

INSTALLATION INSTRUCTIONS

Original Issue Date: **8/01**
 Model: **8.5/11RMY**
 Market: **Residential/Commercial**
 Subject: **DC Carburetor Heater Kit GM21285-KP1**

Introduction

The carburetor heater prevents condensation and carburetor icing. The heater turns on when the temperature at the thermostat falls below approximately 4°C (40°F) and turns off when the temperature rises above approximately 16°C (60°F). The thermostat continuously senses temperature and controls the carburetor heater.

The engine heater obtains power from the generator set's 12 VDC electrical system and draws approximately 3 amps of current. Therefore, the kit requires the use of a battery charger with a minimum rating of 4 amps. The generator set manufacturer has tested and approved this carburetor heater kit for use with Kohler's battery charger GM11849. See Section 1 for information about using other battery chargers with this kit.

The carburetor heater operation is independent of generator set operation. The heater becomes very hot during operation and remains hot for a time after turning off. To prevent burns, disconnect the generator set

battery and battery charger before servicing the generator set, and avoid touching the installed heater when servicing parts near it, such as the generator set air cleaner, carburetor, or throttle linkage.

Follow the Installation Procedure to install the heater between the engine air cleaner and the carburetor and to install the thermostat and diode inside the generator set controller box. Read the entire 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.

The installation procedure requires the following items that are not supplied with the kit:

- 5/32 or 0.156 in. drill bit
- 7/64 or 0.109 in. drill bit
- RTV sealant
- Thread-locking adhesive
- Socket set
- Screwdrivers

Figure 1 shows the heater installed on the carburetor.

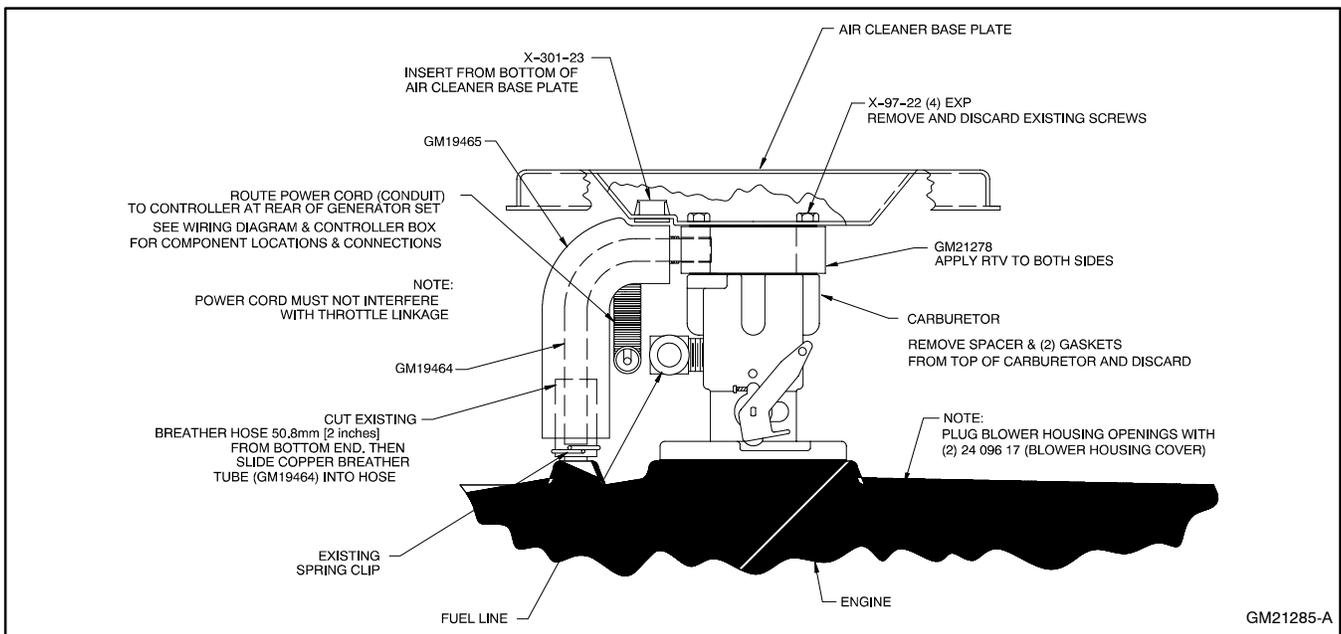


Figure 1 Heater Assembly

GM21285-A

Safety Precautions

Observe the following safety precautions while installing and operating the kit.

⚠ 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.

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.

⚠ WARNING



Airborne particles.
Can cause severe injury or blindness.

Wear protective goggles and clothing when using power tools, hand tools, or compressed air.

⚠ WARNING

Hot engine and exhaust system. Can cause severe injury or death.
Do not work on the generator set until it cools.

Servicing the engine heater. Hot parts can cause minor personal injury or property damage. Install the heater before connecting it to power. Operating the heater before installation can cause severe burns and component damage. Disconnect power to the heater and allow it to cool before servicing the heater or nearby parts.

NOTICE

Hardware damage. The engine and generator set may use both American Standard and metric hardware. Use the correct size tools to prevent rounding of the bolt heads and nuts.

1 Battery Chargers

The generator set manufacturer has tested and approved this carburetor heater kit for use with Kohler's battery charger part number GM11849. Read this section for information about using other battery chargers with this kit.

When the battery voltage is low, float/equalize battery chargers operate in equalize mode. The charger current is high and the charger output voltage is greater than 14 volts. As the battery charges, the current decreases and the charger enters float mode. The voltage drops below 14 VDC and the charger maintains the battery.

The heater in this kit can draw enough current to cause the battery charger to operate in equalize mode for extended periods of time. In equalize mode, the charger output voltage is more than 14 volts, which is high enough to damage the battery over time. This heater kit includes a diode in the circuit that reduces the voltage to

the battery when the heater is on. When the heater is off, the thermostat connects the charger directly to the battery to allow normal battery charging.

If your generator set is equipped with a battery charger other than the Kohler GM11849 charger, check the battery charger operation manual for the charger rating and the voltage output when supplying a 3-amp load. Compare the value to the table in Figure 2. If the battery charger is rated between 4 and 10 amps and the voltage output at 3 amps is greater than 14 VDC, use the diode in the circuit as shown in Figure 20 of the Installation Procedure. If the voltage is less than 14 VDC, do not use the diode. Connect the heater, thermostat, and charger as shown in Figure 21.

