OWNER'S MANUAL 430429-318

Revised December 12, 2000

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

AGV ULTRA CHARGE

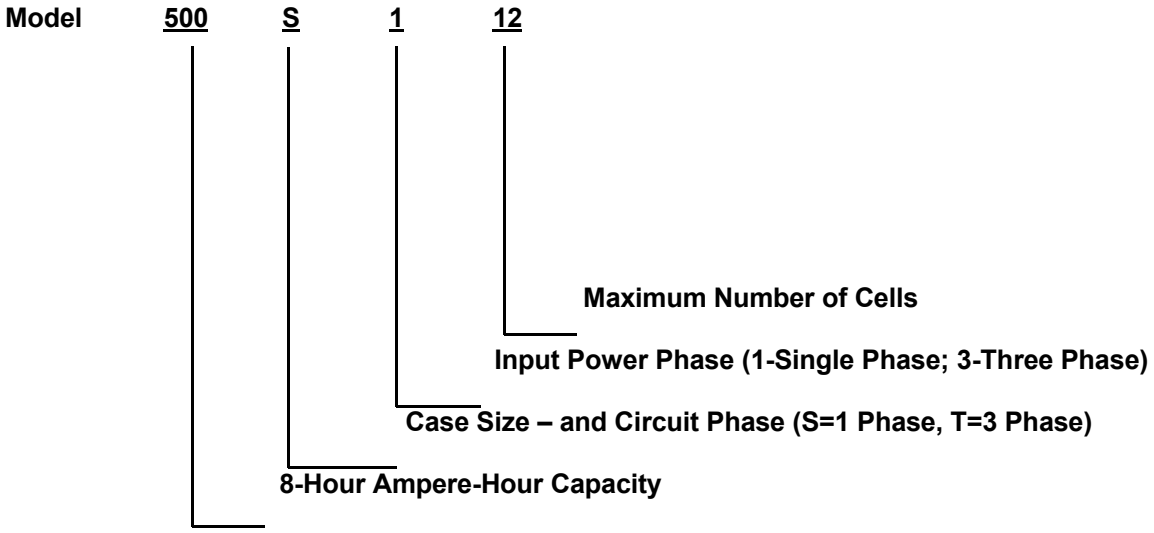
Silicon Controlled Rectifier Battery Charger

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 8-hour ampere-hour capacity, case size, input power phase, and maximum 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.

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.

DESCRIPTION OF EQUIPMENT

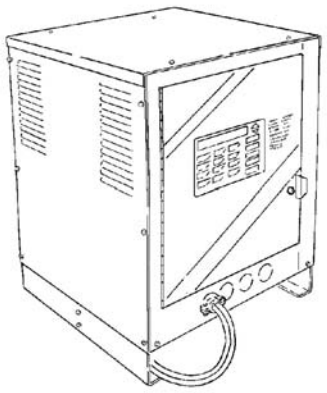

Figure 3-1

The basic charging circuit is the silicon controlled rectifier-type with isolating transformer (s). This SCR design regulates charging current by allowing the battery to determine its own charge cycle rate in accordance with its state of discharge. It provides controlled charge that eliminates the possibility of overcharging, even with line voltage variations of ± 10% and allows the battery to finish at the proper current regardless of battery age or gravity type. Single-phase input chargers have one transformer, three-phase input chargers have two or three.

The Ultra Charge is internally protected against overload and short circuits by both input and output fusing, plus Prestolite's unique *curve monitoring circuit* periodically measures the output curve to ensure that the voltage and current are within the limits set at the factory.

The UC2001 is made up of three main components: the Control Board, Regulator Board, and the Keypad/Display. The Control Board provides the basic operating features of the charger, such as auto start/stop, voltage and current displays, and AGV charge system communication. The Regulator Board actually controls the firing or switching of the SCRs, thus controlling the chargers DC output.

The Keypad/Display provides the user interface with the charger. The durable membrane keypad is impervious to moisture and mechanical shock. The bright 16 character alphanumeric vacuum florescent display constantly displays the charger's output volts and amps during the charge cycle. The display also provides the user with plain English messages concerning charge cycle status.

Four bright LEDs molded into the keypad keep the user informed of charge status at a glance, even from long distances. LEDs notify you that a charge is in progress, that the battery is 80% charged, equalize cycle, charge complete, and fault indication.

WARNING: Do not connect a battery to this charger if any lamp is lit. Do not disconnect a battery from this charger while a charge is in progress; otherwise, damage to charger, 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.

UC2001 Control

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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.

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. Use the slots provided in the base for lifting forks whenever possible.

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 ⏚), 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 a 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 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.

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 (1999) 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 1999 – Table 250-95).

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

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. 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), 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.

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OPERATION

The operating procedure given here explains the operation of a Prestolite Ultra Charger equipped with the Prestolite UC2001 Control.

NOTE: If this charger is equipped with certain optional features, the operating procedure may be modified. Refer to Options Chapter of this manual for details. Options not covered in this chapter 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. 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.

Automatic Charge

The Automatic Mode is intended to be used when the charger is part of an AGV charging system only. The Automatic Mode can be selected by pressing the Automatic key.

1. Insure that battery size matches the charger.

2. Connect the battery to the charger (via connector or AGV system shoes).

3. Apply the On/Off signal to pins 4 and 5 of TB2.

4. After approximately 1.5 seconds, the charger will turn on, and the alphanumeric display will indicate the charging voltage (Volts/Cell) and current Amps). The charger also executes a loop closure between terminals 6 and 7 of TB2.

5. The "80% Charged" LED will light when the battery has reached the gassing point.

6. When the On/Off signal is removed from pins 4 and 5 of TB2, the charger will shut off. If the battery is disconnected from the charger during charging, the charger will also shut off, and terminals 6 and 7 of TB2 will return to an open circuit.

7. If the battery is left connected, and the On/Off signal is applied continuously for 7 hours, the charger will shut down and display "Backup Timer".

NOTE: To disconnect battery from charger before charge is complete, press the "Stop" key on the charger control panel.

WARNING: EXPLOSION HAZARD - Do not connect or disconnect a battery unless the "Charge in Progress" LED is off; otherwise, damage to charger, 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. Disconnect battery if charger is to be turned off for prolonged periods of time.

Off Line

The Off Line Mode is intended for Normal and Equalize charging of battery packs that have been disconnected from the vehicle and taken off line to be charged. The Off Line Mode can be selected by pressing the Off Line key.

NOTE: To disconnect battery from charger before charge is complete, press the "Stop" key on the charger control panel.

Normal Mode

1. Insure that battery size matches the charger.

2. Connect the battery to the charger.

3. After approximately 1.5 seconds, the charger will turn on, and the alphanumeric display will indicate the charging voltage (Volts/Cell) and current (Amps).

4. The "80% Charged" LED will light when the battery has reached the gassing point.

5. When the charger current drops to 10% of the start mode, the charger automatically switches to a float mode and the "Charge Complete" LED will light.

6. Terminate the float charge by pressing the “Stop” key and disconnecting the battery.

7. If the battery doesn’t reach 80% in 16 hours, the charger will shut down and display “Backup Timer”.

Equalize Mode

1. Insure that battery size matches the charger.

2. Press the “Equalize” key.

3. Connect the battery to the charger.

4. After approximately 1.5 seconds, the charger will turn on, and the alphanumeric display will indicate the charging voltage (Volts/Cell) and current (Amps).

5. The “80% Charged” LED will light when the battery has reached the gassing point.

6. When the charger current drops to 25% of the start current, the “Equalize” LED will blink and the charger will automatically shut down after six more hours and the “Charge Complete” LED will light.

7. If the battery current doesn’t drop to 25% of the start current in 16 hours, the charger will shut down and display “Backup Timer”.

Off Mode

The off Mode is intended to disable all charger operation, regardless of battery connection or AGV charging system signals. The Off Mode can be selected by pressing the “OFF” key.

Manual Stop

To stop any charge cycle before charge complete, press the “Stop” key.

WARNING: Do not connect a battery to this charger if any lamp is lit. Do not disconnect a battery from this charger while a charge is in progress; otherwise, damage to charger, 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.

AC Power Fail

The UC2001 Control will resume the charge where it left off when the AC power failure occurred, virtually unaffecting charge time.

NOTE: If a battery is disconnected from the charger during an AC power failure and discharged, reconnecting it or any other battery may result in an incomplete charge cycle.

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

AGV CHARGING SYSTEMS CONNECTIONS

The charger is designed to allow connections to an AGV automatic charging system. These connections will only function properly when the charger has been programmed to the Automatic Mode. The following connections have been provided.

Output Connections – Terminals 1 and 3 of TB2 connect to the charger output terminals. The circuit is protected by a 3 Amp (AGC 3) fuse.

On/Off – Terminals 4 and 5 are used to start and stop the charger when it is programmed to the automatic mode. Shorting the terminals through relay contacts when a battery is connected will turn the charger on. Removing the short will shut the charger off.

Charger Running – Terminals 6 and 7 are used to signal the AGV charging system that the charger is running. These pins are a set of isolated contacts that close when the charger is operating.

Chassis Ground – Terminal 8 is connected to the charger chassis ground stud. It can be used to reference one terminal of the charger running signals to ground.

TB2-1	Charger/Battery Positive
TB2-2	Not Used
TB2-3	Charger/Battery Negative
TB2-4	On/Off (normally open)
TB2-5	On/Off (common)
TB2-6	Charger Running (normally open)
TB2-7	Charger Running (common)
TB2-8	Chassis Ground

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UC2001 CONTROL FEATURES

Main Features

1. Automatic Charger Control
2. Off Line Charging
3. 16 Character Alphanumeric Display
4. Four LEDs for Status Display; automatic LED lamp test provided on start up
5. Manual Stop Capability
6. Manual Equalize Operation
7. Back-up Timer Shutdowns
8. Failure Mode Diagnostics
   - Over Temperature
   - Charge Curve Error
   - Low Current S.D.
   - Backup Timer
   - Manual Stop

