	25	21	49 / 54	31	31
	A12B-100-130V	100	200	3	---	76	71	71	33	28	66 / 71	42	42
	A12B-125-130V	125	200	3	---	94	89	89	41	34	82 / 89	52	52
	A12B-150-130V	150	200	3	---	113	107	107	49	41	98 / 107	62	62
A12B-175-130V	175	250	3	---	132	125	125	57	48	114 / 125	72	72	
A12B-200-130V	200	250	3	---	151	142	142	66	55	131 / 142	83	83	
A12B-250-130V	250	300	3	---	188	178	178	82	68	163 / 178	103	103	
A12B-300-130V	300	400	3	---	226	214	214	98	82	196	/	214	
A12B-400-130V	400	600	3	---	301	285	285	131	109	261	/	285	

## Appendix D: A12B Heat Losses (Single Phase)

**NOTE:** based on 75% efficiency at rated load. Subject to change.

	Model Number	Watts In	Watts Out	Watts Lost	BTU/Hr.
12 Volt Systems	A12B-3-12V	53	40	13	46
	A12B-6-12V	106	79	26	91
	A12B-10-12V	176	132	44	152
	A12B-15-12V	264	198	66	228
	A12B-20-12V	352	264	88	303
	A12B-30-12V	528	396	132	455
	A12B-40-12V	704	528	176	607
	A12B-50-12V	880	660	220	759
	A12B-60-12V	1056	792	264	910
	A12B-75-12V	1320	990	330	1138
	A12B-100-12V	1760	1320	440	1517
24 Volt Systems	A12B-3-24V	106	79	26	91
	A12B-6-24V	211	158	53	182
	A12B-10-24V	352	264	88	303
	A12B-15-24V	528	396	132	455
	A12B-20-24V	704	528	176	607
	A12B-25-24V	880	660	220	759
	A12B-30-24V	1056	792	264	910
	A12B-35-24V	1232	924	308	1062
	A12B-40-24V	1408	1056	352	1214
	A12B-50-24V	1760	1320	440	1517
	A12B-60-24V	2112	1584	528	1821
	A12B-75-24V	2640	1980	660	2276
	A12B-100-24V	3520	2640	880	3034
32 Volt Systems	A12B-3-32V	141	106	35	121
	A12B-6-32V	282	211	70	243
	A12B-10-32V	469	352	117	405
	A12B-15-32V	704	528	176	607
	A12B-20-32V	939	704	235	809
	A12B-30-32V	1408	1056	352	1214
	A12B-40-32V	1877	1408	469	1618
	A12B-50-32V	2347	1760	587	2023
36 Volt Systems	A12B-3-36V	158	119	40	137
	A12B-6-36V	317	238	79	273
	A12B-10-36V	528	396	132	455
	A12B-15-36V	792	594	198	683
	A12B-20-36V	1056	792	264	910
	A12B-30-36V	1584	1188	396	1366
	A12B-40-36V	2112	1584	528	1821
	A12B-50-36V	2640	1980	660	2276
	A12B-60-36V	3168	2376	792	2731

<b>48 Volt Systems</b>	A12B-3-48V	211	158	53	182
	A12B-6-48V	422	317	106	364
	A12B-10-48V	704	528	176	607
	A12B-15-48V	1056	792	264	910
	A12B-20-48V	1408	1056	352	1214
	A12B-30-48V	2112	1584	528	1821
	A12B-40-48V	2816	2112	704	2428
	A12B-50-48V	3520	2640	880	3034
	A12B-60-48V	4224	3168	1056	3641
	A12B-75-48V	5280	3960	1320	3552
<b>130 Volt Systems</b>	A12B-3-130V	572	429	143	493
	A12B-6-130V	1144	858	286	986
	A12B-10-130V	1907	1430	477	1644
	A12B-15-130V	2860	2145	715	2466
	A12B-20-130V	3813	2860	953	3287
	A12B-30-130V	5720	4290	1430	4931
	A12B-40-130V	7627	5720	1907	6575
	A12B-50-130V	9533	7150	2383	8218
<b>260 Volt Systems</b>	A12B-3-260V	1144	858	286	986
	A12B-6-260V	2288	1716	572	1972
	A12B-10-260V	3813	2860	953	3287
	A12B-15-260V	5720	4290	1430	4931
	A12B-20-260V	7627	5720	1907	6575

