

OWNER'S MANUAL 193111-083

Revised April 14, 2009

IMPORTANT: Read these instructions before installing, operating, or servicing this system.

PRESTOLITE ECLIPSE PAC-Series

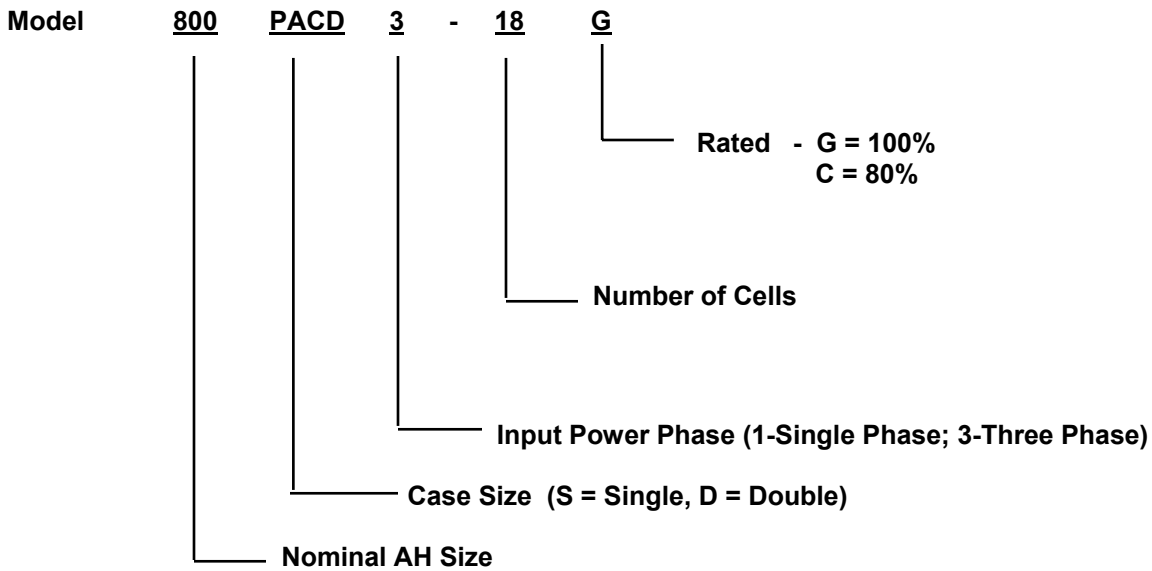
**High Frequency Type
Battery Charger**

DO NOT DESTROY

AMETEK/PRESTOLITE POWER , TROY, OHIO 45373-1099, U.S.A.

NOTE: Information regarding obtaining additional copies of this manual is located in the Introduction chapter of this manual.

A battery charger is identified by model number. Incorporated into the model number is the ampere-hour capacity, case size, input power phase, and number of cells in battery for which charger is intended. The following example explains the basic model numbering arrangement.



NOTE: This information is required for ordering certain replacement/service parts.

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INTRODUCTION

How To Use This Manual

IMPORTANT: It is especially important that all charger internal components be kept clean and dry, and all electrical connections tightened as instructed in the Maintenance chapter of this manual. Replace any precautionary or instruction label that cannot be easily read.

Throughout this manual, the words **WARNING**, **CAUTION**, and **NOTE** may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized as follows:

WARNING gives information regarding possible personal injury. Warnings will be enclosed in a box such as this.

CAUTION refers to possible equipment damage. Cautions will be shown in bold type.

NOTE offers helpful information concerning certain operating procedures. Notes will be shown in italics.

Equipment Identification

The unit's identification number (specification, model, serial number) usually appears on a nameplate attached to the front panel.

Receipt Of Equipment

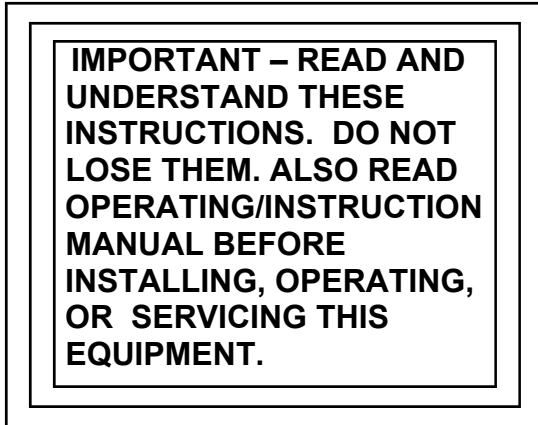
When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to the company shown on the cover of this manual. Include all equipment identification numbers and group part numbers (if any) as described above along with a full description of the parts in error.

Move the equipment to the site of installation before uncrating. Use care to avoid damaging the equipment when using bars, hammers, etc., to uncrate the unit.

Additional copies of this manual may be purchased by contacting the company shown on the cover of this manual. Include the Owner's Manual number and equipment identification numbers.

SAFETY INSTRUCTIONS AND WARNINGS

FOR OPERATION OF BATTERY CHARGING EQUIPMENT



A. General

Battery charging products can cause serious injury or death, or damage to other equipment or property, if the operator does not strictly observe all safety rules and take precautionary actions.

Safe practices have developed from past experience in the use of charging equipment. These practices must be learned through study and training before using this equipment. Anyone not having extensive training in battery charging practices should be taught by experienced operators.

Only qualified personnel should install, use, or service this equipment.

B. Shock Prevention

Bare conductors, or terminals in the output circuit, or ungrounded, electrically-live equipment can fatally shock a person. To protect against shock, have competent electrician verify that the equipment is adequately grounded and learn what terminals and parts are electrically HOT.

The body's electrical resistance is decreased when wet, permitting dangerous current to flow through the body. Do not work in damp area without being extremely careful. Stand on dry rubber mat or dry wood and use insulating gloves when dampness or sweat cannot be avoided. Keep clothing dry.

1. Installation and Grounding of Electrically Powered Equipment – Electrical equipment must be installed and maintained in accordance with the National Electrical Code, NFPA 70, and local codes. A power disconnect switch must be located at the equipment. Check nameplate for voltage and phase requirements. If only 3-phase power is available, connect *single-phase* equipment to only two wires of the 3-phase line. DO NOT CONNECT the equipment grounding conductor (lead) to the third live wire of the 3-phase line as this makes the equipment frame electrically HOT, which can cause a fatal shock.

If a grounding lead (conductor) is part of the power supply cable, be sure to connect it to a properly grounded switch box or building ground. If not part of the supply cable, use a separate grounding lead (conductor). Do not remove a ground prong from any plug. Use correct mating receptacles. Check ground for electrical continuity before using equipment.

The grounding conductor must be of a size equal to or larger than the size recommended by Code or in this manual.

2. Charging Leads – Inspect leads often for damage to the insulation. Replace or repair cracked or worn leads immediately. Use leads having sufficient capacity to carry the operating current without overheating.
3. Battery Terminals – Do not touch battery terminals while equipment is operating.
4. Service and Maintenance – Shut OFF all power at the disconnect switch or line breaker *before* inspecting, adjusting, or servicing the equipment. Lock switch OPEN (or remove line fuses) so that the power cannot be turned ON accidentally. Disconnect power to equipment if it is to be left unattended or out of service.

