

OWNER'S MANUAL 193111-035

Revised December 5, 2000

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

AC500

CHARGE CONTROL

DO NOT DESTROY

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

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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. Replace any precautionary or instruction label that cannot be easily read.

To ensure safe operation, read the entire manual, including the chapter on Safety Instructions and Warnings.

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.

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SAFETY INSTRUCTIONS AND WARNINGS

FOR OPERATION OF BATTERY CHARGING EQUIPMENT

IMPORTANT – READ AND UNDERSTAND THESE INSTRUCTIONS. DO NOT LOSE THEM. ALSO READ OPERATING/INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING, OR SERVICING THIS 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.

INITIAL SET-UP & DESCRIPTION

Set-Up

See Location Diagram of Selector Switches included in this manual.

For proper operation, the AC500 Control must be set to match the charger in which it is installed.

Cell Size Selection

From the data plate on the charger, note the number of cells. Place the corresponding DIP switch (S1) on the AC500 Control in the "ON" position.

S1-1	6 Cells
S1-2	12 Cells
S1-3	18 Cells
S1-4	24 Cells
S1-5	36 Cells
S1-6	Unique Part Number

Only one of the above DIP switches should be in the "ON" position at any one time.

80% Charged Voltage

Switch S1-7 can be used to adjust the 80% charged voltage.

S1-7	80% Charged Voltage
off	2.37 volts/cell
on	2.45 volts/cell

Termination Type

Switch S1-8 can be used to select either dV/dT charge Termination or VT.

S1-8	Termination Type
off	dV/dT
on	VT

Description

AC500 without Ammeter

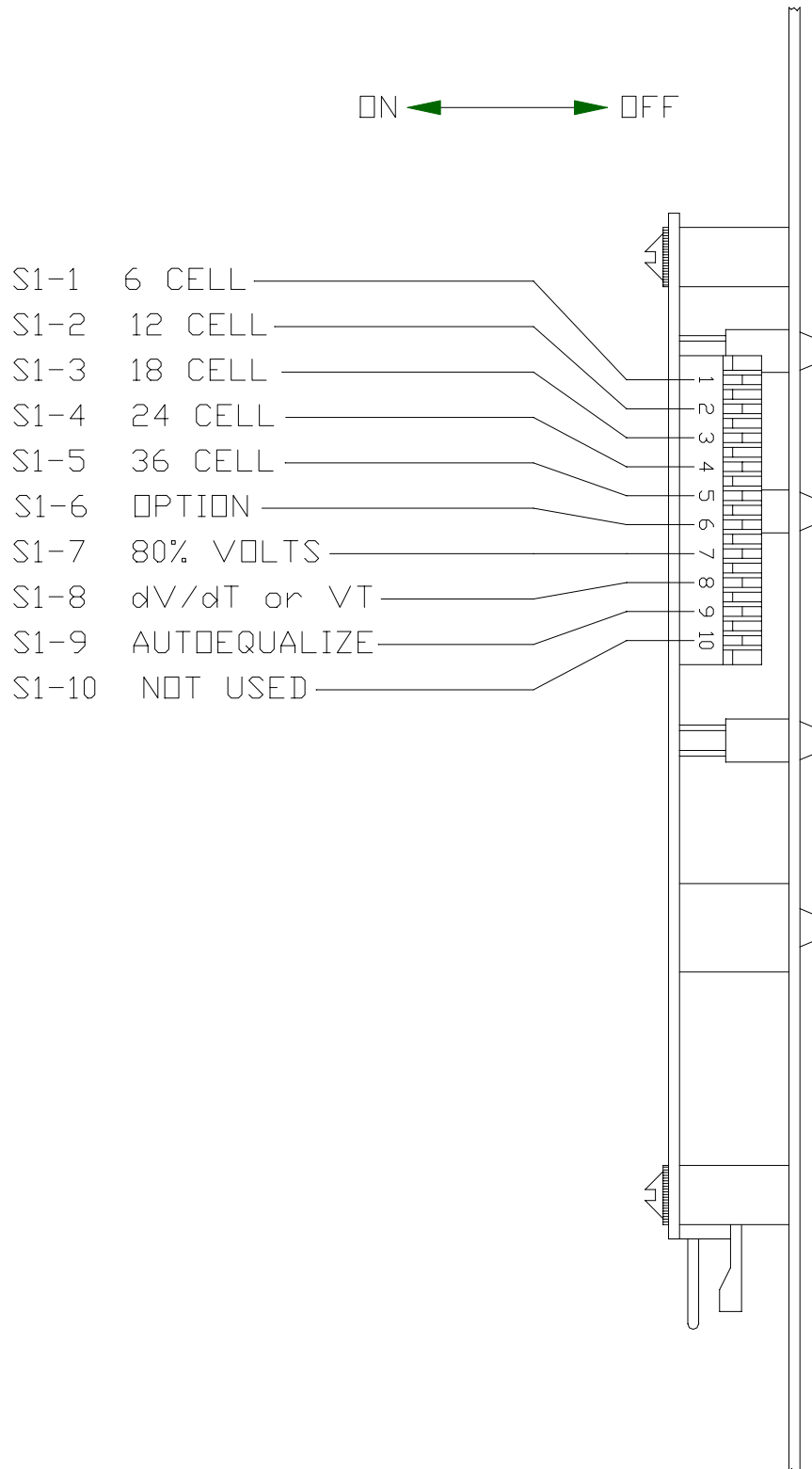
The AC500 Control uses a single chip microcontroller to both monitor and control the battery charging process.

