



START-IT™

AUTOMATIC BATTERY CHARGER

OWNER'S MANUAL & WARRANTY INFORMATION

12 VOLT 2/12 AMPERE WITH 100 / AMPERE START ASSIST
AND MANUAL 6 VOLT 15 AMPERE BATTERY CHARGE

1. WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE USING YOUR CHARGER, YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.
2. To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery.

GENERAL BATTERY SAFETY:

Review cautionary marking on these products and on engine.

1. Use charger for charging a LEAD-ACID battery only. It is not intended to supply power to a low voltage electrical system other than in an automotive application. Do not use battery charger for charging dry-cell batteries that are commonly used with home and portable appliances. These batteries may burst and cause injury to persons and damage to property.
2. 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 persons.
3. To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting charger.
4. An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If extension cord must be used, make sure:
 - a. That pins on plug of extension cord are the same number, size, and shape as those of plug on charger.
 - b. That extension cord is properly wired and in good electrical condition; and
 - c. That wire size is AWG #16 (16 gauge) for up to 25 feet; AWG #12 (12 gauge) for up to 50 feet; AWG # 10 (10 gauge) for up to 100 feet; and AWG # 8 (8 gauge) for up to 150 feet.
5. Do not operate charger with damaged cord or plug - replace the cord or plug immediately.
6. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
7. Do not disassemble charger; take it to a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
8. To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
9. Do not expose charger to rain or snow.
10. Never charge a frozen battery

• IMPORTANT SAFETY INSTRUCTIONS •

SAVE THESE INSTRUCTIONS .

This manual contains important safety and operating instructions for battery charger Model VEC078

4140 S.W. 28th Way, Ft. Lauderdale, FL 33312

Tel: (954) 584-4446 Fax: (954) 584-5556 Toll Free: (866) 584-5504

www.vectormfg.com



VECTOR "GOLD SEAL" 2/4 YEAR LIMITED WARRANTY PROGRAM

This limited warranty program is the only one that applies to this product, and it sets forth all the responsibilities of Vector Manufacturing, Ltd., regarding this product. There is no other warranty, other than those described herein.

This Vector Manufacturing, Ltd. product is warranted, to the original purchaser only, to be free of defects in materials and workmanship for two years from the date of purchase without additional charge. This warranty may be extended to four years from date of purchase by paying an Extended Warranty fee (see below). The warranty does not extend to subsequent purchasers or users. Vector Manufacturing, Ltd. will not be responsible for any amount of damage in excess of the retail purchase price of the product under any circumstances. Incidental and consequential damages are specifically excluded from coverage under this warranty.

This product is not intended for commercial use. This warranty does not apply to accessories or damage to units from misuse or incorrect installation. Misuse includes wiring or connecting to improper polarity power sources.

RETURN/REPAIR POLICY: Defective products, other than accessories, may be returned postage prepaid to Vector Manufacturing. Any defective product, other than accessories, that is returned to Vector Manufacturing within 30 days of the date of purchase will be replaced free of charge. If such a product is returned more than 30 days but less than two years from the purchase date, Vector Manufacturing will repair the unit or, at its option, replace it free of charge. If The Extended Warranty was activated, this repair or replacement period extends to four years from the purchase date.

If the unit is repaired, new or reconditioned replacement parts may be used, at Vector Manufacturing's option. A unit may be replaced with a new or reconditioned unit of the same or comparable design. The repaired or replaced unit will then be warranted under the terms of the remainder of the warranty period. The customer is responsible for the shipping charges on all returned items. During the warranty period, Vector Manufacturing, Ltd. will be responsible for the return shipping charges.

LIMITATIONS: This warranty does not cover accessories, bulbs, fuses and batteries, defects resulting from normal wear and tear (including chips, scratches, abrasions, discoloration or fading due to usage or exposure to sunlight), accidents, damage during shipping to our service facility, alterations, unauthorized use or repair, neglect, misuse, abuse, failure to follow instructions for care and maintenance, fire, flood, and Acts of God.