## Appendix E: A12B Heat Losses (Three Phase)

**NOTE:** based on 85% efficiency at rated load. Subject to change.

	Model Number	Watts In	Watts Out	Watts Lost	BTU/Hr.
12 Volt Systems	A12B-100-12V	1553	1320	233	803
	A12B-125-12V	1941	1650	291	1004
	A12B-150-12V	2329	1980	349	1205
	A12B-175-12V	2718	2310	408	1406
	A12B-200-12V	3106	2640	466	1606
	A12B-250-12V	3882	3300	285	2008
	A12B-300-12V	4659	3960	699	2410
	A12B-350-12V	5435	4620	815	2811
	A12B-400-12V	6212	5280	932	3213
24 Volt Systems	A12B-75-24V	2329	1980	349	1205
	A12B-100-24V	3106	2640	466	1606
	A12B-125-24V	3882	3300	582	2008
	A12B-150-24V	4659	3960	699	2410
	A12B-175-24V	5435	4620	815	2811
	A12B-200-24V	6212	5280	932	3213
	A12B-300-24V	7765	6600	1165	4016
	A12B-350-24V	9318	7920	1398	4819
	A12B-350-24V	10871	9240	1631	5623
	A12B-400-24V	12424	10560	1864	6426
48 Volt Systems	A12B-40-48V	2485	2112	373	1285
	A12B-50-48V	3106	2640	466	1606
	A12B-60-48V	3727	3168	559	1928
	A12B-75-48V	4659	3960	699	2410
	A12B-100-48V	6212	5280	932	3213
	A12B-125-48V	7765	6600	1165	4016
	A12B-150-48V	9318	7920	1398	4819
	A12B-175-48V	10871	9240	1631	5623
	A12B-200-48V	12424	10560	1864	6426
	A12B-250-48V	15529	13200	2329	8032
	A12B-300-48V	18635	15840	2795	9639
	A12B-350-48V	21741	18480	3261	11245
	A12B-400-48V	24847	21120	3727	12852

130 Volt Systems	A12B-20-130V	3365	2860	505	1740
	A12B-30-130V	5047	4290	757	2611
	A12B-40-130V	6429	5720	1009	3481
	A12B-50-130V	8412	7150	1262	4351
	A12B-60-130V	10094	8580	1514	5221
	A12B-75-130V	12618	10725	1893	6526
	A12B-100-130V	16824	14300	2524	8702
	A12B-125-130V	21029	17875	3154	10877
	A12B-150-130V	25235	21450	3785	13053
	A12B-175-130V	29441	25025	4416	15228
	A12B-200-130V	33647	28600	5047	1 7404
	A12B-250-130V	42056	35750	6309	21755
	A12B-300-130V	50471	42900	7571	26105
	A12B-350-130V	58882	50050	8832	30456
	A12B-400-130V	67294	57200	10094	34807
260 Volt Systems	A12B-10-260V	3365	2860	505	1740
	A12B-15-260V	5047	4290	757	2611
	A12B-20-260V	5726	5720	1009	3481
	A12B-30-260V	10094	8580	1514	5221
	A12B-40-260V	13459	11440	2019	6961
	A12B-50-260V	16824	14330	2524	8702
	A12B-60-260V	20188	17160	3028	10442
	A12B-75-260V	25235	21450	3785	13053
	A12B-100-260V	33647	28600	5047	17404
	A12B-125-260V	42059	35750	6309	21755
	A12B-150-260V	50471	42900	7571	26105
	A12B-175-260V	58882	50050	8832	30456
	A12B-200-260V	64294	57200	10094	34807
	A12B-250-260V	84118	71500	12618	43509
	A12B-300-260V	100941	85800	15141	52211
	A12B-350-260V	117765	100100	17665	60921
	A12B-400-260V	134588	114400	20188	69615



## **Appendix F: Manufacturer's Standard Warranty**

**(IF THE INVOICE SHOWS THAT YOU HAVE PURCHASED THE EXTENDED PARTS WARRANTY OR IF YOU ARE INTERESTED IN PURCHASING THE EXTENDED PARTS WARRANTY, SEE THE MANUFACTURER'S EXTENDED PARTS 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 five (5) year warranty, La Marche warrants its magnetics and power diodes on a parts replacement basis only for five (5) more years under normal use.

Any part or parts of the equipment (except protective devices, DC connectors and other wear-related items) that prove defective within a five (5) 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 ten (10) years after date of purchase. During the last five (5) years of this ten (10) year warranty 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.

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 chargers will be considered for return. A 25% restocking fee is charged when return is factory authorized. Special chargers 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. Failure to follow safety precautions specified by the manufacturer during replacement of components or verifications 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, 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.**

## **Appendix G: 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 ANYTIME DURING THE FIRST 12 MONTHS 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, d.c. 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, d.c. 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. If you return the equipment to our factory (freight prepaid), we will repair and cover parts and labor.**

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 under the extended warranty during the initial five (5) year period from the date of our invoice to you. During the next five (5) 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 the extended 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 under the Extended Warranty. 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 alteration 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, 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.**

## Appendix H: Document Control and Revision History

Part Number: 40594  
Instruction Number: P25-LA12B-2  
Issue ECN: 12036 - 06/98

<b>23167 – 04/22</b>	22175 – 04/19	21692 – 01/18	21475 – 06/17
18985 – 04/11	17832 – 04/08	17650 – 11/07	16842 – 07/05
15761 – 02/03	15349-01 – 05/02	14575 – 02/01	13608 – 05/00

## Appendix I: Additional Support Documentation

- **Option Instructions**
- **Schematic Diagram**
- **Dimensional Drawing**
- **Bill of Material Listing**
- **Recommended Spare Parts List**
- **Product Datasheet**