Disconnect battery from charger.

Keep inside parts clean and dry. Dirt and/or moisture can cause insulation failure. This failure can result in high voltage at the charger output.

C. Burn and Bodily Injury Prevention

The battery produces very high currents when short circuited, and will burn the skin severely if in contact with any metal conductor that is carrying this current. Do not permit rings on fingers to come in contact with battery terminals or the cell connectors on top of the battery.

Battery acid is very corrosive. Always wear correct eye and body protection when near batteries.

D. Fire and Explosion Prevention

Batteries give off explosive flammable gases which easily ignite when coming in contact with an open flame or spark. Do not smoke, cause sparking, or use open flame near batteries. Charge batteries only in locations which are clean, dry, and well ventilated. Do not lay tools or anything that is metallic on top of any battery. All repairs to a battery must be made only by experienced and qualified personnel.

E. Arcing and Burning of Connector

To prevent arcing and burning of the connector contacts, be sure the charger is OFF before connecting or disconnecting the battery. (If the charger is equipped with an ammeter, the ammeter should not indicate current flow.) Always connect battery before turning charger ON.

F. Medical and First Aid Treatment

First aid facilities and a qualified first aid person should be available for each shift for immediate treatment of electrical shock victims.

EMERGENCY FIRST AID: Call physician and ambulance immediately. Use First Aid techniques recommended by the American Red Cross.

DANGER: ELECTRICAL SHOCK CAN BE FATAL. If person is unconscious and electric shock is suspected, do not touch person if he or she is in contact with charging leads, charging equipment, or other live electrical parts. Disconnect (open) power at wall switch and then use First Aid. Dry wood, wooden broom, and other insulating material can be used to move cables, if necessary, away from person. IF BREATHING IS DIFFICULT, give oxygen. IF NOT BREATHING, BEGIN ARTIFICIAL BREATHING, such as mouth-to-mouth. IF PULSE IS ABSENT, BEGIN ARTIFICIAL CIRCULATION, such as external heart massage.

IN CASE OF ACID IN THE EYES, flush very well with clean water and obtain professional medical attention immediately.

G. Equipment Warning Labels

Inspect all precautionary labels on the equipment. Order and replace all labels that cannot be easily read.

DESCRIPTION OF EQUIPMENT

Charger

The basic charging circuit is the MOSFET based converter with isolating transformer. This design regulates charging current by allowing the battery to determine its own charge cycle rate in accordance with its state of discharge. It provides an I-E-I charge curve that eliminates the possibility of over-charging, even with line voltage variations of $\pm 10\%$. The charger is internally protected from overload and short circuits.

The charger is available in 100% (G) and 80% (C) rated versions. Charge times are dependent on the charge grade setting as shown below.

Batteries of smaller or larger ampere-hour capacities can also be charged, but will require shorter or longer charging, respectively.

Ratings	BCI Code	Discharge Level	Charge Time
G	100D6C8	100%	8 Hrs.
C	80D6C8	80%	8 Hrs.

Charge Control

The built in charge control utilizes either a voltage/time (VT) charge termination or a dV/dT charge termination technique which eliminates excessive gassing returning approximately 107% to 110% of the amp-hours removed from the battery. Features of the control include auto start/stop, manual equalize, manual stop, back-up timer protection, high and low battery voltage discrimination, AC power fail recovery, selectable output profiles.

The 3 LEDs on the front panel indicate the status of a normal charge cycle. The "80% Charged" LED will light when the battery current is reduced to approximately 8.2 amps per 100 AH of battery rating. The battery voltage at the 80% charged point will vary with charge profile setting. The "Charge Complete" LED will light only if the battery has completed the charge cycle and is ready for use. All three LEDs will flash if the charger terminates a charge prematurely. See the Troubleshooting chapter of this manual to determine the cause of the fault.

WARNING: Do not connect a battery to this charger if any LED is lit. Do not disconnect a battery from this charger while a charge is in progress. Otherwise, arcing and burning of connector parts or a battery explosion may result. Batteries produce explosive gases. Keep sparks, flame, and cigarettes away. Ventilate when charging in an enclosed area. Always shield eyes when working near batteries.

INSTALLATION

Location

For best operating characteristics and longest unit life, take care in selecting an installation site. Avoid locations exposed to high humidity, dust, high ambient temperature, or corrosive fumes. Moisture can condense on electrical components, causing corrosion or shorting of circuits (especially when dirt is also present).

Adequate air circulation is needed at all times in order to assure proper operation. Provide a minimum of 12 inches of free air space at top bottom and left side of the unit.

Make sure that ventilation openings are not obstructed.

Always remove shipping material from the unit before installation. The charger must be installed over a noncombustible surface such as concrete or metal. Keep the charging area clear of all combustible material such as wood, paper, and cloth. When moving the charger after the packing skid and box have been removed, make sure that lifting forks do not damage the charger panels or cables.

WARNING: SPARKS OR MOLTEN METAL falling through charger openings can cause fire or explosion.

- Install over noncombustible material such as concrete or metal.
- Keep charging area clear of combustible material.

Environmental Characteristics

Operating Characteristics	0°C to 40°C (32°F to 104°F)
Operating Altitude	To 2000 Meters (6562 Feet)
Operating Humidity	80% up to 31°C, decreasing to 50% at 40°C, non-condensing 80% up to 88°F decreasing to 50% at 104°F, non-condensing

Grounding

The frame of the power source must be grounded for personnel safety. Where grounding is mandatory under state or local codes, it is the responsibility of the user to comply with all applicable rules and regulations. Where no state or local codes exist, it is recommended that the National Electrical Code be followed.

In addition to the usual function of protecting personnel against the hazard of electrical shock due to fault in the equipment, grounding serves to discharge the static electrical charges which tend to build up on the surfaces of equipment. These static charges can cause painful shock to personnel, and can lead to the erroneous conclusion that an electrical fault exists in the equipment.

If a charger is to be connected to the AC power supply with a flexible jacketed cable, one having a separate grounding conductor should be used. When included in cable assembly, grounding conductor will be green, green with a yellow stripe, or bare. When connecting input power to charger (as instructed in Line Connection to Battery Charger section of this manual), connect grounding conductor to equipment grounding terminal (stud with a green nut and a cup washer and identified by symbol \equiv), taking care to make a good electrical connection. Connect other end of grounding conductor to the system ground.

If, for any reason, an input cable which does not include a grounding conductor is used, the equipment must be grounded with separate conductor. Minimum size and color coding requirements must be in accordance with any applicable state or local code, or the National Electrical Code.

If metallic armored cable or conduit is used, the metal sheathing or conduit must be effectively grounded as required by state or local code, or the National Electrical Code.

If a system ground is not available, the charger frame must be connected to a driven ground rod (at least 8 ft [2438 mm] long), or to a water pipe that enters the ground not more than 10 ft (3048 mm) from the charger. A grounding conductor must be connected to the rod or pipe in a manner that will assure a permanent and effective ground. The conductor must be sized in accordance with any applicable state or local code, or by the National Electrical Code. If in doubt, use the same size conductor as is used for the conductors supplying power to the charger.

WARNING: ELECTRIC SHOCK HAZARD – Under no circumstance should you use a grounding conductor with a current carrying capacity less than the ampere rating shown in Table 4-1.