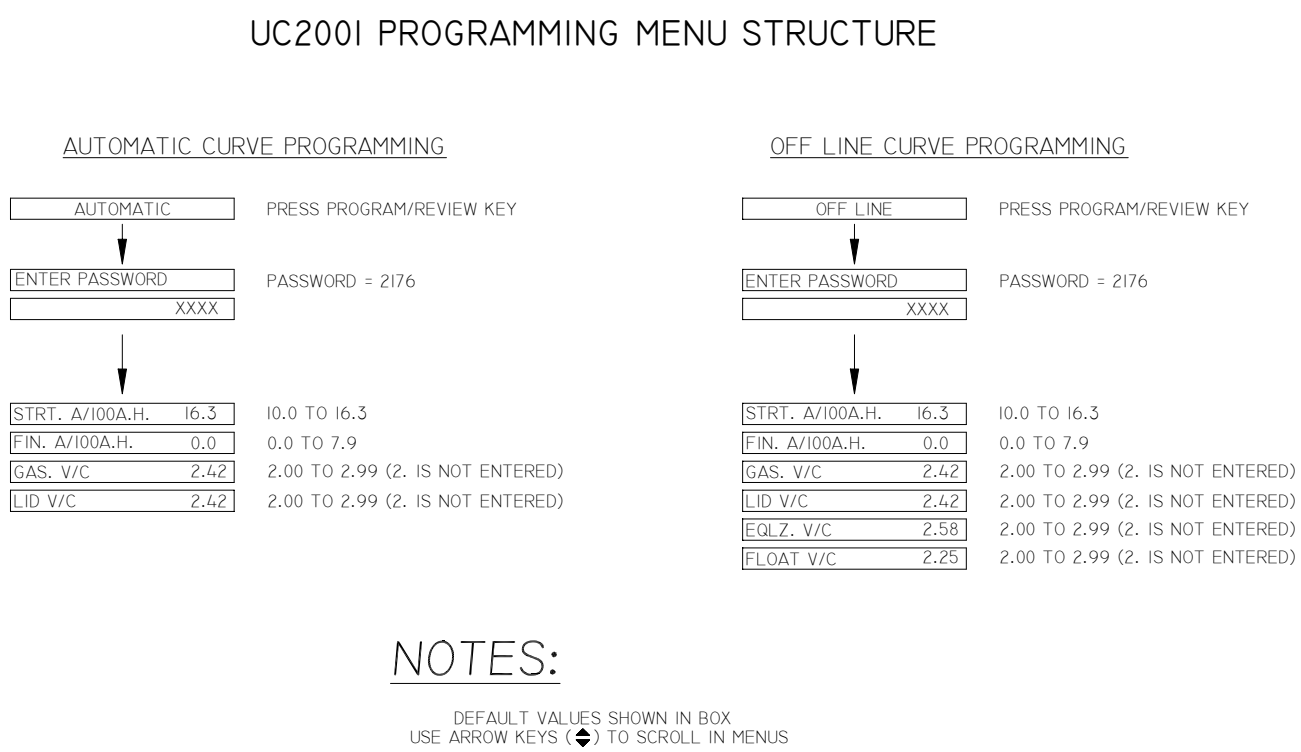
UC2001 PROGRAMMING MENU STRUCTURE
AUTOMATIC CURVE PROGRAMMING
AUTOMATIC
PRESS PROGRAM/REVIEW KEY
ENTER PASSWORD
XXXX
PASSWORD = 2176
STRT. A/100A.H. 16.3
10.0 TO 16.3
FIN. A/100A.H. 0.0
0.0 TO 7.9
GAS. V/C 2.42
2.00 TO 2.99 (2. IS NOT ENTERED)
LID V/C 2.42
2.00 TO 2.99 (2. IS NOT ENTERED)
OFF LINE CURVE PROGRAMMING
OFF LINE
PRESS PROGRAM/REVIEW KEY
ENTER PASSWORD
XXXX
PASSWORD = 2176
STRT. A/100A.H. 16.3
10.0 TO 16.3
FIN. A/100A.H. 0.0
0.0 TO 7.9
GAS. V/C 2.42
2.00 TO 2.99 (2. IS NOT ENTERED)
LID V/C 2.42
2.00 TO 2.99 (2. IS NOT ENTERED)
EQLZ. V/C 2.58
2.00 TO 2.99 (2. IS NOT ENTERED)
FLOAT V/C 2.25
2.00 TO 2.99 (2. IS NOT ENTERED)
NOTES:
DEFAULT VALUES SHOWN IN BOX
USE ARROW KEYS (⬍) TO SCROLL IN MENUS

Figure 7-1

Programming Your UC2001 Control

The programming function allows 10 functions to be programmed to customize your Prestolite Ultra Charge to your AGV battery charging application. Programming is available only when no battery is connected. To access the programmable features that apply to a mode of operation (such as Automatic or Off Line), the charger must be set to that mode of operation.

Figure 7-1 provides the information required to program each of the 10 variables.

Programmable Features

Automatic Mode

STRT. A/100AH — The Automatic output curve start current setting (10.0 to 16.3 amps per 100 ampere-hours).

Factory setting = 16.3

FIN. A/100AH — The Automatic curve finish current setting (0.0 to 7.9 amps per 100 ampere-hours).

Factory setting = 0.0

GAS. V/C. — The Automatic curve gassing voltage level setting (2.00 to 2.99 volts/cell).

Factory setting = 2.42

Note: The first digit (2) is not entered during programming.

LID. V/C. — The Automatic curve lid voltage setting (2.00 to 2.99 volts/cell).

Factory setting = 2.42

Note: The first digit (2) is not entered during programming.

Off Line Mode

STRT. A/100A.H. — The Off Line output curve start current setting (10.0 to 16.3 amps per 100 ampere-hours).

Factory setting = 16.3

FIN. A/100A.H. — The Off Line curve finish current setting (0.0 to 7.9 amps per 100 ampere-hours).

Factory setting = 0.0

GAS. V/C. — The Off Line curve gassing voltage level setting (2.00 to 2.99 volts/cell).

Factory setting = 2.42

Note: The first digit (2) is not entered during programming.

LID. V/C. — The Off Line curve lid voltage level setting (2.00 to 2.99 volts/cell).

Factory setting = 2.42

Note: The first digit (2) is not entered during programming.

EQLZ. V/C. — The Off Line Equalize curve gassing and lid voltage level settings when equalize charging is selected. (2.00 to 2.99 volts/cell).

Factory setting = 2.58

Note: The first digit (2) is not entered during programming.

FLOAT V/C. — The Off Line Float curve gassing and lid voltage level settings used during Float Mode charging. (2.00 to 2.99 volts/cell).

Factory setting = 2.25

Note: The first digit (2) is not entered during programming.

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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 DESCRIPTION **PAGE**

Parallel Charging

This option provides cables allowing two batteries to be charged at the same time (batteries connected in parallel to charger).

To prevent premature charger turn on, this option requires the use of a battery connector with auxiliary contacts (Anderson “SBX” or equivalent). The same type connector must be specified on the battery and vehicle. The connector on the battery must have the auxiliary contacts jumpered together.

NOTE: The safety interlock circuit is protected by an in-line 1 Amp AGC Fuse inside the battery charger.

When charging two batteries, each must be of the same voltage (or number of cells). The total rated ampere-hour capacity of both batteries plus the voltage (number of cells of only one of the batteries) must be within the range of the charger. Refer to charger nameplate for ratings. For example: two 12-volt (6 cell), 225 ampere-hour batteries would make a 12-volt (6 cell), 450 ampere-hour load.

Operate this charger as instructed in Operation chapter of this manual except that batteries are to be connected as shown in Figure 9-1, plus the total ampere-hour capacity must be used to calculate charging time.

CAUTION: Make sure all connections are made positive to positive and negative to negative as shown.

No. 4 size cable for 0-450 AH……..P/N 397891-1
No. 2 size cable for 451-700 AH……..P/N 397891-2

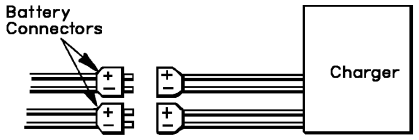

Figure 9-1 Parallel Charging Connections

No. 1/0 size cable for
701-1050 AH……....P/N 397891-4
No. 2/0 size cable for
1051-1500 AH……..P/N 397891-5
No. 3/0 size cable for
1501-1600 AH……..P/N 397891-6

Series Charging

This option provides a cable allowing two batteries to be charged at the same time (batteries connected in series to charger).

Series cables for 0-450 AH……....P/N 396820-1
Series cables for 451-700 AH……P/N 396820-2
Series cables for 701-1050 AH……...P/N 396820-4
Series cables for 1051-1500 AH…….P/N 396820-5
Series cables for 1501-1600 AH…….P/N 396820-6

CAUTION: With the batteries required to be connected in series, this charger cannot be used to charge one battery only.

Both batteries must be of the same ampere-hour rating. The total rated voltage (or number of cells) of both batteries (add the two), plus the ampere-hour capacity of only one battery, must be within the charger name-plate range ratings. For example: two 12-volt (6 cell), 450 ampere-hour batteries would make a 24-volt (12-cell), 450 ampere-hour load.

NOTE: For series charging, both batteries must be at identical depths of discharge (DOD); I.e., they are used in series in the vehicle. A mismatch in DOD of the two batteries will result in severe overcharge of the lightly discharged battery and severe undercharge of a deeply, discharged battery.

Operate this charger as instructed in Operation chapter of this manual, except that charger must be connected to both batteries instead of just one. Refer to Figure 9-2.

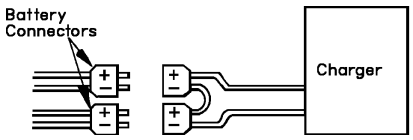

Figure 9-2 Series Charging Connections

CAUTION: Make sure all connections are made positive to positive and negative to negative as shown.

Extra Length Output Cables

	5 Ft Extra	10 Ft Extra
No. 4 size for 0-450 AH	396143-7	396143-13
No. 2 size for 451-700 AH	396143-8	396143-14
No. 1/0 size for 701-1050 AH	396143-10	396143-16
No. 2/0 size for 1051-1500 AH	396143-11	396143-17
No. 3/0 size for 1501-1600 AH	396143-12	396143-13
No. 4/0 size (when specified)	396143-7	396143-13

Fused Disconnect Switch

(Refer to Figure 9-3)

To order "JIC" disconnect chargers, add "-2" to the base Specification No. Example:
750T3-18 w/Opt. 500 = 500132-2
This option is provided to meet certain "JIC" requirements. The switch must be in the open (OFF) position to disconnect all AC power going into the charger and to allow front door to be opened. With switch in open position, door can be opened by turning slotted latch screw to the left.

Disconnect switch is for *emergency* or *service use* only.

Charge cycle should continue until automatically shut off. If cycle must be interrupted, press the "STOP" key.

A control circuit operating on 24 volts is also provided to help assure operator safety.

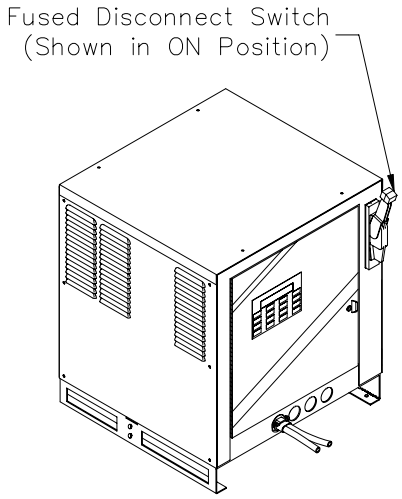

Figure 9-3 Fused Disconnect Switch

Wall Mounting Bracket

Wall Mounting Bracket……...390850-2

Facilitates wall mounting of S and T Case Chargers.

Lifting Eye Kit

Lifting Eye Kit……...191652

Facilitates lifting of S and T Case Chargers.

