

INSTALLATION INSTRUCTIONS

Original Issue Date: 4/02

Model: **Model K and Model S Programmable Transfer Switches and Bypass-Isolation Transfer Switches**

Market: **Transfer Switches**

Subject: **Battery Charger Kits GM22498-KP1 to GM22498-KP8**

Introduction

This document provides installation and operation instructions for battery charger kits GM22498-KP1 to GM22498-KP8. See Figure 1 for the battery charger features and connections. Battery charger kits have models available for 208–600 VAC input connections.

Welded Transfer Switches and Framework Bypass-Isolation Transfer Switch Enclosures

Kit No.	Input Voltage
GM22498-KP1	208 VAC
GM22498-KP2	240 VAC
GM22498-KP3	480 VAC
GM22498-KP4	608 VAC

Framework Transfer Switch Enclosures

Kit No.	Input Voltage
GM22498-KP5	208 VAC
GM22498-KP6	240 VAC
GM22498-KP7	480 VAC
GM22498-KP8	608 VAC

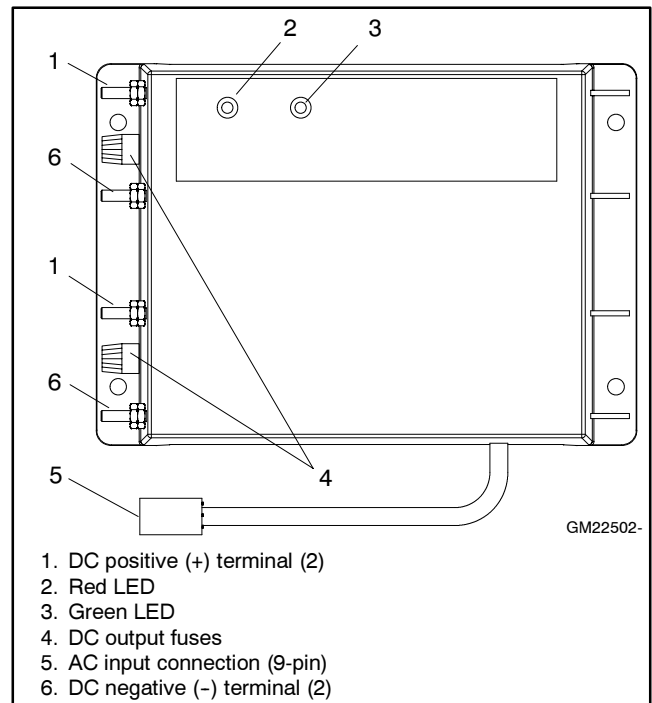


Figure 1 Battery Charger Features and Connections

The battery charger is a 3-stage (bulk, absorption, and float) electronic battery charger designed for 12 or 24 VDC battery electrical systems. It is designed to charge lead-acid or gel cell batteries. The sealed and potted design is rainproof, lightweight, silent, and completely automatic. The battery charger contains internal short-circuit protection for the outputs and fuses for reverse-polarity protection. See Figure 2 for battery charger specifications.

Output	
Charging	12 VDC (min.) at 6 amps 24 VDC (min.) at 3 amps
Maintaining	13.30 VDC at 0.1 amps
Circuit Protection	Two 10-amp fuses (AGC-10)
Input	
Rated AC Voltage	208 VAC, AC connector pin 2 240 VAC, AC connector pin 4 480 VAC, AC connector pin 6 600VAC, AC connector pin 9
Current Draw	@ 50/ 60 Hz, 0.7 amps maximum
Maximum Recommended Battery Size	
Recharging	150 amp-hours
Maintenance only	300 amp-hours
Overall Dimensions and Weight	
Height, mm (in.)	89 (3.5)
Width, mm (in.)	163 (6.4)
Depth, mm (in.)	530 (2.1)
Weight, kg (lb.)	1.6 (3.5)

Figure 2 Battery Charger Specifications

Note: Route AC and DC wiring in separate conduits.

Note: The installing technician must supply the cable with terminals between the battery charger and battery. Step 5 provides details regarding cable length and gauge.

Red and green LEDs indicate the battery charger charge rate status.

Red on/green off indicates the unit is *bulk* charging at the full 6-amp (for 12-volt systems) or 3-amp (for 24-volt systems) rating.

Red on/green on indicates the unit is *absorption* charging at 1.5- to 5-amp (for 12-volt systems) or 0.75- to 2.5-amp (for 24-volt systems) rating.


Red off/green on indicates the unit is *float* charging at less than 1.5 amps (for 12-volt systems) or 0.75 amps (for 24-volt systems).