LINE AMPS	DISCONNECT SWITCH *	BRANCH FUSE SIZE (AMPERES)	COPPER CABLE SIZE AWG **	
			POWER	GROUND
0-2.5	30A	5	No. 14	No. 14
2.6-4.5	30A	7	No. 14	No. 14
4.6-7.5	30A	10	No. 14	No. 14
7.6-12	30A	15	No. 14	No. 14
12.1-16	30A	20	No. 12	No. 12
16.1-18	30A	25	No. 10	No. 10
18.1-22	30A	30	No. 10	No. 10
22.1-24.5	60A	35	No. 8	No. 10
24.6-32.5	60A	40	No. 8	No. 10
32.6-40	60A	50	No. 8	No. 10
40.1-45	60A	60	No. 6	No. 10
45.1-57.5	100A	80	No. 4	No. 8
57.6-78	100A	100	No. 2	No. 8
78.1-102.5	200A	125	No. 2	No. 6
102.6-135	200A	150	No. 1/0	No. 6

Table 4-1 Recommended AC Input and Branch Fusing

The above table (Table 4-1) is based on 75°C (167°F) rated conductors and 40°C (104°F) ambient temperatures. Refer to National Electrical Code (2008) Tables 310-16 corrected to 40°C (104°F).

* For 115, 208, and 230-volt lines, use 250-volt disconnect switch.
 For 440-480, 575-volt lines, use 600-volt disconnect switch.

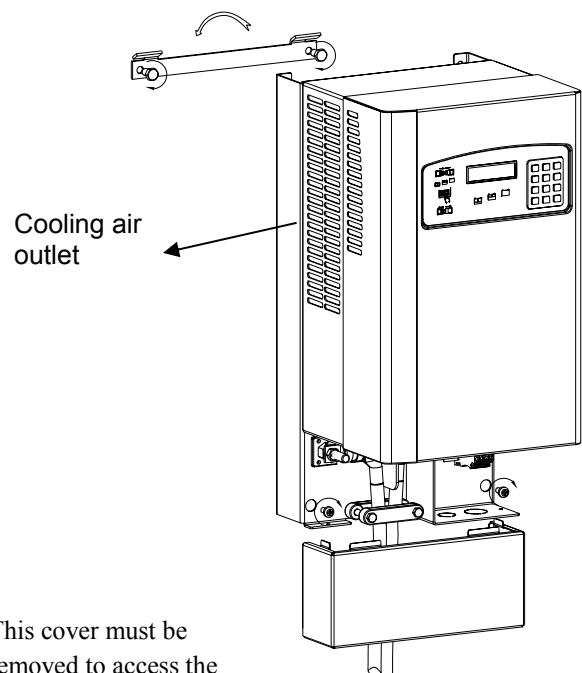
** Two conductors and ground conductor required for single phase.
 Three conductors and ground conductor required for three phase.

Recommended minimum size of grounding conductors (based on National Electrical Code 2008– Table 250-95).

Line Connections to Battery Charger

Follow local code requirements if different than instructions in this manual.

1. Turn charger OFF.
2. Be sure charger is connected correctly for available line voltage as instructed above.
3. On charger nameplate, note the AC input amperes corresponding to the line voltage to which charger is to be connected. Use that ampere value to select the proper disconnect switch, fuse, and power cable sizes from Table 4-1.



4. Route AC power input cable in through knock-out provided in the side panel of charger cabinet. Securely fasten cable wires to a power input terminal inside charger. Refer to Grounding section of this manual for proper connection of grounding conductor.
5. With disconnect switch (on AC input power line) in "OPEN" or "OFF" position, connect power cable coming from charger, to the switch. Install fuses in switch.

Charging Cable Connectors

If connectors are already attached to charging cables, make sure that they're attached so that positive charger polarity will connect to positive battery terminal.

If connectors must be attached to charging cables, follow instructions supplied with connectors.

CAUTION: Make sure connectors are securely attached to cables (good solder joint or well tightened set screws, whichever is applicable). Be certain that positive charger cable will connect to positive battery terminal. If necessary, trace cables into charger and use supplied connection diagram to determine polarity. The use of a DC voltmeter may show polarity. Improper connections will "blow" output fuse and may cause other damage.

Note: If this charger is equipped with certain optional features, the connector attaching procedure may be modified.

Pre-operation Checks

1. Inspect charger thoroughly for damage; loose screws, nuts, or electrical connections.

WARNING: ELECTRICAL SHOCK HAZARD – Before inspecting or cleaning inside cabinet, turn OFF and remove fuses of disconnect switch (supplying AC power to charger) and disconnect battery.

2. Remove all special tags that are tied to charger. Keep tags with this manual for future reference. Leave all precautionary and instruction labels in place on charger. Carefully read and follow instructions on all tags and labels. Make sure all labels remain visible to anyone operating charger.
3. Make sure all charger cabinet panels are fastened in place, to assure proper flow of ventilating air through cabinet.

OPERATION

NOTE: If this charger is equipped with certain optional features, the operating procedure may be modified.

Preliminary

1. Make sure that charger is installed and grounded as instructed in this manual.
2. Turn on main fused disconnect switch that supplies AC power to charger.
3. Maintain electrolyte level in batteries to be charged, as instructed by battery manufacturer. The volume of electrolyte will expand during the charge. Therefore, to avoid overfilling, do not add water until the battery has received at least an 80% charge. This will usually be reached at the time gassing starts.

Normal or Daily Charge

WARNING: DO NOT connect a battery to this charger if any LED is lit. Do not disconnect a battery from this charger while a charge is in progress; otherwise, arcing and burning of connector parts or a battery explosion may result. Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate when charging in an enclosed area. Always shield eyes when working near batteries.

1. Insure that battery size matches the charger. (Number of cells and ampere-hour capacity are within charger nameplate rating.)
2. Securely engage the battery and charger connectors. The Charge in Progress LED will light.
3. After a short ramp up, the charger will reach full output current as demanded by the battery state of charge. The display will indicate charging current.

4. The "80% Charged" LED will light when the battery on charge falls below the 80% charged current level.
5. The charger will automatically turn off and the "Charge Complete" LED will light and display "Charge Complete" when the charge has finished. The light will remain on until the battery is disconnected from the charger.

NOTE: To disconnect battery from charger before charge is complete, first press the "0" keypad key, then disconnect the battery from the charger.

NOTE: While not normally required, the charging rate may be adjusted to compensate for unusual ambient temperature, age of battery, etc. Refer to the control programming section of this manual.

Normally, the required size charger for a given battery is chosen by matching closely the ampere-hour capacity of the battery to the nameplate rating of the charger. A smaller charger can be used to recharge batteries up to 1-1/2 times the charger rating. Charging time will be longer than 8 hours. A higher capacity charger may be used for recharging in less than 8 hours, but care must be taken that the battery temperature does not exceed its manufacturer's recommended limits.

Equalize or Weekend Charge

Batteries may need periodic equalizing to correct for inequalities between cells that result from daily or frequent cycling. An equalizing charge should be given if any of the following conditions exist:

1. The specific gravity of any cell at the end of charge is 20 points less than the average.
2. The on-charge voltage of any cell at the end of charge is 20 mV less than the average.
3. The battery has been stored for 30 days.
4. A large volume of water has been added.