If your problem is not covered by this warranty, call our Technical Support Department at (954) 584-4446 or Toll Free (866)-584-5504 for general repair information and charges if applicable.

STATE LAW RIGHTS: This warranty gives you specific legal rights. Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the exclusions or limitations stated herein may not apply. This warranty gives the purchaser specific legal rights; other rights, which vary from state to state, may apply.

TO REQUEST WARRANTY SERVICE FOR THIS PRODUCT: Contact Vector Manufacturing Technical Support by telephone, fax or mail. We suggest that you keep the original packaging in case you need to ship the unit. When returning a product, include your name, address, phone number, dated sales receipt (or copy), and a description of the reason for return and product serial number. After replacing the unit, we will return it to you within four weeks.

WARRANTY ACTIVATION: Please complete Warranty Activation Card and mail to Vector Manufacturing. If activating Additional Extended Two Year Warranty, (total four years) enclose check or money order for \$30.00 Enter "VEC078" as Model and Battery Charger as "Product Type". All Vector Manufacturing, Ltd. products must be registered within (30) days of purchase. To activate this warranty, mail completed registration form, a copy of the original sales receipt and required fee (if activating extended warranty) to:

All Vector Manufacturing, Ltd. products must be registered within (30) days of purchase to activate this warranty. Mail the completed registration form, along with a copy of the original sales receipt to:

ATTN.: REPAIR / VECTOR MANUFACTURING, Ltd.
4140 SW 28th Way, Ft. Lauderdale, FL 33312
954-584-4446 • Toll Free 866-584-5504 • Fax: 954-584-5556

WARRANTY MUST BE PURCHASED WITHIN 30 DAYS OF PRODUCT PURCHASE DATE.
WARRANTY IS NON-TRANSFERABLE AND NON-REFUNDABLE.

☐ Please activate my Limited Warranty for Model VEC078
I have enclosed a copy of the original sales receipt.

Name _____
Street Address _____
City _____ State _____ Zip code _____
Phone _____ Fax _____ E-mail _____

Item Purchased _____ Date of Purchase _____
Store Where Purchased _____ UPC Number from package (12 digits) _____

All Vector Manufacturing, Ltd. products must be registered within (10) days of purchase to activate this warranty. Mail the completed registration form, along with a copy of the original sales receipt, to:

ATTN: CUSTOMER SERVICE
VECTOR MANUFACTURING, LTD.
4140 S.W. 28th WAY
FT. LAUDERDALE, FL 33312

APPENDIX A - CHARGING TIMES

To calculate the approximate charging time required to fully charge a battery, it is necessary to determine the specific gravity (or, percent of battery charge) using a hydrometer. Use this technique, if battery vent caps can be removed. Check each cell. If there is one cell with a very low specific gravity compared to the other cells, there is probably a shorted cell in the battery. Replace the battery.

The following chart converts hydrometer readings into percent of charge values.

Specific Gravity (Hydrometer Reading)	Percent of Charge In Battery	Percent of Charge Needed By Battery
1.265	100%	0%
1.225	75%	25%
1.190	50%	50%
1.155	25%	75%
1.120	0%	100%

Refer to the chart below for approximate charging times.

PERCENT OF CHARGE	75%	50%	25%	0%
2 AMPS/12 VOLTS	6.5 HRS	12 HRS	18 HRS	23 HRS
15 AMPS/12 VOLTS	1.5 HRS	2 HRS	3.0 HRS	3.5 HRS
15 AMPS/6 VOLTS	1.8 HRS	3.0 HRS	4.5 HRS	6HRS

The times shown in the chart above are approximate and refer to an average automotive battery. For smaller batteries, the charge time should be adjusted using the formula shown below and adding 1 hour to the time calculated.