Read the entire installation procedure and compare the kit parts with the parts list at the end of this publication before beginning installation. Perform the steps in the order shown.

Safety Precautions

Observe the following safety precautions during installation.

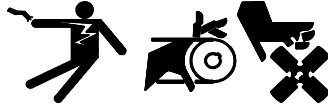
⚠ DANGER



Hazardous voltage.
Will cause severe injury or death.

Disconnect all power sources before opening the enclosure.


⚠ WARNING



Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

⚠ WARNING



Sulfuric acid in batteries.
Can cause severe injury or death.

Wear protective goggles and clothing. Battery acid may cause blindness and burn skin.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or connected equipment, disable the generator set as follows: (1) Move the generator set master switch to the OFF position. (2) Disconnect the power to the battery charger. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.

Battery electrolyte is a diluted sulfuric acid. Battery acid can cause severe injury or death. Battery acid can cause blindness and burn skin. Always wear splashproof safety goggles, rubber gloves, and boots when servicing the battery. Do not open a sealed battery or mutilate the battery case. If battery acid splashes in the eyes or on the skin, immediately flush the affected area for 15 minutes with large quantities of clean water. Seek immediate medical aid in the case of eye contact. Never add acid to a battery after placing the battery in service, as this may result in hazardous spattering of battery acid.

Battery acid cleanup. Battery acid can cause severe injury or death. Battery acid is electrically conductive and corrosive. Add 500 g (1 lb.) of bicarbonate of soda (baking soda) to a container with 4 L (1 gal.) of water and mix the neutralizing solution. Pour the neutralizing solution on the spilled battery acid and continue to add the neutralizing solution to the spilled battery acid until all evidence of a chemical reaction (foaming) has ceased. Flush the resulting liquid with water and dry the area.

Battery gases. Explosion can cause severe injury or death. Battery gases can cause an explosion. Do not smoke or permit flames or sparks to occur near a battery at any time, particularly when it is charging. Do not dispose of a battery in a fire. To prevent burns and sparks that could cause an explosion, avoid touching the battery terminals with tools or other metal objects. Remove all jewelry before servicing the equipment. Discharge static electricity from your body before touching batteries by first touching a grounded metal surface away from the battery. To avoid sparks, do not disturb the battery charger connections while the battery is charging. Always turn the battery charger off before disconnecting the battery connections. Ventilate the compartments containing batteries to prevent accumulation of explosive gases.

Battery short circuits. Explosion can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Disconnect the battery before generator set installation or maintenance. Remove all jewelry before servicing the equipment. Use tools with insulated handles. Remove the negative (-) lead first when disconnecting the

battery. Reconnect the negative (-) lead last when reconnecting the battery. Never connect the negative (-) battery cable to the positive (+) connection terminal of the starter solenoid. Do not test the battery condition by shorting the terminals together.

Grounding electrical equipment. Hazardous voltage can cause severe injury or death. Electrocution is possible whenever electricity is present. Open the main circuit breakers of all power sources before servicing the equipment. Configure the installation to electrically ground the generator set, transfer switch, and related equipment and electrical circuits to comply with applicable codes and standards. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

Short circuits. Hazardous voltage/current can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Do not contact electrical connections with tools or jewelry while making adjustments or repairs. Remove all jewelry before servicing the equipment.

FCC Class A EMC Notice

This equipment was tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning this equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to a different power supply circuit than the receiver.

Installation Procedure

1. Remove the generator set and transfer switch from service

- 1.1 Place all generator set master switches in the OFF position.
- 1.2 Disconnect the power to all battery chargers, if equipped.
- 1.3 Disconnect all generator set engine starting batteries, negative (-) leads first.
- 1.4 Disconnect all power sources to transfer switches and power monitors.
- 1.5 Turn off and disconnect the power to all devices in the system.
- 1.6 Open the transfer switch enclosure.

2. Mount the battery charger in the transfer switch

- 2.1 Use Figure 6 to determine the recommended mounting location. Location and position of the kit vary by transfer switch model. If Figure 6 does not illustrate the mounting location for a given model, look for a set of four studs with the corresponding spacing inside the enclosure for mounting the battery charger.
- 2.2 **Kits GM22498-KP5 to GM22498-KP8 only.** Install the battery charger mounting panel (GM22398) using four 1/4-20 x 3/4 in. thread-forming screws (X-67-114) as shown in Figure 3.
- 2.3 Install the battery charger (GM22502) to the transfer switch mounting studs using four 1/4-20 nuts (X-6210-2). See Figure 6.