Note: Do not use battery chargers with a rating of less than 4 amps with the heater kit. For chargers with ratings greater than 10 amps, see Figure 2.

Battery Charger Current Rating	Voltage Output @ 3 amps	Connection Configuration
4-10 amps	Less than 14 VDC	Figure 21, without diode
	14 VDC or more	Figure 20, with diode
More than 10 amps	Less than 14 VDC	Figure 21, without diode
	14 VDC or more	None. Do not use the charger.

Figure 2 Battery Charger Summary

2 Installation Procedure

2.1 Remove the generator set from service.

1. Remove the enclosure door.
2. Place the generator set master switch in the OFF position.
3. Disconnect the power to the battery charger.

2.2 Remove the generator set enclosure and disconnect the battery. See Figure 3.

1. Remove the screws securing the enclosure roof. Remove the roof.
2. For weather housings:
 - a. Remove the screws securing the back panel and remove the panel.
 - b. Remove the screws securing the side panel near the battery compartment and remove the panel.
3. For sound shield enclosures:
 - a. Remove the remaining screws securing the enclosure side panel on the air intake end (near the controller) and remove the panel.
 - b. Remove 2 screws from inside the air intake (near the battery). See Figure 3.
 - c. Remove the screws from around the bottom perimeter of the enclosure. Carefully lift the enclosure off the generator set.
4. Disconnect the generator set engine starting battery, negative (-) lead first.

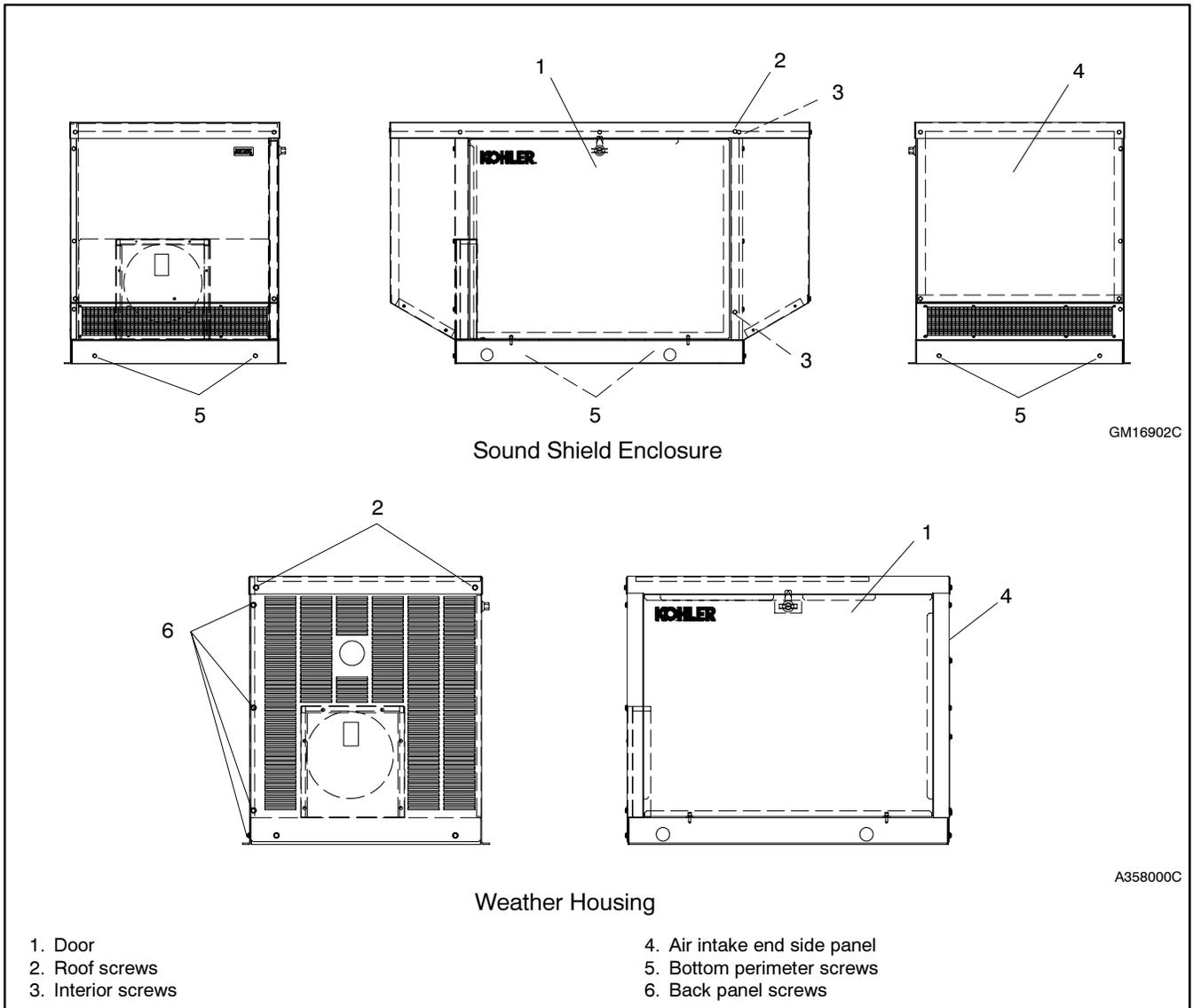


Figure 3 Generator Set Enclosures

2.3 Remove the engine air cleaner assembly. See Figure 4.

1. Loosen the air cleaner cover retaining knob and remove the cover.
2. Remove the wing nut and the element cover.
3. Remove the air cleaner element and foam precleaner.
4. Remove the four screws that attach the air cleaner bracket and base to the carburetor assembly. Remove the bracket and base.