The user is kept up-to-date on the progress of the charge cycle by the four LED's on the front panel of the control (See Page 6-1). The AC500 Control utilizes either a Voltage/Time (VT) charge termination or a patented dV/dT charge termination technique which eliminates excessive gassing by returning approximately 107% of the amp-hours removed from the battery. All front panel information (including operating instructions) is back printed on a polycarbonate overlay which is resistant to damage from oils, gasoline, and frequent operator handling. The AC500 Control is "matched" to the output voltage of the charger by means of a printed circuit board mounted DIP switch (See Figure 4-1). Features of the AC500 Control include auto start/stop, auto/manual equalize, manual stop, backup timer protection, two charge termination methods, 80% voltage point adjustment, high and low battery voltage discrimination, 72 Hour Refresh, and AC power fail recovery.

AC500 with Ammeter

The AC500 with ammeter is identical to the AC500 described above, except for the inclusion of an analog ammeter. The ammeter provides an accurate indication of the DC charging current at all times.

LOCATION DIAGRAM – AC500 CONTROL



OPERATION

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 charger (Number of cells and ampere hour capacity are within nameplate information).
2. Securely engage the battery and charger connectors.
3. After a five second delay (all LED's will be lit), the charger will turn on. The "Charge in Progress" LED will indicate charging current.
4. The "80% Charged" LED will light when the battery on charge reaches the 80% charged voltage.
5. The charger will automatically turn off and the "Charge Complete" LED will light 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 stop key, then disconnect the battery from the charger.

Equalize or Weekend Charge

The AC500 features Auto Equalize every fifth charge cycle. Closing S1-9 disables the auto equalize feature; and an equalize charge request can be performed by pressing the "Equalize" push-button on the control front panel. When Auto Equalize is enabled (S1-9 is open), then the "Equalize" push-button can not be used to request an equalize charge. The AC500 is shipped with auto equalize feature enabled. With auto equalize disabled, an equalize charge can be selected or de-selected for any charge cycle using the sequence below.

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.
3. After a 5 second delay (all LED's will be lit), the charger will turn on. The "Charge In Progress" LED will indicate charging current.
4. Press the "Equalize" key. The "Equalize" LED will light solid. Press the key again to cancel the equalize charge.

NOTE: The equalize charge cannot be cancelled once the battery reaches the equalize charging period. Press the STOP key to terminate the charge.
5. The "80% Charged" LED will light when the battery on charge reaches the 80% charged voltage.
6. The battery reaches the normal termination point (dV/dT or VT). However, the battery is charged another 3 hours. The "Equalize" LED will flash during this equalize period.
7. The charger will automatically turn off, and the "Charge Complete" and the "Equalize" LED will light when the equalized charge has finished. The LED's will remain on until the battery is disconnected from the charger.