TROUBLESHOOTING

Troubleshooting Table

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
No Display And No LED's	(1) No AC Voltage To Charger	10.01	10-10
	(2) Input Fuse(s) Blown	10.02	10-10
	(3) Control Trans. Breaker Tripped	10.03	10-10
	(4) Control Trans. Bad	10.04	10-10
	(5) Wrong Control Trans. Connection	10.05	10-10
	(6) Bad Harness/Connection – Loose or Incorrect	10.06	10-10
	(7) Bad Control Board	10.07	10-10
	(8) Bad Regulator Board	10.08	10-10
	(9) Board Interconnections (Reg-Control)	10.09	10-11
No Keypad Response	(1) Keypad Not Connected	10.10	10-11
	(2) Keypad Connected Improperly	10.10	10-11
	(3) Bad Control Board	10.07	10-10
	(4) Bad Keypad	10.11	10-11
Bad Lamp Test	(1) Keypad Not Connected	10.10	10-11
	(2) Keypad Connected Improperly	10.10	10-11
	(3) Bad Control Board	10.07	10-10
	(4) Bad Keypad	10.11	10-11
Display Illegible	(1) Noisy Environment	10.12	10-11
	(2) Low Input Voltage	10.13	10-11
	(3) Bad Control Board	10.07	10-10
Charger Doesn't Respond To Battery Being Connected	(1) Output Fuse Bad	10.14	10-11
	(2) Bad Harness/Connections – Loose Or Incorrect	10.06	10-10
	(3) Bad Control Board	10.07	10-10
	(4) Bad Regulator Board	10.08	10-10
	(5) Output Cables Reversed	10.15	10-11
	(6) Bad Output Connector	10.16	10-11
	(7) No AGV System Signal	10.69	10-14
Control Not Responding (Locked Up)	(1) Noisy Environment	10.12	10-11
	(2) Bad Suppressor Core	10.17	10-11
	(3) Low Input Voltage	10.13	10-11
	(4) Power Interruption	10.12	10-11

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Unit Smells Hot	(1) Inadequate Ventilation	10.18	10-11
	(2) Ambient Too Hot	10.19	10-11
	(3) Lack of Maintenance	10.20	10-11
	(4) Bad Transformer	10.21	10-11
	(5) Bad Control Transformer	10.04	10-10
	(6) Bad Snubber Board (Suppressors)	10.22	10-12
	(7) Bad Internal Power Connection	10.23	10-12
	(8) Bad Regulator Board	10.08	10-10
	(9) Bad Control Board	10.07	10-10
	(10) Bad Inductor	10.24	10-12
	(11) Wrong Amp/Hour Jumper	10.25	10-12
Battery has Low S. G.'s	(1) Bad Battery	10.28	10-12
	(2) Bad Equalize Schedule	10.29	10-12
	(3) Charge Curve Incorrect	10.30	10-12
	(4) Rates Set Incorrectly	10.32	10-12
	(5) Too Cold	10.33	10-13
Battery Doesn't Last Full Shift	(1) Faulty > Lift Interrupt	10.35	10-13
	(2) Manual Disconnect	10.36	10-13
	(3) A.H. Required > Battery Nameplate	10.37	10-13
	(4) Battery Not Providing Nameplate Rating	10.28	10-12
	(5) Equalize Schedule	10.29	10-12
	(6) Charge Curve Incorrect	10.30	10-12
	(7) Rates Set Incorrectly	10.31	10-12
	(8) Charger Too Small For Battery	10.35	10-13
Battery Water Usage Is Too High	(1) Rates Set Incorrectly	10.31	10-12
	(2) Charge Curve Incorrect	10.30	10-12
	(3) Equalize Schedule	10.29	10-12

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Battery Temperature Too High	(1) Insufficient Cool Down Before And/Or After Charging	10.42	10-13
	(2) Battery Power Demand Too Great	10.43	10-13
	(3) Rates Set Incorrectly	10.31	10-12
	(4) Charge Curve Incorrect	10.30	10-12
	(5) Equalize Schedule	10.29	10-12
Incorrect Charge Rate	(1) Rates Set Incorrectly	10.31	10-12
	(2) Charge Curve Incorrect	10.30	10-12
	(3) Battery A.H. Not Equal To Charger A.H.	10.35	10-13
	(4) Bad Regulator Board	10.08	10-10
	(5) Bad Control Board	10.07	10-10

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Doesn't Shutdown When Battery Is Disconnected	(1) Bad Regulator Board	10.08	10-10
	(2) Bad Control Board	10.07	10-10
Noisy Unit	(1) Loose Sheet Metal	10.48	10-13
	(2) Bad Contactor	10.49	10-14
	(3) Loose Transformer Mounting	10.50	10-14
	(4) Loose Inductor Mounting	10.51	10-14
	(5) Noisy Inductor	10.52	10-14
	(6) Noisy Transformer	10.53	10-14
	(7) Placed On Rack That Makes Noise	10.54	10-14
Erratic Operation	(1) Bad Control Board	10.07	10-10
	(2) Bad Regulator Board	10.08	10-10
	(3) Bad SCR	10.55	10-14
	(4) Bad SCR Gate Connection (Snubber Board)	10.22	10-12
	(5) Snubber Board Loose From Heat Sink	10.22	10-12
	(6) Bad Harness/Connection – Loose Or Incorrect	10.06	10-10
	(7) Bad Power Connection	10.23	10-12
	(8) Bad Output Cable Connector	10.16	10-11
	(9) Bad Inductor	10.24	10-12
	(10) Moisture Inside Cabinet	10.56	10-14
	(11) Lack of Maintenance	10.20	10-11
	(12) High Ambient Temperature	10.19	10-11
Meter Reading Wrong (V/C)	(1) Bad Output Connect	10.16	10-11
	(2) Bad Harness/Connections – Loose Or Incorrect	10.06	10-10
	(3) Internal Power Connection	10.23	10-12
	(4) Bad Control Board	10.07	10-10
	(5) Bad Regulator Board	10.08	10-10
	(6) Board Interconnections (Cont.-Reg.)	10.09	10-11
Meter Reading Wrong (Amps)	(1) Bad Output Connector	10.16	10-11
	(2) Bad Harness/Connections – Loose Or Incorrect	10.06	10-10
	(3) Internal Power Connection	10.23	10-12
	(4) Bad Control Board	10.07	10-10
	(5) Bad Regulator Board	10.08	10-10
	(6) Bad/Incorrect Shunt	10.57	10-14
	(7) Board Interconnections (Cont.-Reg.)	10.09	10-11

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Unbalanced Input Current	(1) Incorrect Wiring To Primary Of Transformer	10.58	10-14
	(2) Incorrect Cabling To Transformer Secondary	10.59	10-14
	(3) Bad Harness/Connections – Loose Or Incorrect	10.06	10-10
	(4) Bad SCR	10.55	10-14
	(5) Bad Diode	10.60	10-14
	(6) Bad Regulator Board	10.09	10-11
	(7) Snubber Board/Gate Lead Connections	10.22	10-12
	(8) AC Supply	10.01	10-10
	(9) Bad Transformer	10.21	10-11
High Input Current	(1) Incorrect Wiring To Primary Of Transformer	10.58	10-14
	(2) Incorrect Cabling To Transformer Secondary	10.59	10-14
	(3) Incorrect AC Input Jumper Setting	10.61	10-14
	(4) Bad Harness/Connections – Loose Or Incorrect	10.06	10-10
	(5) Bad SCR	10.55	10-14
	(6) Bad Diode	10.60	10-14
	(7) Bad Regulator Board	10.09	10-11
	(8) Snubber Board/Gate Lead Connections	10.22	10-12
	(9) AC Supply	10.01	10-10
	(10) Bad Transformer	10.21	10-11
	(11) Bad Inductor	10.24	10-12
Display Reads (Over Temperature)	(1) Temperature Sensor – Bad Or Missing	10.62	10-14
	(2) Bad Harness/Connections – Loose Or Incorrect	10.06	10-10
	(3) Bad SCR	10.55	10-14
	(4) Bad Diode	10.60	10-14
	(5) Inadequate Ventilation	10.18	10-11
	(6) Ambient Too High	10.19	10-11
	(7) Amp/Hour I.D. Incorrect	10.25	10-12
	(8) Bad Control Board	10.07	10-10
	(9) Bad Regulator Board	10.08	10-10
	(10) Bad Snubber Board	10.22	10-12
	(11) Board Interconnections	10.09	10-11
	(12) Lack Of Maintenance	10.20	10-11

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Display Reads (CHRG Curve Error)	(1) Bad Harness/Connections – Loose Or Incorrect	10.06	10-10
	(2) Snubber Board Connections	10.22	10-12
	(3) Bad SCR	10.55	10-14
	(4) Bad Diode	10.60	10-14
	(5) Bad Regulator Board	10.08	10-10
	(6) Bad Control Board	10.07	10-10
	(7) Incorrect Wiring To Primary Of Transformer	10.58	10-14
	(8) Snubber Board	10.22	10-12
	(9) Bad Shunt	10.51	10-14
Display Reads (Backup Timer)	(1) Bad A.H. > Charger A.H.	10.35	10-13
	(2) Bad Output Cable Connector	10.16	10-11
	(3) Incorrect Charge Curve Setting	10.30	10-12
	(4) Bad Battery	10.02	10-10
Display Reads (Manual Stop)	(1) Someone Pressed Manual Stop Button	10.36	10-13
	(2) Bad Connection (Keypad-Control)	10.10	10-11
	(3) Bad Keypad	10.11	10-11
	(4) Bad Control Board	10.07	10-10
Display Reads (Low Current S.D.)	(1) Bad Harness/Connections – Loose Or Incorrect	10.06	10-10
	(2) Battery Not Fully Formed	10.63	10-14
	(3) Bad Battery	10.28	10-12
	(4) Bad A.H. > Charger A.H.	10.64	10-14
	(5) Bad Internal Power Connection	10.23	10-12
	(6) AC Supply	10.01	10-10
	(7) Bad AC Fuse	10.02	10-10
	(8) Bad Contactor	10.24	10-12
	(9) Output Fuse Bad	10.14	10-11
	(10) Bad Control Board	10.07	10-10
	(11) Bad Regulator Board	10.08	10-10
	(12) Bad Snubber Board	10.22	10-12
	(13) Bad Transformer	10.11	10-11
	(14) Bad Or Wrong Size Shunt	10.51	10-14

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Display Reads (AC Fail)	(1) Intermittent AC Fail (Supply)	10.01	10-10
	(2) Control Transformer Connection	10.05	10-10
	(3) Bad Harness/Connection – Loose Or Incorrect	10.06	10-10
	(4) Bad Control Transformer	10.04	10-10
	(5) Bad Regulator Board	10.08	10-10
	(6) Bad Control Board	10.07	10-10
Display Reads (Reset Memory)	(1) Noise (Supply)	10.12	10-11
	(2) Bad Control Board	10.07	10-10
	(3) Bad Suppressor Core	10.17	10-11

SYMPTOM	PROBABLE CAUSES	ACTION	
		PARAGRAPH	PAGE
Display Reads (COP Failure)	(1) Noise (Supply) (2) Bad Control Board (3) Bad Suppressor Core	10.12 10.07 10.17	10-11 10-10 10-11
Display Reads (Clock Monitor)	(1) Noise (Supply) (2) Bad Control Board (3) Bad Regulator Board	10.12 10.07 10.17	10-11 10-10 10-11
Display Reads (Illegal OP Codes)	(1) Noise (Supply) (2) Bad Control Board (3) Bad Suppressor Core	10.12 10.07 10.17	10-11 10-10 10-11

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Action

10.01 Reference the INSTALLATION chapter (pg. 4-1).

10.02 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 DIAGRAM chapter 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 start over. If it still blows fuse (s), the transformer will have to be replaced.