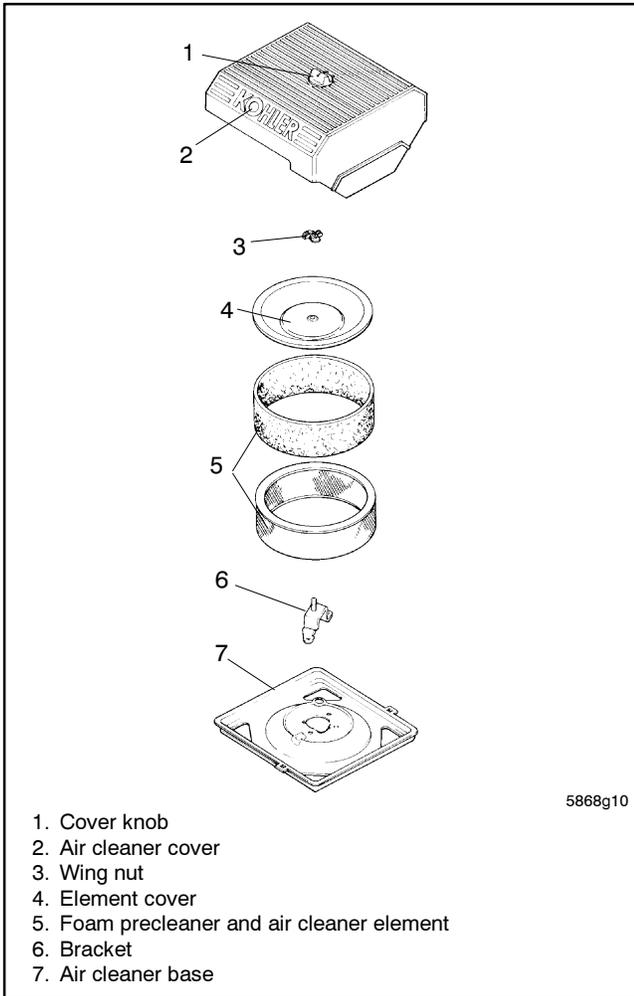


Figure 4 Air Cleaner Components

2.4 Prepare to install the heater.

1. Remove and discard the air cleaner spacer and two gaskets. See Figure 5.
2. Remove the rubber crankcase breather hose. Save the hose and clamp to reuse later. See Figure 5.

3. Apply a bead of RTV sealant just below the top flanges of the two blower housing covers, 24 096 17. Install the covers on the blower housing openings. See Figure 6.

Note: If you plan to operate the unit at or near full load during the summer and expect the ambient temperatures to exceed 38°C (100°F), remove the blower housing covers in the spring. Reinstall the covers in cold weather.

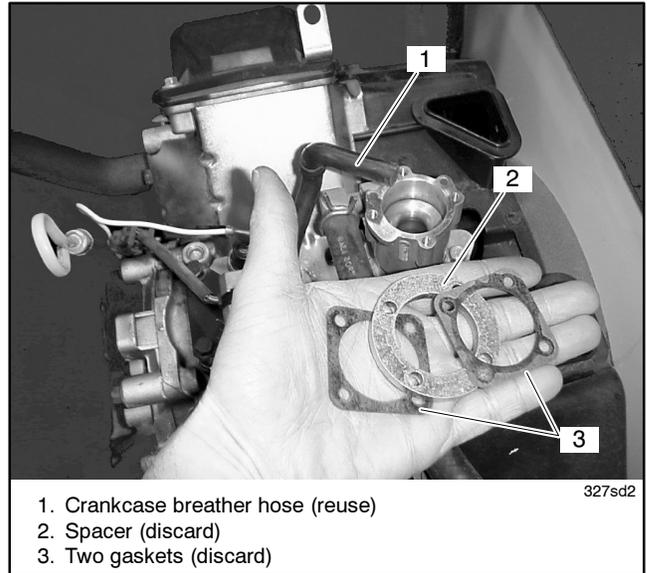


Figure 5 Air Cleaner Spacer, Gaskets, and Crankcase Breather Hose



Figure 6 Blower Housing Openings

2.5 Assemble the heater parts.

1. Apply RTV sealant to the outside of one end of the copper breather tube, GM19464 (included in the kit). Insert the tube into the drilled hole in the heater, GM21278, as shown in Figure 7. Press the breather tube approximately 10 mm (0.4 in.) into the heater plate so that the end of the tube is flush with the inside diameter but does not extend into the large opening of the heater.
2. Place the heater on the carburetor without a gasket and adjust the angle of the breather tube to line up with the breather nipple on the engine crankcase. See Figure 8.
3. Install the insulation, GM19465, over the breather tube. See Figure 9.
4. Cut off the rubber breather hose 50 mm (2 in.) from the engine end. See Figure 10.