3. Connect the battery charger AC harness

- 3.1 Connect the mating ends of the battery charger AC harness connector to the wiring harness (GM22529-GM22532). See Figure 4.

Note: Do not interchange wiring harnesses. The battery charger kit includes a wiring harness that determines the AC input voltage. Do not use the wiring harness from another kit without determining the corresponding AC input voltage configuration. See Figure 5.

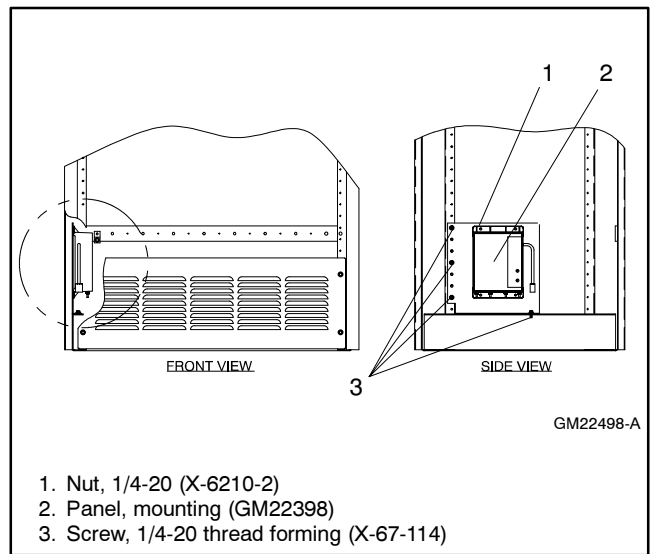


Figure 3 Installing the Transfer Switch Mounting Panel

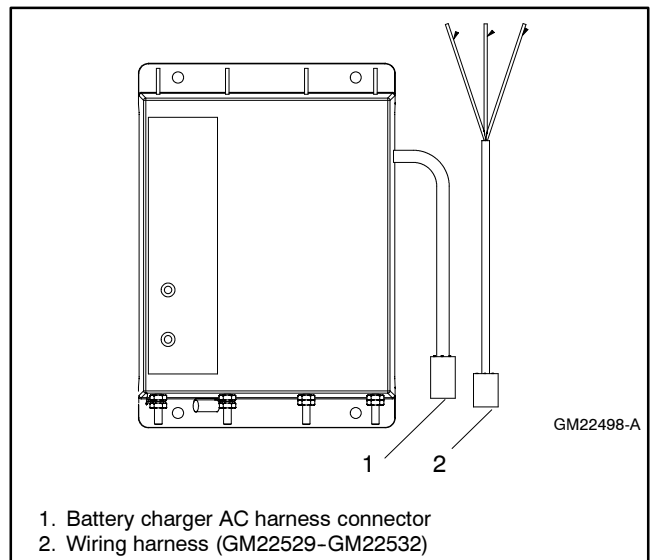
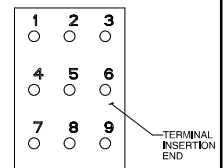


Figure 4 Battery Charger AC Connector and Wiring Harness

CONNECTOR PIN-OUT		
PIN	WIRE	FUNCTION
1	1	NEUTRAL INPUT
2	2	208 VAC INPUT
3	-	-
4	3	240 VAC INPUT
5	-	-
6	4	480 VAC INPUT
7	6	GROUND
8	-	-
9	5	600 VAC INPUT



