

# ***Minuteman***

## **24 VOLT FULLY AUTOMATIC BATTERY CHARGER MODEL 957731**

### **Specifications**

<b>AC Supply:</b>	100 volts, 60 hertz, 7 amps, single-phase
<b>DC Output:</b>	24 volts, 20 amps initially tapering to 6 amps
<b>Battery Capacity:</b>	24 volt, 12 cell, 168 to 275 ampere-hour liquid electrolyte (wet) lead acid batteries

### **PLEASE SAVE THESE IMPORTANT SAFETY AND OPERATING INSTRUCTIONS**

For correct operation of the equipment, it is important to read and be familiar with this entire manual before installing and operating the charger.  
**DO NOT DISCARD THIS MANUAL AFTER READING.**



**LOOK FOR THIS SYMBOL TO POINT OUT SAFETY PRECAUTIONS. IT MEANS: BECOME ALERT—YOUR SAFETY IS INVOLVED. IF YOU DO NOT FOLLOW THESE SAFETY INSTRUCTIONS, INJURY OR PROPERTY DAMAGE CAN OCCUR.**

#### **IMPORTANT SAFETY INSTRUCTIONS**

- 1. SAVE THESE INSTRUCTIONS** – This manual contains important safety and operating instructions for battery charger Model 957731.
- Before using battery charger, read all instructions and cautionary markings on (1) battery charger, (2) battery, and (3) product using battery.
- CAUTION:** TO REDUCE RISK OF INJURY, CHARGE ONLY LIQUID ELECTROLYTE (WET) LEAD ACID RECHARGEABLE BATTERIES. OTHER TYPES OF BATTERIES MAY BURST CAUSING PERSONAL INJURY AND DAMAGE.
- Do not expose charger to rain or snow.
- Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to person.
- To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting charger.
- Make sure cord is located so that it will not be stepped on, tripped over, or otherwise subjected to damage or stress.
- An extension cord should not be used unless absolutely necessary. Use of improper extension cord could result in a risk of fire and electric shock. If extension cord must be used, make sure:
  - Pins on plug of extension cord are the same number, size, and shape as those of plug on charger.
  - Extension cord is properly wired and in good electrical condition.
  - Wire size is large enough for AC ampere rating of charger.
- Do not operate charger with damaged cord or plug; replace it immediately.

9. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified service center.
10. Do not disassemble charger; take it to a qualified service center when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
11. To reduce risk of electric shock, unplug charger from a live outlet or disconnect AC power to the outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

## INTRODUCTION

This battery charger is a self-regulating charger with a minimum of moving parts, designed for long, trouble-free service. Built-in line voltage compensation produces a consistent output when the AC supply voltage varies by as much as 10% from nominal. Convection cooling maximizes the reliability and minimizes any maintenance costs. **ONLY LIQUID ELECTROLYTE (WET) LEAD ACID BATTERIES** should be recharged with this charger to ensure superior battery performance and life. A patented electronic circuit turns the charger on and off automatically. When the battery has reached its maximum state of charge, the circuitry will turn the charger off.

## RECEIVING AND INSTALLATION

When the charger is received, check for possible in-transit damage. If any damage is found, it should be reported as a claim to the carrier.

Proper installation of the charger is important in order to achieve good charger performance and to prevent damage to the charger and batteries. The charger should be located in a clean, cool, dry and well ventilated area. To permit free air flow for convection cooling, allow three inches (3") minimum between the charger and any wall and six inches (6") between the charger and other equipment. Position the charger on a foundation of stone, brick, concrete, or grounded metal.

**⚠ DANGER: TO REDUCE THE RISK OF FIRE, DO NOT USE THE CHARGER NEAR FLAMMABLE MATERIALS OR VAPORS.**

## AC INPUT AND GROUNDING INSTRUCTIONS

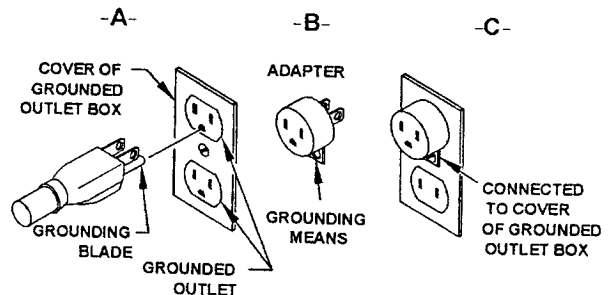
**⚠ CAUTION: TO REDUCE RISK OF ELECTRIC SHOCK OR FIRE, DISCONNECT POWER TO RECEPTACLE BEFORE INSTALLING OR REMOVING UNIT.**