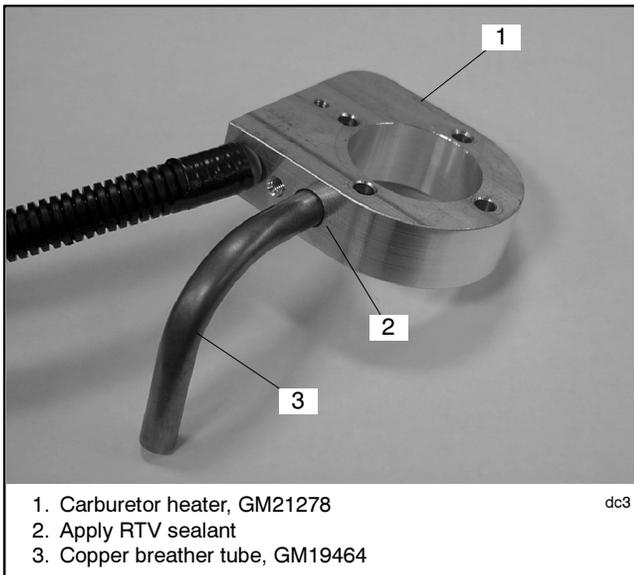


Figure 7 Heater with Copper Breather Tube

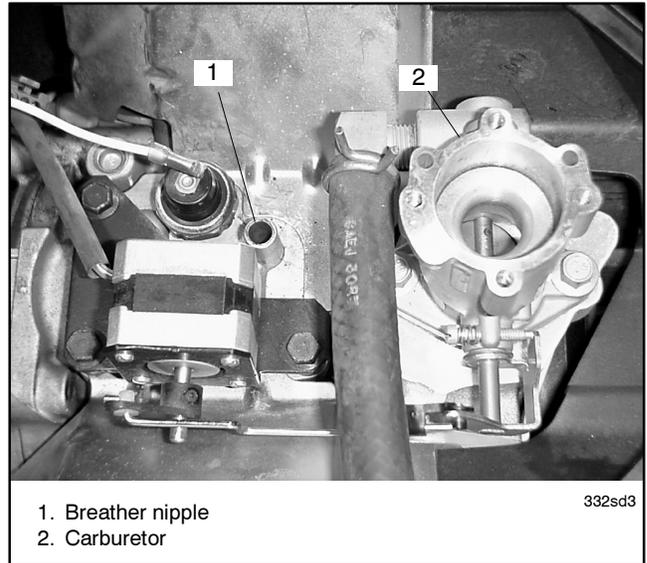


Figure 8 Engine Crankcase Breather Nipple

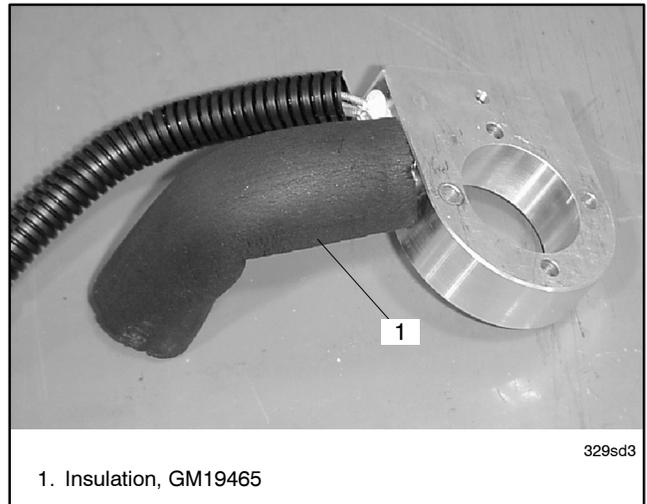


Figure 9 Breather Tube Insulation

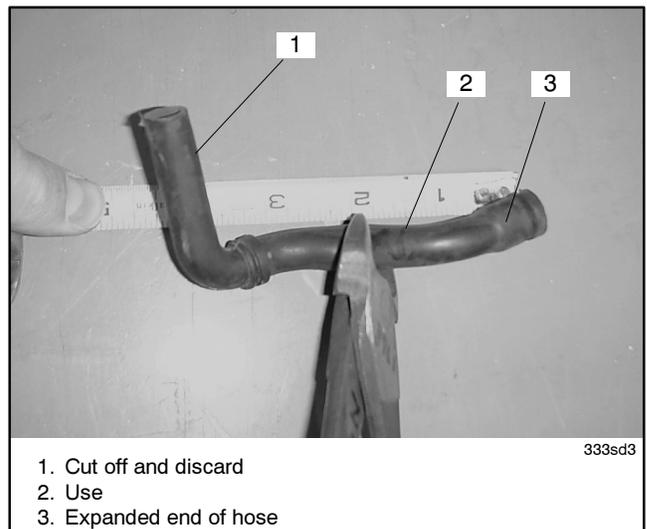


Figure 10 Cutting Off the Rubber Breather Hose

2.6 Install the heater.

1. Apply a thin layer of RTV sealant to both sealing surfaces of the heater. See Figure 11.
2. Slide the clamp removed in step 2 onto the 2-inch section of hose.
3. Slip the 50-mm (2-in.) length of breather hose onto the end of the breather tube. Insert the breather tube into the small end of the hose until the end of the breather tube reaches the expanded diameter of the hose. See Figure 12.
4. Place the heater on the carburetor as shown in Figure 13. Do not use a gasket. Route the power cord toward the back of the generator set.
5. Use the clamp removed in step 2 to attach the breather tube to the breather nipple on the engine crankcase. See Figure 14.

