

# **OWNER'S MANUAL 193111-078**

Revised May 13, 2011

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

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Specifications covered by this manual:

**Multi-Range  
Silicon Diode Ferroresonant  
Transformer type  
Battery Charger**

. **500882-001**

. **500883-001**

**DO NOT DESTROY**

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

SPECIFICATION NO. EXPLANATION – The unit’s specification, model, and serial numbers appear on a name-plate, usually attached to its control panel. The “specification” number starts out with a “series” number (first 4-digit number with a possible letter suffix) which does not cover a complete unit. A “dash” number (-1, -2, etc.) must follow the “series” number to make a complete “specification” number. For example: 1234A-1, 1234A-2, etc.

**IMPORTANT**

It is especially important that all charge internal components be kept clean and dry, and all electrical connections tightened as instructed in Maintenance section of this manual.

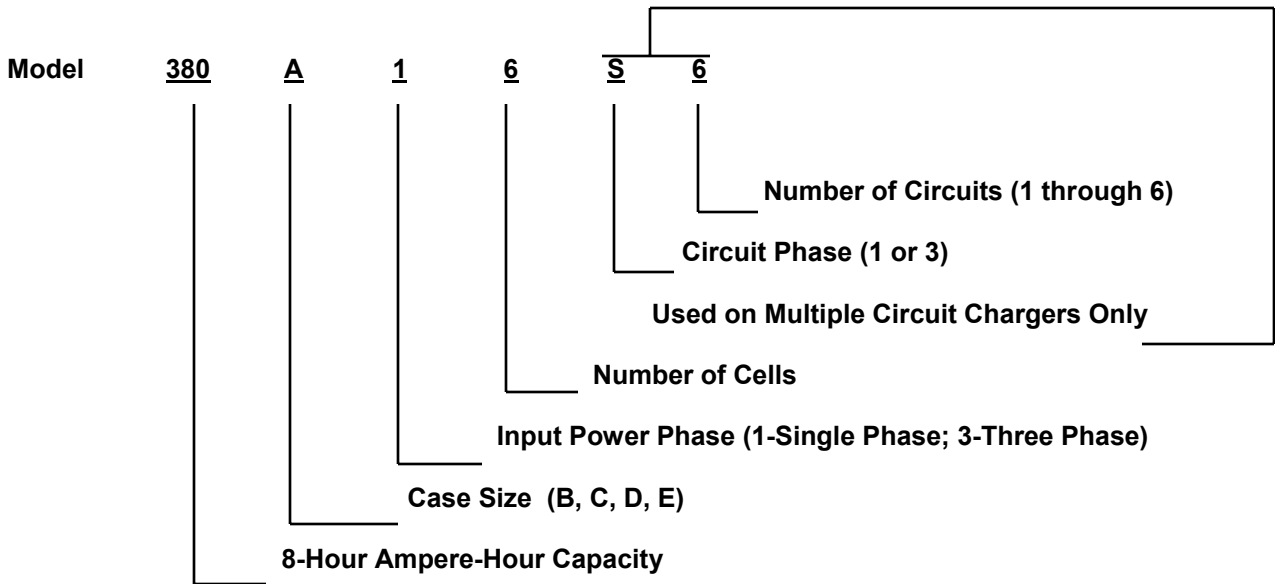
Replace any precautionary or instruction label that cannot be easily read.

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

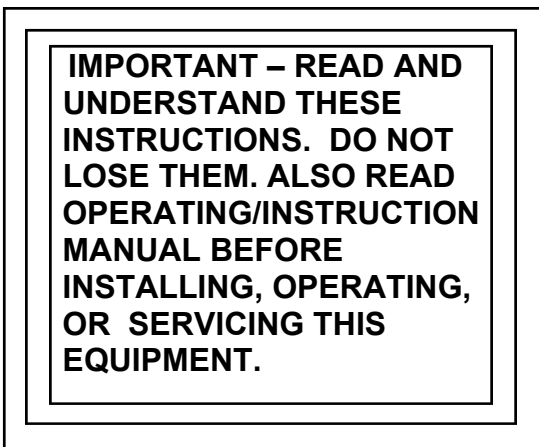
A battery charger is identified by model number. Incorporated into the model number is the 8-hour ampere-hour capacity, case size, input power phase, and number of cells in battery for which charger is intended. The following example explains the basic model numbering arrangement.



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

# 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. Measure voltage on capacitors and discharge through an insulated screwdriver if there is any voltage reading.

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.

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# INSTRUCTIONS

## RECEIPT OF EQUIPMENT

Check the equipment received against the shipping invoice to make certain that the shipment is complete and undamaged. If the equipment has been damaged in transit, notify the carrier (railroad, trucking company, etc.) at once and file a claim for damages. If you require assistance with a damage claim, or if the shipment is in error, furnish full information to the company shown on cover of this manual.

Give the MODEL, SPECIFICATION, SERIAL AND GROUP PART (if any) numbers of the equipment, and a full description of the parts in error. Refer to front sheet of this manual for an explanation of the specification numbers.

Generally, it is good practice to move the equipment

to the site of installation before uncrating. Use care in uncrating in order to avoid damage to the equipment when bars, hammers, etc., are used.

Best results with this equipment will be obtained ONLY if the responsible operating and maintenance personnel have access to and are familiar with these instructions. Additional copies may be obtained at small cost per copy by writing to the company shown on cover of this manual. Supply the owner's manual no. (193111-078), plus the MODEL, SPECIFICATION, SERIAL, AND GROUP PART (if any) numbers of your equipment.

