

Instruction Sheet

A046M778 (Issue 2)

8-2016

Installation Instructions for Battery Heater Kits A046G494 and A054X752

1 Introduction

Read these instructions completely and become familiar with safety warnings, cautions and procedures before starting the installation.

The information contained within is based on information available at the time of going to print. In line with Cummins Power Generation policy of continuous development and improvement, information may change at any time without notice. The users should therefore make sure that before commencing any work, they have the latest information available.

The latest version of this instruction sheet is available on QuickServe Online (<https://qsol.cummins.com/info/index.html>).

2 Safety Precautions

2.1 General Safety Precautions

WARNING

Hot Pressurized Liquid

Contact with hot liquid can cause severe burns.

Do not open the pressure cap while the engine is running. Let the engine cool down before removing the cap. Turn the cap slowly and do not open it fully until the pressure has been relieved.

WARNING

Moving Parts

Moving parts can cause severe personal injury.

Use extreme caution around moving parts. All guards must be properly fastened to prevent unintended contact.

WARNING

Toxic Hazard

Used engine oils have been identified by some state and federal agencies to cause cancer or reproductive toxicity.

Do not ingest, breathe the fumes, or contact used oil when checking or changing engine oil. Wear protective gloves and face guard.

⚠ WARNING

Toxic Hazard

Ethylene glycol, used as an engine coolant, is toxic to humans and animals.

Wear appropriate PPE. Clean up coolant spills and dispose of used coolant in accordance with local environmental regulations.

⚠ WARNING

Toxic Gases

Substances in exhaust gases have been identified by some state and federal agencies to cause cancer or reproductive toxicity.

Do not breathe in or come into contact with exhaust gases.

⚠ WARNING

Combustible Liquid

Ignition of combustible liquids is a fire or explosion hazard which can cause severe burns or death.

Do not store fuel, cleaners, oil, etc., near the generator set.

⚠ WARNING

High Noise Level

Generator sets in operation emit noise, which can cause hearing damage.

Wear appropriate ear protection at all times.

⚠ WARNING

Hot Surfaces

Contact with hot surfaces can cause severe burns.

Wear appropriate PPE when working on hot equipment and avoid contact with hot surfaces.

⚠ WARNING

Combustible Gases

Ignition of battery gases is a fire and explosion hazard which can cause severe personal injury or death.

Do not smoke, or switch the trouble light ON or OFF, near a battery. Touch a grounded metal surface first before touching batteries to discharge static electricity. Ventilate the battery area before working on or near the battery. Wear protective clothing and goggles. Stop the generator set and disconnect the battery charger before disconnecting battery cables. Using an insulated wrench, disconnect the negative (-) cable first and reconnect it last.

⚠ WARNING

Electrical Generating Equipment

Incorrect operation and maintenance can result in severe personal injury or death

Make sure that only suitably trained and experienced service personnel perform electrical and/or mechanical service.

⚠ WARNING

Electrical Generating Equipment

Incorrect operation can cause severe personal injury or death.

Do not operate equipment when fatigued, or after consuming any alcohol or drug.

⚠ WARNING

High Voltage

High voltages can cause electrical shock, resulting in severe personal injury or death. Voltages of up to 600 VAC are present inside the control box. The control box must be opened only by technically qualified personnel. Even with power removed, improper handling of components can cause electrostatic discharge and damage to circuit components.

Turn off or remove AC power from the battery charger and then remove the negative (-) battery cable from the set starting battery. This is to make sure the set will not start while working on it and to avoid circuit board damage, caused by voltage spikes when removing and replacing circuit board connectors.

⚠ WARNING

Automated Machinery

Accidental or remote starting of the generator set can cause severe personal injury or death.

Isolate all auxiliary supplies and use an insulated wrench to disconnect the starting battery cables (negative [-] first).

⚠ WARNING

Fire Hazard

Materials drawn into the generator set are a fire hazard. Fire can cause severe burns or death.

Keep the generator set and the surrounding area clean and free from obstructions.

⚠ WARNING

Fire Hazard

Materials drawn into the generator set are a fire hazard. Fire can cause severe burns or death.

Make sure the generator set is mounted in a manner to prevent combustible materials from accumulating under the unit.

⚠ WARNING

Incorrect Maintenance

Incorrect service or replacement of parts can result in severe personal injury or death, and/or equipment damage.

Service personnel must be trained and experienced to perform electrical and mechanical service.

⚠ CAUTION

High Voltage

Disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits of the generator set.

Always disconnect a battery charger from its AC source before disconnecting the battery cables.

⚠ WARNING

Fire Hazard

Accumulated grease and oil are a fire hazard. Fire can cause severe burns or death.