10.03 Reset the breaker. Disconnect the control and reapply AC power to the charger. Measure to see if 24VAC is on the output side of the control transformer. If there is, the control has failed. If there isn't 24VAC, then replace the control transformer. It is still possible that the control has failed; so once the control transformer is replaced, measure to see if the 24VAC drops once the control is connected.

10.04 Check and see if any input fuses are blown. Visually inspect the control transformer for discoloration on the casing of the input side of the control transformer. Disconnect the control before applying AC power. Once AC power is reapplied, measure the input voltage to the control transformer; it should be the AC supply voltage (208/240/480). If not, check the control transformer input wiring. If you did read the supply voltage, then measure the output side and you should read 24VAC. If not, replace the control transformer.

10.05 Look at the casing of the control transformer on the input side. Reference the DIAGRAM chapter 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). 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.

10.06 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.

10.07 To check the Control Board for proper operation, first check the DIP Switch settings of S1. Make sure the shunt size setting matches the shunt in the charger (100A ON = 100A shunt, 400A ON = 400A, 100A and 400A OFF = 200A). Check the voltages at FT1 through FT6. The 2.00V and 4.75V should be within 1% of those values when measured with respect to GNDA. The +5V and +12V should be within 5% of those values when measured with respect to GNDP. Replace the Control Board if the voltages are not in spec.

If the charger operates normally except there is no alphanumeric display, the check the connection from the display to the Control Board. Replace the Control Board if the connection is correct.

If the charger still does not work properly even though the above settings and voltages are correct, the Control Board may need replaced. However, this is unlikely and all other possibilities should be checked before taking this step.

10.08 To check the Regulator Board for proper operation, first check the cell size DIP switch SW1 and make sure that the switch setting matches the charger nameplate cell size rating. To check the PC board power supplies, remove the AH Jumper (J5) and measure the voltages on pins 2 and 3 with respect to pin 1 of J5. Pin 2 should read within 5% of + 5V. Pin 3 should read within 10% of + 12V. If these voltages are not present , the board should be replaced. Also check the board visually for any components that are damaged. If any damaged components are found, replace the PC board.

If the charger still does not work properly, even though the above settings and voltages are correct, the Regulator Board may need to be replaced. However, this is unlikely and all other possibilities should be checked before taking this step.

10.09 Look at the inside of the door and locate the Control Board and Regulator Board. (Reference the illustrated Parts List for locations). The control/regulator interconnection point is located at the bottom left corner of the Control Board. The Regulator Board has the (male) connector and the Control Board has the (female) connector. Look at the connection and make sure that they match, that they aren't offset. There shouldn't be any pins visible. If it looks questionable, remove the Control Board and correct it.

10.10 Look at the inside of the door and locate the Control Board and Regulator Board. (Reference the illustrated Parts List for locations). The keypad is connected to the Control Board. Look up between the Control Board and the Regulator Board. You should be able to see the keypad ribbon cable. The ribbon cable should be connected to a socket on the Control Board. If it's not connected, or looks questionable, remove the Control Board and correct it.

10.11 With no battery connected to the charger, press all of the keys on the keypad and the display should indicate that the button did function. The only exception will be the Equalize and Stop keys. To test them, connect a battery and allow the charger to start, then press the button. The ULTRA CHARGER was shipped set for automatic equalize which means unless this was changed, the Equalize button will not respond. To find out if the Status LED's on the keypad are okay, press key number "0" and a complete review will occur that starts out by performing a lamp test which lights all the Status LED's.

10.12 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.

10.13 Measure the AC supply voltage coming into the charger to confirm that it matches the charge input tap settings.

10.14 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.

10.15 Refer to the DIAGRAM chapter in the owners manual and locate the diagram for your charger to determine where the output cables connect to the charger. The black (Negative) output cable goes into the charger and connects to a bus bar on the end of the DC Fuse which is located on the left portion of the interior panel. The red (Positive) output cable goes into the charger and connects to the leads of the inductor that is located on the right-front corner of the charger base. The output connector will have a (+) and (-) symbol on it. The (+) terminal should have the red output cable connected to it, and the (-) should have the black output cable connected to it.

10.16 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 tem 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.

10.17 Make sure the suppressor core is attached to the control wire harness with the green wire outside the core, and that it is not missing. Visually inspect the suppressor core for missing pieces or cracks. If so, replace the suppressor core.

10.18 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. If a charger runs under extreme temperatures, any component inside the charger could fall prematurely.

10.19 An extremely high ambient temperature can cause many different problems. If a charger runs under extreme temperatures, any component inside the charger could fail prematurely.

10.20 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.

10.21 AC fuses are most likely to have failed. Visually inspect the transformer. If a winding has failed, the winding will appear to be burnt or look black. The varnish might be flaking off. Refer to the DIAGRAM chapter in the manual and locate the diagram for your charger. On the diagram there will be a winding configuration of the transformer. Disconnect the SCRs and diodes from the transformer and reapply AC to the charger. Measure the transformer secondary voltage, if less than 25VAC is present, replace the transformer.

10.22 Visually inspect for loose connections or components on the board that appear to be bad. There are suppressors on the board that are designed to absorb energy surges. If the surge is too high the component will fail. It will be very dark in color or cracked.

10.23 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.

10.24 Connect a fully charged battery to the charger. Make sure that the charger is set to its maximum Fixed AH capacity (See the Programming Your UC2001 Control chapter in this manual). If the input current exceeds the nameplate rating for the input voltage range that the charger is connected to, replace the inductor. Also inspect the inductor for dark horizontal areas on the coil insulation. If any significant discoloration of the inductor is found, it should be replaced.

10.25 If the AH jumper is incorrect for the charger, it will cause the unit to charge at rates either higher or lower than name-plate rating.

10.26 To check the expansion board for proper operation, first make sure there is a good connection to the UC2001 Control board. The connection is in the lower center of the expansion PC board. Looking at the inside of the door, check the voltages at the following points: across C20 – 18 to 35 VDC, across C12 – 4.75 to 5.25 VDC, and across C19 – 4.75 to 5.25 VDC. Observe polarity when making these measurements. Check for the proper Charger I.D. number in function 43 (See the Programming Your UC2001 Control chapter of this manual) if the problem is long CDAC approval delays. Also check the CDAC cables for proper insertion or damage.

If the expansion board still does not work after these checks and/or if any of the voltage measurements are incorrect, replace the expansion PC board.

10.27 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.

10.28 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.

10.29 The proper equalize schedule is one that is tailored to the specific battery and charger operation. The UC2001 Auto Equalize feature can be used to automate the equalize schedule (See the UC2001 Features chapter of this 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 (See the Programming Your UC2001 Control chapter of this manual). Some operations may also benefit from day of week equalizing. This can be programmed by the Auto EQ type function to the UC2001 Control (See the Programming Your UC2001 Control chapter of this manual).

10.30 Using the Review feature of the control (See the Control Features chapter of this manual), check the charge curve setting of the charger. If it does not match the Battery Type (Standard, SLA, Custom), reprogram the control to the proper curve. (Refer to the Programming Your UC2001 Control chapter of this manual).

10.31 Using the Review feature of the control (See the Control Features chapter of this manual), check the Fixed AH setting of the charger. If it does not match the battery nameplate rating of the battery (it should be within 20% of the battery nameplate rating), reprogram the control to the proper Fixed AH rating (Refer to the Programming Your UC2001 Control chapter of this manual). If this is not possible due to the maximum rating of the charger, a larger charger should be used.

10.32 Refer to Program chapter. Go to function number ___ and confirm that the control is set for the correct Fixed Temperature Setting. If not, enter the correct setting.

10.33 If battery electrolyte temperatures are well below 32 degrees F, the Ultra Charge 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.

10.34 The BID module communicates battery temperature, cell size, voltage, ampere hour size, BID no., and type to the charger. A nonfunctioning or incorrectly programmed BID can cause charging and /or battery problems. Using the UC2001 Review Features (See the UC2001 Review Features in this manual), check the review items listed above. Replace a nonfunctioning or incorrectly programmed module with a new one.

10.35 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).

10.36 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.*

10.37 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.

10.38 If the control is set to perform forming cycles , DV/DT termination is disabled, and the low current shutdown is disabled. To return to normal operation, program the control to "00" Forming Cycles (See the Programming Your UC2001 Control chapter of this manual).

10.39 The Ultra Charge is capable of charging batteries of somewhat larger AH capacities than it's nameplate rating, if increased time is allowed. When charging oversize batteries, be sure to allow the battery to reach charge complete.

10.40 Program the control to DV/DT charge termination (See the Programming Your UC2001 Control chapter of this manual).

10.41 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.

10.42 A cool down can be programmed into the UC2001 Control to add a specified cool down time between charge termination and the signaling of charge complete (See the Programming Your UC2001 Control chapter of this manual). A delayed start can be programmed into the UC2001 Control to add a specified delay time between battery connection and the start on the charge (See the Programming Your UC2001 Control chapter of this manual).

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

10.44 Check and repair/reconnect connections between the last charger that is polling properly and the next charger connected (See your CDAC Owners Manual).

10.45 Reboot computer and select "Restart CDAC after abnormal termination" menu item (See your CDAC Owners Manual).

10.46 Check for control operation on all CDAC connected chargers down stream of the last connected charger that is polling properly (or all CDAC connected chargers). Loss of AC power connections or proper control transformer voltage will prevent proper CDAC operation (See CDAC Owners Manual).

10.47 The Charger I.D. function in the UC2001 Control must be set to 0000 for proper normal (non-CDAC) operation (See the Programming Your UC2001 Control chapter of this manual).

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

10.49 Check the voltage across the contactor coil. If the voltage is 24VAC +/- 10%, replace contactor with a properly functioning part.

10.50 Check and tighten all transformer mounting screws.

10.51 Check and tighten all inductor mounting screws.

10.52 Check inductor for visible damage. Coat the transformer coil with a Prestolite approved (contact Prestolite Service) air dry varnish. If that fails to reduce the noise level, drive a shim of the proper material (contact Prestolite Service) between coil and core.

10.53 Check transformer for visible damage. Coat the transformer coil with a Prestolite approved (contact Prestolite Service) air dry varnish. If that fails to reduce the noise level, drive a shim of the proper material (contact Prestolite Service) between coil and core.