Charger should be grounded to reduce the risk of electric shock. This charger is equipped with an electric cord having an equipment-grounding conductor and grounding plug. The installed plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

**⚠ DANGER: NEVER ALTER AC CORD OR PLUG PROVIDED, IF IT WILL NOT FIT OUTLET. HAVE A PROPER OUTLET INSTALLED BY A QUALIFIED ELECTRICIAN. IMPROPER CONNECTION CAN RESULT IN A RISK OF ELECTRIC SHOCK.**

This batter charger is for use on a nominal 120 volt circuit and has a grounding plug, which looks like the adapter illustrated in figure A. A temporary adapter, which looks like the adapter illustrated in figures B and C, may be used to connect this plug to a two-pole receptacle as shown in figure B if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician.

### GROUNDING METHODS



**NOTE:** Use of adapter shown in figures B and C is not permitted in Canada.

**⚠ DANGER: BEFORE USING ADAPTER AS ILLUSTRATED, BE CERTAIN THE CENTER SCREW OF OUTLET PANEL PLATE IS GROUNDED.**

The green-colored rigid ear or lug extending from adapter must be connected to a properly grounded outlet. If necessary, replace original outlet cover plate screw with a longer screw that will secure adapter ear or lug to outlet cover plate and make ground connection to grounded outlet.

## EXTENSION CORD REQUIREMENTS

Always use a three conductor No. 14 AWG (1.5mm) heavy duty cord with ground, properly wired, in good electrical condition and keep it as short as possible. Make sure the pins on the plug of the extension cord are the same number, size and shape as the AC plug of the battery charger. The use of an improper extension cord could result in a risk of fire or electric

shock. Locate all cords so they will not be stepped on, tripped over, or otherwise subjected to damage or stress.

## DC OUTPUT

This battery charger is designed to produce a 24-volt DC output with an initial charge current of 20 amps. ONLY 24 VOLT, 12 CELL, 168 TO 275 AMP-HOUR, LIQUID ELECTROLYTE (WET) LEAD ACID BATTERIES SHOULD BE USED. The charge current will decrease gradually to about 6 amps as the battery reaches full charge and will remain there until the charger turns off. As the battery ages, the charge current may no longer decrease to the 6 amp finish current. Liquid electrolyte batteries will normally be charged to 2.5-2.6 volts per cell.

## OPERATING INSTRUCTIONS

1. Connect the AC supply cord to a properly grounded 120 volt, 60 hertz, single phase outlet.
2. Connect the DC output plug by grasping the plug body and pushing it straight into the receptacle until it is fully engaged. The black wire must be connected to battery negative (-), and the red or white wire to battery positive (+). Make sure all connections are clean and tight.
3. The charger will start after a short delay as indicated by the transformer hum and the ammeter movement.

**⚠ WARNING: LEAD ACID BATTERIES GENERATE GASES WHICH CAN BE EXPLOSIVE. CHARGE ONLY IN WELL VENTILATED AREAS. DO NOT DISCONNECT CHARGER DC OUTPUT TERMINALS FROM BATTERY WHEN CHARGER IS ON. THE RESULTING ARCING AND BURNING COULD CAUSE THE BATTERY TO EXPLODE. KEEP SPARKS, FLAME AND SMOKING MATERIALS AWAY FROM BATTERY.**

If the charger must be stopped, always disconnect the AC supply cord from its outlet before disconnecting the DC output terminals from the battery.

4. Monitor the ammeter for correct charge rate. The initial charge rate should be approximately 20 amps. If the battery has not been discharged, or the AC supply voltage, is lower than 100/200 volts, the initial charge rate may be less than 20 amps.
5. Charger turns off automatically when battery is fully charged. Charge time varies with battery size and depth of discharge. Allow 12 hours for normal charging. Severely discharged batteries may require up to 18 hours to be properly charged and equalized. After the charger has

turned off, disconnect the AC supply cord from outlet.

