BATTERY CHARGER OWNER'S MANUAL

Congratulations on purchasing the finest new charger on the market today. We wish to acknowledge UL for their contribution of the following important safety precautions. Please read and retain these instructions for the continued safe use of your new charger.

IMPORTANT SAFETY INSTRUCTIONS – READ THESE FIRST

- **SAVE THESE INSTRUCTIONS —** This manual contains important safety and operating instructions for the automatic battery charger.
- Do not expose charger to rain or snow.
- Do not use and an attachment not recommended or sold by Griot's Garage. Doing so may result in a risk of fire, electric shock, or injury to persons.
- To reduce risk of damage to electric plug and cord, pull plug rather than cord when disconnecting charger.
- Do not use an extension cord 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 the wire size is large enough for the length of cord as specified below.

Length of cord in feet:	25	50	100	150
AWG size of cord:	18	18	16	14

- Do not operate charger with damaged cord or plug. Replace the cord or plug immediately.
- 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 fire, electric shock, or injury to persons.
- To reduce risk of electric shock, unplug the charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
- Monitor battery charger daily when using it to maintain battery for extended periods.

WARNING — RISK OF EXPLOSIVE GASES.

a) 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.

b) To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and the manufacturer of any equipment you intend to use in vicinity of the battery. Review cautionary markings on these products and in the engine compartment.

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PERSONAL PRECAUTIONS

- Someone should be within range of your voice or close enough to come to your aid when you work near a lead-acid battery.
- Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- 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 10 minutes and get medical attention immediately.
- All lead-acid batteries produce hydrogen gas which may violently explode in the presence of fire or sparks. Do not smoke, use matches or a cigarette lighter while near batteries. Do not handle the battery while wearing vinyl clothing because, static electricity sparks are generated when vinyl clothing is rubbed. Do not drop tools or other metal objects on or near the battery as a spark may result, igniting explosive gases.
- 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 other jewelry to metal, causing a severe burn.
- Use charger for charging LEAD-ACID battery only. It is not intended to supply power to a low voltage electrical system other than in a starter-motor application. Do not use battery charger for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.
- NEVER charge a frozen battery.

PREPARING TO CHARGE BATTERY

1. If necessary to remove battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so removal will not cause an arc.
2. 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.
3. Clean battery terminals with a mixture of baking soda and hot water. 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 manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.
6. Determine voltage of battery by referring to car owner's manual and make sure that output voltage selector switch is set at correct voltage.

LOCATING THE CHARGER

1. Locate the charger as far away from the battery as DC cables permit.
2. Never place the charger directly above the battery being charged; gases from the battery will corrode and damage the charger.
3. Never allow battery acid to drip on the charger when reading specific gravity or filling the battery.
4. Do not operate the charger in a closed area or restrict ventilation in any way.
5. Do not set a battery on top of the charger.
6. Locate the charger at least 18" above the floor.
7. Do not place the charger where rain, snow, or other moisture could drip on it.

GROUNDING & AC POWER CORD CONNECTION INSTRUCTIONS

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

WARNING — RISK OF ELECTRIC SHOCK.

Never alter AC cord or plug provided – if it will not fit outlet, have proper outlet installed by a qualified electrician. Improper connection can result in a risk of an electric shock.

BATTERY CHARGER CONNECTION PRECAUTIONS

1. **CAUTION: Connect and disconnect DC output clips only after setting any switches with an OFF position to off and removing AC power cord from electric outlet. Never allow clips to touch each other.**
2. When hooking up charger, attach one clip to battery and the other to a point away from battery (see the following sections CHARGING A BATTERY THAT IS INSTALLED IN A VEHICLE or CHARGING A BATTERY OUTSIDE A VEHICLE). Do not hook up charger until reading this entire manual.

To reduce explosion risk, never connect both clips directly to the battery. When making each connection, twist or rock clip back and forth several times to make a good connection and to reduce the risk of a clip slipping off and creating a spark. Do not twist or rock clip on the battery after the second clip connection is made.

