

–Save– Important Safety Instructions

Read Rules for Safe Operation and Instructions Carefully

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.

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer and birth defects or other reproductive harm. ***Wash hands after handling.***

A. GENERAL BATTERY SAFETY

1. Before you use your battery charger, be sure to read all instructions and cautions printed on:
 - Battery Charger
 - Battery
 - Vehicle or unit using battery
2. Use battery charger on LEAD ACID type rechargeable batteries only, such as used in autos, trucks, tractors, airplanes, vans, RV's, trolling motors, etc. Charger is not intended to supply power to low-voltage electrical system other than in an automotive application.

WARNING: 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.
3. Use only attachments recommended or sold by manufacturer. Use of non-recommended attachments may result in fire, electric shock, or injury.
4. When disconnecting the battery charger, pull by the plug not by the cord. Pulling on the cord may cause damage to cord or plug.
5. Locate battery power cord so it cannot be stepped on, tripped over, or subjected to damage or stress.
6. Do not operate charger with damaged cord or plug. Have cord replaced immediately.
7. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way. Take it to a qualified professional for inspection and repair.
8. Do not disassemble charger. Take it to a qualified professional when service or repair is required. Incorrect reassembly may result in electric shock or fire.
9. To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning.

10. Do not use an extension cord unless absolutely necessary. Use of an improper extension cord could result in fire or electric shock. If an extension cord must be used, make sure that:
 - 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, as specified below:

AC INPUT RATING, AMPERES		AWG SIZE OF CORD			
Equal to or Greater than	but less than	Length of Cord, Feet			
		25	50	100	150
0	2	18	18	18	16
2	3	18	18	16	14
6	8	18	16	12	10

11. Always charge battery in a well ventilated area. **NEVER** operate in a closed-in or restricted area without adequate ventilation.

WARNING: Risk of explosive gas.
12. Locate charger as far away from battery as DC charger cables permit.
13. Do not expose charger to rain or snow.
14. **NEVER** charge a frozen battery. If battery fluid (electrolyte) is frozen, bring into a warm area to thaw before charging.
15. **NEVER** allow battery acid to drip on charger when reading specific gravity or filling battery.
16. **NEVER** set a battery on top of charger.
17. **NEVER** place charger directly above battery being charged. Gases from battery will corrode and damage charger.
18. **NEVER** touch the battery clamps together when the charger is energized.

SCHUMACHER ELECTRIC CORPORATION

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Call Customer Service if you have questions: 1-800-621-5485

B.

PERSONAL PRECAUTIONS AND SAFETY

1. **WARNING:** Wear complete eye protection and clothing protection, when working with lead-acid batteries.
2. Make sure someone is within range of your voice or close enough to come to your aid when you work with or near a lead-acid battery.
3. Have plenty of fresh water and soap nearby for use if battery acid contacts skin, clothing, or eyes. If battery acid contacts skin or clothing, wash immediately with soap and water.
4. Avoid touching your eyes while working with a battery. Acid particles (corrosion) may get into your eyes! If acid enters your eye, immediately flood eye with running cold water for at least 10 minutes. Get medical attention immediately.
5. Remove all 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.
6. Take care not to drop a metal tool or other metal onto the battery. Metal may cause sparking or short circuit the battery or another electrical device. Sparking may cause an explosion.
7. Always operate battery charger in an open well ventilated area.
8. **NEVER** smoke or allow a spark or flame in the vicinity of the battery or engine. Batteries generate explosive gases!

C.

PREPARING TO CHARGE

1. Make sure you have a 12 or 24 volt lead-acid battery. Check car owner manual to make sure.
2. Clean battery terminals. Take care to keep corrosion from coming in contact with your eyes.
3. If required, add distilled water in each cell until battery acid reaches levels 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.
4. Study all battery manufacturer's specific precautions, such as removing or not removing cell caps while charging, and recommended rates of charge.
5. 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 non-metallic material as a fan.
6. 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 as not to cause an arc.
7. A marine (boat) battery must be removed and charged on shore. To charge it on board requires equipment specially designed for marine use.