## MAINTENANCE INSTRUCTIONS

The battery charger requires minimal maintenance. It should be kept clean and all connections are to be tightly secured. In the event of intermittent operation, examine and tighten, if necessary, all connections. **BE SURE THE CHASSIS IS SECURELY GROUNDED.** If any problems cannot be resolved, consult a qualified service center.

Observe the following battery maintenance procedures to obtain good performance and maximum cycle life.

1. Always observe the following personal safety precautions when working with lead acid batteries:
  - a. Someone should be within range of your voice or close enough to come to your aid when you work near a battery.
  - b. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
  - c. Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
  - d. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least ten minutes and get medical attention immediately.
  - e. NEVER smoke or allow a spark or flame in vicinity of batteries.
  - f. Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
  - g. Remove personal metal items such as rings, bracelets, necklaces and watches when working with a lead acid battery. A lead acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
  - h. NEVER charge a frozen battery.

**⚠ DANGER: TO REDUCE RISK OF ELECTRIC SHOCK, ALWAYS DISCONNECT THE AC SUPPLY CORD FROM ITS OUTLET AND THE DC OUTPUT CORD FROM THE BATTERY BEFORE ATTEMPTING ANY MAINTENANCE OR CLEANING OF THE BATTERY.**

2. New batteries should be given a full charge before their first use because it is difficult to know how long batteries have been stored.

3. Limit use of new batteries for first 5 cycles. New batteries are not capable of their rated output until they have been discharged a number of times.
4. Do not excessively discharge batteries. Excessive discharge can cause polarity reversal of individual cells resulting in complete failure shortly thereafter. Limited use of new batteries will minimize the chance of cell reversal.
5. CHECK THE LEVEL OF THE ELECTROLYTE IN CONVENTIONAL LIQUID ELECTROLYTE ACID BATTERIES MONTHLY. MAINTAIN THE PROPER ELECTROLYTE LEVEL BY ADDING DISTILLED OR PURIFIED WATER WHEN NECESSARY. Electrolyte levels lower during discharge and rise during charge. Therefore, it is mandatory that water be added to cells ONLY when they are fully charged; do not overfill. Old batteries require more frequent additions of water than do new batteries.
6. Keep tops of batteries clean and dry to prevent excessive self discharge. Keep battery terminals reasonably tight.

#### TROUBLE SHOOTING GUIDE

FOR SAFE AND EFFICIENT TROUBLE SHOOTING, READ THIS GUIDE COMPLETELY BEFORE BEGINNING ANY TESTS.

**⚠ CAUTION: DO NOT OPERATE THE CHARGER IF IT IS DAMAGED OR APPEARS TO BE MALFUNCTIONING. PERSONAL INJURY OR DAMAGE TO THE CHARGER OR BATTERIES MAY RESULT. DO NOT DISASSEMBLE THE CHARGER. TAKE IT TO A QUALIFIED SERVICE AGENT WHEN SERVICE OR REPAIR IS REQUIRED. INCORRECT REASSEMBLY MAY RESULT IN A RISK OF ELECTRIC SHOCK OR FIRE.**

To determine if a charger malfunction exists, eliminate the problems not associated with the charger noted in the sections below. If the problem cannot be resolved, contact a qualified service center.

1. CHARGER DOES NOT TURN ON.
  - a. Battery is not connected to charger.
  - b. Charger is not plugged into a live AC outlet.

**⚠ WARNING: IF THE AC OR DC PLUG OR RECEPTACLE IS BROKEN, TWISTED, BENT OR LOOSE AND DOES NOT MAKE GOOD ELECTRICAL CONTACT, HAVE IT REPLACED BY QUALIFIED SERVICE PERSONNEL IMMEDIATELY. DO NOT USE THIS CHARGER IN THIS CONDITION AS FIRE OR PERSONAL INJURY CAN RESULT.**