GM22502-

Figure 5 Battery Charger AC Wiring Harness Configurations

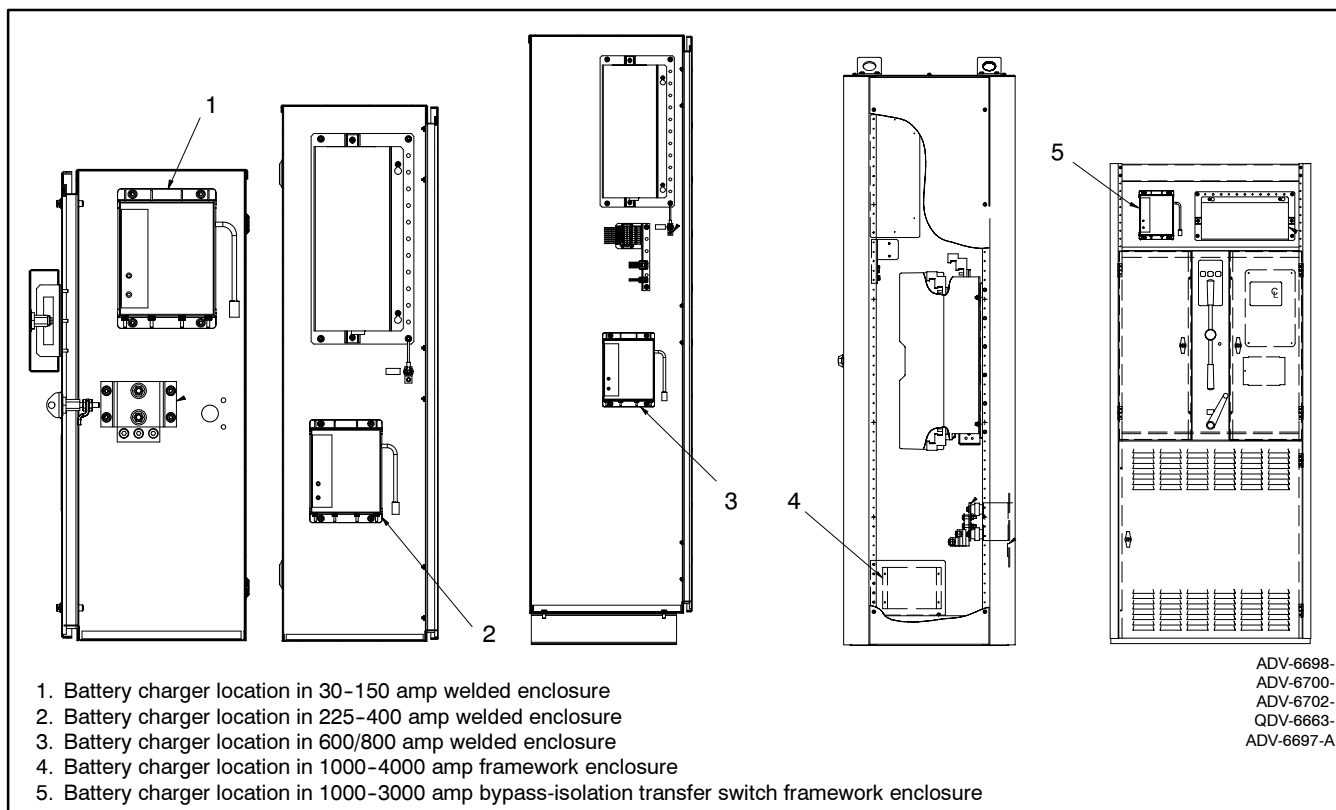


Figure 6 Battery Charger Typical Mounting Locations

3.2 Connect the ground (GND) wire. Refer to the corresponding transfer switch wiring diagram as necessary.

Welded enclosure transfer switches

3.2.1 Route the wiring harness ground wire to the transfer switch ground lug, cut the wire to length, and install a 1/4 in. eyelet terminal (X-283-9).

3.2.2 Remove the transfer switch ground lug nut, install the eyelet terminal, and replace the nut.

Framework transfer switches and framework bypass-isolation transfer switches

3.2.3 Route the wiring harness ground wire to the transfer switch corner channel hole, cut the wire to length, and install a 1/4 in. eyelet terminal (X-283-9).

3.2.4 Attach the eyelet terminal using a 1/4-20 x 3/4 in. form-threading screw (X-67-114) and a 1/4 in. internal/external tooth-lock washer. Position the eyelet terminal between the screw head and the internal/external tooth-lock washer.

3.3 Connect the neutral (N) and phase (208, 240, 480, or 600) wires. Refer to the corresponding transfer switch wiring diagram as necessary.

30-150 amp models

3.3.1 Route the wiring harness neutral wire to the A phase load connection, cut the wire to length, and install a 3/16 in. push-on terminal (X-431-48).

3.3.2 Attach the neutral wire push-on terminal to the A phase load connection.

3.3.3 Route the wiring harness phase wire (208, 240, 480, or 600) to the C phase load connection, cut the wire to length, and install a 3/16 in. push-on terminal (X-431-48).

3.3.4 Attach the phase wire (208, 240, 480, or 600) push-on terminal to the mating C phase load connection.

225-4000 amp models

- 3.3.5 Route the wiring harness neutral wire to the A phase load connection, cut the wire to length, and install a 3/8 in. eyelet terminal (X-283-21).
- 3.3.6 Attach the neutral wire to the A phase load connection using the lug mounting bolt.
- 3.3.7 Route the wiring harness phase wire (208, 240, 480, or 600) to the C phase load connection, cut the wire to length, and install a 3/8 in. eyelet terminal (X-283-21).
- 3.3.8 Attach the phase wire (208, 240, 480, or 600) to the C phase load connection using the lug mounting bolt.