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.

Manual Stop

1. To turn the charger off during any part of a charge cycle, press the STOP key. All four LEDs will flash.
2. To restart the charger, disconnect and reconnect the battery. A new charge cycle will begin.

Battery Discrimination

The AC500 Control has the ability to reject batteries with cell sizes that do not match the cell size that the control is set up for (via DIP switch S1-1 through S1-6). If the battery connected to the charger has an average terminal voltage of greater than 2.30 volts/cell, the charger will not start and all 4 LEDs will flash, then the "Charge in Progress" LED will flash (high battery fault indication). If the battery voltage eventually falls below 2.30 volts/cell, the control will begin a normal charge sequence.

If the battery connected to the charger has an average terminal voltage of less than 1.75 volts/cell, the charger will not start and all 4 LEDs will flash, then the "80% Charged" LED will flash (low battery fault indication). If the battery voltage eventually rises above 1.75 volts/cell, the control will start a normal charge sequence. If the battery connected to the charger has a terminal voltage of less than 1.75 volts/cell and the operator wishes to start the charge regardless of this low battery voltage, the charge cycle will start if both the EQUALIZE and the STOP keys are held pushed in until all LEDs go out (approximately 5 seconds). Release the keys at this time.

Refresh Charge

In order to guarantee that a fully charged battery is always ready for use, a "Refresh" feature has been incorporated into the AC500 Control. If a battery is left connected to the charger for 72 hours after a "Charge Complete" has been reached, the AC500 will start a charge sequence. The running time of this "Refresh" charge will depend on the depth of self-discharge of the battery.

Backup Timer Shutdown

A backup timer will shut down the charger and all 4 LEDs will flash then the "Charge Complete" LED will flash if the battery on charge does not reach the 80% voltage during the first 10 hours of charging.

Likewise, if the AC500 Control is set to terminate via the dV/dT methodology (DIP switch S1-8 off) and the charger does not reach the termination point within 5 hours after reaching the 80% charged voltage, all 4 LEDs will flash then the "Charge Complete" LED 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.

Battery Disconnect Shutdown

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

Low Current Shutdown

If the charger output current falls below a predetermined level, a low current shutdown will occur. All 4 LEDs will flash, then the "Equalize" LED will flash.

AC Power Failure

During an AC power failure, the AC500 Control stores key information about the charge cycle. The information is retained by powering some of the control's key components with a battery derived power supply. This causes the control to resume the charge where it left off when the AC power is returned, unaffected timers and equalize requests.

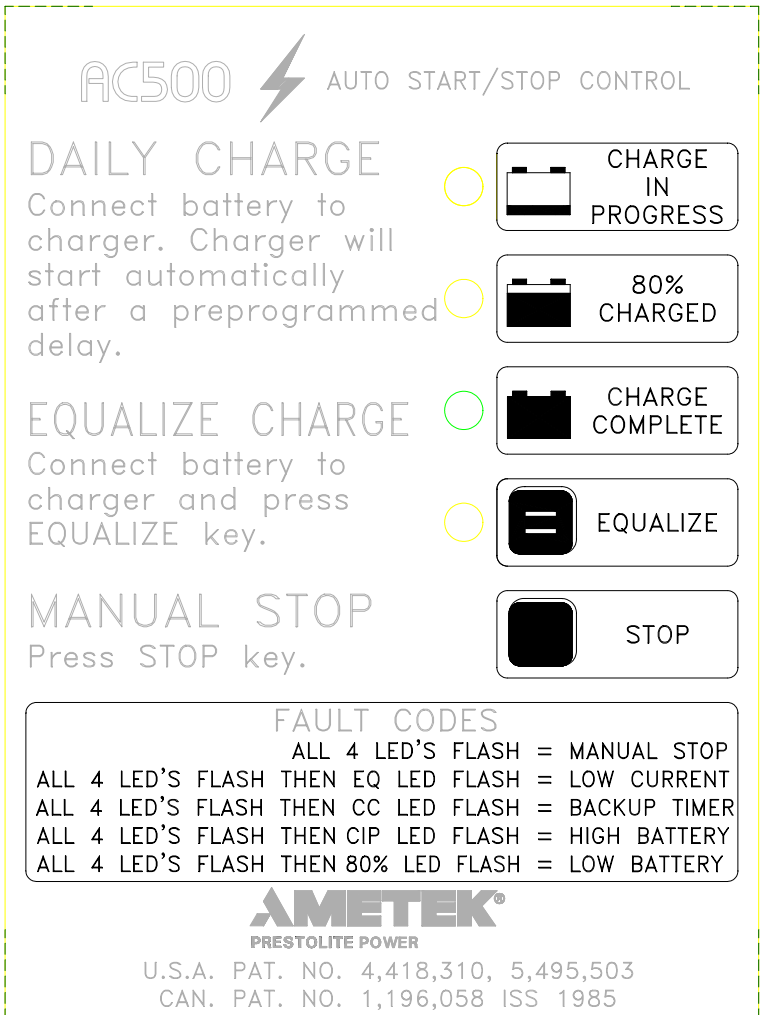
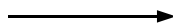
TROUBLESHOOTING