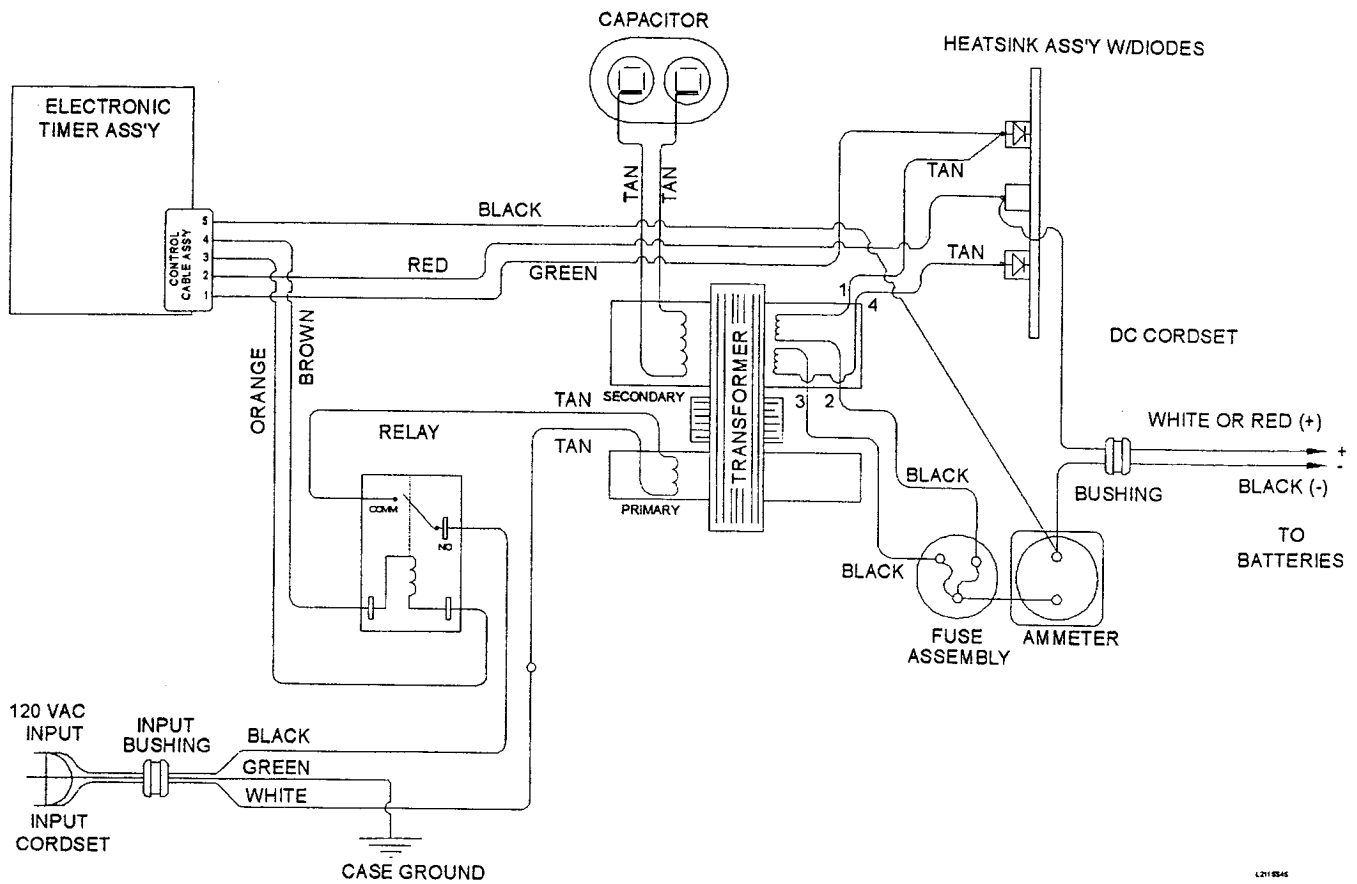
- c. DC fuses blown.