CHARGING A BATTERY THAT IS INSTALLED IN A VEHICLE

CAUTION: A marine (boat) battery must be removed and charged on shore. To charge it on board requires equipment specially designed for marine use.

WARNING — RISK OF EXPLOSIVE GASES.

A spark near battery may cause the battery to explode. To reduce risk of a spark near battery:

- Do not drop tools or other metal objects on or near the battery.
- Do not smoke, use matches or a cigarette lighter while near battery.
- Do not handle the battery while wearing vinyl clothing, as static electricity sparks are generated when vinyl clothing is rubbed.

1. Position all cords in a manner that will reduce the risk of damage by the automobile's hood, door, or moving engine part.
2. Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
3. Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, –) post.
4. Determine which post of battery is grounded (connected) to the chassis. If the negative post is grounded to the chassis (as in most vehicles), see Figure 1 and instruction 5a. If the positive post is grounded to the chassis, see Figure 2 and instruction 5b.

5a. For NEGATIVE GROUNDED vehicle, connect POSITIVE (Red) clip from the battery charger to the POSITIVE (POS, P,+) ungrounded post of the battery.

5b. For POSITIVE GROUNDED vehicle, connect the NEGATIVE (Black) clip from the battery charger to the NEGATIVE (NEG, N, –) ungrounded post of the battery.

6. Connect the remaining battery charger clip to the vehicle chassis or engine block, as far away from the battery as possible. Do not connect the clip to carburetor, fuel lines, or sheet metal body parts. Connect to a heavy gauge metal part of the frame or engine block.
7. When disconnecting charger, turn all switches with an OFF position to off, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.
8. Refer to the Operating Instructions for information on setting selector switches. Be sure to refer to the instructions for your model of charger.

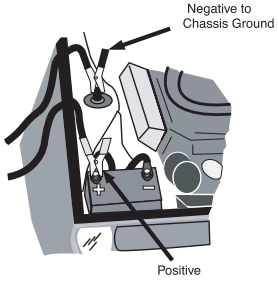


Figure 1

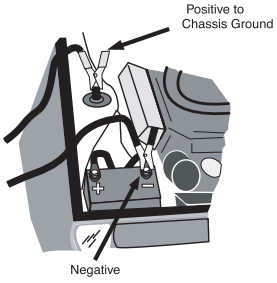


Figure 2

CHARGING A BATTERY OUTSIDE OF THE VEHICLE

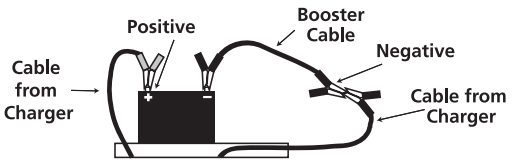
WARNING — RISK OF EXPLOSIVE GASES.

A spark near battery may cause battery explosion. To reduce risk of a spark near battery:

- Do not drop tools or other metal objects on or near the battery.
- Do not smoke, use matches or a cigarette lighter while near battery.
- Do not handle the battery while wearing vinyl clothing, as static electricity sparks are generated when vinyl clothing is rubbed.

1. Check polarity of battery posts. POSITIVE (POS, P,+) battery post usually has a larger diameter than NEGATIVE (NEG, N,–) post.
2. Attach a cable (not provided) to the NEGATIVE (NEG, N, –) battery post. This cable must be a minimum of 24” long, and of a wire gauge that is no lighter than the wire gauge of the charger’s output cables (battery cables and booster cables work well).
3. Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
4. Position yourself and the free end of the cable (installed in step #2) as FAR away from the battery as possible. FACING AWAY FROM THE BATTERY, connect the NEGATIVE (Black) charger clip to the free end of the cable.
5. When disconnecting charger, always do so in reverse sequence of the connecting procedure and break first connection while as far away from battery as practical.

Figure 3



ENGINE STARTING

CAUTION: Battery must be installed in vehicle to use the engine starting feature.