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

10.55 Check the SCR as described below. If it tests faulty, replace with an SCR of the proper type.

Connect a VOM set on the 1k Ohms scale; positive to SCR anode (stud), negative to SCR cathode (heavy red lead). The VOM should read a very high impedance (near open circuit). Touch and hold the SCR gate lead (small white lead) to the SCR anode. The VOM should read a low impedance (near short circuit). If the SCR reads shorted before the gate is touched to the anode, the SCR is bad. If the SCR reads open when the gate is touched to the anode, the SCR is bad (A DVM may be used if it is set to the Diode scale). A high impedance will be indicated by an over range indication (usually OL), a low impedance will be indicated by a low reading 1.00.

10.56 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, up to 104 degrees F) and dry as possible.

10.57 Replace damaged and/or incorrect shunt with one of correct size.

10.58 Reconnect transformer primary wiring to match the schematic included in this manual.

10.59 Reconnect transformer secondary wiring to match the schematic included in this manual.

10.60 Using a VOM or DVM, check the diode for proper operation as stated below.

Set the VOM to the 1k Ohms scale. Connect the positive VOM lead to the anode (cable lead) and the negative VOM lead to the cathode (stud). The VOM should read a low impedance (near short circuit). Reverse the VOM leads. The VOM should read high impedance (near open circuit). Replace any diodes that fail with the proper part.

10.61 Reconnect the input primary jumpers to match the input voltage, see the installation chapter of this manual. *Be sure to connect the control transformer primary properly*.

10.62 Replace the snubber PC board assembly (the temperature sensor is part of this assembly).

10.63 Program the forming cycles feature of the UC2001 control to the number of cycles required to properly form the battery. See the Programming Your UC2001 chapter of this manual.

10.64 Reprogram the fixed AH setting of the UC2001 control to match the battery nameplate AH rating. See the Programming Your UC2001 chapter of this manual.

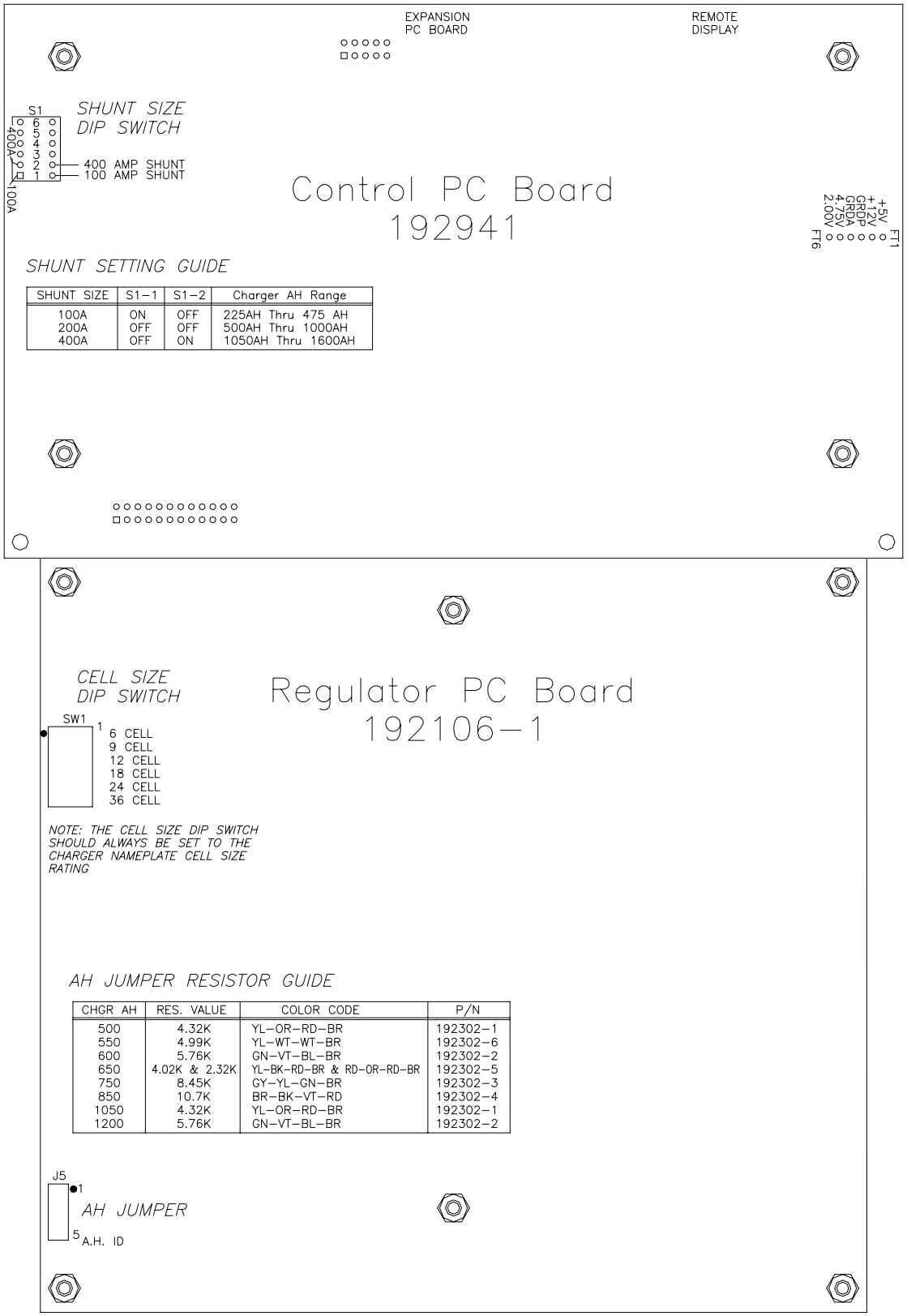
10.65 Program the UC2001 control to Multi-cell mode “ON” or program the Fixed cell setting to the proper cell size for your battery. See the Programming Your UC2001 chapter of this manual.

10.66 Set the control PCB shunt size dip switch to match the shunt on the charger (1 leaf = 100A, 2 leaves = 200A, 4 leaves = 400A). See Figure 10-1.

10.67 Set the regulator PCB cell size dip switches to match the charger nameplate cell size. See Figure 10-1.

10.68 Replace the ampere hour jumper with one that matches the nameplate AH rating of the charger. See the parts list included in this manual. See Figure 10-1.

10.69 Check for continuity at TB2-4 to TB2-5. If these terminals are separated by an impedance greater than 100 ohms, check AGV system.



SHUNT SIZE	S1-1	S1-2	Charger AH Range
100A	ON	OFF	225AH Thru 475 AH
200A	OFF	OFF	500AH Thru 1000AH
400A	OFF	ON	1050AH Thru 1600AH

CHGR AH	RES. VALUE	COLOR CODE	P/N
500	4.32K	YL-OR-RD-BR	192302-1
550	4.99K	YL-WT-WT-BR	192302-6
600	5.76K	GN-VT-BL-BR	192302-2
650	4.02K & 2.32K	YL-BK-RD-BR & RD-OR-RD-BR	192302-5
750	8.45K	GY-YL-GN-BR	192302-3
850	10.7K	BR-BK-VT-RD	192302-4
1050	4.32K	YL-OR-RD-BR	192302-1
1200	5.76K	GN-VT-BL-BR	192302-2

