

Battery Charger

**INSTRUCTION 91036
April 1999**

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Safety and Equipment Protection

WARNING!

ELECTRICAL POWER CAN RESULT IN DEATH, PERSONAL INJURY OR CAN CAUSE DAMAGE TO EQUIPMENT.

If the instrument is driven by an external power source, disconnect the instrument from that power source before attempting any repairs.

WARNING!

BATTERIES ARE DANGEROUS. IF HANDLED IMPROPERLY, THEY CAN RESULT IN DEATH, PERSONAL INJURY OR CAN CAUSE DAMAGE TO EQUIPMENT.

Batteries can be hazardous when misused, mishandled, or disposed of improperly. Batteries contain potential energy, even when partially discharged.

WARNING!

ELECTRICAL SHOCK CAN RESULT IN DEATH OR PERSONAL INJURY.

Use extreme caution when handling cables, connectors, or terminals; they may yield hazardous currents if inadvertently brought into contact with conductive materials, including water and the human body.

CAUTION!

Be aware of protective measures against environmentally caused electric current surges.

In addition to the previous warnings and cautions, the following safety activities should be carefully observed.

Safety and Equipment Protection

Children, Adolescents

NEVER give batteries to young people who may not be aware of the hazards associated with batteries and their improper use or disposal.

Jewelry, Watches, Metal Tags

To avoid severe burns, NEVER wear rings, necklaces, metal watch bands, bracelets, or metal identification tags near exposed battery terminals.

Heat, Fire

NEVER dispose of batteries in fire or locate them in excessively heated spaces. Observe the temperature limit listed in the instrument specifications.

Charging

NEVER charge "dry" cells or lithium batteries that are not designed to be charged.

NEVER charge rechargeable batteries at currents higher than recommended ratings.

NEVER recharge a frozen battery. Thaw it completely at room temperature before connecting charger.

Unvented Container

NEVER store or charge batteries in a gas-tight container. Doing so may lead to pressure buildup and explosive concentrations of hydrogen.

Short Circuits

NEVER short circuit batteries. High current flow may cause internal battery heating and/or explosion.

Safety and Equipment Protection

Damaged Batteries

Personal injury may result from contact with hazardous materials from a damaged or open battery. NEVER attempt to open a battery enclosure. Wear appropriate protective clothing, and handle damaged batteries carefully.

Disposal

ALWAYS dispose of batteries in a responsible manner. Observe all applicable federal, state, and local regulations for disposal of the specific type of battery involved.

NOTICE

Stevens makes no claims as to the immunity of its equipment against lightning strikes, either direct or nearby.

The following statement is required by the Federal Communications Commission:

WARNING - This equipment generates, uses, and can radiate radio frequency energy and, if not installed in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

USER INFORMATION

Stevens makes no warranty as to the information furnished in these instructions and the reader assumes all risk in the use thereof. No liability is assumed for damages resulting from the use of these instructions. We reserve the right to make changes to products and/or publications without prior notice.

1 Introduction

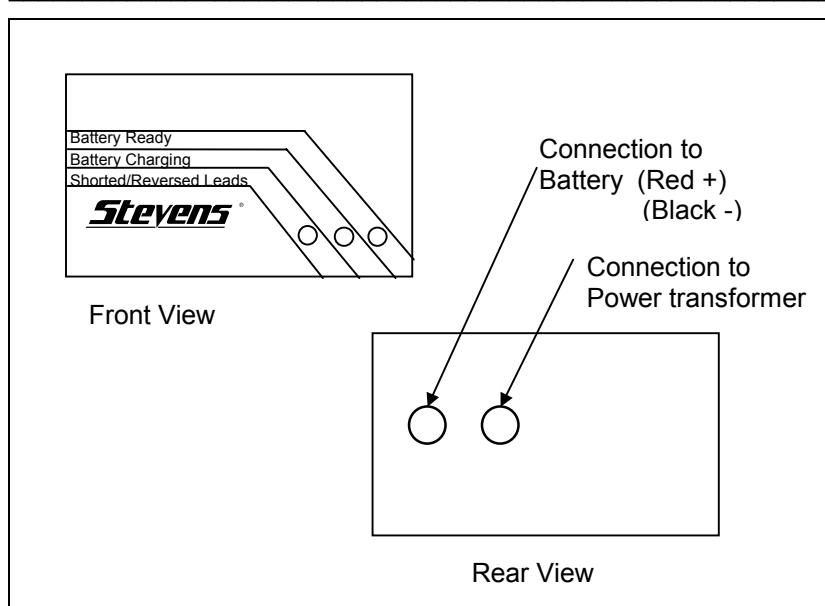


Figure 1 Battery Charger

1.1 GENERAL DESCRIPTION

The Stevens® Battery Charger (*Figure 1*) is designed to work as either a bench charger or together with a rechargeable battery to power Stevens instruments. Its unique auto-switching capability makes this possible without the need for adjustment by the user.