To estimate charging time for a discharged battery, divide the AH rating of the battery by the charge rate selected. This is the number of hours required to recharge the battery. For example, a 50 AH (12 volt) battery is discharged to 10 volts. How long should it be charged at the 15 Amp rate? Divide the 50 AH by 15 AH. The answer is approximately 3.5 hours. A six-volt battery is considered discharged when it reaches 5.0 VDC. Always round up the charge time by 25% to ensure full charge. In most cases, battery recharge times will vary depending on the age and condition of the battery. Smaller batteries should be charged at the lower rate (2 Amps) and add an extra hour to charge time.

APPENDIX B - SPECIFICATIONS

Height	5.75" (14.6 cm)
Width	10.25" (26.1 cm)
Depth	6.25" (15.9 cm)
Weight	17.7 lbs, 8.0 kgs.
Internal protection	self-resetting breaker
Reverse Polarity	indicator LED
Charging complete (12 V FULL)	auto shut-off LED for 12 volt
Convenience features	Handle
Power Required	120V AC, 60 Hz, 2.8 Amperes

PERSONAL PRECAUTIONS AND SAFETY

1. Someone should be within range of your voice or close enough to come to your aid when you work near a lead-acid battery.
2. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
3. Wear complete eye protection and clothing protection. Avoid touching eyes while working with a battery. Acid, acid particles or corrosion may get into eyes. Immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.
4. If battery acid contacts skin or clothing, wash immediately with soap and water.
5. NEVER smoke or allow a spark or flame in vicinity of battery or engine.
6. 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.
7. 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.

GROUND AND AC POWER CORD CONNECTIONS

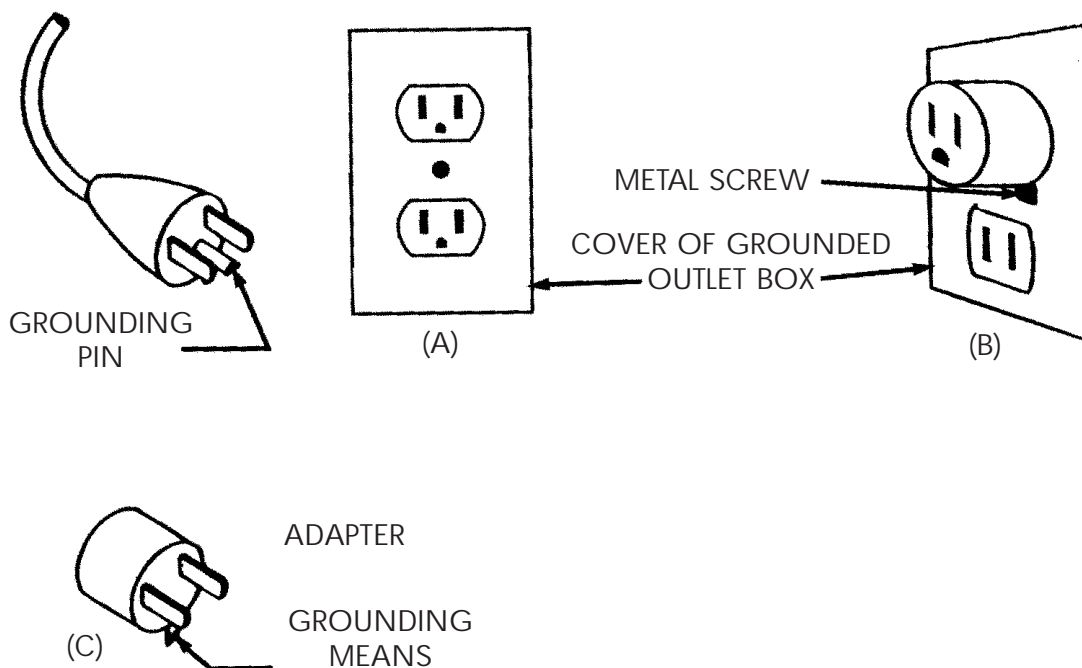
The charger should be grounded to reduce the risk of electric shock. The charge is equipped with an electric cord having an equipment grounding conductor and a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local electric codes and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

DANGER - NEVER alter an AC cord or plug. If the plug will not fit the outlet, have a proper outlet installed by a qualified electrician. Improper connection can result in a risk of electric shock.