Figure 10-1 PC Boards

PARTS LIST

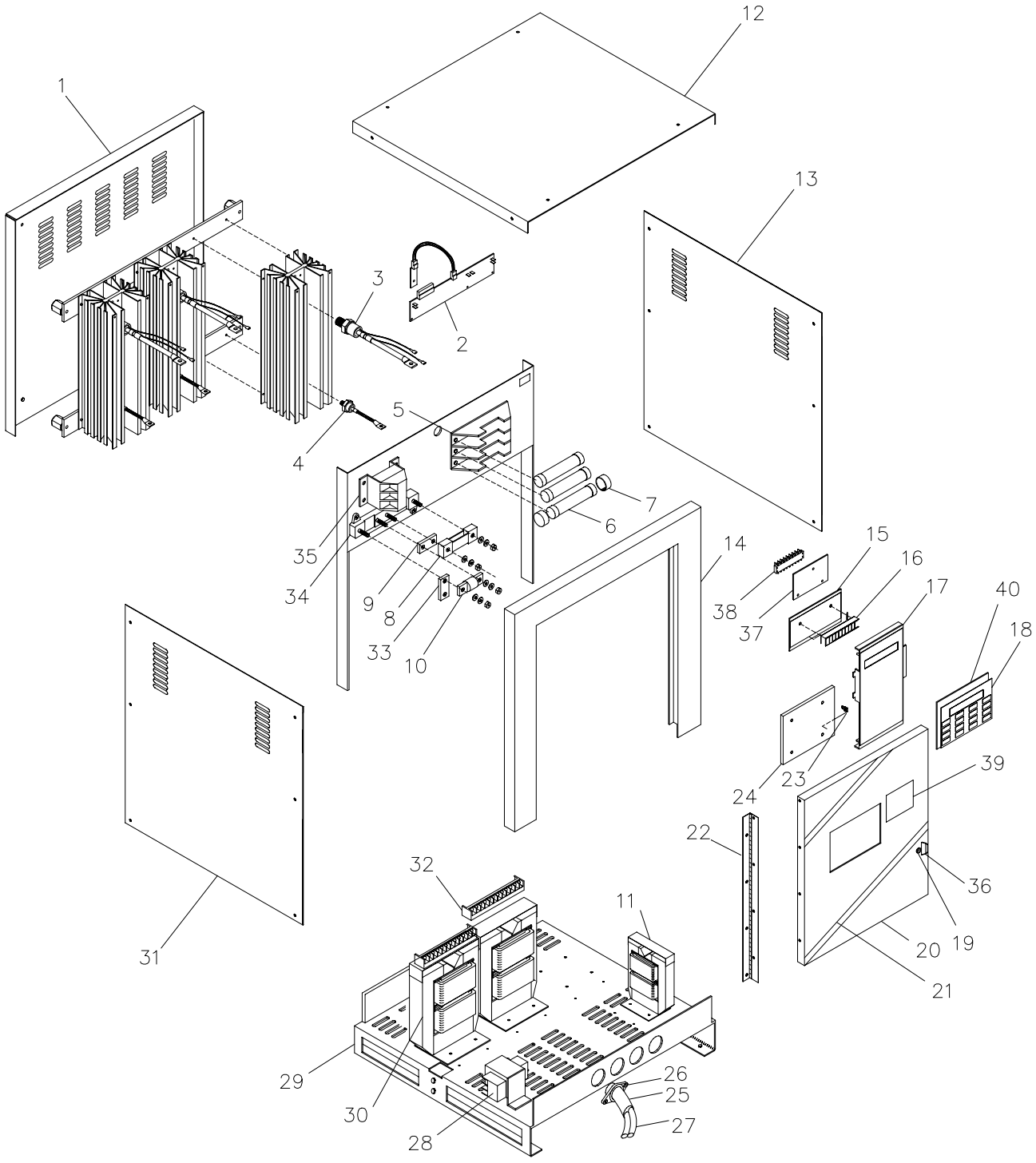


Figure 11-1

Parts List for Figure 11-1

ITEM	DESCRIPTION	500130-006 500S1-12	500220-006 650T3-24
1	PANEL, REAR	191053	191082A
2	BOARD, PC, AY, SNUBBER	192235	192110
3	SCR	192112-001	192112-001
4	DIODE	N/A	402832-003
5	BLOCK, FUSE	406207-001	404605-005
6	FUSE - SEE CHART ON PAGE 11-3		
7	REDUCER, FUSE	N/A	192301
8	SHUNT, CURRENT	193125-002	193125-002
9	BUS BAR	396725	396725
10	FUSE, DC, OUTPUT	Y1890-006	Y1890-006
11	CHOKE, AY.	192162	192180
12	PANEL, TOP	191692	193163
13	PANEL, SIDE, RIGHT	191047	191080
*14	FRAME, DOOR	192349	192141
15	BOARD, PC, SCR, CONTROL	192941	192941
16	DISPLAY, FLUOR, ALPHA	192095-001	192095-001
17	PANEL, CONTROL	193832	193832
18	SWITCH, AY	192936	192936
19	LATCH, DOOR	402425	402425
*20	PANEL, DOOR	192348A	192142A
21	LABEL, OVERLAY	192098	192111
22	HINGE	192145	1921441
23	CONNECTOR, AH, AY	192302-001	192302-005
24	BOARD, PC, SCR, REGULATOR, AY	192106-001	192106-001
25	COVER, OUTER NEOPRENE	378234-013	378234-013
26	CONNECTOR, STRAIN RELIEF	W10080-005	W10080-005
27	CABLE, CHARGING, OUPUT	396143-002	396143-002
28	TRANSFORMER, CONTROL	406247-002	406247-002
29	BASE, AY	192278	396047
30	TRANSFORMER, AY	192170A	192167A
31	PANEL, SIDE, AY	191048	191081
32	BLOCK, TERMINAL	192273	192273
33	BUS BAR	396725	396725
34	INSULATOR, FUSE & SHUNT AY	193114	193114
35	CONTACTOR	406243-001	406243-001
36	HANDLE, DOOR	192219	192219
37	BOARD, PC, INTERFACE	192934	192934
38	BLOCK, TERMINAL	401911-008	401911-008
39	LABEL, INSTRUCTIONS	192939	192939
40	PANEL, FILLER, CONTROL	192286	192286

*** IF YOUR CHARGER IS EQUIPPED WITH JIC DISCONNECT (OPTION 500), PLEASE SPECIFY WHEN ORDERING THESE PARTS.**

FOR CHARGERS WITH SERIAL NUMBER BEFORE 1/99

ITEM	DESCRIPTION	500130-006 500S1-12	500220-006 650T3-24
6	FUSE (208 VAC)	192724-005	192724-006
	(240 VAC)	192724-004	*192724-005
	(480 VAC)	192724-002	*192724-002
* REQUIRES ITEM #7, 2 PER FUSE			

FOR CHARGERS WITH SERIAL NUMBER AFTER 1/99

ITEM	DESCRIPTION	500130-006 500S1-12	500220-006 650T3-24
6	FUSE (208 VAC)	W10386-008	W10386-009
	(240 VAC)	W10386-007	*W10386-008
	(480 VAC)	*W10386-005	*W10386-005
* REQUIRES ITEM #7, 2 PER FUSE			

ELECTRONIC PRINTED CIRCUIT BOARD EXCHANGE SERVICE POLICY

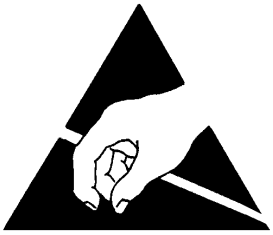
Because of the definite superiority of certain solid-state control components over conventional electromechanical relays and regulators, the company product lines now incorporate solid-state controls for applications in which they may be used to advantage. To facilitate testing and servicing, these control 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.

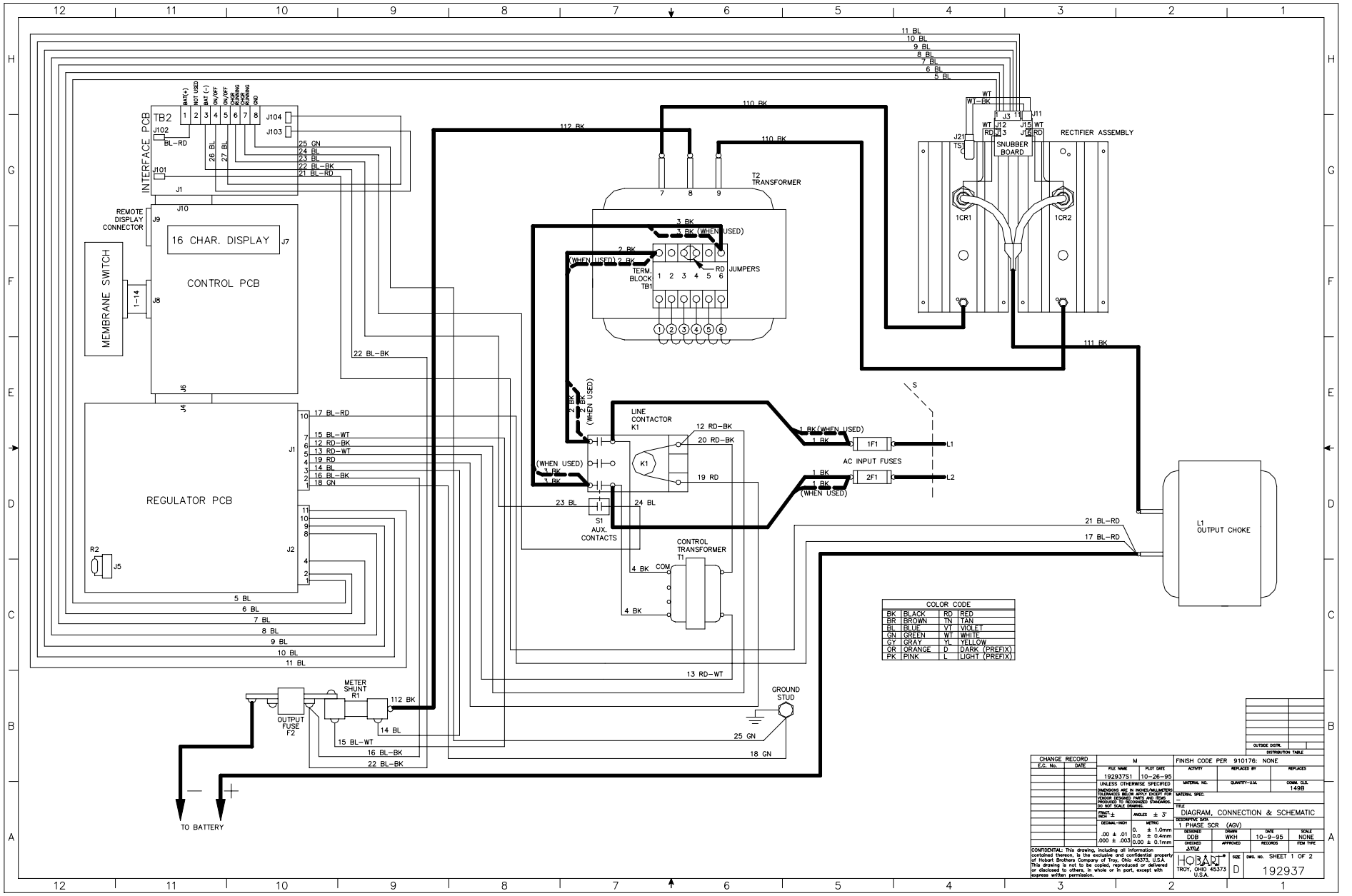
This Exchange Plan applies only to the specified solid-state control components circuitry which have failed due to electrical fault or normal deterioration resulting from use and age. The plan does not cover parts which have been physically damaged through accident or abuse, or to which unauthorized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



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

DIAGRAMS

MODEL NO. INFORMATION CASE SIZE	DIAGRAM OUTPUT SCHEMATIC	OUTLINE AND DIMENSION
S	192937	192320
T	194586	
See model number description inside front cover.		