It will charge the 12 volt, 7 ampere-hour, sealed lead-acid battery, Stevens Part Number 33957 and can operate from 115 or 230 VAC, 50-60 Hz, as supplied by a plug-in-the-wall transformer. The configuration and rating for the charger is specified on the label on the underside of the unit.

The charger will operate under severe environmental conditions: -40° to +70 °C (-40° to +160° F) and 0 to 95% relative humidity, non-condensing. Built-in temperature compensation optimizes battery charging for different operating temperatures.

1 Introduction

1.2 SAFETY INFORMATION

Before performing any procedure in this manual, please read all applicable warnings and cautions.

1.3 BATTERY CHARGER SPECIFICATIONS

Input power	115 VAC, 0.48 A or 230 VAC, 0.24 A (16.5 V, 40VA supplied to unit)
Output	8.5 to 14.5 VDC, up to 1.5 Amps into 7 ampere-hour 12 volt lead-acid battery; float current 0 - 1.5 Amps at float voltage of 13.9 VDC, fully temperature-compensated
Operating Temperature	-40 to +50 °C -40 to +122 °F
Relative Humidity	0 to 95% relative, non-condensing
Size	3.5 x 2.5 x 5 inches (9 x 7 x 13 cm)
Weight	2.5 pounds (1.1 kg)
Indicator	Three light-emitting diode (LED); Red: reverse connection or shorted battery; Yellow: bulk charge; Green: float charge.

Note: Power supplied to the charger is via a standard, plug-in-the-wall transformer unit, rated for indoor use only. This unit is not to be used in unprotected, outdoor applications that are in violation of the U/L rating restrictions.

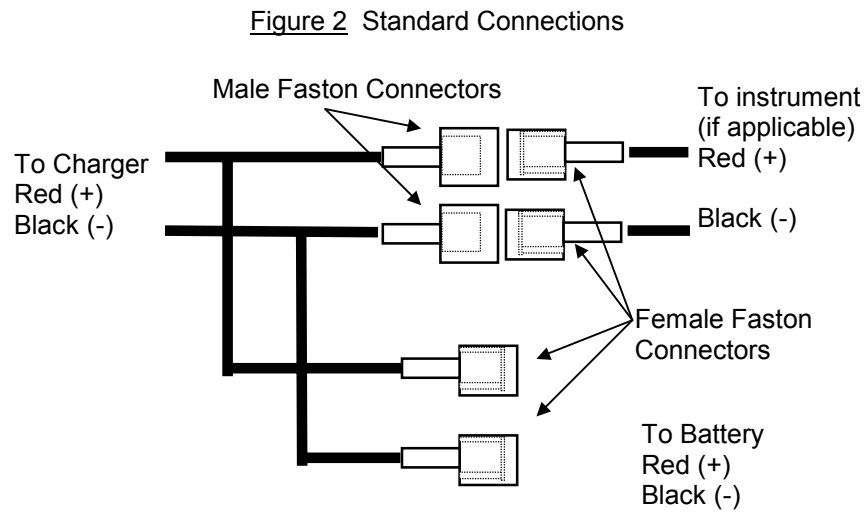
2 Installation and Operation

2.1 INSTALLATION

Place the charger on a shelf in a position where the power input transformer can be connected to an appropriate source and the output cable connected to the battery to be charged, or the battery plus a Stevens instrument. Make sure that the charger and cables are located where there is no dripping water or condensation.

CAUTION: *Always* connect a battery when used with an instrument. *Never* attempt to power the instrument from the charger alone.

Connect the battery, and instrument if used, to the cable coming from charger. See *Figure 2*.



2 Installation and Operation

2.2 OPERATION

The charger has several charging modes and automatically switches between these modes to provide optimum charging of the battery. Discharged batteries are rapidly charged in a constant current mode. Fully charged batteries are maintained, using a float charge mode. Other steps in between optimize the total charging cycle and help extend the life of the battery. Because of these various charging steps, best operation is achieved if the battery is connected before AC power is applied to the charger. The battery and instrument are connected to the charger using the cable coming from the rear panel (see *Figure 2*).