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## DESCRIPTION OF EQUIPMENT

The basic charging circuit is the silicon diode, rectifier-type with ferroresonant transformer (s). This ferroresonant transformer design regulates charging current by allowing the battery to determine its own charge cycle rate in accordance with its state of discharge. It provides a constantly-tapering charge that eliminates the possibility of overcharging, even with line voltage variations of  $\pm 10\%$ . Single-phase input chargers have one transformer, three-phase input chargers have three.

Other features are internal protection against overload and short circuits.

When charging lead acid batteries, with the same number of cells and ampere-hour capacity as shown on charger nameplate, the charging time will be approximately 8 hours. Batteries of smaller or larger ampere-hour capacities can also be charged, but will require shorter or longer charging, respectively.

## CONTROL

**Manual Timer Control**— Selects the desired length of charging time. When the charger is ON, the "Charge in Progress" LED is lit; charge time, voltage and current information are displayed. Refer to OPERATION section of this manual for details on possible timer settings.

If the "Battery Disconnect Defeat" mode is turned on, voltage will be present on the charger output leads if the battery is disconnected before the charge is terminated.

**CAUTION:** The "Manual Stop" switch should always be used to prematurely end a charge cycle.

# 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 6 inches of free air space at rear and sides of the unit. Make sure that ventilation openings are not obstructed.

## 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 3-1.**

## Line Voltage Changeover Instructions

1. Determine if the charger is connected for available line voltage. A label located near AC input terminals is marked with the AC voltage for which the charger is factory connected.
2. If charger is not connected correctly, check serial nameplate to determine that charger is equipped to be connected for available line voltage. If charger is suitably equipped, make voltage changeover connections by following instructions on AC INPUT label inside charger.
3. If charger is reconnected, check input fuse (s) ratings with ratings specified on label and replace if necessary.

**CAUTION: INCORRECT CONNECTIONS AND INCORRECT FUSE SIZE can damage this equipment. Follow voltage changeover instructions carefully.**

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 3-1 Recommended AC Input and Branch Fusing**

The above table (Table 3-1) 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 3-1. A "WARNING" label inside charger also lists fuse sizes for each line voltage (circled fuse rating is required for internal line voltage connections made at factory).

4. Route AC power input cable in through knockout provided in 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. (Charger cabinet top or side panel, or both, may have to be removed to provide access to terminal block).
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 are 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. Refer to OPTIONS chapter of this manual for details.*

## 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), disconnect battery, and check for voltage on capacitors. Discharge through insulated screwdriver if there is any reading.**

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. Refer to OPTIONS section of this manual for details. Options not covered in this section will be described on separate "addendum" sheets enclosed with the manual.*

## Preliminary

1. Make sure that charger is installed and grounded as instructed in this manual.
2. 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.
3. Securely engage battery and charger connectors.

**WARNING: EXPLOSION HAZARD - Do not connect or disconnect a battery unless the Charge Control/Timer switch is in OFF position and Pilot Light is off, and Ammeter reads zero; 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. Do not turn timer switch ON when no battery is connected. Disconnect battery if charger is to be turned off for prolonged periods of time.**

4. On charger nameplate, note number of cells and ampere-hour capacity of batteries it will charge. The Multi-Range chargers are designed to recharge lead-acid batteries of 6,12,18,24, or 36 cells of various capacities in 8 to 24 hours.

- A.. Output Voltage Selection – A cell selector switch is located inside the unit for adjusting the output for 6,12,18,24, or 36 cell batteries.

*NOTE: The cell selector must be set for the same number of cells as the battery to be charged.*

- B. Ampere-Hour Capacity Selection – The charging current automatically tapers on all cell settings; however, the starting current will vary between settings, as shown in the following table:

<u>CELL SETTING</u>	<u>50 AMP MODEL</u>	<u>75 AMP MODEL</u>
6	50	75
12	40	60
18	30	45
24	25	38
36	18	28

5. Turn ON main fused disconnect switch that supplies AC power to charger.

*Note: Charging cycle can be stopped at any point by pressing the stop switch.*

**Normal (Daily) Charge** (for batteries with Ampere-Hour capacity within the range shown on Charger nameplate)

**WARNING: EXPLOSION HAZARD - Do not connect or disconnect a battery unless the Charge Control/Timer switch is in OFF position and Pilot Light is off, and Ammeter reads zero; 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. Do not turn timer switch ON when no battery is connected. Disconnect battery if charger is to be turned off for prolonged periods of time.**

Setting Charge Control Time to determine approximate timer setting see Figure 1 or Figure 2.

- A. Select chart corresponding to Maximum Amp. Rating (see (a) of model number i.e., 50 amp or 75 amp.)
- B. Select the appropriate number of battery cells and battery Ampere-Hour for battery to be charged.
- C. Find the corresponding time, in hours, from the chart.

EXAMPLE: Charging a 6-cell, 450 AH battery; on a 50-Amp charger, set timer to approximately 13 hours, and on a 75-Amp charger, set timer to approximately 10 hours.

- D. On succeeding charge cycles, increase or decrease timer setting as necessary to bring specific gravity to full charge value (usually 1.270 to 1.290. See battery specifications for typical values).

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

**Equalizing (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.

Just set Charge Control Time for 3 hours more than required for a normal (daily) charge. The charge is complete when Charge Control Time runs down.