The battery charger is for use on a nominal 120 volt AC circuit, has a grounding plug that looks like the plug illustrated in Figure 1. A temporary adapter, which looks like the adapter in figures 1b and 1c may be used to connect this plug to a two pole receptacle as shown in figure 1b, if a properly grounded outlet is not available. The temporary adapter should only be used until a properly grounded outlet can be installed by a qualified electrician.

DANGER - Before using the adapter as illustrated, be certain that the center screw of the outlet plate is grounded. The green colored rigid ear or lug extending from the adapter must be connected to a properly grounded outlet - make certain it is grounded. If necessary, replace the original outlet cover plate with a longer screw that will secure the adapter ear or lug to the outlet's cover plate and make ground connection to grounded outlet.

FIGURES 1 1a to 1c



PREPARING TO CHARGE

1. Determine voltage of battery by referring to car owner's manual and make sure that output voltage selector switch is set at correct voltage.
2. If it is necessary to remove battery from vehicle to charge, or to clean terminals, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.
3. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
4. Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps, carefully follow manufacturer's recharging instructions.
5. Study all battery manufacturers' specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.
6. Be sure area around battery is well ventilated while battery is being charged. Gas can be forcefully blown away by using a piece of cardboard or other nonmetallic material as a fan.
7. Charge battery initially at the 2 Amp (lowest) rate.

CHARGER LOCATION

1. Locate charger as far away from battery as cables permit.
2. Never place charger directly above battery being charged; gases from battery will corrode and damage charger.
3. Never allow battery acid to drip on charger when reading gravity or filling battery.
4. Do not operate charger in a closed-in area or restrict ventilation in any way.
5. Do not set a battery on top of charger.
6. If battery charger is used in a commercial garage or aircraft hangar application or in an area where combustible gas fumes can accumulate, the battery charger must be located at least 18 inches above the floor as stated by the National Electrical Code.

DC CONNECTION PRECAUTIONS

1. Connect and disconnect DC output clips only after removing AC cord from electric outlet.
2. Never allow clips to touch each other.
3. Attach clips to battery posts and twist or rock back and forth several times to make a good connection. This tends to keep clips from slipping off terminals and helps to reduce risk of sparking.

FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE. A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

- a. Position AC and DC cords to reduce risk of damage by hood, door, or moving engine part.
- b. Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
- c. Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, -) post.
- d. Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see (e). If positive post is grounded to the chassis, see (f).
- e. For negative-grounded vehicle, connect POSITIVE (RED) clip from battery charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect NEGATIVE (BLACK) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to heavy gauge metal part of the frame or engine block.
- f. For positive-grounded vehicle, connect NEGATIVE (BLACK) clip from battery charger to NEGATIVE (NEG, N, -) ungrounded post of battery. Connect POSITIVE (RED) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.
- g. When disconnecting charger, turn switches to off, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.

service. Follow these simple steps to maintain the charger in optimum condition:

- After each use, clean the battery charger clamps - be sure to remove any battery fluid that will cause corrosion of the copper clamps.
- Clean the outside case of the charger with a soft cloth and, if necessary, mild soap solution.
- Keep the charger cords loosely coiled during storage to prevent damage to the cords. Do not use the charger if cords or clamps have been damaged in any way - call Vector Technical Support Department at (954) 584-4446 or toll free at (866)-584-5504 for details on replacing cords and clamps.

TROUBLESHOOTING

VERY COLD BATTERY

If the battery to be charged is extremely cold (in temperatures less than freezing - 0°C/32°F) it cannot accept a high rate of charge so the initial charge rate will be slow. The rate of charge will increase as the battery warms.

WARNING: DO NOT attempt to charge a frozen battery.