INTERFACE PCB
TB2
BAT(+)
NOT USED
BAT (-)
ON/OFF
ON/OFF
REMOTE RUNNING
REMOTE RUNNING
GND
J104
J103
J102
BL-RD
J101
J1
J10
REMOTE DISPLAY CONNECTOR
J9
16 CHAR. DISPLAY
J7
CONTROL PCB
MEMBRANE SWITCH
1-14
J8
J6
J4
REGULATOR PCB
J1
J2
R2
J5
25 GN
24 BL
23 BL
22 BL-BK
21 BL-RD
26 BL
27 BL
22 BL-BK
17 BL-RD
15 BL-WT
12 RD-BK
13 RD-WT
19 RD
14 BL
16 BL-BK
18 GN
5 BL
6 BL
7 BL
8 BL
9 BL
10 BL
11 BL
11 BL
10 BL
9 BL
8 BL
7 BL
6 BL
5 BL
110 BK
112 BK
110 BK
T2
TRANSFORMER
7 8 9
3 BK
3 BK (WHEN USED)
2 BK
(WHEN USED) 2 BK
TERM. BLOCK TB1
1 2 3 4 5 6
RD
JUMPERS
1 2 3 4 5 6
WT
WT-BK
J3
J11
J12
RD
J13
WT
J15
WT
J16
RD
J21
TS1
SNUBBER BOARD
RECTIFIER ASSEMBLY
1CR1
1CR2
111 BK
2 BK
(WHEN USED)
LINE CONTACTOR
K1
12 RD-BK
20 RD-BK
19 RD
K1
(WHEN USED)
3 BK
3 BK
23 BL
24 BL
S1
AUX. CONTACTS
1 BK (WHEN USED)
1 BK
1F1
L1
AC INPUT FUSES
1 BK
1 BK (WHEN USED)
2F1
L2
S
CONTROL TRANSFORMER
T1
4 BK
COM
4 BK
21 BL-RD
17 BL-RD
L1
OUTPUT CHOKE
13 RD-WT
METER SHUNT
R1
112 BK
OUTPUT FUSE
F2
14 BL
15 BL-WT
16 BL-BK
22 BL-BK
GROUND STUD
25 GN
18 GN
TO BATTERY
COLOR CODE
BK BLACK
BR BROWN
BL BLUE
GN GREEN
GY GRAY
OR ORANGE
PK PINK
RD RED
TN TAN
VT VIOLET
WT WHITE
YL YELLOW
D DARK (PREFIX)
L LIGHT (PREFIX)
CHANGE RECORD
Eo. No.
DATE
M
FILE NAME
192937S1
PLOT DATE
10-26-95
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES/MILLIMETERS
TOLERANCES ARE FOR MACHINED PARTS
VENDOR DESIGNED PARTS AND ITEMS
PRODUCED TO RECOGNIZED STANDARDS.
DO NOT SCALE DRAWING.
FRACT ± 1/64
ANGLES ± 3°
DECIMAL-INCH
.00 ± .01
.000 ± .003
METRIC
0. ± 1.0mm
0.0 ± 0.4mm
0.00 ± 0.1mm
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FINISH CODE PER 910176: NONE
ACTIVITY
REPLACED BY
REPLACES
MATERIAL NO.
QUANTITY-U.M.
COMM. CUS.
149B
MATERIAL SPEC.
—
TITLE
DIAGRAM, CONNECTION & SCHEMATIC
DESCRIPTIVE DATA
1 PHASE SCR (AGV)
DESIGNED
DDB
DRAWN
WKH
DATE
10-9-95
SCALE
NONE
CHECKED
APPROVED
RECORDS
ITEM TYPE
HOBART
TROY, OHIO 45373
U.S.A.
SIZE
D
DWG. NO.
192937
SHEET 1 OF 2
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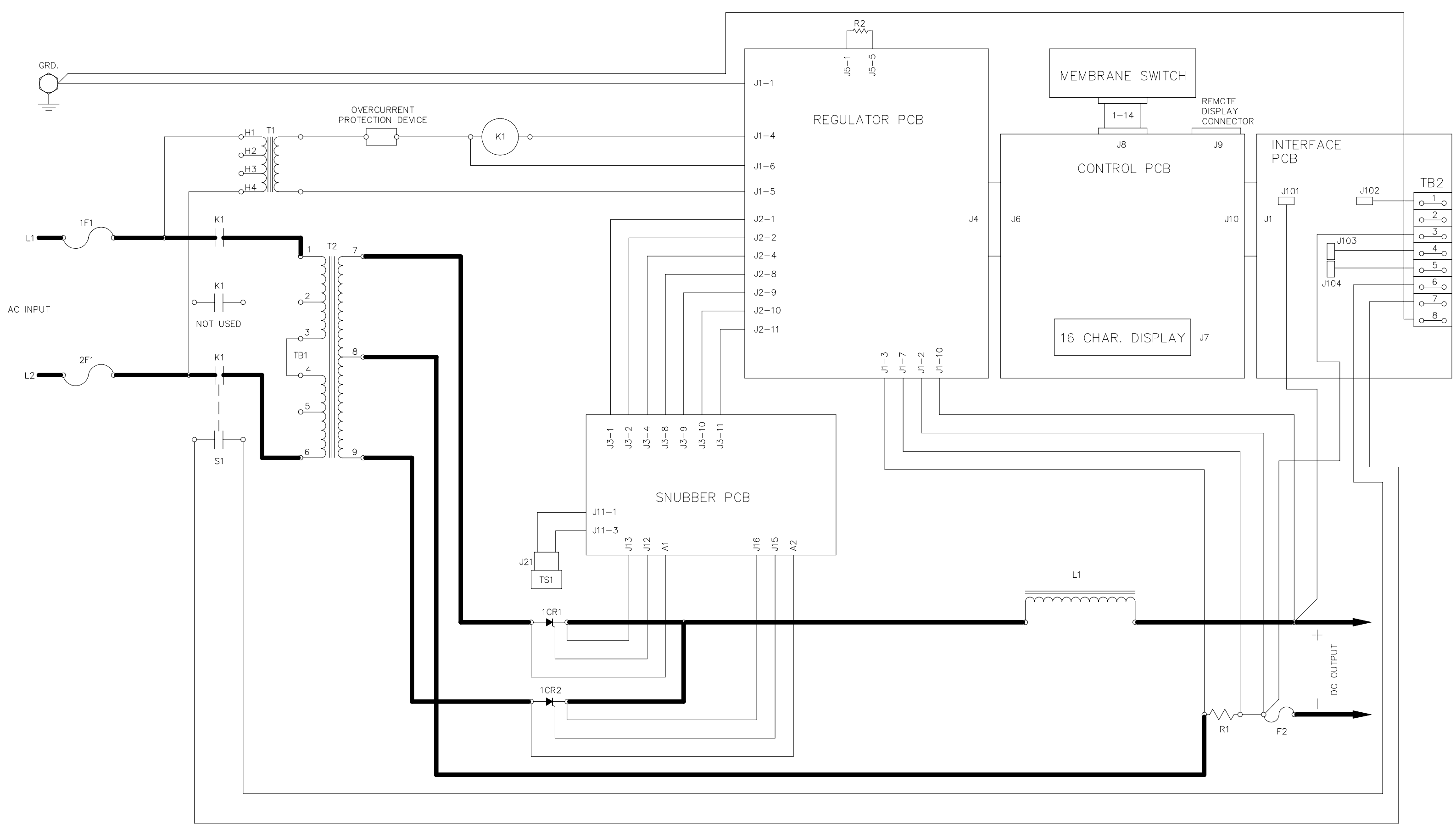
DISTRIBUTION TABLE



LEGEND

1CR1, 1CR2	SCR, OUTPUT
1F1, 2F1	FUSE, INPUT AC
A1, A2	ANODE, SCR
F2	FUSE, OUTPUT DC
J1,J2,J3,J4,J5,J6,J7,J8 J9,J10,J10A,J11,J12 J13,J15,J16,J21,J101 J102,J103,J104	CONNECTOR, PC BOARD
K1	CONTACTOR, AC
L1	INDUCTOR, OUTPUT
R1	SHUNT, METER
R2	RESISTOR, AMP HOUR SETTING
S	SWITCH, DISCONNECT
S1	AUX. CONTACTS
T1	TRANSFORMER, CONTROL
T2	TRANSFORMER
TB1	BLOCK, TERMINAL
TB2	BLOCK, TERMINAL
TS1	SENSOR, TEMPERATURE

CHANGE RECORD — E.C. No. / DATE

FILE NAME: 192937S2 — PLOT DATE: 10-26-95

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES/MILLIMETERS. TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS. DO NOT SCALE DRAWING.

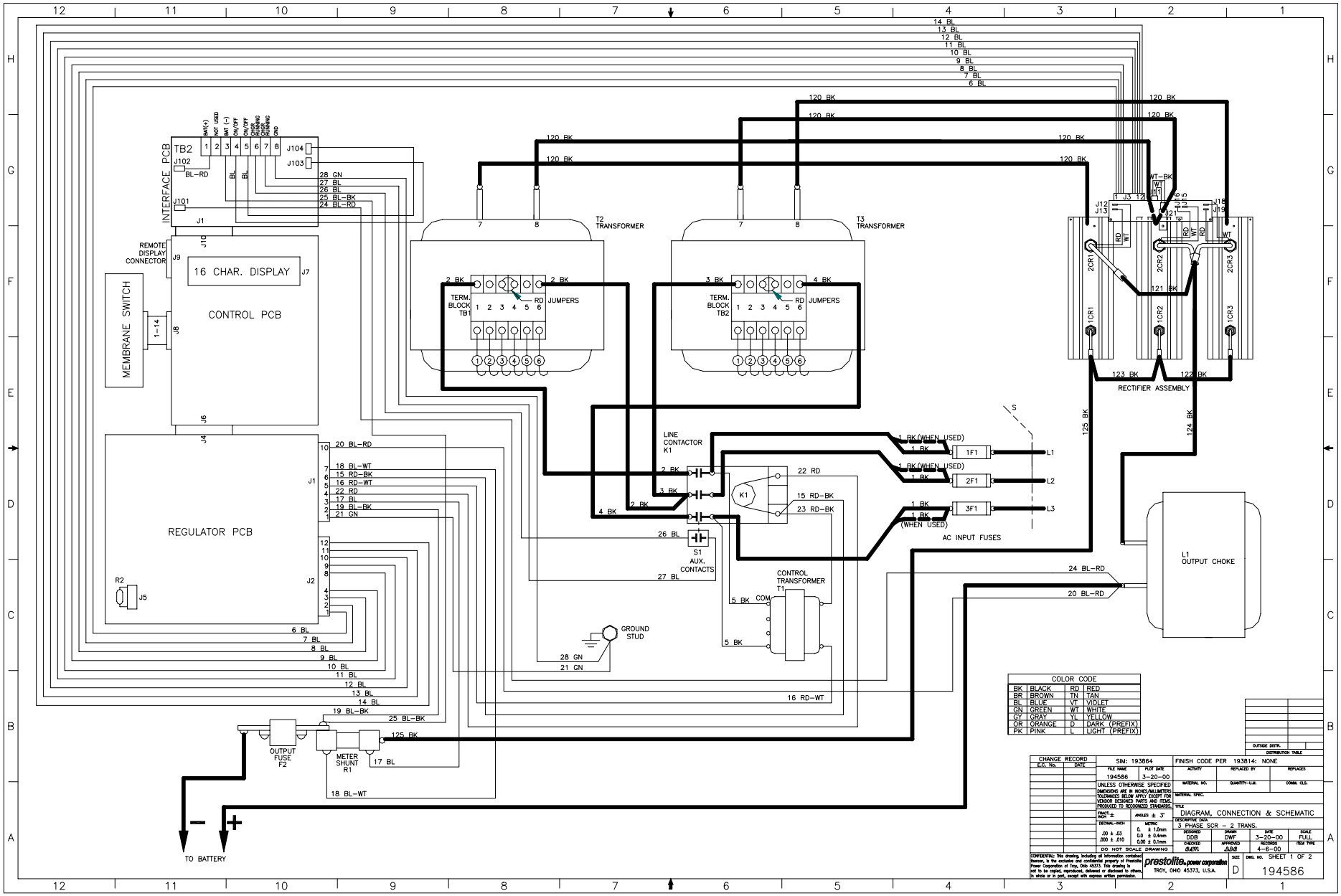
FRACT. INCH ± — ANGLES ± 3°
DECIMAL-INCH: .00 ± .01, .000 ± .003 — METRIC: 0. ± 1.0mm, 0.0 ± 0.4mm, 0.00 ± 0.1mm

FINISH CODE PER NONE

TITLE: DIAGRAM, CONNECTION & SCHEMATIC
DESCRIPTIVE DATA: 1 PHASE SCR (AGV)

DESIGNED: DDB — DRAWN: WKH — DATE: 10-10-95 — SCALE: NONE
COMM. CLS. 149B

HOBART — TROY, OHIO 45373 U.S.A.
SIZE D — DWG. NO. SHEET 2 — 192937



COLOR CODE			
BK	BLACK	RD	RED
BR	BROWN	TN	TAN
BL	BLUE	VT	VIOLET
GN	GREEN	WT	WHITE
GY	GRAY	YL	YELLOW
OR	ORANGE	D	DARK (PREFIX)
PK	PINK	L	LIGHT (PREFIX)

CHANGE RECORD	
E.C. No.	DATE

SIM: 193864 — FINISH CODE PER 193814: NONE

FILE NAME	PLOT DATE	ACTIVITY	REPLACED BY	REPLACES
194586	3-20-00			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES/MILLIMETERS
TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS. PRODUCED TO RECOGNIZED STANDARDS.

MATERIAL NO.	QUANTITY-U.M.	COMM. CLS.

MATERIAL SPEC.

FRACT. ± — ANGLES ± 3°

DECIMAL-INCH: .00 ± .03; .000 ± .010
METRIC: 0. ± 1.0mm; 0.0 ± 0.4mm; 0.00 ± 0.1mm

DO NOT SCALE DRAWING

TITLE: DIAGRAM, CONNECTION & SCHEMATIC
DESCRIPTIVE DATA: 3 PHASE SCR - 2 TRANS.