If a problem is suspected with the AC500 Control, always check that the cell selection switch on the side of the control is set correctly (see Location Diagram on page 4-1). An improperly set cell selection switch could cause the charge to end prematurely or to run too long resulting in an abnormal shutdown.

Also, an improperly connected or faulty control wire harness could cause erratic operation. Inspect the control wire harness connections for proper mating and that all wire/terminals are fully installed in the connector housing (s). For detailed charger troubleshooting procedures, see the Charger Manual.

WARNING: ELECTRICAL SHOCK HAZARD — Before checking electrical components, turn off and remove fuses of disconnect switch (supplying AC power to charger), disconnect battery, and check for voltage on capacitors. Discharge through insulated screwdriver if there is any reading.

**FRONT PANEL
FAULT CODES**



SYMPTOM	PROBABLE CAUSES	PARAGRAPH	PAGE
All 4 LEDs Flash. Manual Stop	1) Someone has pressed the Manual Stop Key 2) Bad Control PCB	6.01 6.02	6-3 6-3
All 4 LEDs Flash then Charge In Progress LED Flashes. Hi Battery Reject	1) Bad Battery 2) Bad Control PCB 3) Incorrect DIP Switch Setting 4) Wrong Cell Size Battery	6.03 6.02 6.04 6.05	6-3 6-3 6-3 6-3
All 4 LEDs Flash then 80% Charged LED Flashes. Lo Battery Reject	1) Bad Harness Connection 2) Bad Battery 3) Wrong Cell Size Battery 4) Incorrect DIP Switch Setting 5) Bad Control Board 6) Bad Output Cables/Connector	6.06 6.03 6.05 6.04 6.02 6.07	6-3 6-3 6-3 6-3 6-3 6-3
All 4 LEDs Flash then Equalize LED Flashes. Lo Current Shutdown	1) Bad Harness/Connection – Loose or Incorrect 2) Battery Not Fully Formed 3) Bad Battery 4) Battery A.H. > Charger A.H. 5) Bad Internal Power Connection 6) Bad or Incorrect AC Supply 7) Bad AC Fuse 8) Bad Contactor 9) Output Fuse bad 10) Bad Control Board 11) Bad Transformer 12) Cold Battery	6.06 6.08 6.03 6.09 6.10 6.11 6.12 6.13 6.14 6.02 6.15 6.16	6-3 6-3 6-3 6-3 6-3 6-3 6-3 6-4 6-4 6-3 6-4 6-4
All LEDs on Solid High AC Input	1) Bad or Incorrect AC Input 2) Control Transformer Connected Incorrectly	6.11 6.17	6-3 6-4
All 4 LEDs Flash then Charge Complete LED Flashes. Backup Timer	1) Hot Battery 2) Battery A.H. > Charger A.H. 3) Bad Output Cable/Connector 4) Bad Battery 5) 80% Point Set Incorrectly	6.18 6.09 6.07 6.03 6.19	6-4 6-3 6-3 6-3 6-4