To select an equalize charge:

1. Insure that battery size matches the charger. (Number of cells and ampere-hour capacity are within charger nameplate rating.)
2. Securely engage the battery and charger connectors. The charger will start.
3. After a brief ramp up, the display will indicate charging current.
4. Press the keypad "3" key. The display will read "Equalize". Press the push button again to cancel the equalize charge.

NOTE: The equalize charge cannot be cancelled once the battery reaches the equalize charging period. Press the STOP pushbutton to terminate the charge.

5. The "80% Charged" LED will light when the battery on charge reaches the 80% charged level.
6. The battery reaches the normal charge termination point. However, the battery is charged another 3 hours.
7. The charger will automatically turn off, and the "Charge complete will be displayed on the display.

WARNING: DO NOT connect a battery to this charger if any LED is lit. Do not disconnect a battery from this charger while a charge is in progress; otherwise, arcing and burning of connector parts or a battery explosion may result. Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate when charging in an enclosed area. Always shield eyes when working near batteries.

Battery Discrimination

The PAC Control has the ability to reject batteries with cell sizes that do not match the cell size of the charger. If the battery connected to the charger has an average terminal voltage of greater than 2.35 volts/cell, the charger will not start and all three LEDs will flash and the display will read "High DC Voltage". If the battery voltage eventually falls below 2.35 volts/cell, the control will automatically begin a normal charge sequence.

If the battery connected to the charger has an average terminal voltage of less than 1.70 volts/cell, the charger will not start and all three LEDs will flash and display will read "Low DC Voltage". If the battery voltage eventually rises above 1.75 volts/cell, the control will automatically start a normal charge sequence.

AC Power Fail

During an AC power failure, the charger control stores key information about the charge cycle. The information is retained. This causes the control to resume the charge where it left off when the AC power is returned, virtually unaffected timers and equalize requests.

WARNING: ELECTRICAL SHOCK HAZARD — Before checking electrical components, turn off and remove fuses or disconnect switch (supplying AC power to charger) and disconnect battery.

Abnormal Shutdowns

1. Manual Stop

To turn the charger off during any part of a charge cycle, press the "0" pushbutton. All three LEDs will flash, and the display will read "Manual Stopped".

To restart the charger, disconnect and reconnect the battery. A new charge cycle will begin.

2. Backup Timer Shutdown

A backup timer will shut down the charger and all three LEDs will flash and the display will read "0-80" if the battery on charge does not reach the 80% voltage during the first 9 hours of charging. Likewise, if the control is set to terminate via the dV/dT methodology and the charger does not reach the termination point within 5 hours after reaching the 80% charged level, the charger will shut down and all three LEDs will flash.

WARNING: DO NOT connect a battery to this charger if any LED is lit. Do not disconnect a battery from this charger while a charge is in progress; otherwise, arcing and burning of connector parts or a battery explosion may result. Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate when charging in an enclosed area. Always shield eyes when working near batteries.

3. Battery Disconnect Shutdown

If the battery is disconnected from the charger during a charge cycle, the charger will emit a short beep and shut down. All LEDs will be off.

MAINTENANCE

WARNING: ELECTRICAL SHOCK HAZARD — Before inspecting or cleaning inside cabinet, turn OFF and remove fuses of disconnect switch (supplying AC power to charger) and disconnect battery.

Inspection And Cleaning

For uninterrupted, satisfactory service from this charger, it's necessary to keep unit clean, dry, and well ventilated. At least every three months, or more often as necessary, wipe and blow out all dirt from unit's interior components, with clean, dry air of not over 25 psi (172 kPa) pressure. Use a hand bellows if compressed air isn't available.

Check and tighten the input and output electrical connections as necessary to eliminate unnecessary losses and to avoid subsequent trouble from overheating or open circuits. Check for broken wiring or damaged insulation on wiring.

WARNING: ELECTRICAL SHOCK HAZARD — Failure to keep internal parts clean and dry may allow transformer (s) to short out, causing secondary circuits to carry dangerously high voltage.

Be sure to replace all charger cabinet panels after any servicing, to assure proper flow of cooling air through unit and to protect internal components.

Connect battery to charger and inspect fans for proper operation. Do not operate the charger with non operable fans. Replace fans if faulty.

WARNING: ELECTRICAL SHOCK HAZARD — All cabinet panels must be replaced to protect personnel from contact with hazardous voltages.

Lubrication

None required.

Fuse Replacement

The silicon diodes in this charger are protected by a "fast-clearing" type fuse.

CAUTION: The use of any other type fuse besides the "fast-clearing" type may cause damage to silicon diodes.

TROUBLESHOOTING

Troubleshooting Table

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Charger Doesn't output full rated current.	(1) Make sure Battery is Discharged	7.01	7-4
	(2) Verify Correct AH and I1 programming	7.04	7-4
	(3) Verify proper fan operation	7.03	7-4
	(4) Check for adequate air flow clearance	7.11	7-4
Display Illegible	(1) Low Input Voltage	7.07	7-4
	(2) Bad Control Board	7.05	7-4
Charger Doesn't Respond To Battery Being Connected	(1) Output Fuse Bad	7.08	7-4
	(2) Bad Control Board	7.05	7-4
	(3) Output Cables Reversed	7.09	7-4
	(4) Bad Output Connector	7.10	7-4
Control Not Responding (Locked Up)	(1) Noisy Environment	7.06	7-4
	(2) Low Input Voltage	7.07	7-4
	(3) Power Interruption	7.03	7-4
Unit Smells Hot	(1) Inadequate Ventilation	7.11	7-4
	(2) Ambient Too Hot	7.12	7-4
	(3) Lack of Maintenance	7.13	7-4
	(4) Bad Control Board	7.07	7-4
Battery has Low S. G.'s	(1) Reading Not Temperature Corrected	7.15	7-4
	(2) Bad Battery	7.16	7-4
	(3) Bad Equalize Schedule	7.17	7-4
	(4) Charge Curve Incorrect	7.18	7-4
	(5) Rates Set Incorrectly	7.18	7-4
	(6) Too Cold	7.19	7-4

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Battery Doesn't Last Full Shift	(1) Faulty > Lift Interrupt	7.20	7-5
	(2) Manual Disconnect	7.21	7-5
	(3) A.H. Required > Battery Nameplate	7.22	7-5
	(4) Battery Not Providing Nameplate Rating	7.16	7-4
	(5) Equalize Schedule	7.17	7-5
	(6) Charge Curve Incorrect	7.18	7-5
	(7) Rates Set Incorrectly	7.18	7-5
	(8) Charger Too Small For Battery	7.23	7-5
Battery Water Usage Is Too High	(1) Rates Set Incorrectly	7.18	7-5
	(2) Charge Curve Incorrect	7.18	7-5
	(3) Equalize Schedule	7.17	7-5
Low Number Of A.H.'s Returned To Battery	(1) Faulty Lift Interrupt	7.20	7-5
	(2) Battery Not Fully Discharged	7.24	7-5
	(3) Manual Disconnect	7.21	7-5
	(4) Rates Set Incorrectly	7.18	7-5
	(5) Charge Curve Incorrect	7.18	7-5
	(6) Battery Not Providing Nameplate Rating	7.16	7-4
	(7) Bad Control Board	7.05	7-4
		7.28	7-5
Battery Temperature Too High	(1) Insufficient Cool Down Before And/Or After Charging	7.25	7-5
	(2) Battery Power Demand Too Great	7.26	7-5
	(3) Rates Set Incorrectly	7.18	7-5
	(4) Charge Curve Incorrect	7.18	7-5
	(5) Equalize Schedule	7.17	7-5
Incorrect Charge Rate	(1) Rates Set Incorrectly	7.18	7-5
	(2) Charge Curve Incorrect	7.18	7-5
	(3) Battery A.H. Not Equal To Charger A.H.	7.23	7-5
	(4) Bad Control Board	7.05	7-4
		7.07	7-4