DESIGNED	DRAWN	DATE	SCALE
DDB	DWF	3-20-00	FULL
CHECKED	APPROVED	RECORDS	ITEM TYPE
BMH	JJB	4-6-00	

prestolite power corporation
TROY, OHIO 45373, U.S.A.

SIZE D — DWG. NO. 194586 — SHEET 1 OF 2

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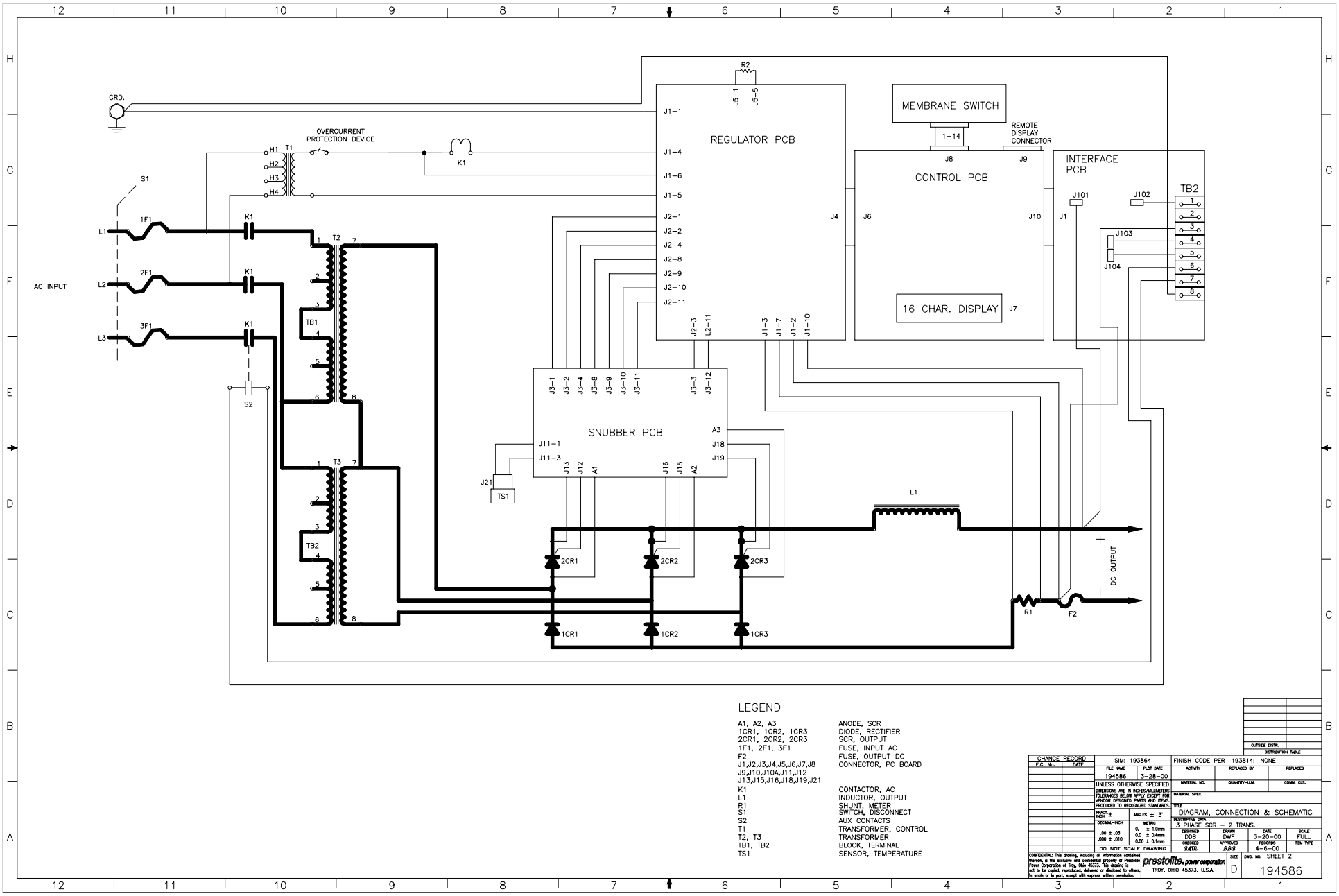

LEGEND

A1, A2, A3	ANODE, SCR
1CR1, 1CR2, 1CR3	DIODE, RECTIFIER
2CR1, 2CR2, 2CR3	SCR, OUTPUT
1F1, 2F1, 3F1	FUSE, INPUT AC
F2	FUSE, OUTPUT DC
J1,J2,J3,J4,J5,J6,J7,J8 J9,J10,J10A,J11,J12 J13,J15,J16,J18,J19,J21	CONNECTOR, PC BOARD
K1	CONTACTOR, AC
L1	INDUCTOR, OUTPUT
R1	SHUNT, METER
S1	SWITCH, DISCONNECT
S2	AUX CONTACTS
T1	TRANSFORMER, CONTROL
T2, T3	TRANSFORMER
TB1, TB2	BLOCK, TERMINAL
TS1	SENSOR, TEMPERATURE

CHANGE RECORD		SIM: 193864		FINISH CODE PER 193814: NONE			
ECC No.	DATE	FILE NAME	PLOT DATE	ACTIVITY	REPLACED BY		REPLACES
		194586	3-28-00				
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES/MILLIMETERS TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS.		MATERIAL NO.	QUANTITY-U.M.		COMM. CLS.
		FRACT ± 1/64	ANGLES ± 1°	MATERIAL SPEC.			
		DECIMAL-INCH	METRIC	TITLE	DIAGRAM, CONNECTION & SCHEMATIC		
		.00 ± .03	0. ± 1.0mm	DESCRIPTIVE DATA	3 PHASE SCR – 2 TRANS.		
		.000 ± .010	0.0 ± 0.4mm	DESIGNED	DRAWN	DATE	SCALE
			0.00 ± 0.1mm	DDB	DWF	3-20-00	FULL
		DO NOT SCALE DRAWING		CHECKED	APPROVED	RECORDS	ITEM TYPE
				BAM	BAB	4-6-00	

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SIZE D | DWG. NO. 194586 | SHEET 2

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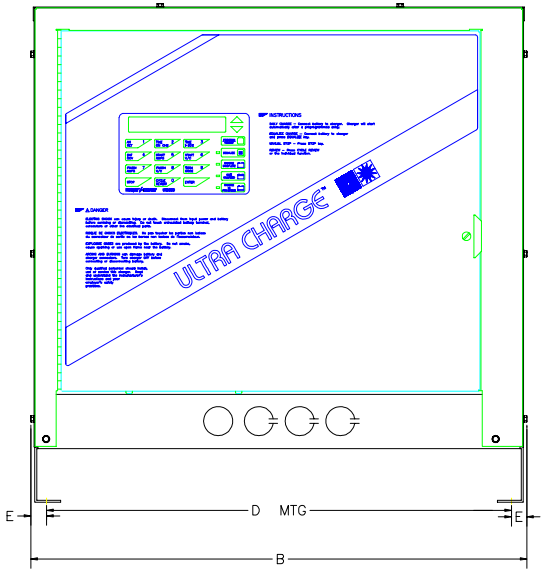

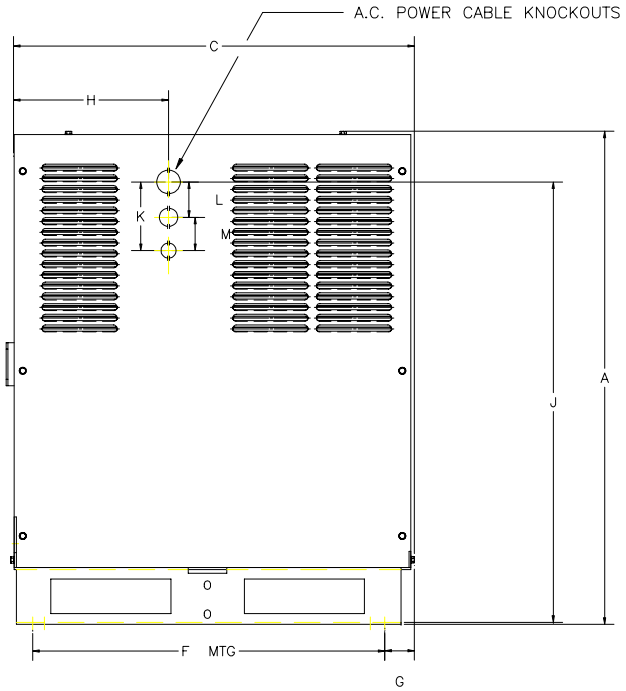

CABINET DESIGNATION	DIMENSIONS	A	B	C	D	E	F	G	H	J	K	L	M
SINGLE PHASE	INCHES	26-7/16	21-1/2	20-1/2	19-3/8	3/4	17-3/4	1	8-1/2	23	4	2-1/16	1-15/16
	MILLIMETERS	672.0	546.1	521	492.0	19.0	451.0	25.4	216	584.0	101.6	52.4	49.2
THREE PHASE	INCHES	28-13/16	29-1/4	23-1/2	27-1/8	3/4	19-1/16	1-3/4	9-3/8	25-1/2	4	2-1/16	1-15/16
	MILLIMETERS	732.0	743.0	597	689.0	19.0	484.0	44.0	238	684.0	101.6	52.4	49.2

CHANGE RECORD
E.C. No. | DATE

FILE NAME: 192320 | PLOT DATE: 4-3-98

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES/MILLIMETERS. TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS.

FRACT. ± 1/16 | ANGLES ± 3°

DECIMAL-INCH: .00 ± .03; .000 ± .010 | METRIC: 0. ± 1.0mm; 0.0 ± 0.4mm; 0.00 ± 0.1mm

DO NOT SCALE DRAWING

FINISH CODE PER 193814: NONE

ACTIVITY	REPLACED BY	REPLACES

MATERIAL NO.	QUANTITY-U.M.	COMM. CLS.

MATERIAL SPEC.: –

TITLE: OUTLINE, DIMENSION

DESCRIPTIVE DATA: SCR CHARGER

DESIGNED	DRAWN	DATE	SCALE
BAM	BAM	3-28-94	NONE

CHECKED	APPROVED	RELEASED	ITEM TYPE
		3-28-94	

DWG. NO. 192320 | SIZE D | SHEET

OUTSIDE DISTR.

DISTRIBUTION TABLE

AMATEK
PRESTOLITE POWER
TROY, OHIO 45373, U.S.A.

WARRANTY

AMETEK/PRESTOLITE POWER SCR 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 transformer, inductors, silicon diodes, and SCR's 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) Printed circuit board assemblies are warranted for three (3) years after Prestolite's shipment of the unit (s) of which they are a part, provided, however, that during the last two (2) years of this 3 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.

   c) 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 judgment. 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 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.

AMETEK/PRESTOLITE POWER
TROY, OHIO, U.S.A.

Data Sheet: 1148
Index: 110100
Replaces: 082499

AMETEK®
PRESTOLITE POWER