- 6.01** 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 STOP key before disconnecting the battery from the charger.*
- 6.02** To check the Control Board for proper operation, first check the DIP Switch settings of S1. Make sure the the proper cell size is set to match the charger.
- 6.03** 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.
- 6.04** The cell selection DIP switch on the control may be set incorrectly. See the Set-Up chapter of this manual and verify that the switches are set correctly.
- 6.05** The battery connected to the charger may be the wrong cell size for the charger. Check the nameplate on the battery and verify that it matches the cell size of the charger.
- 6.06** A bad harness/connection can cause many different problems. The best way to confirm a bad harness/connection problem is to take measurements where the harness is connected to the charger and then follow the wire (s) up the harness to the PC boards and measure there also. The measurement should match what was measured at the charger connection. If it doesn't, check the following: Check the connectors at the square plugs where the control harness connects to the charger harness. The connectors could be pressed out of the plugs. Make sure the connectors look okay inside the edge mount connector at the PC board (s). Make sure the harness connections are tight where they connect to the charger. Make sure the wires are crimped to the terminals tightly and also check to make sure that they are crimped to the bare wire and not to the insulation only.
- 6.07** 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.
- 6.08** New batteries may not be fully formed. Contact your Battery Manufacturer's Service Representative.
- 6.09** Try charging the battery on a larger amp-hour rated charger or downsize the battery to match the available chargers size.
- 6.10** Do a continuity or resistance test. Check for connection points that visually appear to have been exposed to extreme heat. Any connections that appear loose or overheated must be re-lugged and rechecked.
- 6.11** Check Voltage on ALL input power phases. Verify that the main power and Control Transformers are connected per the instructions provided in the charger door.
- 6.12** Disconnect AC power and replace the bad AC fuse. Reapply AC power to the charger. If the fuse (s) blows instantly, check the connections on the input side of the contactor to make sure there are no shorts between any of the input wires. If that's okay, then check or change the control transformer. If the fuse (s) blow after the contactor closes, then check the input wiring from the contactor to the main transformer (s). Refer to the charger manual and locate the diagram for your charger to confirm that the charger is wired correctly. Also check the wires going up to the terminal block on the transformer, the wires will have numbers that correspond to the number on the terminal block. If they are incorrect, change them and

- 6.13** If Charger repeatedly shuts down a few seconds after initial contactor closure, perform the following for each (1, 2, or 3) power transformer. Disconnect battery and monitor the voltage at terminals 1 to 6 of each transformer. Reconnect battery, after 5 seconds. Line Voltage should be present from terminals 1 to 6 of each transformer. If not, replace contactor and retest.
- 6.14** Use an Ohmmeter and measure directly across the DC Fuse. A good fuse will measure almost (0) Ohms and 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.
- 6.15** Check for darker discolored transformer windings with charger running. Check PRI current of all transformers. Input currents should match $\pm 10\%$.
- 6.16** 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.
- 6.17** Look at the casing of the control transformer on the input side. Reference the Charger Manual to determine the input. There will be four pins and each one will be labeled as follows: COM (common), 208 (208VAC), 240 (240VAC), and 480 (480VAC). Some chargers are equipped with higher input voltage control transformer labeled as follows: COM (common), 240 (240VAC), 480 (480VAC), and 575 (575VAC).
There should always be a wire on the common pin no matter what voltage is applied to the charger, and the second wire will go to the pin labeled as the voltage that is applied to operate the charger. Measure the voltage on the output side of the control transformer, it should read approximately 24VAC.
- 6.18** Batteries that arrive at the charge with electrolyte temperatures $> 115^{\circ}\text{F}$ should not be charged until they have been allowed to cool.
- 6.19** The gassing or 80% charged point may be set too low or high. Try readjusting with DIP Switch S1-7.