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Doesn't Shutdown When Battery Is Disconnected	(1) Bad Control Board	7.05	7-4
Noisy Unit	(1) Loose Sheet Metal	7.27	7-5
	(2) Bad Fan Bearing	7.28	7-5
	(3) Foreign Object in Fan	7.29	7-5
	(4) Placed On Rack That Makes Noise	7.30	7-5
Erratic Operation	(1) Bad Control Board	7.05	7-4
	(3) Bad Output Cable Connector	7.14	7-4
	(4) Moisture Inside Cabinet	7.31	7-5
	(5) High Ambient Temperature	7.12	7-4

Action

- 7.01** Reference the INSTALLATION chapter (pg. 4-1).
- 7.02** Disconnect AC power and replace the bad AC fuse. Reapply AC power to the charger. If the fuse (s) blows instantly, Call your local PRESTOLITE POWER representative.
- 7.03** Disconnect and reapply AC power to reset control.
- 7.04** With the display reading "Connect Battery" press * #. AH reading should match charger nameplate. If the value displayed does not match the nameplate, call your local PRESTOLITE POWER representative
- 7.05** To check the Control Board for proper operation, verify that the board responds to pressing the * and # keys by changing the display. If the display does not operate or respond to keyboard entries replace the board.
- 7.06** Temporarily shut down any equipment on the same voltage supply line and see if the charger starts to respond normally. If the charger does, then check all grounds going to the equipment that is shut down. If the problems still exist, then return power to all the other equipment and call your local PRESTOLITE POWER Representative.
- 7.07** Measure the AC supply voltage coming into the charger to confirm that it matches the charger input voltage rating.
- 7.08** Use an Ohmmeter and measure directly across the DC Fuse. A good fuse will measure almost (0) Ohms and a bad one will measure a very high resistance, in the megohm range or greater. If for some reason a DC Fuse measures somewhere in between, replace the DC Fuse and send it in to your local PRESTOLITE POWER Representative.
- 7.09** Remove the three screws that retain input/output connection cover. The black (Negative) output cable goes into the charger and connects to a stud terminal. The red (Positive) output cable goes into the charger and connects to the charger DC fuse at a similar stud terminal. The charger case is marked with (+) and (-) symbols. The output connector will have a (+) and (-) symbol on it. The (+) terminals should have the red output cable connected to them, and the (-) should have the black output cable connected to them.
- 7.10** Make sure the output connector does not have any cracks on its casing that could result in a short. Make sure the output cable lugs are making a good connection with the battery connector. You will see traces of pitting on the lug surface from arcing if there isn't a good connection. This could be the result of a weak retainer clip in the connector or lugs that were soldered on incorrectly. If the lugs had too much heat applied to them when the cables were soldered on, the solder will wick up the cable and make it very stiff. When they are inserted into the connector, the stiff cable forces the retainer clip down and creates poor connection between the battery connector and the charger connector.
- 7.11** Refer to the INSTALLATION chapter and go to the paragraph labeled "LOCATION". This will define the guide lines. If a charger has inadequate ventilation, many different problems can occur. Also see the outline dimensions drawing located near the end of this manual for a detailed layout. If a charger runs under extreme temperatures, the output current will automatically be reduced.
- 7.12** An extremely high ambient temperature can cause many different problems. If a charger runs under extreme temperatures, the output current will automatically be reduced.
- 7.13** Refer to the MAINTENANCE chapter in the manual. Electrical parts tend to attract dust and dirt after a long period of time, which can cause parts to fail prematurely.
- 7.14** Remove the three screws that retain the input/output cover. Visually inspect for loose connections on the input and output terminals. Repair or replace any darkened or cracked components and insulation.
- 7.15** Specific Gravity readings vary with the temperature of the electrolyte. To temperature correct the Specific Gravity readings to match the nameplate ratings of the battery, use the following rule of thumb; + 1 S.G. point per 3 degrees F that the electrolyte temperature exceeds 77 degrees F.
- 7.16** Take Specific Gravity readings and measure Cell Voltages. If acid has been spilled or the battery has been extremely heated, it is possible that a battery's capacity could be greatly reduced, and the acid is not capable of increasing to the battery nameplate rating.

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TROUBLESHOOTING

7.17 The proper equalize schedule is one that is tailored to the specific battery and charger operation. The Control Auto Equalize feature can be used to automate the equalize schedule (See the Control Owner's manual).

Excess equalizing causes increased water usage. Too little or no equalizing can lead to battery sulfation and/or decrease battery shift run times. Adjusting the auto equalize number of cycles can improve the equalize performance. Some operations may also benefit from day of week equalizing. This can be programmed by the Auto EQ type function of the control .

7.18 Using the charge algorithm menu verify the proper curve type, battery cells and AH settings.

7.19 If battery electrolyte temperatures are well below 32 degrees F, the charger will not be able to adequately charge the battery. Battery insulation or heaters would be required to keep the battery electrolyte temperatures close to 32 degrees F or above.

7.20 A faulty lift interrupt on a lift truck can cause the battery to be over or under discharged. Check the interrupt voltage of the interrupt following the procedures found in your truck and/or lift interrupt operator's manual (s).

7.21 Repeated manual disconnecting of the battery from the charger before charge complete can cause long term battery damage and lead to inefficient truck/battery/charger operations. When it is necessary to stop the charge cycle before charge complete *always terminate the charge cycle by pressing the 0 key before disconnecting the battery from the charger.*

7.22 If the application requires a larger AH battery than is presently in use, the only long term solution is to replace the battery with one of the proper AH rating.

7.23 The charger is capable of charging batteries of somewhat larger AH capacities (up to a maximum of 20%) than it's nameplate rating, if increased time is allowed. When charging oversize batteries, be sure to allow the battery time to reach charge complete.

7.24 If fully discharged batteries are desired for efficient operations, lift interrupts can be installed on the trucks to allow the operators to recognize a fully discharged battery.

7.25 If battery temperatures are elevated, cool down time should be allowed either before or after charging. Time allowed should be proportional to the amount of cooling required.

7.26 Battery is being discharged at too high (fast) of a rate. Consult the battery manufacturer or distributor for applications assistance.

7.27 Check and tighten all sheet metal fasteners (screws and bolts).

7.28 Contact your local PRESTOLITE POWER representative for fan replacement and repair.

7.29 Disconnect the unit from AC power and the battery. Gain access to the rear of the charger and remove foreign object. Inspect fan for physical damage and reconnect the charge to AC power and a battery. Confirm proper fan operation.