2. CHARGER REMAINS AT HIGH RATE
  - a. The charger is connected to a battery pack with a system voltage lower than specified.
  - b. Battery amp-hour capacity is greater than specified for charger.
  - c. One or more of the batteries in the battery pack has reversed polarity.
3. CHARGER TURNS OFF EARLY
  - a. The DC cord was accidentally disconnected from the battery during charge.
  - b. The battery has been allowed to sulfate. Charge the battery at least once every three days when the equipment is lightly utilized. Once sulfation is allowed to occur, it may be partially reduced by returning, temporarily, to daily charging.
  - c. AC circuit is not live (power outage or circuit breaker blown).
4. CHARGER DOES NOT TURN OFF
  - a. The charger is connected to a battery with an amp-hour capacity greater than specified.
  - b. The charger is connected to a battery pack with a system voltage higher or lower than specified.
  - c. New batteries (5 cycles or less), cold batteries, or over-discharged batteries may require an extended charge time to achieve full charge.
5. CHARGER FUSE BLOWS (OR CIRCUIT BREAKER)
  - a. DC fuse blows from improper polarity from charger to battery.
6. BUILDING AC LINE CIRCUIT BREAKER OR FUSE BLOWS
  - a. A "weak" fuse or circuit breaker is protecting the circuit. Connect the charger to another outlet on a different circuit. If the charger operates properly, have a qualified electrician inspect and test the original circuit.
  - b. The circuit is overloaded. Connect the charger to another outlet on a different circuit.
7. EQUIPMENT RANGE DECREASING
  - a. The electrolyte level in conventional liquid electrolyte lead acid batteries was allowed to drop below the top of the battery plates. Add distilled water to just cover the tops of the plates immediately upon discovery and fill to the proper level with distilled water at the completion of the very next charge cycle. Battery capacity lost in this manner is permanent and is not recovered with additional charge cycles.

b. Use of the equipment before the batteries have been fully charged and the charger turns off. This shortens battery life and hastens the onset of reduced daily range. Battery capacity lost in this manner is

permanent and is not recovered with additional charge cycles.  
 c. This is the normal wearout process for all types of deep-cycle motive power batteries.

### WIRING DIAGRAM



L2118246

## PARTS LIST

When replacing a part, USE ONLY ORIGINAL FACTORY REPLACEMENT PARTS of the correct size and rating.

QTY.	DESCRIPTION
1	CASE ASSEMBLY
1	TRANSFORMER
2	FUSEHOLDER
2	DC FUSE, AB-30
1	ELECTRONIC TIMER
1	AMMETER
1	AC CORDSET
1	DC CORDSET
1	HEATSINK W/ DIODES
1	CONTROL CABLE
1	BUSHING, AC CORD
1	BUSHING, DC CORD
1	RELAY
1	CAPACITOR

### LIMITED WARRANTY

Minuteman warrants each new Battery Charger for defects in material and workmanship for a period of ~~ONE~~ <sup>ONE</sup> year from the date of manufacture of the complete unit. Repairs can be made at the Minuteman factory. To do so, send the defective unit with transportation charges prepaid to:

**Minuteman, Inc.**  
**111 South Rohlwing Road**  
**Addison, Illinois 60101**  
**Attention: Service Department**

For repairs made at other than the Minuteman factory, Minuteman will provide only the replacement parts. Defective parts should be sent with transportation charges prepaid to the Minuteman factory at the address noted above.

If the unit or parts are found in the reasonable judgment of Minuteman to be defective in material or workmanship, repair or replacement will be made by Minuteman without charge for parts or labor. Repair or replacement will be at the discretion of Minuteman, with replacements being made using current models or parts performing the equivalent function. Labor charges other than those incurred at the Minuteman factory are not covered under this warranty. All expenses associated with delivering defective items to the Minuteman factory and the expense of returning repaired or replaced items from the Minuteman factory to the owner will be paid for by the owner. All warranty work accomplished at the Minuteman factory will be completed with a reasonable time after receipt of defective items.

This warranty does not cover any semiconductor parts, such as diodes, which are vulnerable to electrical overloads beyond the control of Minuteman. Warranty on parts not manufactured by Minuteman, which include, but are not limited to, timers and ammeters, is limited to the period specified in the original manufacturer's warranty.

This warranty does not cover any charger that has been subject to misuse, neglect, negligence, or accident, or operated in any way contrary to instructions specified on the charger case and in the owner's manual. No claim of breach of warranty shall be cause for cancellation of the contract of sale of any Minuteman charger. Minuteman assumes no responsibility for loss of time, inconvenience, or other damage, consequential or otherwise, resulting from a defective charger. All implied warranties (including merchantability) are limited in duration to the two years from date of manufacture warranty period.

Some states do not allow the exclusion or limitation of incidental or consequential damages; or limitations on how long an implied warranty lasts, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Minuteman's obligation under this warranty is strictly and exclusively limited to the repair or replacement of defective items. Minuteman issues this warranty in good faith and with full confidence in the workmanship and quality of Minuteman products.