**OPERATING INSTRUCTIONS**

SET CELL SELECTOR inside charger to proper number of CELLS and VOLTS for battery to be charged.  
SET TIMER according to BATTERY CELLS and BATTERY AMPERE-HOUR from the chart below. Vary charging time as indicated by specific gravity reading.

CELLS	BATTERY AH															
	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
6	8	8½	9	10	11	11½	13	14	15	16½	17½	19	20½	22	23	24
12	8	9	10	11½	12½	14	15½	17	18½	20	21½	23				
18	8	10	12	14	16	18	20½	22½								
24	8	11	13½	16½	19	22										
36	8	14½	18½	22												

APPROXIMATE CHARGING TIME IN HOURS

407177

Approximate Charging Time for 50 Amp Charger  
Figure 1

**OPERATING INSTRUCTIONS**

SET CELL SELECTOR inside charger to proper number of CELLS and VOLTS for battery to be charged.  
SET TIMER according to BATTERY CELLS and BATTERY AMPERE-HOUR from the chart below. Vary charging time as indicated by specific gravity.

CELLS	BATTERY AH																							
	225	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350
6	8	8¼	8½	9	9½	10	10½	11	11½	12½	13½	14	15	15½	16	17	18	19	19½	20½	21	22½	23	24
12	8	8¼	9	9½	10½	11½	12	13½	14	15	16	17	17½	19	20	21	22	23	24					
18	8	8½	9½	11	12½	13½	15	16½	18	19½	20½	22½	24											
24	8	9	11	13	15	17	19	21	22½	24														
36	8	9½	13	16	19	22	24																	

APPROXIMATE CHARGING TIME IN HOURS

407178

Approximate Charging Time for 75 Amp Charger  
Figure 2

# MAINTENANCE

**WARNING: ELECTRICAL SHOCK HAZARD** — Before inspecting or cleaning inside cabinet, 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.

## 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 all 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.

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

## Lubrication

None required.

## Charging Rate Adjustment

Although it is normally not required, the charging rate can be adjusted to accommodate unusually high or low AC power line voltages, unusually high or low ambient temperatures, or aged battery.

A rate adjustment is necessary if battery consumes more water than normal or if its specific gravity after a normal (daily) charge is not within 10 points of its gravity after a weekend (equalizing) charge.

**CAUTION: Before adjusting charging rate, make sure that bad connections or damage to charger isn't affecting charging process. Also make sure proper charging procedure has been followed (thoroughly read Operation chapter of this manual).**

**WARNING: ELECTRICAL SHOCK HAZARD** — Before adjusting charging rate, 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.

1. Locate charging rate adjustment label inside charger cabinet (same as Table 5-1). The factory set charging rate is indicated on this label by circles around terminal numbers to which YELLOW jumper and ORANGE lead were connected.
2. Locate YELLOW jumper and ORANGE lead on each transformer terminal block present in your unit (one transformer per circuit for single-phase charging circuits, three for three-phase charging circuits.)

	Yellow Jumper	Orange Lead	Charger Output
	8 to 9	to 12	Maximum Output
	8 to 10	to 12	↑
	8 to 9	to 11	Higher Output
	8 to 10	to 11	↓
	8 to 9	to 10	Lower Output
	8 to 9	to 8	Minimum Output
	8 to 10	to 9	
	8 to 11	to 10	
	8 to 11	to 9	
8 to 12	to 10		
8 to 12	to 9		

CONNECTION FOR MINIMUM OUTPUT SHOWN

**Table 5-1 Charging Rate Adjustment Table**

3. Mark present location of YELLOW jumper and ORANGE lead on charger rate adjustment label and on Table 5-1 if different from that marked by factory.
4. Reconnect YELLOW jumper and ORANGE lead to the terminals giving the desired change of charging rate, as shown in Table 5-1.

**CAUTION:** Do not change connections more than one step before observing effect on charging rate. Check must be made on 6-Cell battery with selector switch in 6-Cell position. On fully charged 6-Cell battery, (approx. 1.270 to 1.290 specific gravity), rate should not exceed 15% of “MAX AMPS” on charger nameplate. On fully discharged 6-Cell battery, (approx. 1.140 specific gravity), rate should not exceed 110% of “MAX AMPS”.

On three-phase charging circuits, all transformer terminal blocks must be identically connected.

### 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.

### Silicon Diode Testing

**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.

1. Disconnect one diode lead to isolate diode from electrical circuitry.
2. Use a good quality ohmmeter (preferably one having a mid-scale value of approximately 50 ohms) to measure resistance values.
3. Zero ohmmeter on R x 1 scale.
4. Record indicated resistance while placing either ohmmeter lead on threaded end of diode and other ohmmeter lead on diode lead.
5. Reverse ohmmeter leads on diode and record indicated resistance.
6. Consider diode good if one resistance reading is infinitely (or very) high and the other is extremely low.

*NOTE: An acceptable low resistance value or range of values can't be given because of different readings from different ohmmeters, and differences in diodes of the same rating.*

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## Transient Suppressor Testing

1. Heed WARNING in SILICON DIODE TESTING section.
2. Disconnect one suppressor lead to isolate suppressor from electrical circuitry.
3. Use a good quality ohmmeter (preferably one having a mid-scale value of approximately 50 ohms) to measure resistance values.
4. Zero ohmmeter on R x 1 scale.
5. Record indicated resistance across suppressor.
6. Reverse ohmmeter leads on suppressor and record indicated resistance.
7. Consider suppressor good if the two readings are similar (within 20%) and of a relatively high value. Suppressor is bad if resistance readings are infinitely high or very low.