4. Configure the battery charger for the corresponding generator set engine electrical system

- 4.1 Determine the generator set engine electrical system configuration, either 12-volt or 24-volt. The generator set nameplate provides this information.
- 4.2 Configure the battery charger for the corresponding generator set engine electrical system.
 - 4.2.1 **Configure the battery charger for 12 volts** by attaching leads (SWJ-1004-1414) to battery charger terminals as shown in Figure 7. Place the jumper lead terminal between the two flat washers on the battery charger terminal. Do not final-tighten the battery charger terminal nuts at this time.

or

- 4.2.2 **Configure the battery charger for 24 volts** by attaching lead (SWJ-1004-1414) to battery charger terminals as shown in Figure 8. Place the jumper lead terminal between the two flat washers on the battery charger terminal. Do not final-tighten the battery charger terminal nuts at this time.

Note: The 24-volt configuration uses only one jumper lead. The remaining jumper lead is not used.

5. Connect the battery charger to the generator set engine starting batteries

The following information is intended for generator sets with a single starter motor. If the generator set has two starter motors, supply a set of cables from the battery charger to each battery bank (two sets of two cables).

Note: Route AC and DC wiring separately.

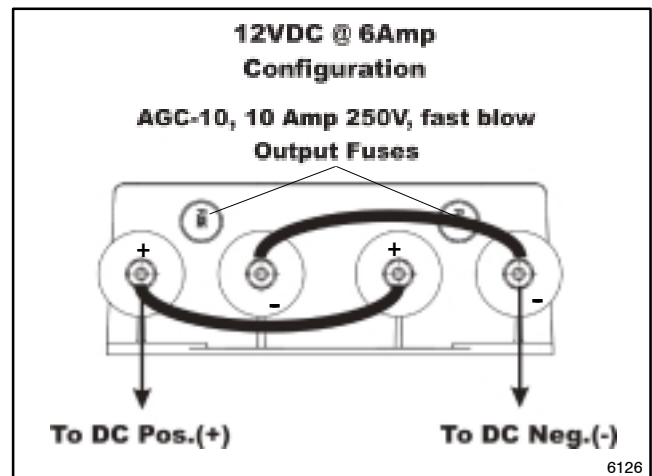


Figure 7 12-Volt Battery Charger Configuration

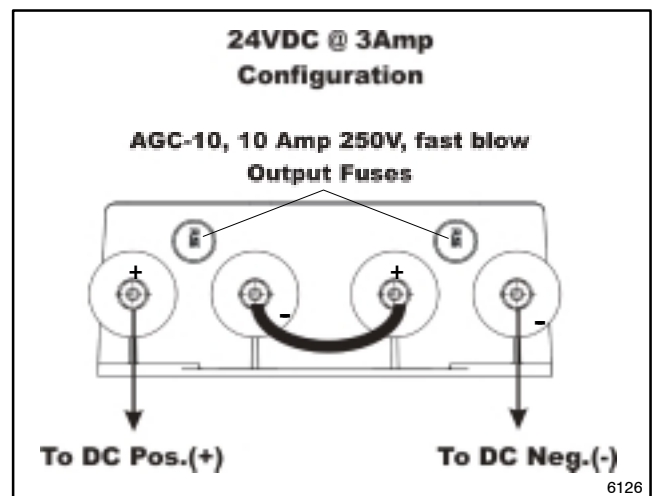


Figure 8 24-Volt Battery Charger Configuration

- 5.1 Determine the length of cable needed to connect the battery(ies) to the battery charger. Determine the wire gauge using Figure 9.

Note: The installing technician must supply the cable between battery charger and battery and the terminals for connection at the battery. Using red cable for battery positive (+) and black cable for battery negative (-) is highly recommended.

Maximum Length	Wire Size	Battery Charger Terminal Size	Eyelet Terminal Part No.
4.5 m (15 ft.)	12 AWG	No. 10	X-283-11
7.5 m (25 ft.)	10 AWG		

Figure 9 Battery Cable and Terminal Recommendations

- 5.2 Run the cables through electrical conduit as necessary to reach the generator set engine starting batteries. Comply with all applicable codes when installing a wiring system.
- 5.3 Insert the end of the red cable through the red terminal boot and attach a No. 10 eyelet terminal (X-283-11) to the cable end.
- 5.4 Insert the end of the black cable through the black terminal boot and attach a No. 10 eyelet terminal (X-283-11) to the cable end.
- 5.5 Attach the red and black cables to the battery charger terminals as shown in Figure 7 (12-volt electrical systems) or Figure 8 (24-volt electrical systems). Place the cable terminal between the two flat washers on the battery charger terminal.
- 5.6 Final-tighten all battery charger terminal nuts.
- 5.7 Slip the attached terminal boots over the two battery charger terminals.
- 5.8 Place the two loose terminal boots over the two remaining battery charger terminals. Be sure to match boot color with battery polarity.