1. Connect the battery charger to the vehicle as indicated in the preceding section CHARGING A BATTERY THAT IS INSTALLED IN A VEHICLE.
2. Follow OPERATING INSTRUCTIONS for setting the output switches.

Note: Performance will be enhanced if you charge the battery for 10 to 20 minutes before attempting to start.

3. Start the vehicle. Crank engine for around 3 to 4 seconds.
4. If engine fails to start, charge battery for another 10 to 20 minutes and attempt to start the engine again.

Note: This charger is equipped with an automatic reset circuit breaker to protect the battery charger from overload conditions. This circuit breaker will trip if you crank the engine too long at one time. If this happens, wait six to seven minutes. The breaker will reset automatically and engine starting or battery charging can resume.

OPERATING INSTRUCTIONS

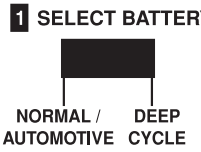
This charger is equipped with Automatic On-Off Technology. After connecting to a 12 volt battery, the charger needs to sense a minimum voltage condition to begin charging and it will stop charging when it reaches the maximum voltage condition, but it will continue to monitor the battery charge level. The charger will "hum" as it monitors. If the battery charge level drops, the charger will begin charging again.

Note: If the charger does not sense a minimum voltage condition because of a deeply discharged battery, then preactivation of the battery is required (see the following paragraph PREACTIVATION OF A DISCHARGED BATTERY). The meter will read zero or near zero.

Step 1: Make Connections

Make sure AC power cord is unplugged from wall outlet. Make proper connections to the battery as explained on pages 4–5.

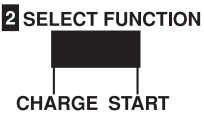
Step 2: Select Battery (Switch 1)



Select the NORMAL/ AUTOMOTIVE position to charge automotive batteries and deep cycle batteries that are older than two years.

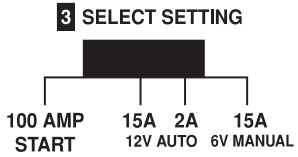
Select DEEP CYCLE for marine batteries that are less than two years old.

Step 3: Select Function (Switch 2)



Select the CHARGE position to charge the battery. This is the automatic mode for 12 volt batteries. Select the START position if you are attempting to start a car with a weak battery or to preactivate a discharged battery.

Step 4: Select Setting (Switch 3)



Select the 100 AMP START position if you are attempting to start a car with a weak battery (12V only). Plug the AC power cord into the wall outlet.

Note: For best results, charge the battery first for 10 to 20 minutes using the 15 A, 12 V position before attempting to start the vehicle in the 100 AMP START position.

Engage the starter for 3 to 4 seconds; if engine fails to start, charge the battery using the 15 A, 12 V position for another 10 to 20 minutes and attempt to start the engine again. Be aware that a typical starter on a vehicle may need 250 to 500 amps to start the engine.

Select the 15 A ,12 V AUTO position if you are charging large lead acid batteries, such as those used in automobiles, boats, trucks, vans, farm equipment, etc. Plug the AC power cord into the wall outlet. The meter will read up to 15 amps and taper down to 6 or 7 as the battery reaches full charge. When the battery is fully charged the charge complete light will come on, the meter will drop to 0 amps, and the charger will automatically stop charging.

For charging lawn tractor, motorcycle, snowmobile, or other small batteries, select the 2 A, 12 V AUTO position. Connect the charger to the battery as indicated in the preceding sections CHARGING A BATTERY THAT IS INSTALLED IN A VEHICLE or CHARGING A BATTERY OUTSIDE A VEHICLE. Plug the charger's AC power cord into the wall outlet. The meter will read up to 5 amps and taper down to around 1 amp as the battery reaches full charge. Using this setting for large automotive, truck, or marine batteries will not allow the charger to shut off automatically.