SULFATED BATTERY

When batteries are left in a discharged state for a long period of time, they become "sulfated". Sulfated batteries cannot accept a high rate of charge since the internal plates are coated with lead sulfate. To see if a battery in this condition can be "saved", take it to a service station or battery distributor for professional evaluation and/or service.

SHORT-CIRCUITED BATTERY

- If the battery being charged has been short-circuited, the ammeter will show that the battery has zero charge level, and that the charger is operating at peak amperage. If, after 5 minutes charging time, the ammeter reading has not decreased, unplug the charger and discontinue the charging process.
- Using a voltmeter, determine the voltage of the battery and if it is under 12 volts (under 6 volts for 6 volt batteries), the battery is probably beyond repair or recharging, and will need to be replaced.
- If the voltage is over 12 volts (over 6 volts for 6 volt batteries), reconnect the charger and resume the charging process for another 15-20 minutes. If, after that time, the ammeter still has not moved towards a lower reading, repeat the voltmeter test. If the reading is still over 12 volts (or over 6 volts for 6 volt batteries), there is a problem with the battery that requires professional service or replacement.

NO AMMETER READING

- Make sure that the charger is powered by a "live" 110/120-volt grounded AC outlet.
- Unplug charger and check battery connections - ensure that there is a good connection with the battery terminal and/or vehicle chassis.
- Check to be sure that the battery is not sulfated.
- Check that the correct charge rate has been selected for the battery being charged.
- Ensure that enough charging time has been allowed for - check table in Appendix for approximate charging times.
- See Pre-charge Battery Activation.

AMMETER DISPLAYS A READING, BUT BATTERY IS NOT ACCEPTING CHARGE

- First, make sure that battery is capable of being charged - ensure that it is not sulfated or damaged.
- Refer to Charging Time Table in Appendix to ensure that enough time is being allowed to charge the battery.

sheet-metal body parts: connect only to a heavy gauge, stable metal part of the frame or engine block.

NOTE: If there is any problem connecting the charger clamps to the battery terminals, contact the Vector Technical Support Department at (954) 584-4446 or toll free at (866)-584-5504 for assistance.

d) Plug battery charger power cord into grounded AC power outlet and refer to Appendix A at the end of this document for approximate charging times.

e) When charging is completed, disconnect cables and clamps in reverse order from which they were connected.

NOTE: Use of Extension Cords If it is necessary to use an extension cord, as is often the case, observe the following important safety information:

- Before using any extension cord, ensure that the wire size is at least 16 AWG or larger and 14 AWG for longer than 100 feet.
- Use only a good quality, good condition, UL-approved extension cord, and ALWAYS connect charger to the extension cord before plugging the extension cord into a 110/120-volt AC power outlet. The use of a poor quality extension cord or one that is not in good repair could cause fire and/or electric shock.
- Use a three-wire extension cord with a 3-prong plug and 3-conductor socket.

CHARGING IF BATTERY IS OUTSIDE OF VEHICLE

Set charger's Charge Rate Selector switch to appropriate setting according to battery size. Make sure the Charge/Start switch is in the Charge position.

- a) Check polarity of battery posts- For top-mounted battery connectors, the positive post (marked POS, P, +) usually has a larger diameter than the Negative battery post (marked NEG, N, -). For side-mounted battery connections the Positive terminal is red, the Negative terminal is black.
- b) Attach a 24-inch (minimum length) 6 AWG insulated battery cable to the Negative battery post (marked NEG, N, -).
- c) Connect the Positive (RED) battery clamp to the Positive battery connector (marked POS, P, + or red).
- d) Stand as far back from battery as possible, and do not face battery when making final connection.
- e) Carefully connect the Negative (BLACK) charger clamp to the free end of the battery cable connected to the negative terminal. Connect the charger's power cord to a grounded 110/120-volt AC power outlet, and refer to section 8 for approximate charging times.
- f) When charging is completed, disconnect cables and clamps in reverse order from which they were connected.