- 5.9 Connect battery charger cables to the battery.

- 5.9.1 Connect appropriately sized *electrical terminals* (not supplied) to the cables and attach the terminals to the locations where the respective engine starting battery(ies) connect to the generator set. Typically, the red cable goes to the starter solenoid and the black cable goes to the engine block. See the generator set wiring diagram as needed.

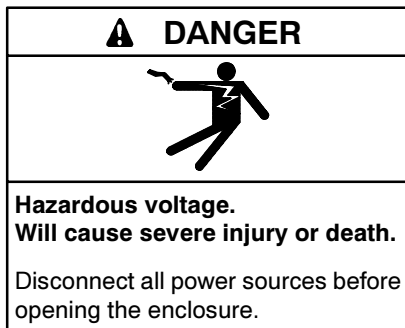
or

- 5.9.2 Attach color matched *alligator clips* (not supplied) to the cables and clip the cables to the engine starting batteries. Locate the alligator clips on the respective battery posts that connect to the generator set battery cables.

6. Restore the generator set and transfer switch to service

- 6.1 Close and secure the transfer switch enclosure.
- 6.2 Check that all generator set master switches are in the OFF position.
- 6.3 Reconnect all generator set engine starting batteries, negative (-) leads last.
- 6.4 Reconnect power to the battery charger, if equipped.
- 6.5 Reconnect all power sources to the transfer switches and power monitors.
- 6.6 Reconnect power to all devices in the system.
- 6.7 Place all generator set master switches to the AUTO position.

Battery Charger Disconnection



1. Before opening the transfer switch enclosure, disconnect power to the transfer switch by opening switches or circuit breakers to the transfer switch.
2. Disconnect the AC power cord at the inline connector. Refer to the respective transfer switch operation manual.
3. Remove the black negative (-) wire from the the battery terminal first.
4. Remove the red positive (+) wire from the battery terminal.

Battery Charger Operation

Red and green LEDs on the battery charger indicate the charge rate status. Refer to Figure 10 for a description of the LED indicator operation. Figure 11 and Figure 12 show the 3-stage battery charging modes for 12-volt and 24-volt electrical system configurations.

Battery Charger and Battery Maintenance

Perform battery charger and battery maintenance according to the following procedure.

1. Check battery terminals and battery charger connectors for clean contact surfaces. Clean battery terminals and battery charger connectors as necessary with a mild baking soda/water solution. If battery charger does not work, see the Troubleshooting section.
2. Check battery fluid level regularly; maintain battery fluid at the level specified by the battery manufacturer.

LED Indicators		Stage	Operating Condition
Red	Green		
On	Off	1	<p>The battery is discharged and the battery charger is recharging at the BULK rate. This battery charging rate is 6 amps (for 12-volt systems) or 3 amps (for 24-volt systems).</p> <p>The measured battery voltage with the battery charger on is 11.8–14 volts (12-volt) or 23.6–28 volts (24-volt).</p> <p>If the red LED stays on for more than 24 hours, refer to Problem 1 in the Troubleshooting section.</p>
On	On	2	<p>The battery charger is charging at the ABSORPTION rate of 1.5–5 amps. This battery charging mode gradually <i>tops off</i> the battery, and reduces harmful battery sulfating. While both LEDs are on, the battery voltage measured with the battery charger on is 14.0–14.5 volts (for 12-volt systems) or 28.0–29.0 (for 24-volt systems).</p> <p>If both LEDs stay on longer than 24 hours, refer to Problem 2 in the Troubleshooting section.</p>
Off	On	3	<p>The battery charger is charging at a FLOAT or MAINTENANCE rate of less than 1.5 amps. The battery is now 90% charged and ready for use. This float charging current will gradually decrease to as low as 0.1 amps as the battery reaches 100% charge. The float rate maintains the battery at full charge without overcharging.</p> <p>If the green LED stays on when the battery is known to be low, refer to Problem 3 in the Troubleshooting section.</p>