For charging 6 volt batteries used in automobiles, trucks, and farm equipment, select the 15 A, 6 V position. Connect the charger to the battery as indicated in the preceding sections CHARGING A BATTERY THAT IS INSTALLED IN A VEHICLE or CHARGING A BATTERY OUTSIDE A VEHICLE. Plug the charger's AC power cord into the wall outlet. This setting does not taper and does not shut off automatically.

Note: Do not use this battery charger to charge batteries larger than those typically found in boats, passenger cars, or light trucks.

Preactivation of a Discharged Battery

Preactivation will raise the voltage in a 12 volt battery to a level high enough to allow the charger to operate in the automatic mode. This step is required if you have been attempting to charge a low or dead battery and the battery has not been accepting any charge.

- Select the START position on the SELECT FUNCTION switch.
- Select the highest charging position on the SELECT SETTING switch. (Not the Start setting.)
- Charge the 12 volt battery for 5 to 15 minutes.
- Select the CHARGE position on the SELECT FUNCTION switch.

The battery should now accept the charge and the amperage meter should indicate 6 to 15 amps. If not, the battery should be professionally tested. If battery is okay, call Griot's Garage at (800) 345-5789.

READING THE METER

The ammeter built into this charger indicates the amperage that the battery is drawing from the charger. The meter may read up to 15 amps if the battery is discharged and the charger is set on the 12 volt, 15 amp setting. As the battery charges, the meter will taper back to around 7 amps. This charger, equipped with Automatic On-Off Technology, will drop to zero amps and the CHARGE COMPLETE light will come on when the battery is fully charged. On the 12 volt, 2 amp setting the meter may read up to 5 amps for a discharged battery and taper down to about 1 amp as it charges.

The 6 volt setting is a constant current setting and the needle will not move from right to left.

The BATTERY area in red at the top of the meter should not be used as a precise measurement of the battery's percent of charge. There are differences from battery to battery that prevent it from accurately representing the actual percent of charge.

The charger will show 100% when fully charged.

TIME TO CHARGE

On the 6 volt setting, this is a manual battery charger, and needs to be disconnected from a battery when the battery is fully charged. If this is not done, the battery will overcharge, resulting in possible battery damage.

A large automotive battery (65 amp hours or 100 minutes of reserve capacity) that is completely discharged (lights will not come on at all) should never take longer than 8 hours to charge on the 12 volt, 15 amp setting. Batteries with a partial charge will take even less time to charge. If the meter shows that the battery is drawing amperage (from 7 to 15 amps) and after charging for up to eight hours, the battery still isn't fully charged, have the battery professionally tested or replaced. If the meter shows zero amps and the battery is still discharged, then preactivation of the battery may be required (see the paragraph entitled "Preactivation of a Discharged Battery" in the OPERATING INSTRUCTIONS section).

The following instructions will allow you to determine how long it will take to bring a specific battery to full charge. If the charger is so equipped, a green light on the charger will indicate the battery has become fully charged.

CAUTION: Batteries that have 25% charge or less can easily freeze and should be charged at once, but DO NOT CHARGE A BATTERY THAT IS ALREADY FROZEN.

1. Determine the present level of charge in the battery with a hydrometer or electronic percent-of-charge tester.
2. Determine the size of the battery in AMP HOURS or RESERVE CAPACITY. If these ratings are not printed on the battery, contact your local battery dealer for this information. These are the only ratings that can be used to determine length of charging time. Then use the formula in step 3 for the charging rate capabilities of your charger.
3. Use the battery rating, the charge level of the battery, and the amp setting to be used on the charger, in the formula provided below.

$$\left(\frac{\text{Amp Hour Rating of Battery} \times \text{Percent of Charge NEEDED}}{\text{Amp Setting Selected On Charger}} \right) \times 1.25 = \text{Hours to Charge}$$

EXAMPLE:

Battery's Present State of Charge: 25%
Percent of Charge NEEDED: 100% – 25% = 75%
Expressed as a Decimal: = .75
Amp setting on Charger: 10
Amp-Hour Rating of Battery: 60