CHARGING TIMES

The VEC078 is a fully automatic battery charger while charging 12 volt batteries. It automatically adjusts the charge rate as the battery becomes charged and stops charging when the battery is fully charged. If you require some estimate of the time it takes to charge a battery refer to Appendix A for these details.

ENGINE START

The Engine Start function can supply up to 100 amps of current during engine starting. This function is protected by an automatic reset protector and there is a five-second limit at this output level. Follow all precautions as if charging a battery in a vehicle, except that the Charge/Start Switch is placed in the Start position and the Charge Rate Switch is placed in the Engine Start position. **DO NOT MAKE BATTERY AND CHASSIS CONNECTIONS WITH CHARGER PLUGGED INTO AC.** Make the final connection to battery and chassis and plug in the charger. Immediately crank the engine in three-second bursts until it starts. Disconnect the charger's AC connection first and then the chassis and battery connections. If the engine fails to start, you may change switch positions and charge the battery without disconnecting the charger from AC.

After charging, if the charger is already powered and connected to the battery, you may safely move the charger's switches to the Start and Engine Start positions without disconnecting the charger from AC. After the engine starts, disconnect AC, then the chassis and battery connections.

CARE AND MAINTENANCE

With only minimal maintenance, the Vector VEC078 Battery Charger will deliver years of dependable

h. See operating instructions for length of charge information.

INTRODUCTION AND FEATURES

Thank you for selecting the Vector(r) Model VEC078 2/15/100 Automatic Battery Charger. With proper care and use, it will give you years of dependable service. Please read all safety warnings and cautions, and this entire User's Manual, before using this device. The manual should then be retained for easy reference whenever the unit is used.

This model battery charger has a high charge rate of up to 15 amps, and low charge rate of up to 2 amps (12 Volt only). It is intended for charging only 12 volt and 6 volt lead-acid batteries - maintenance-free and conventional automotive - that are usually used in cars, trucks, farm equipment, boats, RVs and SUVs, lawn mowers and garden tractors, motorcycles, personal watercraft, snowmobiles, ATVs, and various light commercial applications. This charger can assist in engine starting by delivering up to 100 amps for up to five seconds.

Charges 12 Volt automotive batteries in only 3-6 hours. A four position rotary Charge Rate Switch controls output voltage and current. From left (clockwise) to right:

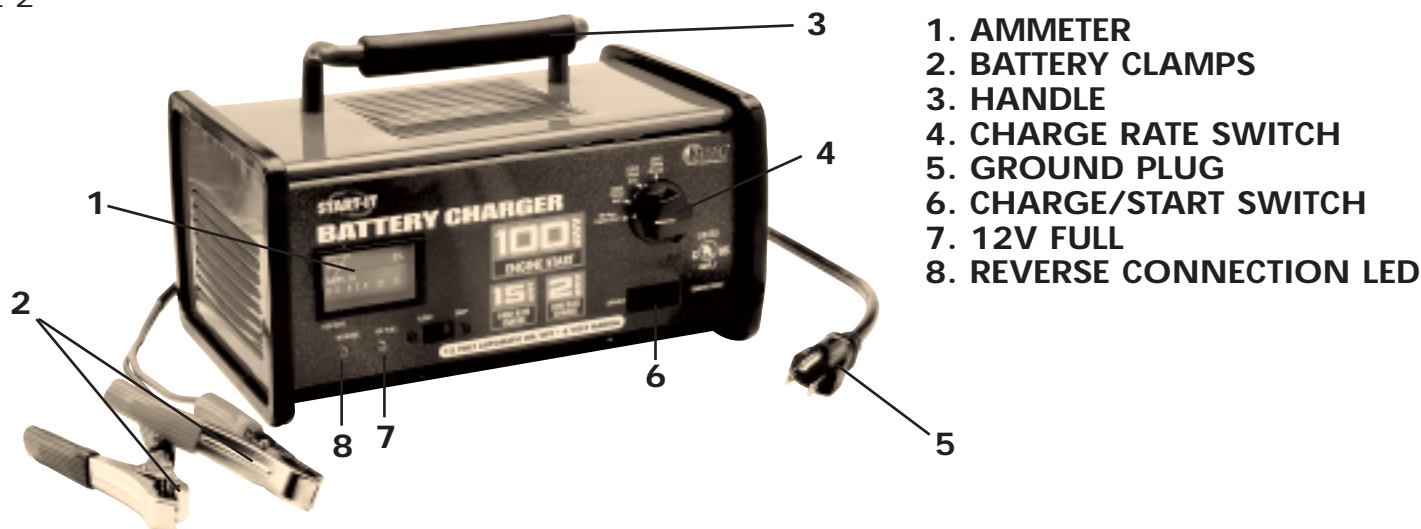
- a) Engine Start (to 100 Amps - 7.2 volts only)
- b) 12 volt 2 Amp (automatic)
- c) 12 Volt 15 Amp (automatic)
- d) 6 volt 15 Amp (manual charging)