When charging a battery in a RV or motor home always connect one lead of the output cable to the battery. Never connect to a remote receptacle or other means for the purpose of remotely charging the battery. The wires may be inadequate for handling the charge current of this charger and may over heat. Often these wires are bundled in with other wires which could be damaged and lead to a direct short across the battery and charger. If this occurs a fire can result, equipment and appliances operated from the battery may also be damaged.

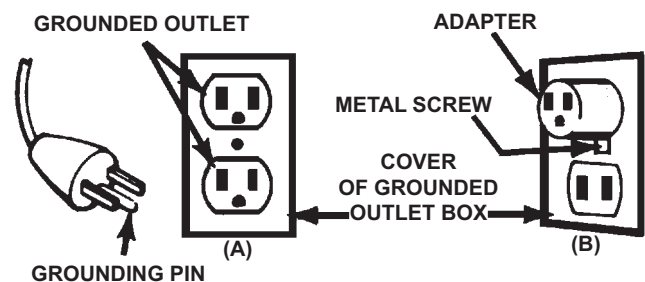


FIGURE 1: GROUNDING METHODS

GROUNDING AND 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 a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with local codes and ordinances.

DANGER - 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 electric shock.

This battery charger is for use on a nominal 120-volt circuit, and has a grounding plug that looks like the plug illustrated in sketch **A**. A temporary adapter, which looks like the adapter illustrated in sketch **B**, may be used to connect this plug to a two-pole receptacle as shown in sketch 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.

During operation do not place the charger or its cables on the vehicle seat or carpeting.

DANGER - Before using adapter as illustrated, be certain that center screw of outlet plate is grounded. The green-colored rigid ear or lug extending from adapter must be connected to a properly grounded outlet - make certain it is grounded. 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.

Use of an adapter plug is not allowed in Canada.

D.

BATTERY CHARGER CONTROLS

NOTE: A buzz, or hum is normal when the output cables have been disconnected and the AC power cord is still connected to an electrical source (i.e. wall outlet).

OPERATION – Model SE-70MA

Two switches permit operation and volt selection.

Switch #1 – OPERATION SELECTOR

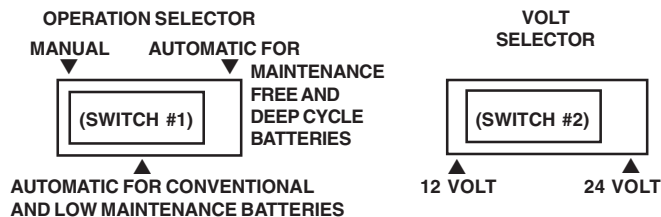
Mode 1 – Manual setting: Warning: This charging must be monitored and stopped when the battery is charged. Overcharging will damage the battery.

Mode 2 – Automatic setting for Conventional and Low Maintenance Batteries. If you are not sure of your battery type, use the Conventional setting.

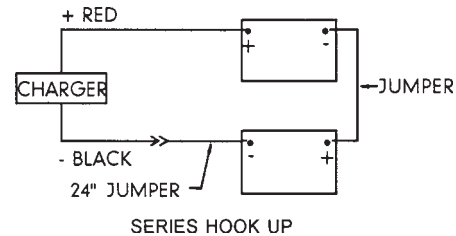
Mode 3 – Automatic setting is for Maintenance Free and Deep Cycle batteries.

Switch #2 – VOLT SELECTOR

Select either the 12 or 24-volt setting: Use the 12-volt setting for a 12-volt battery and the 24-volt setting for two 12-volt batteries hooked up in series.



If more than one battery is to be charged, be sure the total battery voltage is not less than that of the charger or damaged could result to batteries and charger. Diagram for series hook up is shown below:



Use #10 AWG jumper wires to connect batteries.

E.

DC CONNECTION PRECAUTIONS

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

F.

FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE

A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION. FOLLOW THESE STEPS TO REDUCE RISK OF SPARK NEAR BATTERY:

1. Position AC and DC cords to reduce risk of damage by 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 negative post is grounded to chassis (as in most vehicles), see No. 5. If positive post is grounded to the chassis, see No. 6.
5. For a negative-grounded vehicle, connect POSITIVE (RED) clamp from battery charger to POSITIVE (POS, P,+) ungrounded post of battery. Connect NEGATIVE (BLACK) clamp to vehicle chassis or engine block away from battery. Do not connect clamp to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block. (Figure 2)
6. For a positive-grounded vehicle, connect NEGATIVE (BLACK) clamp from battery charger to NEGATIVE (NEG, N, -)

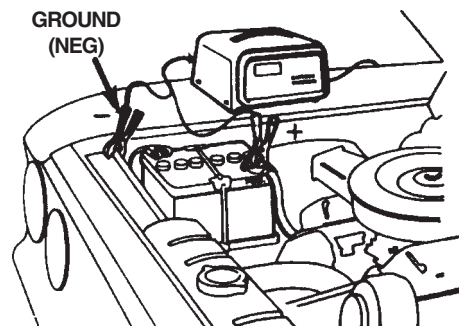


FIGURE 2: CONNECTION TO NEGATIVE GROUNDED BATTERY

- ungrounded post of battery. Connect POSITIVE (RED) clip to vehicle chassis or engine block away from battery. Do not connect clamp to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block. (Figure 3)
7. When disconnecting charger, disconnect AC cord, remove clamp from vehicle chassis, and then remove clamp from battery terminal, in that order.
 8. See charge period for length of charge information.

G**FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE**

A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

1. Check polarity of battery posts. POSITIVE (POS, P,+) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
2. Attach at least a 24-inch-long 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post (not provided).
3. Connect POSITIVE (RED) charger clamp to POSITIVE (POS, P,+) post of battery.
4. Position yourself and free end of cable as far away from battery as possible - then connect NEGATIVE (BLACK) charger clamp to free end of cable.
5. Do not face battery when making final connection.
6. When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.
7. A marine (boat) battery must be removed and charged on shore. To charge a battery on the boat requires equipment specially designed for marine use.

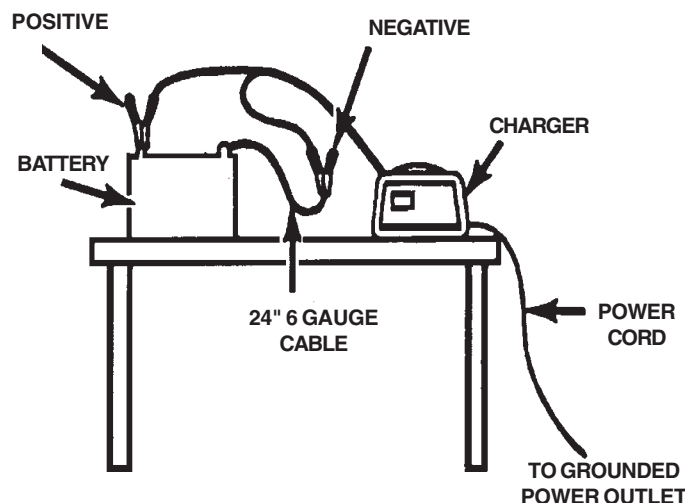


FIGURE 3: CONNECT NEGATIVE BATTERY CLIP TO 24 INCH CABLE END

H.**AC POWER CORD CONNECTION INSTRUCTIONS**

DANGER - 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.

This battery charger is for use on a nominal 120-volt 60 Hz circuit.

I.**OPERATION INSTRUCTIONS**

1. These battery chargers are equipped with a self-resetting circuit breaker. This device protects the charger from temporary overloads. In the event of an overload, the circuit breaker will trip open, and after a short cooling off period, will reset automatically. This process is known as cycling and can be recognized by an audible clicking sound.
2. These battery chargers are equipped with an electronic control circuit which automatically governs the charge rate to your battery. The charger will satisfactorily charge Maintenance Free and Conventional batteries.