## Capacitor Testing

1. Heed WARNING in Silicon Diode Testing section.
2. Disconnect capacitor and connect leads of ohmmeter (set to highest scale) to capacitor terminals.
3. If capacitor is good, pointer will deflect, indicating capacitor is being charged, followed by a deflection in the opposite direction indicating partial discharge.

If there is no deflection, capacitor is "open" and must be replaced. Also, if meter needle moves and stops at one value, replace capacitor.

Replacement capacitors must be ordered from factory. When ordering, supply serial number of charger and microfarad (MFD) or ( $\mu$ F) value printed on capacitor.

# Troubleshooting

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

**CAUTION: HIGH VOLTAGE FROM TEST EQUIPMENT** can damage silicon diodes and other parts. Short silicon diodes with extremely short leads, or disconnect, before applying voltage from a "megger" or other high voltage test equipment.

The following chart contains information which can be used to diagnose and correct unsatisfactory operation or failure of various components of the unit. Each malfunction is followed by a suggested checking or inspection procedure. Refer to Connection/Schematic Diagram in the Diagrams chapter included in this manual.

## Troubleshooting Guide

### **Control Display not working**

Check line voltage

*Close fused disconnect switch or repair open circuit*

Check for blown fuses

*Replace blown fuses. See Table 3-1 for proper fuse sizes*

Replace Control

### **Charger will not provide charging current**

Check Line voltage

*Refer to Line Voltage Changeover instructions*

Check for blown fuses

*Replace blown fuses. See Table 3-1 for proper fuse sizes  
If DC output fuse is blown, check for the cause of the problem*

*Reverse battery connection*

*Check for shorted diode. Refer to Silicon Diode Testing section*

Check for internal short circuit

*Repair short circuit, or replace faulty component*

Check for "open" battery circuit

*Clean and tighten connections, especially battery cable connections.*

Replace Control



**Low charging current at beginning of cycle (battery fully discharged)**

Check for failed capacitor (s) (one or more)

*Replace capacitor if can is ruptured or fails test. Refer to Capacitor Testing in Maintenance section*

Check charging rate for "too low" adjustment

*Refer to Charging Rate Adjustment in Maintenance section*

Check line voltage for connection to proper input voltage

*Refer to Line Voltage Changeover instructions in Installation section*

**Less than rated output on fully discharged battery (approximately 1/2 rated output) (3-phase chargers only)**

Check input fuses (one probably blown). Check for either a shorted transformer, or wiring short circuit

*Replace as necessary*

**High charging current at beginning of cycle (battery overcharged)**

Check charging current for "too high" adjustment

*Refer to Charging Rate Adjustment in Maintenance section*

**Charger does not shut OFF**

Check Manual Timer Control

*If the Charge Timer is a 0000, the charger should be off. If it is not, inspect input Contactor and/or possibly replace the Charge Control*

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# OPTIONS

The options listed in the following table of contents are those most commonly available. Special options not listed here will be covered by enclosed “addendum” sheets.

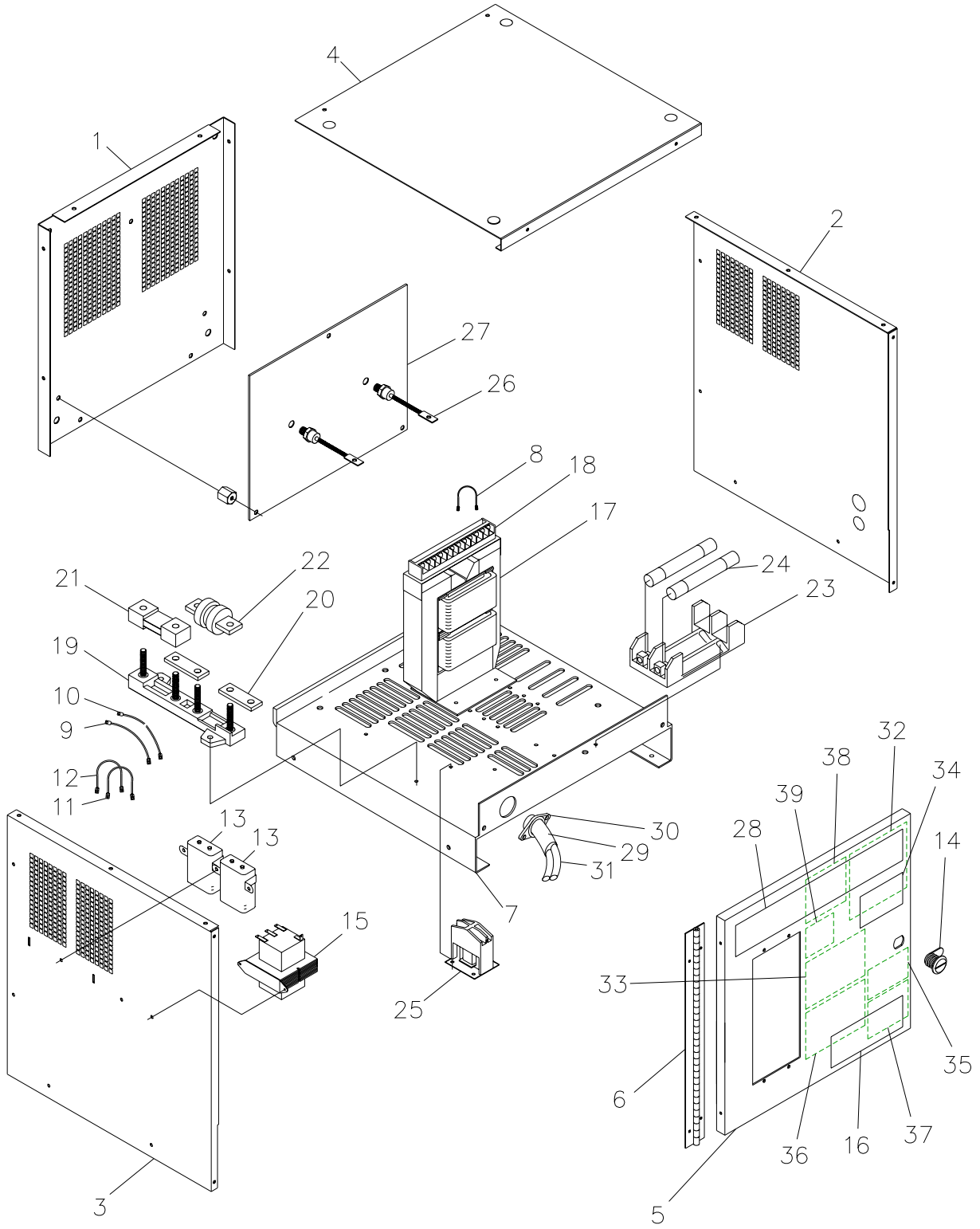
OPTION NUMBER	OPTION DESCRIPTION	PAGE
055	Portable Mounting Kit .....	7-1
	Booted Alligator Clips.....	7-1