7.30 Check for and tighten any loose fasteners on the rack. Remove any lightweight loose objects that are on the rack near the charger.

7.31 Disconnect the charger from the battery and the input AC. Blow out the charger with compressed air, and allow the unit to set unused for 1 to 2 weeks in a warm dry environment (as hot as possible, up to 104 degrees F) and dry as possible.

PROGRAMMING

8.0 Programming

8.1 Equalize Programming

The charger is capable of 4 types of Equalize charging. Off (0), Automatic by complete cycle count (1), Automatic by day of week (2), and Manual (3). To program the equalize function press the * key until the display reads "Connect Battery" and follow the key sequence below:

2451

###

Enter Equalize type 0=off, 1=auto by cycle, 2= auto by DOW, 3= manual

#

Enter Equalize by cycle count, 1 to 30

#

Enter Equalize Day, 1 to 7 (1 = Monday)

#

Press * Key until "Connect Battery" is displayed.

8.2 Time of Day Blockout

To program Time of Day Blockout, which will prevent the charger from running and consuming significant power during the programmed time each day, press the * key until the display reads "Connect Battery" follow the key sequence below:

2451

#####

Enter the beginning time of the blockout period (24 hour time),

#

Enter the end time of the blockout period (24 hour time),

#

Press * Key until "Connect Battery" is displayed.

8.3 Extra Charging Time (Refresh Charging)

To program extra charging time on the first day after the weekend break, press the * key until the display reads "Connect Battery" follow the key sequence below:

2451

#####

Enter the extra charging weekday, 1 to 7 (1 = Monday),

#

Enter the extra charging start time, (24 hour time),

#

Press * Key until "Connect Battery" is displayed.

8.4 Delayed Start

To program a delay between the connection of the battery and charger start (Delayed Start), press the * key until the display reads "Connect Battery" and follow the key sequence below:

2451

#####

Enter the required delay time (HH:MM)

#

Press * Key until "Connect Battery" is displayed.

8.5 Display Language

To program the charger display language, press the * key until the display reads "Connect Battery" or "Connector Bat." and follow the key sequence below:

2451

#####

Enter the desired language (0 = English, 1 = French)

#

Press * Key until "Connect Battery" is displayed.

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PROGRAMMING**

8.6 Time, Date, Day of Week and Year
To program the correct time, date, day of week and year into the charger, press the * key until the display reads "Connect Battery" and follow the key sequence below:

2451

#

Enter the correct time (HH:MM)

#

Enter the correct date (MM-DD)

#

Enter the correct day of week
(1 thru 7, 1 = Monday)

#

Enter the correct year (YYYY)

#

Press * Key until "Connect Battery" is displayed.

8.7 Charging Algorithm
To program the desired charging algorithm, press the * key until the display reads "Connect Battery" and follow the key sequence below:

2451

#####

Enter the desired charge profile (algorithm) code from the table below (XX-XX)

Curve	Name	Code	Description
FLD100	LK02-01	0201	Flooded LA 100%
DSG100	LK02-02	0202	Deka Gel 100%
SLR100	LK02-03	0203	AGM Sealed 100%
SLE100	LK02-04	0204	Energys Gel 100%
FLD80	LK02-05	0205	Flooded LA 80%
DSG80	LK02-06	0206	Deka Gel 80%
SLR80	LK02-07	0207	AGM Sealed 80%
SLE80	LK02-08	0208	Energys Gel 80%

#

Press * Key until "Connect Battery" is displayed.

8.8 Battery Size and Charging Factor
To program the desired battery size (must be within the capacity of the charger nameplate rating), press the * key until the display reads "Connect Battery" and follow the key sequence below:

2451

*

#

Enter battery capacity (AH rating)

#

Enter battery cells

#

Enter desired charging factor
(7% is highly recommended)

#

Press * Key until "Connect Battery" is displayed.

8.9 High and Low Battery Reject

To enter the desired high and low battery reject levels, press the * key until the display reads "Connect Battery" and follow the key sequence below:

2451

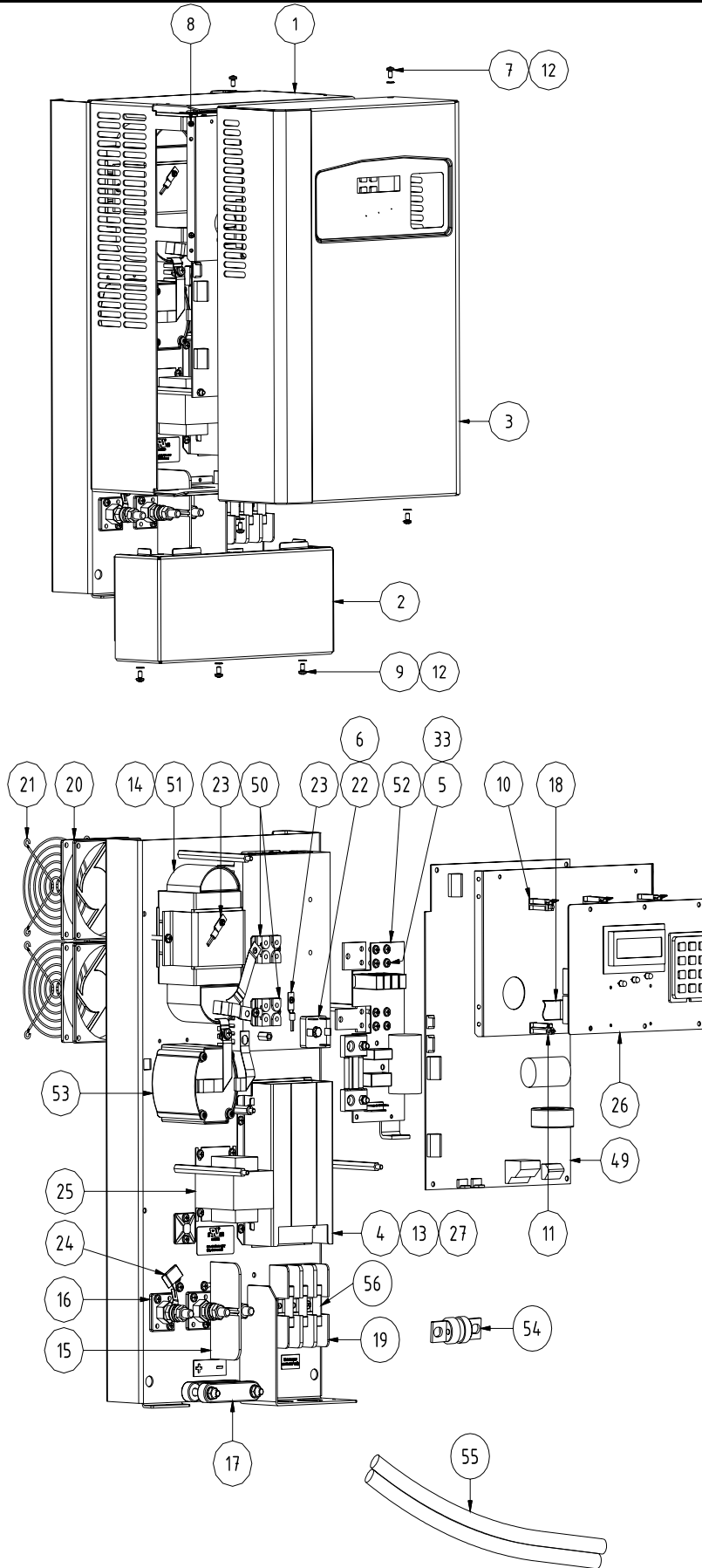
##

Enter lower start limit X.XX Volts/Cell

#

Enter upper start limit X.XX Volts/Cell

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PARTS LIST



Item	Description	Part no.
1	Collar	MTMHF.11.02.035
2	Cover ,electrical compartment	MTMHF.11.09.002
3	Front cover	MTMHF.11.09.005
4	Casing, EMC line filter	MTMHF.11.22.002
5	Screw M4x10 Torx	MTMHF.14.29.016
6	Screw M4x20 Torx	MTMHF.14.29.018
7	Screw RTS ST4,2x9,5 Torx	MTMHF.14.30.007
8	Screw, thread rolling, M3x6 Torx (Taptite or equiv.)	MTMHF.14.64.006
9	Screw, thread rolling, M4x8 Torx (Taptite or equiv.)	MTMHF.14.64.012
10	Plastic stand, 30 mm, lock	MTMHF.14.80.030
11	Plastic stand, 30 mm, hinge	MTMHF.14.80.031
12	Tooth lock washer M4	MTMHF.16.02.002
13	Insulation paper	MTMHF.17.23.001
14	Rubber pad	MTMHF.17.14.023
15	Separation wall for M8-studs	MTMHF.24.10.008
16	M8 stud	MTMHF.85.20.012
17	Strain relief, half	MTMHF.25.02.013
18	Ribbon cable 14-way	MTMHF.29.35.029
19	Fuse holder	MTMHF.30.07.018
20	Cooling fan 12VDC 92x92mm	MTMHF.38.01.010
21	Fan guard, metal	MTMHF.38.01.022
22	3-phase rectifier 26A/1600V	MTMHF.43.40.028
23	Thermistor	MTMHF.46.37.010
24	EMC-Capacitor	MTMHF.85.35.002
25	Aux transformer 480/22V	MTMHF.59.01.034
26	Controller board MTM-HF	MTMHF.80.01.177
27	EMI filter board 480VAC	MTMHF.80.01.210
28	Wire line filter (not shown)	MTMHF.81.01.209
29	Wire +/- (not shown)	MTMHF.81.01.216
30	Wire filter-prim board (not shown)	MTMHF.81.01.218
31	Wire filter-rectifier (not shown)	MTMHF.81.12.217
32	Insulation washer (not shown)	MTMHF.16.10.011
33	Crinkle washer (not shown)	MTMHF.16.07.001

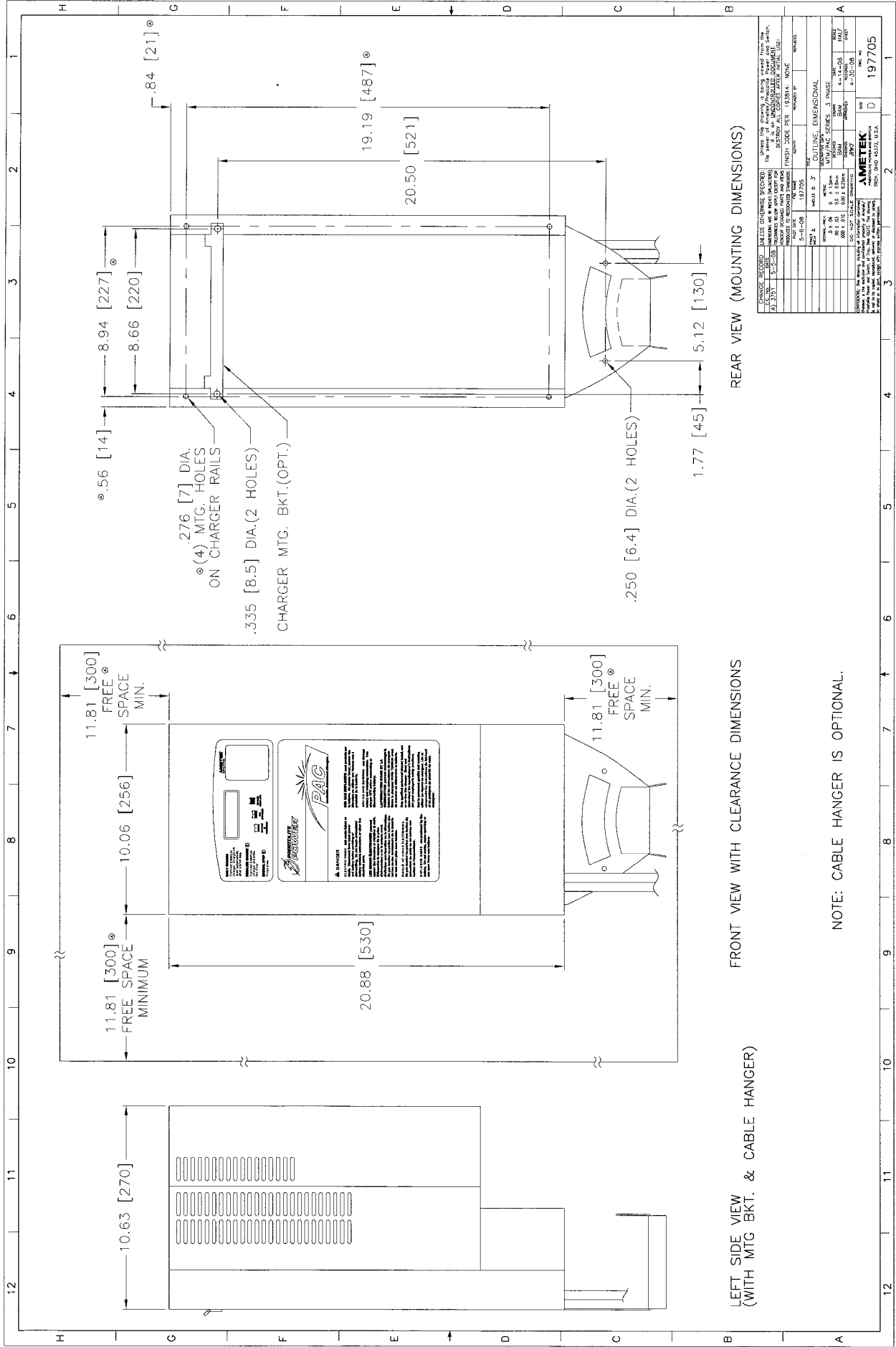
Item	Description	925PACS3-12G 1050PACS3-12C	1050PACS3-12G 1200PACS3-12C	600PACS3-18G 700PACS3-18C	800PACS3-18G 900PACS3-18C	925PACS3-18G 1050PACS3-18C	1050PACS3-18G 1200PACS3-18C
49	Primary circuit board	197834	197835	197836	197837	197838	197839
50	Rectifier diode	MTMHF.43.01.057	MTMHF.43.01.057	MTMHF.43.01.057	MTMHF.43.01.057	MTMHF.43.01.057	MTMHF.43.01.057
51	Main Transformer	MTMHF.59.05.012	MTMHF.59.05.012	MTMHF.59.05.012	MTMHF.59.05.012	MTMHF.59.05.012	MTMHF.59.05.012
52	Secondary board	MTMHF.85.40.004	MTMHF.85.40.004	MTMHF.85.40.004	MTMHF.85.40.004	MTMHF.85.40.004	MTMHF.85.40.004
53	Inductor	MTMHF.58.01.025	MTMHF.58.01.025	MTMHF.58.01.025	MTMHF.58.01.025	MTMHF.58.01.025	MTMHF.58.01.025
54	DC output fuse	Y1890-005	Y1890-6	Y1890-4	Y1890-5	Y1890-5	Y1890-6
55	DC output cables	396263-127	396263-127	396263-126	396263-127	396263-127	396263-127
56	AC input fuse	197087-008	197087-010	197087-008	197087-010	197087-012	197087-015