Figure 10 Battery Charger Operation

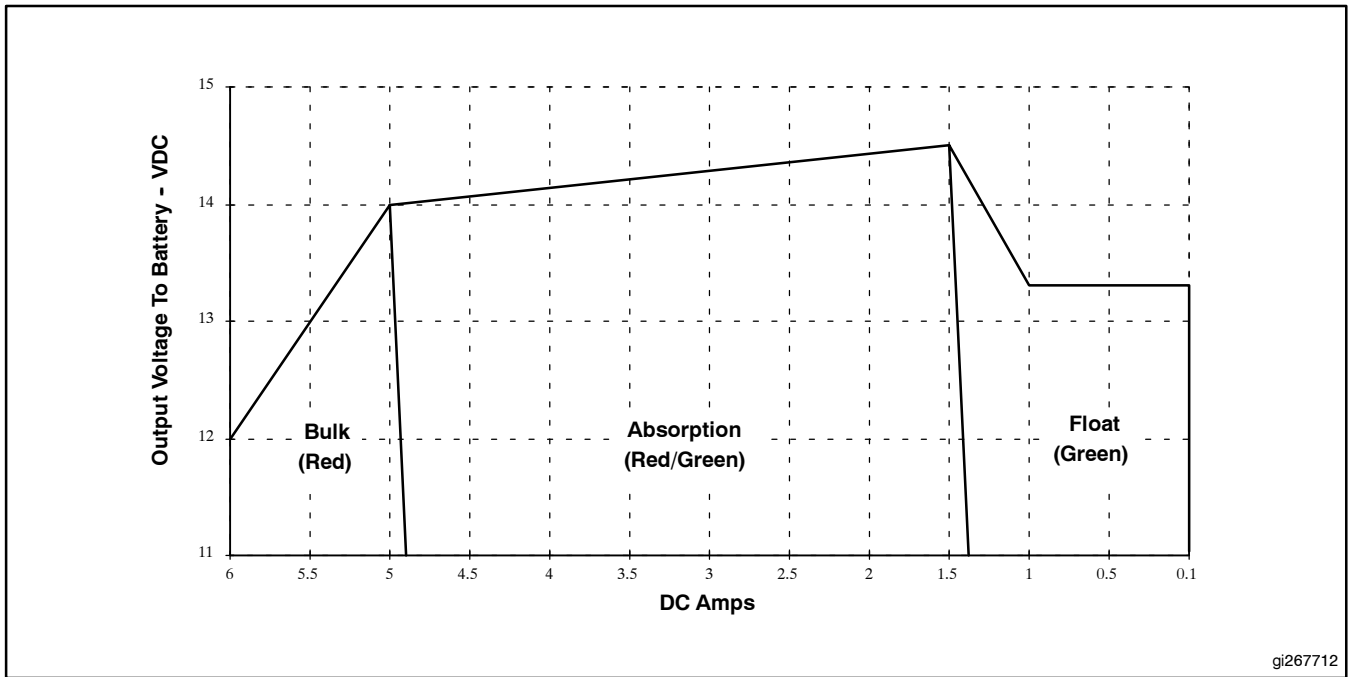


Figure 11 Charging Method, 12 VDC, 6 A Configuration

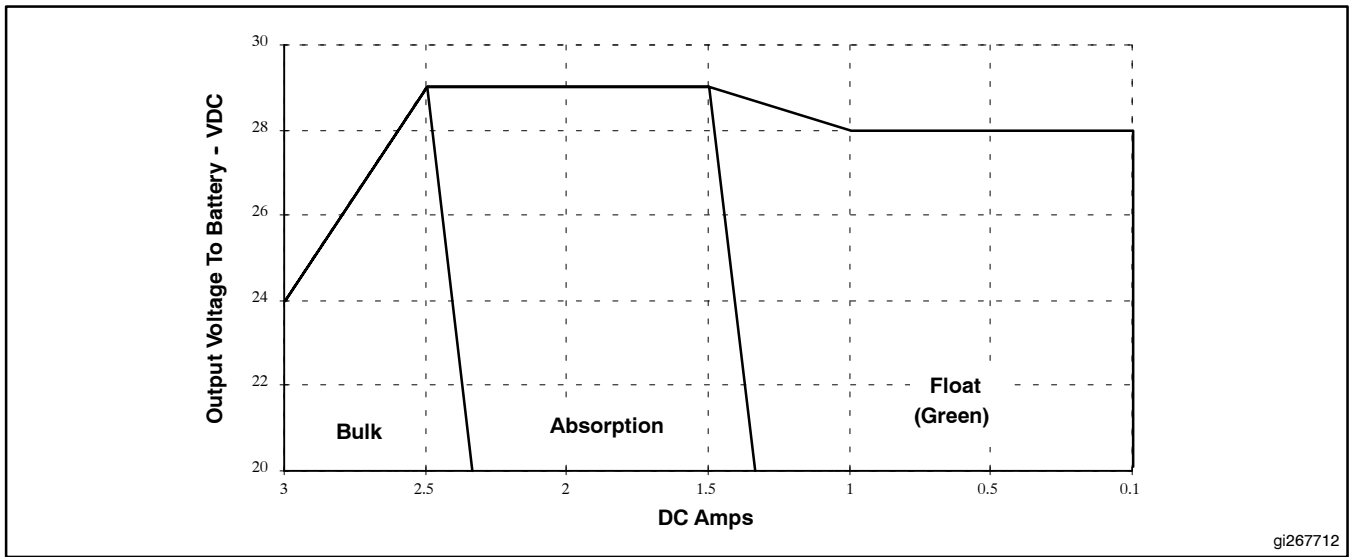


Figure 12 Charging Method, 24 VDC, 3 A Configuration

Troubleshooting

Problem	Cause	Solution
Red LED stays on for more than 24 hours	One or more defective or damaged cells.	Load test the battery and replace if necessary.
	The battery charger has reduced its output voltage below the normal level due to a DC overload or a DC short.	Remove the source of the overload or short. Disconnect the battery charger's black (negative) ring terminal from the battery. Reapply AC power and the green LED only should now light.
	The on-board DC systems are drawing more current than the battery charger can replace.	Turn off all DC equipment while charging.
The red and green LEDs stay on for more than 24 hours	The on-board DC systems are drawing between 1.5 and 5 amps.	Turn off all DC equipment while charging.
	One or more defective or damaged battery cells.	Load test the battery and replace if necessary.
	Extremely low AC voltage at the battery charger.	Apply a higher AC voltage source, reduce the length of the power cord, or increase the power cord wire size (gauge).
Green LED stays on when the battery is known to be low	The DC output fuse is blown.	Replace the DC output fuse (AGC-10).
	Faulty or contaminated terminal connections.	Clean and tighten or repair all terminal connections.
	One or more defective or damaged cells.	Load test the battery and replace if necessary.