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PARTS LIST FOR AC500 CONTROL

(WITHOUT AMMETER)

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
1	CONTROL ASSEMBLY, AC500	194214-001
2	WIRE HARNESS	191303

PARTS LIST FOR AC500 CONTROL

(WITH AMMETER)

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
1	CONTROL ASSEMBLY, AC500	194217-001
2	WIRE HARNESS	191303
3	METER WIRE HARNESS	194218
4	ANALOG AMMETER	
	100A	193622-001
	200A	193622-002
	400A	193622-003

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ELECTRONIC PRINTED CIRCUIT BOARD EXCHANGE SERVICE POLICY

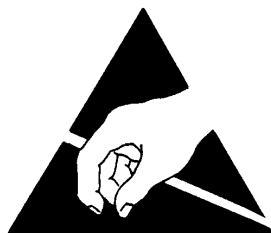
Because of the definite superiority of certain solid-state control components over conventional electromechanical relays and regulators, the company product lines now incorporate solid-state controls for applications in which they may be used to advantage. To facilitate testing and servicing, these control components and circuits have been assembled as modules on printed circuit boards, mounted in such a manner as to be quickly and easily removed. Electrical connections to other components of the unit are by means of plug-in, screw type, or "Faston" connectors.

In recognition of the fact that most users of this equipment lack the facilities and specially trained personnel necessary to service and repair electronic equipment, the company has established an electronic printed circuit board exchange service plan.

Under the Printed Circuit Board Exchange Plan, the owner of the equipment may exchange the printed circuit board (s) in which fault has developed for a replacement.

A standard exchange price has been established for each printed circuit board without regard to the amount of repair required to the original turned in, which is applied against the cost of the replacement. Exchange prices for a specific printed circuit board may be determined by contacting an authorized company distributor or by writing to the factory, giving the SPECIFICATION or ASSEMBLY, MODEL, and SERIAL numbers of the unit in which the printed circuit board is installed.

This Exchange Plan applies only to the specified solid-state control components circuitry which have failed due to electrical fault or normal deterioration resulting from use and age. The plan does not cover parts which have been physically damaged through accident or abuse, or to which unauthorized repairs have been made or attempted.



CAUTION: Printed circuits and other devices may be affected by static electricity. Handling precautions required.

DIAGRAMS

<u>DESCRIPTION</u>	<u>PART NUMBER</u>
AC500 WIRING DIAGRAM (WITHOUT AMMETER)	194214 SHEET 2
AC500 WIRING DIAGRAM (WITH AMMETER)	194217 SHEET 2
REMOTE CONTROL WIRING DIAGRAM	191143

WARRANTY

AMETEK/PRESTOLITE POWER 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. **PRODUCTS AND PARTS WARRANTED.** Subject to the exceptions listed below each Industrial Battery Charger is warranted for a period of one (1) year from the date of its 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) Power transformers and silicon diodes on unit (s) shipped after January 1, 1997 are warranted for ten (10) years after Prestolite's shipment of the unit(s) of which they are a part, provided however that during the last nine (9) years of this 10 year period the warranty covers parts replacement only – no labor or other services are provided by Prestolite, nor shall Prestolite be obligated to reimburse the owner or any other person for any work performed.
 - b) Primary switch contacts, fuses, bulbs, and filters are not warranted unless found to be defective prior to use.
2. **COMMENCEMENT OF WARRANTY TIME PERIODS.** The warranty periods indicated in the Warranty Schedule shall commence on the date of shipment by Prestolite.
3. **PERSONS COVERED BY WARRANTY.** This warranty is extended by Prestolite 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.
4. **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.

Prestolite and its authorized distributors or dealers shall not be liable for direct or indirect, special or consequential damages in excess of such repair or replacement. In no event shall the purchaser be entitled to recover for contingent expenses resulting from, but not limited to, telephone calls, telegrams, travel expenses, lodging, duties and taxes, labor, rental or replacement equipment, loss of business or profits or other commercial losses.
5. **USE OF DEFECTIVE PRODUCT.** Continued use of an Industrial Battery Charger after discovery of a defect VOIDS ALL WARRANTIES.
6. **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.

EXCEPT AS STATED ABOVE, ALL OTHER WARRANTIES AND CONDITIONS, EITHER EXPRESSED OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED AND BUYER ASSUMES ALL RISK AND LIABILITY RESULTING FROM USE OF THE GOODS. AMETEK/PRESTOLITE POWER NEITHER ASSUMES NOR AUTHORIZES ANY PERSONS TO ASSUME FOR AMETEK/PRESTOLITE POWER 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.

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