A two-position Charge/Start Selector slide switch enables the Engine Start function when the Charge Rate Selection Switch selects Engine Start.

Built-in meter displays charge rate and battery charge level on color-coded, easy-to-read display.

- Automatically taper charges and stops charging when battery is fully charged to 12 volts.
- Manually charges 6 volt battery at up to 15 amperes (will taper but not automatic Off when fully charged).
- Heavy-duty transformer and rectifier for dependability
- Built-in circuit protection guards against short circuit
- Automatically checks for correct polarity (requires a minimum of 4 volts DC at the battery terminals)
- Heavy-duty cables and copper clamps are corrosion-resistant for better connections
- Connect to side- or top-mount battery terminals
- Rugged steel case with baked-on finish, plus sturdy handle
- Ideal for charging or boosting during winter season when the starting performance of vehicle batteries is lowered by cold or extreme weather conditions. See Figure 2.

FIGURE 2



CHARGER CONTROLS

Charger controls are located on the front panel. Understand control use before operating charger.

CHARGE RATE SELECTOR SWITCH

- The Charge Rate Selector switch on the front panel of the charger (Figure 3) offers two 12 volt and one 6 volt charge rates for charging various types of batteries and an Engine Start position to assist starting engines. Select the correct switch position BEFORE connecting the charger to a battery or AC power source.
- Selections are made by rotating the switch to the correct position, corresponding with the type of battery being charged, as follows:
- Small 12 volt DC batteries such as those used in motorcycles, garden tractors, ATVs, jet skis, and snowmobiles can be damaged by high rates of charge. ALWAYS select the 2 Amp/12 Volt setting (RIGHT switch position) to charge this type of battery. For a slower charging time on larger batteries also select the 2 Amp/12 Volt setting. Larger batteries, can be safely charged at the 12 Amp rate.

FIGURE 3



Selector Switch Position

LEFT (fully counterclockwise)

CENTER LEFT

CENTER RIGHT

RIGHT (fully clockwise)

Charging Rate

100 Amp Engine Start (100A, 7.2 volts)

12 Volt DC/15 Amp Charge (larger batteries)

12 Volt DC/2 Amp Charge (smaller batteries)

6 Volt/15 Amp (6 medium and large 6 volt batteries)

WARNING: IF IN DOUBT ABOUT SELECTING A CHARGE RATE, SELECT THE LOWER RATE. BATTERIES GET WARM DURING CHARGING - IF BATTERIES ARE GETTING HOT, DISCONTINUE CHARGING AND INVESTIGATE FOR DAMAGED BATTERY.

The Charge/Start Selector switch in the Start position protects the Ammeter from reading excessive current. When the Charge position is selected, the Ammeter reads charge current for both 12 volt and 6-volt settings. See Figure 4.

FIGURE 4



AMMETER AND INDICATORS

The ammeter is the colored (red, green and blue) meter on the front of the unit. It displays the current flowing from the charger to the battery, in amperes. See Figure 5.