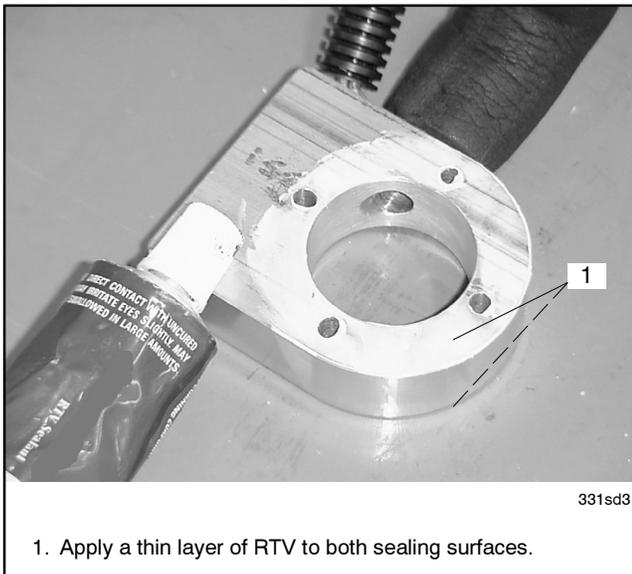


Figure 11 RTV Sealant

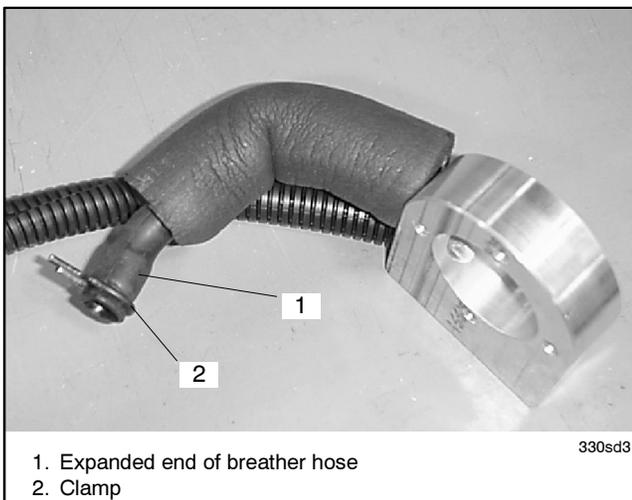


Figure 12 Breather Hose and Clamp

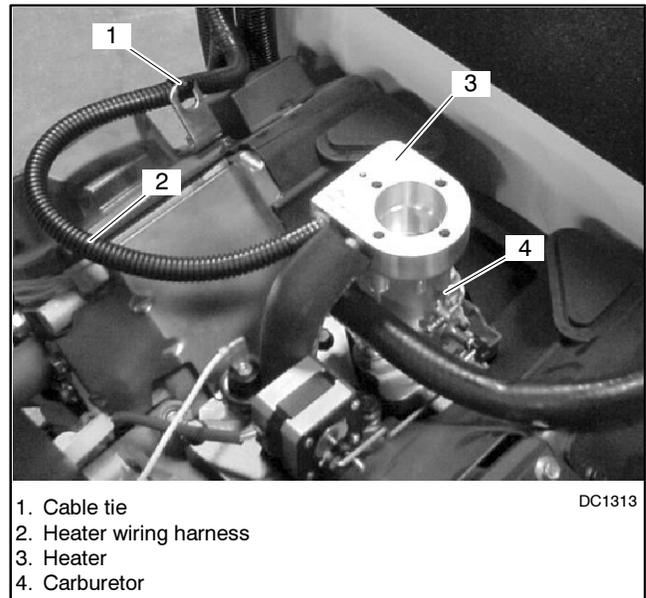


Figure 13 Heater Location

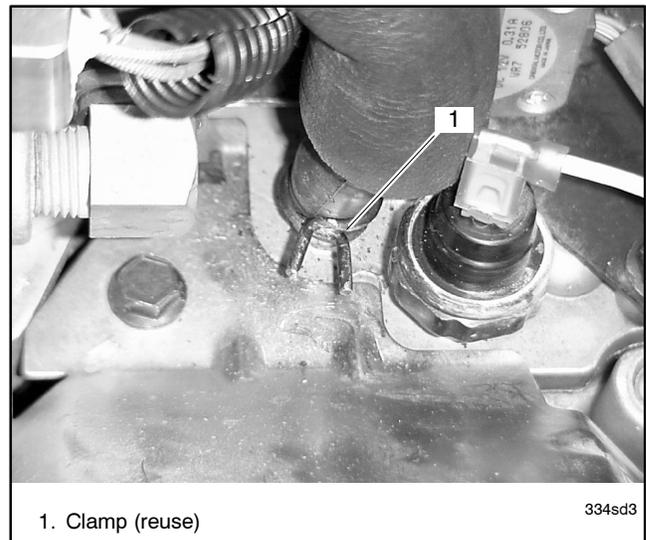


Figure 14 Breather Hose Clamp

2.7 Reinstall the air cleaner and attach the Caution decal.

1. Plug the breather access hole in the air cleaner base plate with plug X-301-23. Insert the plug from the bottom of the base plate. See Figure 1 and Figure 15.
2. Place the air cleaner base on the heater and align the screw holes in the base, the heater, and the carburetor.

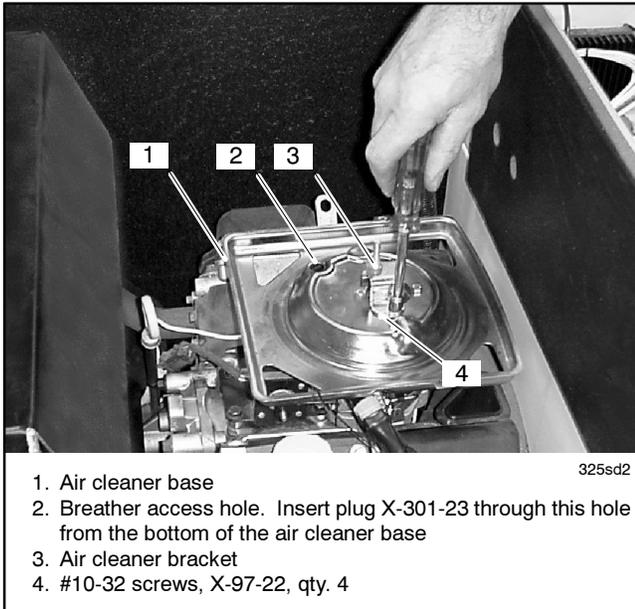


Figure 15 Air Cleaner Bracket and Screws

3. Place the air cleaner bracket on the air cleaner base. Apply a thread-locking adhesive such as Loctite® 222, 243, or equivalent to the threads of the four #10-32 x 1 1/4 in. screws, X-97-22, provided with the kit. Insert the screws through the air cleaner base, bracket, and heater and into the threaded holes in the carburetor. See Figure 15.
4. Reinstall the air cleaner element and covers. See Figure 4.
5. Attach the decal, GM22387, near the air cleaner as shown in Figure 16.

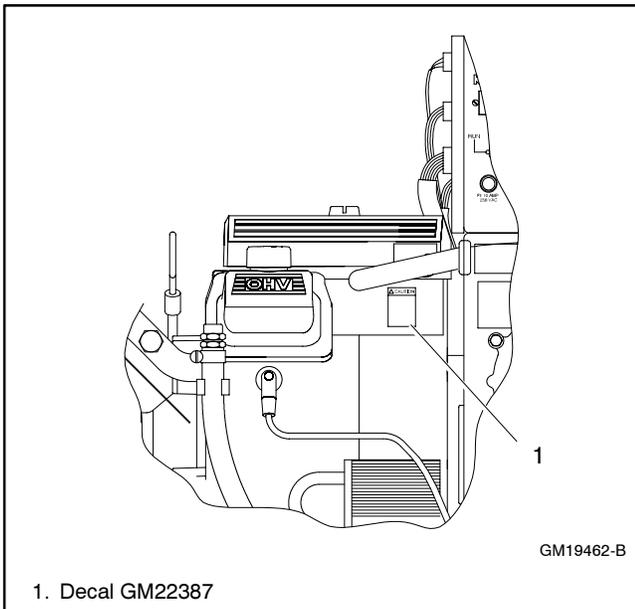


Figure 16 Caution Decal Location

Loctite® is a registered trademark of the Loctite Corporation.

2.8 Install the thermostat and diode (if required; see Section 1).

1. Route the heater wiring harness toward the back of the engine. Bring the thermostat and diode leads through the controller box opening in the lower corner as shown in Figure 17.
2. Mark and drill one 3.96 mm (0.156 in.) hole for the diode (if required) and two 2.78 mm (0.109 in.) holes in the bottom of the controller box at the locations shown in Figure 18. Use a dry brush or a vacuum cleaner to remove metal chips and dust from inside the controller box after drilling.