$\frac{60 \times .75}{10}$ X 1.25 = Hours to Reach Full Charge

$\frac{45}{10}$ X 1.25 = Hours to Reach Full Charge

4.5 X 1.25 = 5.625 Hours to Reach Full Charge
(5 Hours, 38 Min.)

Note: If the battery is rated in RESERVE CAPACITY, use the following formula to convert reserve capacity to amp-hours.

$$\frac{\text{Reserve Capacity}}{2} + 15.5 = \text{Amp-Hour Rating}$$

TROUBLESHOOTING

1. NO AMMETER READING and NO INDICATOR LIGHTS (Charging has not yet started)

- Make sure charger is plugged into a LIVE AC outlet.
- After unplugging unit, check connections at battery. Make sure the battery posts are clean and the clamps are making good contact with the battery terminal and other point of connection.
- Check to see that battery is capable of being charged. It may be damaged, sulfated, or have an open circuit.
- Make sure you have selected the proper charge voltage for the battery being charged.
- Battery may need preactivation (see the paragraph entitled "Preactivation of a Discharged Battery" in the OPERATING INSTRUCTIONS section).
- Verify that the vehicle's battery cables are in good condition and properly connected to the battery, especially the ground terminal.
- The battery may already be fully charged.

2. LOW AMMETER READING and NO INDICATOR LIGHTS (Charging has been in process)

- Battery is nearing full charge, green light will eventually turn on.
- The 2 amp setting has been selected for charging a larger 12 volt battery. Full charge may never be reached to allow the CHARGE COMPLETE light to turn on. Switch to 12 volt, 15 amp setting.
- If green CHARGE COMPLETE indicator does not come on within 8 hours of charging on the 12 volt, 15 amp setting, have the battery professionally tested. If the battery is defective, replace battery. If battery is OK, call Griot's Garage at (800)345-5789.
- If meter reading is between 1 and 5 amps on the 15 amp setting, have the battery professionally tested or replaced.

3. NO AMMETER READING, REVERSE HOOK-UP INDICATOR IS ON

- The charger's output cables are reversed at the battery and other point of connection. Unplug charger, correct the hook-up, then plug charger in and resume charging.

4. NO AMMETER READING, BUT CHARGE COMPLETE INDICATOR IS LIT

- Battery is fully charged. Charger may be disconnected at any time.

5. CHARGE COMPLETE INDICATOR IS ON, BUT BATTERY EYE DOES NOT INDICATE FULL CHARGE

- When the CHARGE COMPLETE indicator comes on, the battery IS fully charged. However, due to electrolyte stratification, the hydrometer eye in the battery may not immediately indicate full charge. To get the eye to register full charge, set the SELECT FUNCTION switch to START and charge for one more hour on the 15 amp setting.

6. VEHICLE WILL NOT START WHEN USING THE ENGINE START SETTING

- After unplugging unit, check connections. Make sure the clamps are making good contact with the battery terminal and other point of connection.

- If ammeter reads zero, the internal circuit breaker may have tripped. Wait six to seven minutes. The circuit breaker will reset automatically and the ammeter needle will again register amperage. Charge battery for another 10 to 20 minutes and attempt to start the engine again.
- If after several attempts, the engine still won't start, there may be a problem with the engine that will need to be corrected before it can be started or the battery may not be capable of accepting a charge and will need to be replaced.
- Verify that the vehicle's battery cables are in good condition and properly connected to the battery.

CHARGER CARE & MAINTENANCE

CAUTION – Make sure charger is unplugged from electrical outlet before performing any maintenance.

A minimum amount of care can keep your battery charger working and looking good for years.

- Clean the clamps after each use. Wipe off any battery fluid that may have come in contact with the clamps to prevent corrosion. Battery fluid may be neutralized with a solution of water and baking soda.
- Once a year, apply some grease to the exposed wires on the ends of the cables where the clamp is connected to prevent corrosion.
- If needed, the case may be wiped clean with a soft cloth.

There are no user-serviceable parts inside.

For information concerning use, applications, or service, call Griot's Garage at (800)345-5789.

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