## Portable Mounting Kit

This option includes wheels and handle (shipped loose). Kit also includes 8 ft. (2.438 m) of AC cable complete with plug. 50 Amp #393699-1, 75 Amp #393699-2. This option allows for charger to be Easily moved from one location to another.

## Booted Alligator Clips – Option 055

This option may be used in place of standard charging connector. Kit includes output cable assembly with booted alligator clips, #396802.



Typical "A" Case Shown For Parts Designation

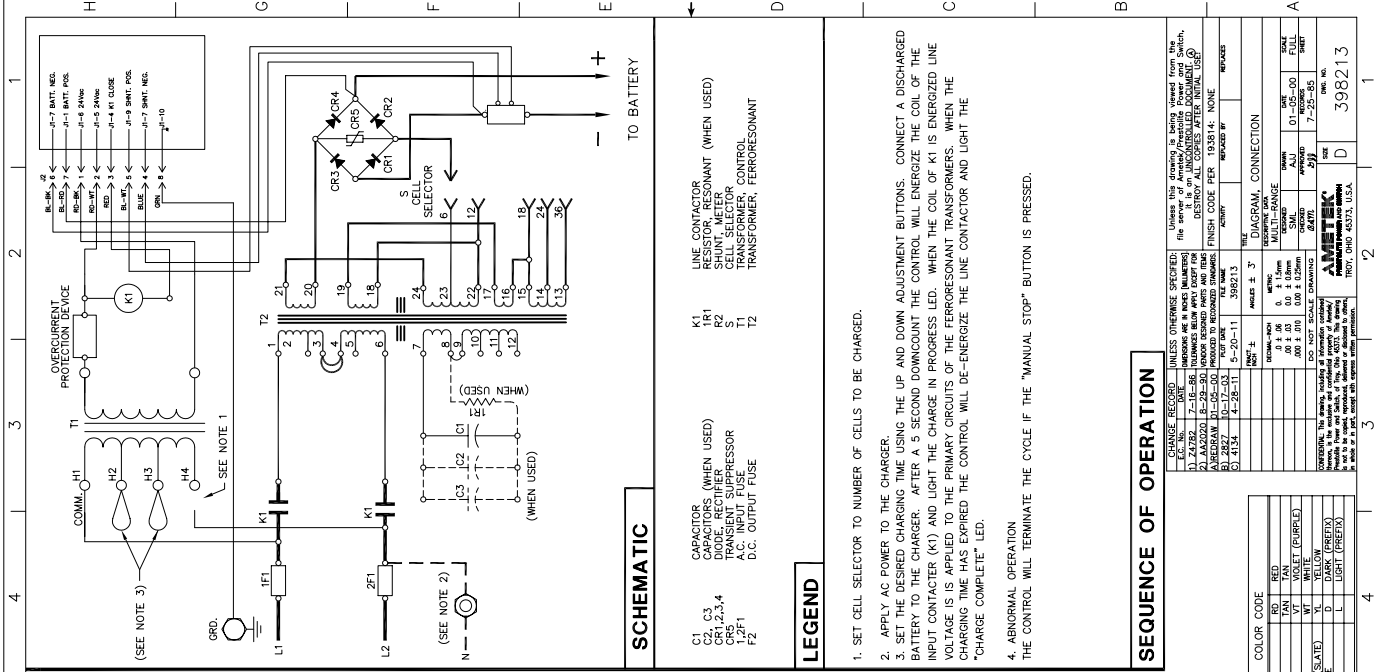
<u>ITEM NO.</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	197157	Panel, Rear
2	197159	Panel, Side, Right
3	197158	Panel, Side, Left
4	197163	Top
5	197164	Door
6	197165	Hinge
7	197324	Base
8	357205-357	Lead, Yellow (1 Req'd)
9	357205-127	Lead, Orange (1 Req'd)
10	357205-128	Lead, White (1 Req'd)
11	357205-060	Jumper, Orange (2 Req'd)
12	357205-061	Jumper, White (2 Req'd)
13	See Table	Capacitor, Transformer
14	194530	Latch, Door
15	See Table	Transformer, Control
16	196036	Label, Prestolite
17	See Table	Transformer, Power
18	402520	Terminal Block
19	193114	Insulator, Fuse & Shunt
20	392458	Bus Bar
21	193125-001	Shunt, Meter
22	See Table	Fuse, Output
23	See Table	Block, Input Fuse
24	See Table	Fuse, Input
25	406240-001	Contactora, AC Input
26	402832-003	Diode, Silicon Pos. Base (2 Req'd)
27	402833-003	Diode, Silicon Neg. Base (2 Req'd)
28	197364	Heat Sink
29	406338	Label, Identification
30	378234-013	Cover, Outer Neoprene
31	W10085-005	Connector, Strain Relief
32	396263-119	Cable, DC Output
33	See Table	Label, AC Input
34	194335	Label, Danger, AC Volts & Fuse
35	404099	Label, Danger
36	191892	Label, Rain Exposure
37	402717	Label, Charging Rate
38	406434	Label, Input Warning
39	195531	Label, DC Output Fuse
40	406593	Label, AC Input Fuse
41	405929	Connector, Single Pole
42	197290	Harness, Wire (For Modular Control)