Neither of the LEDs turn on when the AC power is applied	No AC power is available at the battery charger.	Connect AC power or reset the AC circuit breaker on the main panel.
	Component failure.	Return battery charger to an authorized distributor/dealer for repair.

Parts List

Battery Charger Kits

Kits: GM22498-KP1 to GM22498-KP4						
Qty.	Description	Common Parts	Unique Parts			
			GM22498-KP1	GM22498-KP2	GM22498-KP3	GM22498-KP4
1	Charger, battery	GM22502				
1	Harness, wiring		GM22530	GM22532	GM22531	GM22529
2	Lead, jumper	SWJ-1004-1414				
1	Terminal, 1/4 in. eyelet, 16-22 gauge	X-283-9				
2	Terminal, 3/16 in. push-on, 16-22 gauge	X-431-48				
2	Terminal, 3/8 in. eyelet, 16-22 gauge	X-283-21				
2	Terminal, #10 eyelet, 10-12 gauge	X-283-11				
1	Screw, 1/4-20 x 3/4 in. thread-forming	X-67-114				
4	Nut, 1/4-20	X-6210-2				
1	Lockwasher, 1/4 in. internal/external	X-22-12				

Kits: GM22498-KP5 to GM22498-KP8						
Qty.	Description	Common Parts	Unique Parts			
			GM22498-KP5	GM22498-KP6	GM22498-KP7	GM22498-KP8
1	Charger, battery	GM22502				
1	Harness, wiring		GM22530	GM22532	GM22531	GM22529
1	Panel, mounting	GM22398				
2	Lead, jumper	SWJ-1004-1414				
1	Terminal, 1/4 in. eyelet, 16-22 gauge	X-283-9				
2	Terminal, 3/16 in. push-on, 16-22 gauge	X-431-48				
2	Terminal, 3/8 in. eyelet, 16-22 gauge	X-283-21				
2	Terminal, #10 eyelet, 10-12 gauge	X-283-11				
5	Screw, 1/4-20 x 3/4 in. thread-forming	X-67-114				
4	Nut, 1/4-20	X-6210-2				
1	Lockwasher, 1/4 in. internal/external	X-22-12				