Note: The hole locations shown in Figure 18 are recommendations. Adjust the thermostat and diode locations inside the control housing to avoid interference with accessory leads connected to the terminal strip, if necessary. Verify that the heater leads are long enough to reach the thermostat and diode before drilling the holes.

3. Mount the diode, GM21283 (if required), using one #6-32 screw X-49-6, washer X-25-48, and nut X-6210-3. See Figure 18.
4. Mount the thermostat using two #8-18 self-tapping screws, X-794-2, through the two 2.78 mm (0.109 in.) holes. See Figure 18.

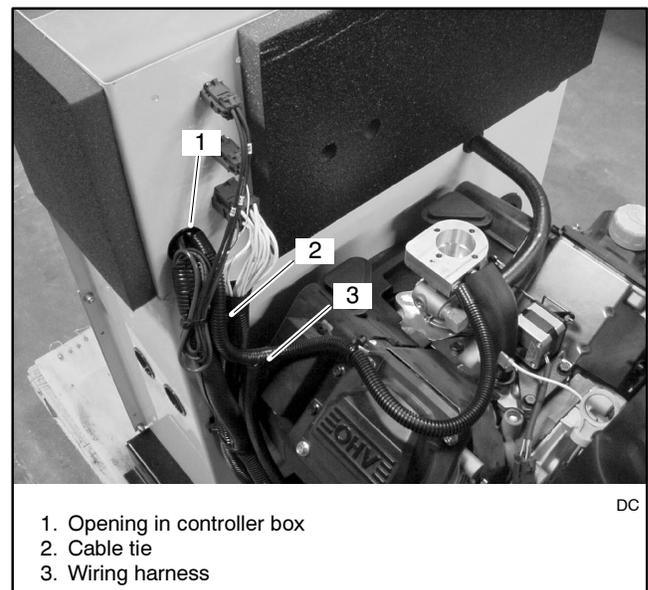


Figure 17 Routing the Wiring Harness

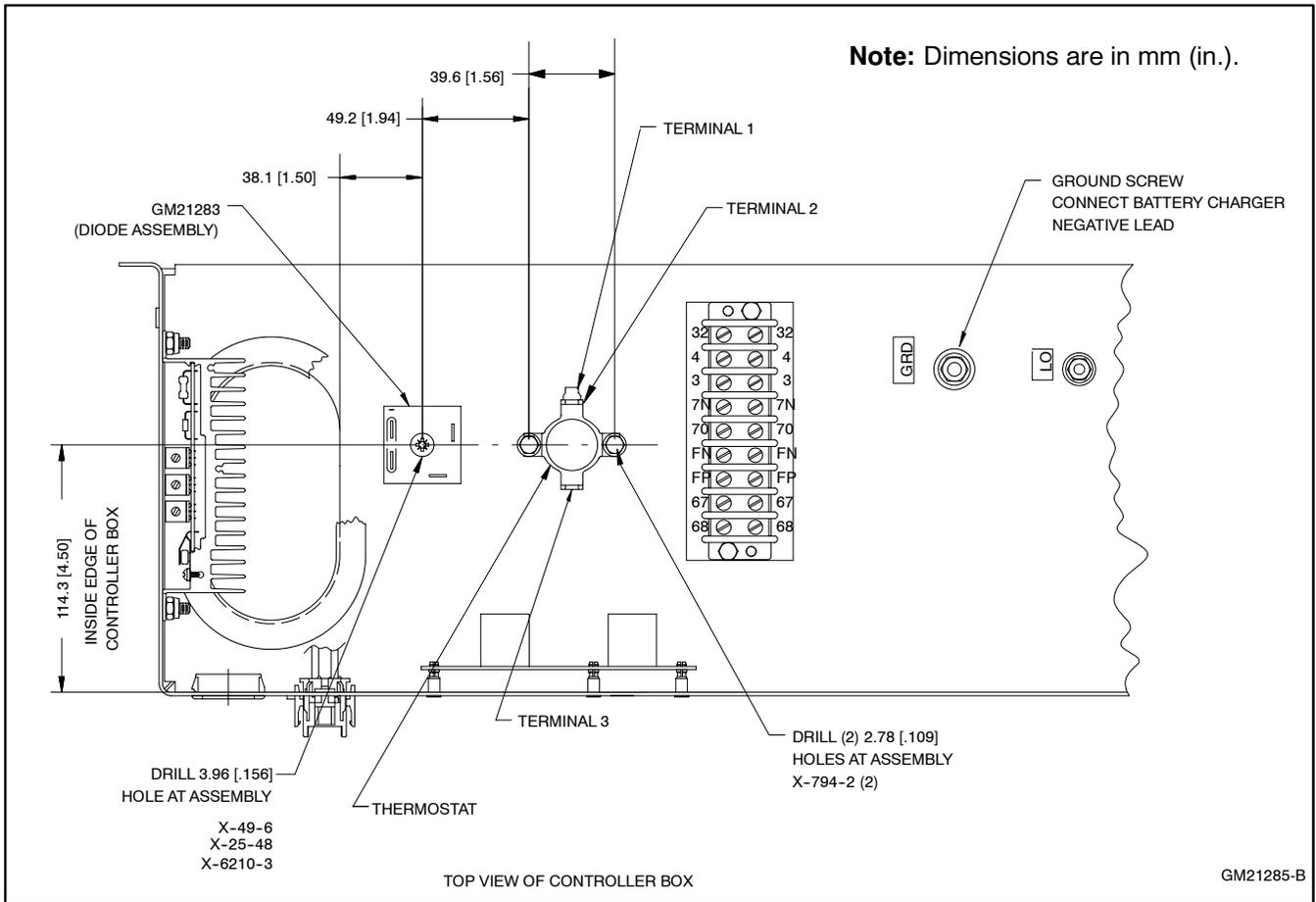


Figure 18 Recommended Thermostat and Diode Mounting Locations Inside the Controller Box