MODEL NUMBER	COMPLETE SPEC	INPUT FUSE			OUTPUT FUSE	INPUT FUSE BLOCK	T2 TRANS	CAPS /TRANS	AC INPUT LABEL	CONTROL TRANS
		120	208	240						
50A1-6M36	500882-001	W10085-7	W10085-5	W10085-5	Y1890-1	405357-1	197391	TRY-154-4	406465	406247-1

MODEL NUMBER	COMPLETE SPEC	INPUT FUSE			OUTPUT FUSE	INPUT FUSE BLOCK	T2 TRANS	CAPS /TRANS	AC INPUT LABEL	CONTROL TRANS
		208	240	480						
75A1-6M36	500883-001	W10386-7	W10386-6	W10386-5	Y1890-3	406207-1	197402	TRY-154-6	406461	406247-2

# DIAGRAMS

MODEL NUMBER	SPECIFICATION NO.	DIAGRAM	DIMENSIONAL OUTLINE
50A1-6M36	500882-001	398213	197203
75A1-6M36	500883-001	398213	197203



**SCHEMATIC**

C1 CAPACITOR  
 C2, C3 CAPACITORS (WHEN USED)  
 CR1, 2, 3, 4 DIODE RECTIFIER  
 CR5 SUPPRESSOR  
 F2 A.C. INPUT FUSE  
 L1, 2, 3, 4 D.C. OUTPUT FUSE  
 K1 LINE CONTACTOR  
 R1 RESISTOR, RESONANT (WHEN USED)  
 R2 METER SHUNT  
 S CELL SELECTOR  
 T1 TRANSFORMER, CONTROL  
 T2 TRANSFORMER, FERRORESONANT