FIGURE 5



When starting to charge a battery, the current will depend on the battery's percent of charge. The actual current will usually be lower than the current selected on the charger's switch, unless the battery is severely discharged. As the battery charge level increases, the current reduces.

The ammeter is intended to show how the charging process is proceeding, it should not be used to determine the level of battery charge - this should be done using a hydrometer or a voltmeter.

Typically 12.6 VDC is considered full charge for a 12 volt battery if the voltage is measured one hour after the charger is disconnected. During charging, a nominal 12 volt battery can be 13.6 volts or somewhat

higher, so it needs to rest after charging to measure actual state of charge.

Below the Ammeter is an incorrect polarity indicator that lights when incorrect polarity is sensed. It is marked REVERSE. See figure 6a. It indicates that the charger to battery connection is reversed and it must be reconnected before charging can begin. This feature only operates when at least 4 volts or higher voltage remains in the battery to be charged. This feature is active for both 6 and 12 volt batteries.

The charger's built-in circuitry automatically taper charges the 12 volt battery as it approaches full charge and then discontinues charging when the battery reaches full charge. This is the automatic feature. When the battery is fully charged the 12 Volt FULL indicator lights. See Figure 6B the 12V FULL indicator and Polarity indicator. Note that the automatic off feature only operates during 12 volt charging; six volt charging is manual.

FIGURE 6a



FIGURE 6b



CIRCUIT BREAKER

This battery charger has an internal self-resetting circuit breaker automatic reset protector that protects the charger from temporary overloads. When it operates it makes a clicking sound. You will see the ammeter reduce to zero when the breaker is open. After a cool-down period, the breaker will automatically close and the ammeter will show a high rate of charge. If the breaker continues to cycle every few minutes, reduce charge rate or discontinue charging.

PRE-CHARGE ACTIVATION

CAUTION: Be aware that a fully charged battery will also cause a low Ammeter reading. Attempting pre-charge activation of a fully charged battery may cause explosion - make sure that battery really is discharged, before using this procedure.

Pre-charge activation is the term for the time it takes before a battery begins to accept a measurable rate of charge - it can be as long as 4-8 hours from the time the charging process begins.

Pre-charge activation is indicated if the ammeter reading is zero and a hydrometer or voltmeter reading shows that the battery is fully discharged.

NOTE: The newer, high-calcium-type 12 Volt DC batteries may need pre-charge activation if their charge has been allowed to drop to a very low level. When deeply discharged, this type of battery will provide only a very low voltage output and will draw less than 1 amp during the recharging process, until activated.

CHARGING IF BATTERY IS INSTALLED IN A VEHICLE

- a) Set charger's Charge Rate Selector switch to appropriate setting according to battery size. Make sure the Charge/Start switch is in the Charge position.
- b) Check polarity of battery posts - For top-mounted battery connectors, the Positive post (marked POS, P, +) usually has a larger diameter than the Negative battery post (marked NEG, N, -). For side-mounted battery connectors, the terminals are marked Positive -red and Negative -black.
- c) Attach charger clamps to battery connections, as follows, ensuring a good connection (if there is a mistake, the Reverse Polarity Indicator will light): **NEGATIVE-GROUNDED VEHICLE:** Connect the **POSITIVE (RED)** charger clamp to the **POSITIVE (POS, P, +)** ungrounded battery terminal. Then, connect the **NEGATIVE (BLACK)** charger clamp to the vehicle chassis, or the engine block (away from the battery). Do not connect the clamp to the carburetor, fuel lines, or sheet-metal body parts: connect only to a heavy gauge metal part of the frame or engine block. **NOTE:** **NEGATIVE-GROUNDED** type systems are the most common in today's vehicles.

POSITIVE-GROUNDED VEHICLE: Connect the **NEGATIVE (BLACK)** charger clamp to the **NEGATIVE (NEG, N, -)** ungrounded battery post. Then, connect the **POSITIVE (RED)** battery clamp to the vehicle chassis or engine part (away from the battery). Do not connect the clamp to the carburetor, fuel lines, or