Item	Description	500PACS3-24G 550PACS3-24C	600PACS3-24G 700PACS3-24C	800PACS3-24G 900PACS3-24C	375PACS3-40G 425PACS3-40C	500PACS3-40G 550PACS3-40C
49	Primary circuit board	197840	197841	197842	197843	197844
50	Rectifier diode	MTMHF.43.01.056	MTMHF.43.01.056	MTMHF.43.01.056	MTMHF.43.01.056	MTMHF.43.01.056
51	Main Transformer	MTMHF.59.05.013	MTMHF.59.05.013	MTMHF.59.05.013	MTMHF.59.05.011	MTMHF.59.05.011
52	Secondary board	MTMHF.85.40.003	MTMHF.85.40.003	MTMHF.85.40.003	MTMHF.85.40.006	MTMHF.85.40.006
53	Inductor	MTMHF.58.01.025	MTMHF.58.01.025	MTMHF.58.01.025	MTMHF.58.01.026	MTMHF.58.01.026
54	DC output fuse	Y1890-003	Y1890-004	Y1890-005	Y1890-003	Y1890-003
55	DC output cables	396263-126	396263-126	396263-127	396263-126	396263-126
56	AC input fuse	197087-008	197087-012	197087-015	197087-012	197087-015

Item	Description	500PACS3-12G	600PACS3-12G	750PACS3-12G
49	Primary circuit board	197924	197925	197926
50	Rectifier diode	MTMHF.43.01.057	MTMHF.43.01.057	MTMHF.43.01.057
51	Main Transformer	MTMHF.59.05.012	MTMHF.59.05.012	MTMHF.59.05.012
52	Secondary board	MTMHF.85.40.004	MTMHF.85.40.004	MTMHF.85.40.004
53	Inductor	MTMHF.58.01.025	MTMHF.58.01.025	MTMHF.58.01.025
54	DC output fuse	Y1890-003	Y1890-4	Y1890-4
55	DC output cables	396263-126	396263-126	396263-126
56	AC input fuse	197087-008	197087-008	197087-008

DIAGRAMS

Model no. Information	OUTLINE DIMENSION
PHASE	
1	197705
3	197705
See model number description inside front cover.	





WARRANTY

AMETEK/PRESTOLITE POWER "ECLIPSE" and "ECLIPSE PLUS" INDUSTRIAL BATTERY CHARGERS

Ametek/Prestolite Power (hereinafter called "Prestolite") warrants that each new and unused Industrial Battery Charger manufactured and supplied by it is of good workmanship and is free from any inherent mechanical defects, provided that (1) the product is installed and operated in accordance with generally accepted industrial standards and in accordance with the printed instructions of Prestolite, (2) the product is used under normal conditions for which designed, (3) the product is not subjected to misuse, negligence or accident, and (4) the product receives proper care, protection and maintenance under supervision of competent personnel. This warranty is subject to the following provisions:

1. **PRODUCT AND PARTS WARRANTED.** Subject to the exceptions listed below each Industrial Battery Charger is warranted for a specific period of time commencing from the date of it's shipment by Prestolite, provided the charger is used in accordance with Prestolite's published performance rating for the unit involved. The exceptions to this warranty are as follows:

a) Terms and conditions for warranty coverage:

FULL COVERAGE - LABOR, TRAVEL, MILEAGE & PART REPLACEMENT	1-year
ELECTRONICS, ELECTRONIC MODULES (EXCLUDING KEY PAD) (REPLACEMENT ONLY)	2-years additional
TRANSFORMER (REPLACEMENT ONLY)	9-years additional
TOTAL WARRANTY TERM (YEARS)	10-years

b) **Warranty Expense Limitation:** The maximum warranty expense Prestolite will incur for any Battery Charger will be limited to the original purchase price of the Battery Charger.

c) Primary switch contacts, fuses, bulbs and filters are not warranted unless found to be defective prior to use.

- COMMENCEMENT OF WARRANTY TIME PERIODS.** The warranty periods indicated in the Warranty Schedule shall commence on the date of shipment by Prestolite.
- PERSONS COVERED BY WARRANTY.** Prestolite extends this warranty only to the purchaser of new equipment from Prestolite or one of its authorized distributors. The products purchased under this agreement shall be used exclusively by the buyer and its employees and by no other persons; and therefore there shall be no third party beneficiary to this warranty.
- LIMITATION OF REMEDY.** The existence of claimed defects in any product covered by this warranty is subject to Prestolite's factory inspection and judgement. Prestolite's liability is limited to repair of any defects found by Prestolite to exist or, at Prestolite's option, the replacement of the defective product F.O.B. factory after the defective product has been returned by the purchaser at its expense to Prestolite's shipping place. Replacement and exchange parts will be warranted for the remainder of the original Industrial Battery Charger Warranty or for a period of ninety (90) days, whichever is greater.
- USE OF DEFECTIVE PRODUCT.** Continued use of an Industrial Battery Charger after discovery of a defect VOIDS ALL WARRANTIES.
- ALTERED EQUIPMENT.** Except as authorized in writing, the warranty specified does not cover any equipment that has been altered by any party other than Prestolite.

THIS WARRANTY IS GIVEN AND ACCEPTED IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OTHER THAN AS EXPRESSLY SET FORTH HEREIN. IN NO EVENT SHALL PRESTOLITE BE LIABLE FOR ANY ANTICIPATED OR LOST PROFITS, SPECIAL, DIRECT, INDIRECT OR INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, TIME CHARGES OR OTHER COMMERCIAL EXPENSES OR LOSSES, AND BUYER ASSUMES ALL RISK AND LIABILITY RESULTING FROM USE OF THE GOODS. PRESTOLITE DOES NOT AUTHORIZE ANY REPRESENTATIVE OR OTHER PERSON TO ASSUME ON BEHALF OF PRESTOLITE ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OR USE OF THE GOODS SOLD, AND THERE ARE NO ORAL AGREEMENTS OR WARRANTIES COLLATERAL TO OR AFFECTING THIS WRITTEN WARRANTY.

WARNING

At all times, safety must be considered an important factor in the installation, servicing and operation of the product and skilled, qualified technical assistance should be utilized.

AMETEK/PRESTOLITE POWER - TROY, OHIO USA

Data Sheet: 1157
Index: 060110
Replaces: 080708