J.**OUTPUT VOLTAGE**

This charger is for use with 12 volt lead-acid batteries. The SE-70MA is for 12 and 24 volt systems.

K.**INDICATION OF PROPER OPERATION TO A DISCHARGED BATTERY BUT OTHERWISE IN GOOD CONDITION**

10 Amp 12 Volt setting: The initial charge current should be 10 amps gradually tapering throughout the charge cycle to 5 amps. Though not indicated, battery voltage will gradually rise to approximately 14.3 volts, then hold constant throughout remainder of charge cycle. When the battery reaches 14.3 volts and charge current drops to 5 amps the charger will turn off. Initially the battery voltage will drop from its 14.3 volt level fairly quickly. When 13 volts is reached, the charger will again turn on, until the 14.3 volt, 5 amp condition is met. As this action continues, on time will decrease to a few seconds while off time increases to a range of several minutes to an hour. on/off times vary with size, type and condition of battery.

L.**CHARGE PERIOD**

The approximate required time to bring a battery to full charge state depends upon the number of ampere hours (AH) depleted from the battery. AHs are determined by multiplying the number of hours by the number of amps supplied to a load.

For example - If a load was connected to a battery, which drew 7 amps for a period of 5 hours, the battery will have supplied 35 AH. The approximate recharge time would then be calculated by dividing the 35 AH depleted from the battery, by the ampere charge rate of the charger. To allow for tapering off of the charge rate, add 25 percent to the charge time.

Indications of a fully charged battery are:

1. When the meter indicates an intermittent current flow to the battery.

2. A hydrometer reading of the specific gravity of the electrolyte (fluid) of a battery in good condition should be between 1.250 and 1.285.
3. When a battery reaches 80-85% of full charge, bubbles will appear on the surface of the fluid. As the battery nears full charge, bubbling will become more noticeably active.
4. The time required to charge two 6-volt batteries connected in series will be the same as for one 12-volt battery of equivalent size.

NOTE: This charger will shut off when the battery is fully charged and will turn back on automatically when the battery needs to be charged again.

5. Do not charge two 12-volt batteries in parallel.

N.**STORAGE**

Store battery charger in a dry area.

M.**TROUBLESHOOTING**

The battery charger is designed to work automatically. However, If a problem does occur, check the following:

PROBLEM	POSSIBLE CAUSE	SOLUTION
No meter reading.	Connections are reversed. Poor electrical connection. (Rock clamps back and forth to bite in.) AC outlet is dead. Battery is defective (will not accept charge).	With charger unplugged, reverse clamps and reconnect (rock back and forth to bite in). Clean clamps and battery posts and reconnect Plug in a lamp or other appliance to check for voltage. Have battery checked.
Charger will not turn on (when properly connected to power.	Battery recently charged as result of driving and is fully charged.	Battery does not need charging. (Turning on headlights will lower battery voltage in a few seconds and charger should then turn on.)
Charger will not turn OFF.	Battery has problem and will not take full charge.	Have battery checked.
Meter needle pulses (fluctuates) every few seconds <u>AFTER THREE HOURS</u> without slowing down.	Two or more batteries connected in parallel. Battery of 200 ampere hours or larger. Battery is connected to application that draws a small current (such as an interior light).	Do not parallel charge. Requires more time to charge: continue charging.
Meter needle moves to extreme right, remains a short time, then returns to zero, accompanied by a clicking sound.	Severely discharged battery (but otherwise good battery). Battery is defective (will not accept charge). Charger is cycling after circuit breaking overload.	Allow charging to continue until battery has recovered sufficiently to take a charge. (Circuit breaker will continue to cycle and needle will swing side to side until battery has recovered.) Have battery checked. Wait until charger automatically resets itself (DO NOT RETURN FOR SERVICE).