**LEGEND**

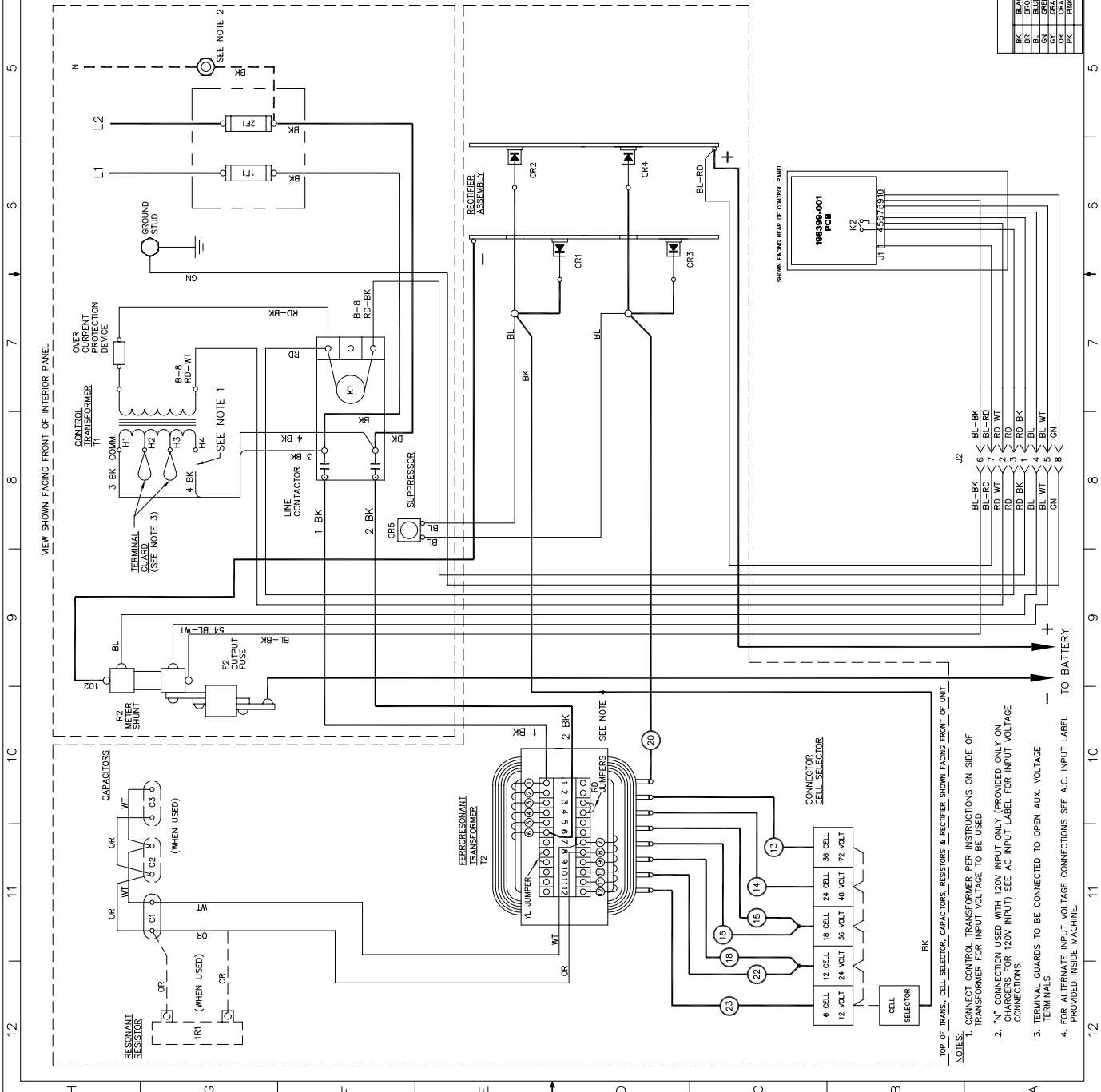
1. SET CELL SELECTOR TO NUMBER OF CELLS TO BE CHARGED.
2. APPLY AC POWER TO THE CHARGER.
3. SET THE DESIRED CHARGING TIME USING THE UP AND DOWN ADJUSTMENT BUTTONS. CONNECT A DISCHARGED BATTERY TO THE CHARGER. AFTER A 5 SECOND DOWNCOUNT THE CONTROL WILL ENERGIZE THE COIL OF THE INPUT CONTACTOR (K1) AND LIGHT THE CHARGE IN PROGRESS LED. WHEN THE COIL OF K1 IS ENERGIZED LINE VOLTAGE IS APPLIED TO THE PRIMARY CIRCUITS OF THE FERRORESONANT TRANSFORMERS. WHEN THE CHARGING TIME HAS EXPIRED THE CONTROL WILL DE-ENERGIZE THE LINE CONTACTOR AND LIGHT THE "CHARGE COMPLETE" LED.
4. ABNORMAL OPERATION THE CONTROL WILL TERMINATE THE CYCLE IF THE "MANUAL STOP" BUTTON IS PRESSED.

**SEQUENCE OF OPERATION**

UNLESS THIS DRAWING IS BEING VIEWED FROM THE REVERSE SIDE OF THE SHEET, THE TERMINALS ARE TO BE IDENTIFIED BY THE NUMBER OF THE TERMINAL INDICATED IN THE DRAWING. DESTROY ALL COPIES AFTER INITIAL USE.

REV.	DATE	BY	FOR
1	11-17-64	JJG	REVISED
2	11-17-64	JJG	REVISED
3	11-17-64	JJG	REVISED
4	11-17-64	JJG	REVISED
5	11-17-64	JJG	REVISED
6	11-17-64	JJG	REVISED
7	11-17-64	JJG	REVISED
8	11-17-64	JJG	REVISED
9	11-17-64	JJG	REVISED
10	11-17-64	JJG	REVISED
11	11-17-64	JJG	REVISED
12	11-17-64	JJG	REVISED