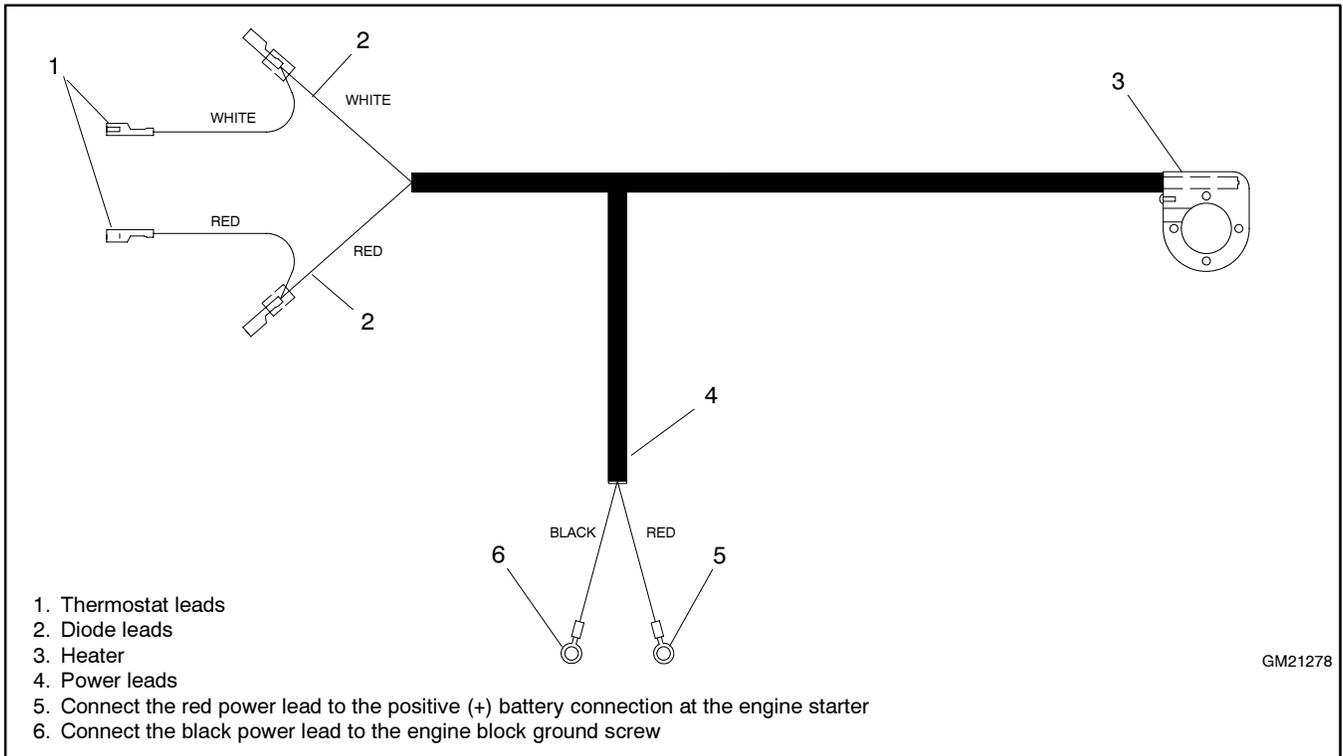


Figure 19 Heater with Wiring Harness

2.9 For the Kohler charger GM11849 or other chargers that require using the diode in the circuit (see Section 1), use this section. If the diode is not required, go to step 2.10.

1. See Figure 19 to identify the wiring harness leads for the thermostat, heater, and power connections.
2. Connect the thermostat and diode leads.
 - a. Connect the white lead to thermostat terminal 3 and the red lead to thermostat terminal 2. See Figure 20.
 - b. Connect the second connector on the white lead to the diode's AC (-) terminal and the second connector on the red lead to the diode's positive (+) terminal. See Figure 20.

Note: Do not use the diode terminals that are covered with shrink tube.

3. Verify that the power to the generator set battery charger is disconnected. Connect the battery charger leads.
 - a. Connect the positive (+) lead from the battery charger to thermostat terminal 1 (inside the control box) using the crimp-on connector, X-431-30, supplied with the heater kit.
 - b. Connect the negative (-) lead from the battery charger to the ground screw inside the controller box. See Figure 20.
4. Proceed to step 2.11.

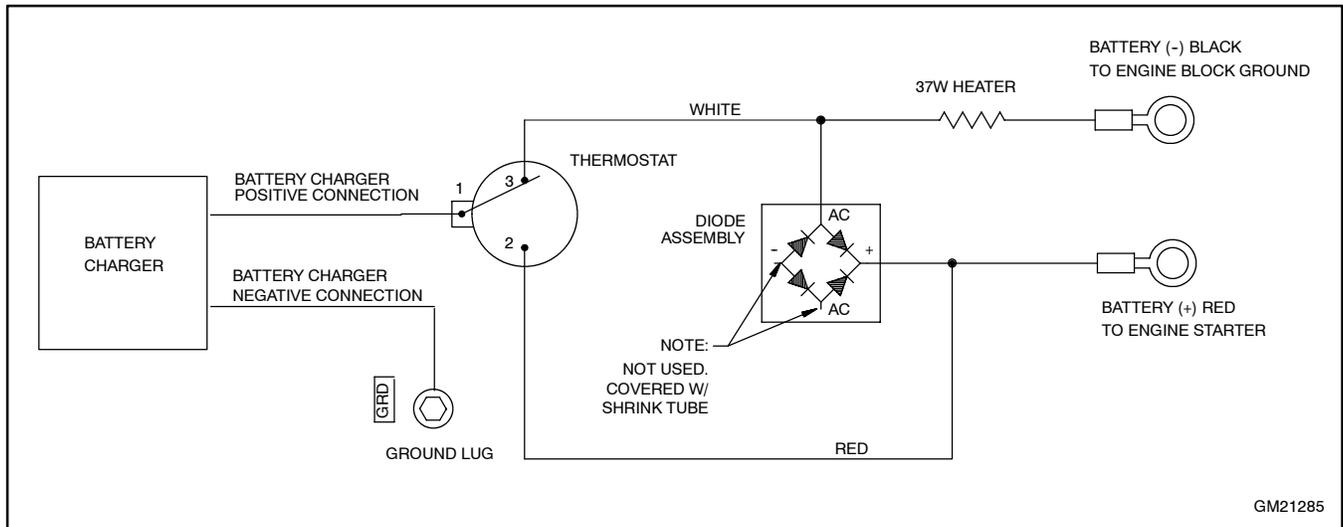


Figure 20 Connection Configuration with the Diode (Use this configuration for Kohler's battery charger GM11849 and for chargers rated 4-10 amps that produce 14 VDC or more at 3 amps.)