When used with a Stevens instrument, the charger maintains the battery in a float state. If the battery discharges below a certain level, the charger will automatically switch to the constant current mode and bring the battery back to full charge, while maintaining power to the instrument.

In case of an AC power failure, the instrument will continue to run on the battery. When power is restored, the charger will return the battery to a fully charged state. The charger provides no load to the battery while the AC power is off.

CAUTION The charger should always be used together with a battery when connected to an instrument. *Never use the charger alone to power an instrument.* The correct installation sequence is to connect the battery to the charger, connect the charger to the instrument and then apply AC power to the charger. Also, the charger wazzu is designed to work with *one* battery. *Do not connect more than one battery to the charger at one time.*

Three light emitting diodes (LED) on the charger panel indicate the charge mode. Yellow indicates constant current or bulk charging mode, and the green indicates float charge mode. Red indicates an extremely discharged or shorted battery, or reversed polarity of the connections. (see *Figure 1*).

The charger is well suited for bench charging batteries from the field. Batteries with an open circuit voltage below 11.9 volts DC should be

2 Installation and Operation

brought in from the field and charged. Normal charging will take 24 hours, and the fully charged state is indicated by a green LED.

CAUTION: Batteries that have been deeply discharged may exhibit certain symptoms when connected to the bench charger. If the green LED is illuminated even when the battery is discharged, it is likely that a surface charge has built up on the battery and it may not recover. If after 24 hours the battery has not charged or the yellow LED has not come on, the battery has likely sustained some permanent damage and will never again hold a full charge. If the yellow LED stays on for more than 72 hours, the battery may have one or more shorted cells, and should *not* be used. *No battery should be left on the charger more than 72 hours if the LED is continuously red.*

The cost of new batteries and the value of retaining unique data from data loggers make it very important to monitor and maintain batteries in a charged state. It may not be possible to recover a battery that has been allowed to go into deep discharge for a period of time. Even well-maintained rechargeable batteries will gradually lose their original capacity over many charge-discharge cycles. Maximum battery life will be obtained when batteries are carefully monitored and charged in a timely manner.

3 Maintenance and Service

3.1 MAINTENANCE

There is little regular maintenance required for the Battery Charger. The area around the Charger should be kept reasonably clean and dry to avoid entry of dust or moisture into the electrical connectors. If there are any questions concerning the Charger, call and ask for a Stevens Customer Technical Representative. The direct dial number is 1-800-452-5272, and the call is free from Canada or the USA. An alternative number is (503) 469-8000. Please provide an equipment description and serial number, when possible.

Many questions can be answered by telephone, or you may obtain authorization for return of the equipment, should that be necessary. The factory is open Monday through Friday from 7 a.m. to 5 p.m. in the Pacific Time Zone. If no one is available, you can leave a message at any time on an excellent phone-mail system; just clearly tell us your name, location, telephone number and how to reach you.

3.2 FACTORY SERVICE

There are no user serviceable parts within the charger. *Do not attempt to open the charger.* It is sealed for your protection. Refer any repairs to a Stevens factory service technician.

Service Notes:

4 Technical Notes

The Stevens Battery Charger monitors both the battery voltage and the charging current during operation. Using the values for these two parameters, it determines how to best charge the battery. If battery voltage is below an initial "threshold" level (typically 8.5 volts), the charger supplies a trickle charge current. This prevents high current charging if a battery is deeply discharged, or if the battery is inadvertently connected in reverse polarity to the charger. Once the battery is above the threshold level, charging switches to the constant current mode (typically 1.5 Amps for a 7 ampere-hour battery).

This continues until the battery is actually over-charged to about 14.5 volts. This voltage level is maintained and the charging current begins to decrease. Once the charging current falls below the float threshold (about 200 mA), the charger switches to the float charging mode, holding the battery at approximately 13.9 volts. At this point, the green LED will illumine, indicating that the battery is fully charged. If the load discharges the battery below the float level low limit, (about 12.7 volts), the charger again switches to the constant current mode and repeats the cycle.

Because of the nature of the charger's auto-switching, it is possible for a fully charged battery to indicate a high charge state (red LED) when first connected to the charger. This is appropriate, and the charger should indicate a float condition shortly after the battery is connected. It is also possible for a battery that is not fully charged to indicate a float condition (green LED). To avoid this latter condition, always connect the battery before applying AC power to the charger.