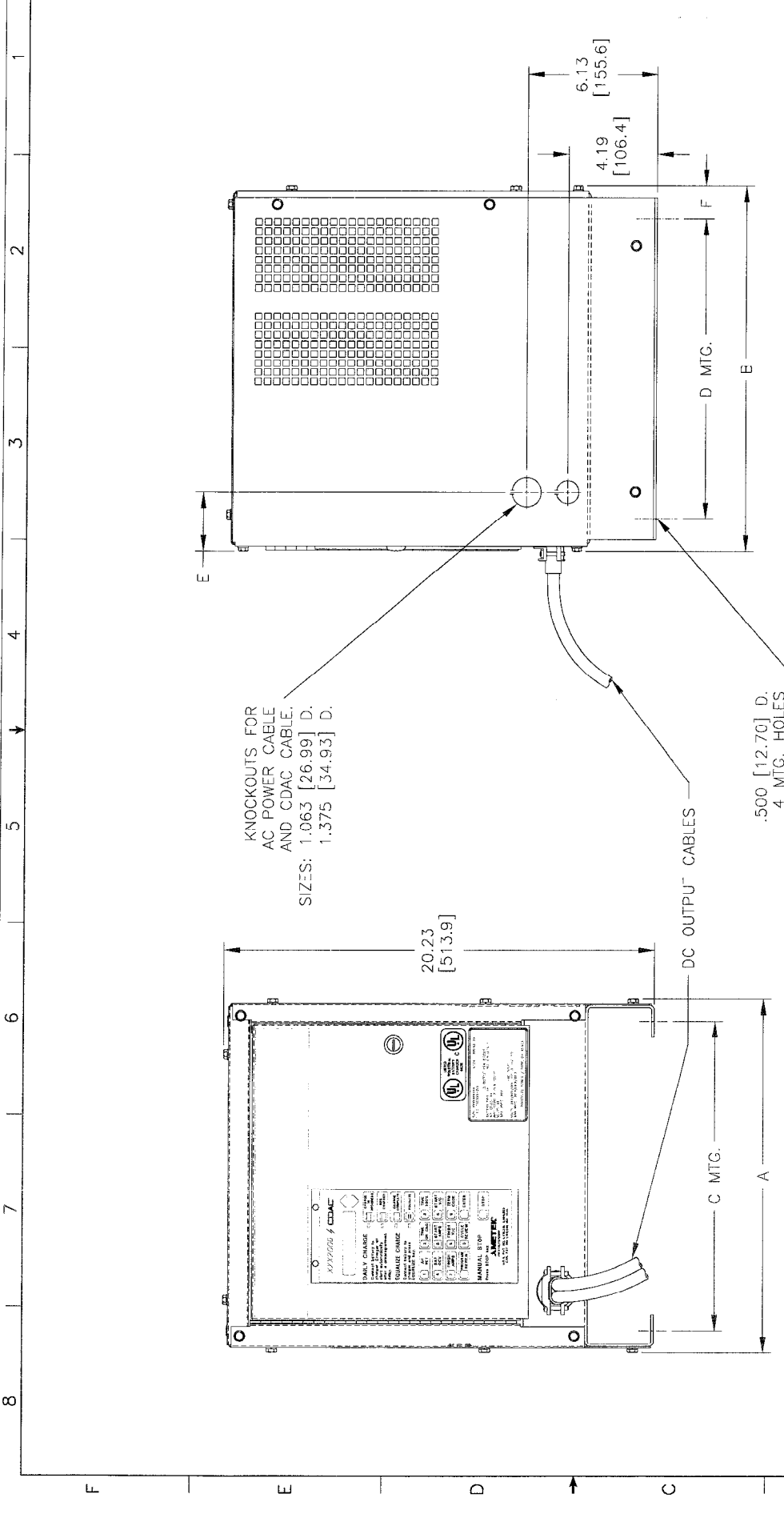
AMETEK  
 1707, OHIO 43053, U.S.A.



**VIEW SHOWING FRONT OF INTERIOR PANEL**

- TOP OF TRANS., CELL SELECTOR, CAPACITORS, RESISTORS & RECTIFIER SHOWN FACING FRONT OF UNIT.
- NOTES:
1. CONNECT CONTROL TRANSFORMER PER INSTRUCTIONS ON SIDE OF TRANSFORMER FOR INPUT VOLTAGE TO BE USED.
  2. "N" CONNECTION USED WITH 120V INPUT ONLY (PROVIDED ONLY ON CHARGERS FOR 120V INPUT) SEE AC INPUT LABEL FOR INPUT VOLTAGE CONNECTIONS.
  3. TERMINAL GUARDS TO BE CONNECTED TO OPEN AUX. VOLTAGE TERMINALS.
  4. FOR ALTERNATE INPUT VOLTAGE CONNECTIONS SEE AC INPUT LABEL PROVIDED INSIDE MACHINE.

REV.	DATE	BY	FOR
1	11-17-64	JJG	REVISED
2	11-17-64	JJG	REVISED
3	11-17-64	JJG	REVISED
4	11-17-64	JJG	REVISED
5	11-17-64	JJG	REVISED
6	11-17-64	JJG	REVISED
7	11-17-64	JJG	REVISED
8	11-17-64	JJG	REVISED
9	11-17-64	JJG	REVISED
10	11-17-64	JJG	REVISED
11	11-17-64	JJG	REVISED
12	11-17-64	JJG	REVISED



KNOCKOUTS FOR  
AC POWER CABLE  
AND CDAC CABLE.  
SIZES: 1.063 [26.99] D.  
1.375 [34.93] D.

DC OUTPUT CABLES  
.500 [12.70] D,  
4 MTC HOLES  
WITH MATCHING HOLES  
IN TOP FOR STACKING

DIMENSIONS ARE SPECIFIED AS:  
INCHES  
[MILLIMETERS]

CABINET DESIGNATION (CASE)		DIMENSIONS					
A	B	C	D	E	F		
(WIDTH)	(DEPTH)	(MTC.)	(MTC.)	(KO'S)	(MTC.)		
16.58 [421.1]	17.09 [434.2]	14.50 [368.3]	14.00 [355.6]	2.78 [70.7]	1.55 [39.4]		

CHANGE RECORD E.C. NO.	DATE	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [MILLIMETERS] TOLERANCES BELOW APPLY EXCEPT FOR DIMENSIONS IN PARENTHESES WHICH APPLY PRODUCED TO REGISTERED STANDARDS	FINISH CODE PER 19J814: NONE	REPLACED BY	REVISED
PROJECT DATE	FILE NAME	FILE NO.		ACTIVITY	
1-10-08	197203	197203			
TITLE	ANGLES ±				
OUTLINE, DIMENSIONAL	3°				
DESCRIPTION DATA					
A. CASE					
1.5mm					
BAM					
BAM					
WORKING					
DATE	FRAMES	DATE	DATE	SHEET	
6-28-06	BAM	6-28-06	6-28-06	THIRD	
				SHEET	
				1	
				OF 1	
AMETEK			DATE	DRAW. NO.	
PRECISE POWER AND SWITCH				C	197203
IRVY, OHIO 45373, U.S.A.					





## 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.
  - c) 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.
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.** 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.
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.
5. **USE OF DEFECTIVE PRODUCT.** Continued use of 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.

**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: 1140  
Index: 030105  
Replaces: 110100