2.10 If the diode is not required in the heater circuit, use this section.

1. See Figure 19 to identify the wiring harness leads for the thermostat, heater, and power connections.
2. Connect the thermostat leads. See Figure 21.
 - a. Connect the white lead to thermostat terminal 3.
 - b. Remove the red wire from terminal 2 on the thermostat and connect it to terminal 1. See Figure 21.
3. Verify that the power to the generator set battery charger is disconnected. Connect the battery charger leads.
 - a. Connect the positive (+) lead from the battery charger to the engine starter positive battery connection. See Figure 21 and Figure 22.
 - b. Connect the negative (-) lead from the battery charger to the engine block ground screw. See Figure 21 and Figure 22.
4. Proceed to step 2.11.

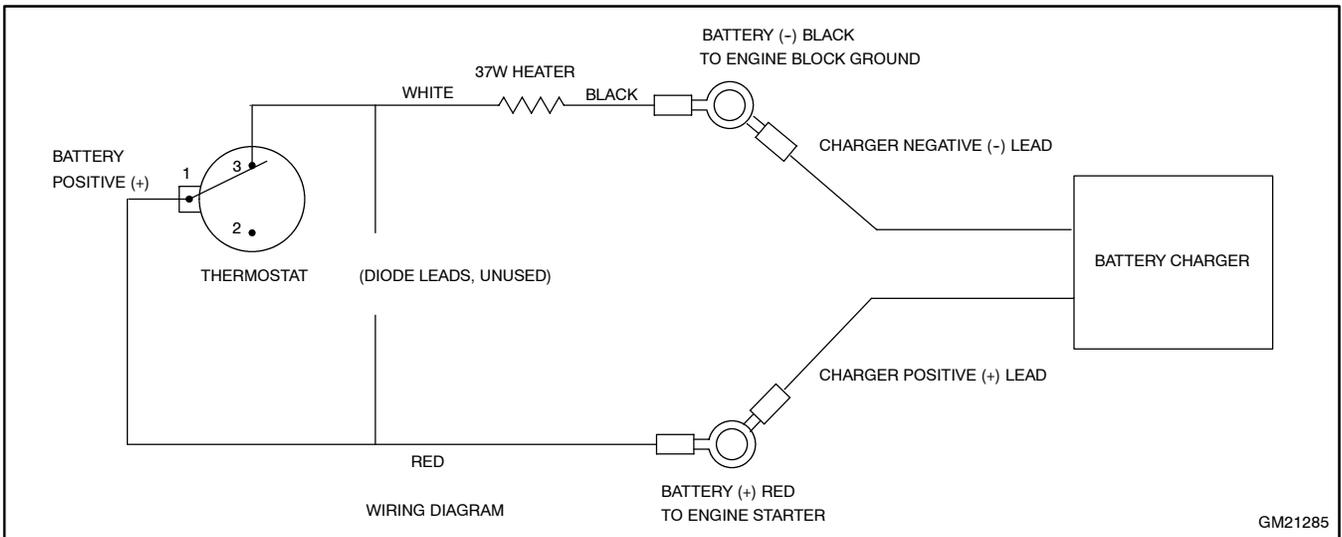


Figure 21 Connection Configuration without the Diode (Use this configuration for chargers rated 4 amps or more that produce less than 14 VDC at 3 amps.)

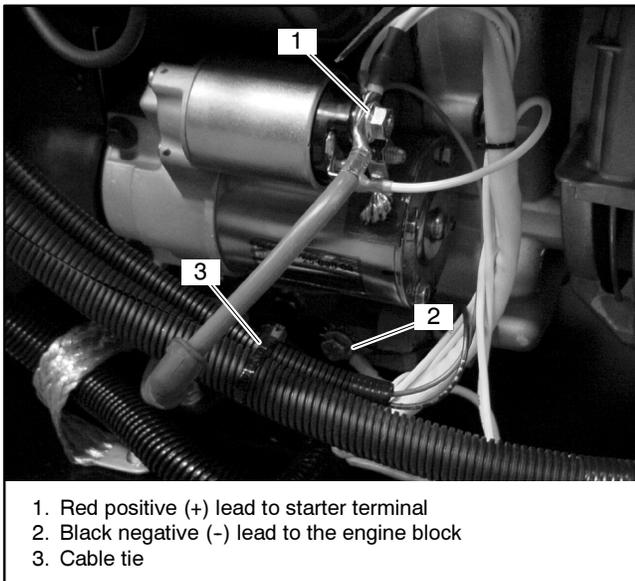


Figure 22 Connecting the Heater Power Leads

2.11 Connect the heater power leads.

Note: See Figure 19 to identify the heater power leads. The power leads have ring terminals on the ends.

1. Verify that the generator set battery is disconnected.
2. Connect the red (positive) lead to the engine starter positive battery connection. See Figure 22.
3. Connect the black (negative) lead to the engine block ground screw. See Figure 22.
4. Secure the wiring harness with cable ties as shown in Figure 22.

2.12 Restore the generator set to service.

1. Check that the generator set master switch is in the OFF position.
2. Reconnect the generator set engine starting battery, negative (-) lead last.
3. Reconnect power to the battery charger.
4. Reverse the steps in 2.2 to reinstall the generator set enclosure.
5. Reinstall the enclosure door.
6. Give this instruction sheet to the generator set owner for parts reference and information.

3 Parts List

Heater Kit, DC

Kit: GM21285-KP1		
Qty.	Description	Part Number
2	Cable tie	X-468-1
2	Cover, blower housing	24 096 17
1	Decal, Caution Hot Carburetor Heater	GM22387
1	Diode, assembly	GM21283
1	Heater, plate 37W, 12V DC w/diode	GM21278
1	Installation instructions	TT-1313
1	Insulation, breather line	GM19465
1	Nut, flange whiz, 6-32	X-6210-3
1	Plug, button	X-301-23
1	Screw, cross recess pan head mach	X-49-6
4	Screw, hex head	X-97-22
2	Screw, hex washer head, drill	X-794-2
1	Terminal, fast-on, female, 14-16 AWG	X-431-30
1	Tube, breather (.375"OD) copper	GM19464
1	Washer, plain, .188 ID x .438 in.OD	X-25-48