Keep the generator set and the surrounding area clean and free from obstructions. Repair oil leaks promptly.

⚠ WARNING

Combustible Gases

Ignition of battery gases is a fire and explosion hazard which can cause severe personal injury or death.

Make certain the battery area has been well-ventilated before servicing the battery. Arcing can ignite explosive hydrogen gas given off by batteries, causing severe personal injury. Arcing can occur when a battery cable are removed or reattached, or when the negative (-) battery cable is connected and a tool used to connect or disconnect the positive (+) battery cable touches the frame or other grounded metal part of the generator set. Always remove the negative (-) cable first, and reconnect it last. Make certain hydrogen from the battery, engine fuel, and other explosive fumes are fully dissipated. This is especially important if the battery has been connected to a battery charger.

NOTICE

Keep multi-class ABC fire extinguishers handy. Class A fires involve ordinary combustible materials such as wood and cloth. Class B fires involve combustible and flammable liquid fuels and gaseous fuels. Class C fires involve live electrical equipment. (Refer to NFPA No. 10 in applicable region.)

NOTICE

Before performing maintenance and service procedures on enclosed generator sets, make sure the service access doors are secured open.

NOTICE

Stepping on the generator set can cause parts to bend or break, leading to electrical shorts, or to fuel, coolant, or exhaust leaks. Do not step on the generator set when entering or leaving the generator set room.

2.2 Generator Set Safety Code

Before operating the generator set, read the manuals and become familiar with them and the equipment. Safe and efficient operation can be achieved only if the equipment is properly operated and maintained. Many accidents are caused by failure to follow fundamental rules and precautions.

⚠ WARNING

Electrical Generating Equipment

Incorrect operation and maintenance can result in severe personal injury or death.

Read and follow all Safety Precautions, Warnings, and Cautions throughout this manual and the documentation supplied with the generator set.

2.3 Electrical Shocks and Arc Flashes Can Cause Severe Personal Injury or Death

⚠ WARNING

Electric Shock Hazard

Voltages and currents present an electrical shock hazard that can cause severe burns or death. Contact with exposed energized circuits with potentials of 50 Volts AC or 75 Volts DC or higher can cause electrical shock and electrical arc flash. Refer to standard NFPA 70E or equivalent safety standards in corresponding regions for details of the dangers involved and for the safety requirements.

Guidelines to follow when working on de-energized electrical systems:

- Use proper PPE. Do not wear jewelry and make sure that any conductive items are removed from pockets as these items can fall into equipment and the resulting short circuit can cause shock or burning. Refer to standard NFPA 70E for PPE standards.
- De-energize and lockout/tagout electrical systems prior to working on them. Lockout/Tagout is intended to prevent injury due to unexpected start-up of equipment or the release of stored energy.
- De-energize and lockout/tagout all circuits and devices before removing any protective shields or making any measurements on electrical equipment.
- Follow all applicable regional electrical and safety codes.

In summary:

- Do not tamper with or bypass interlocks unless you are authorized to do so.
- Understand and assess the risks - use proper PPE.
- Make sure that an accompanying person who can undertake a rescue is nearby.

3 Instruction

3.1 Installation of Battery Heater Kit

These instructions give the procedure for installing the battery heater kit. The generator set models are shown below:

Kit Number	Type	Models
A046G494	Generator sets with a single battery and plastic control box	C20 N6, C22 N6, C25 N6, C30 N6, C36 N6, C40 N6, C30 N6H, C36 N6H, C40 N6H, C45 N6H, C50 N6H, C60 N6H, C10 D6, C15 D6, C20 D6, C25 D6, C30 D6, C35 D6, C40 D6, C50 D6, and C60 D6
A054X752	Generator sets with single/dual batteries and sheet metal control box	C50D6C, C60D6C, C80D6C, C100D6C, and C125D6C

Because the installation presents a severe shock hazard, this kit must be installed by trained and experienced personnel only.

Read these instructions completely and become familiar with safety warnings, cautions and procedures before starting the installation.

NOTICE

On some generator set controls, the exercise settings will need to be reset whenever the starting battery is disconnected.

NOTICE

The battery heater can only be installed in the accessory's steel battery tray.

1. Make sure the generator set is shut down and disabled.
 - a. Press the generator set's PCC "O" (Off) button on the local display to stop the generator set. Allow the generator set to thoroughly cool to the touch.
 - b. If applicable, turn off and disconnect the battery charger from the AC source before disconnecting the battery cables.
 - c. Disconnect the negative (-) cable from the battery and secure it from contacting the battery terminals to prevent accidental starting.
2. Remove the enclosure service panel (for enclosed sets) to reach for battery, and other panels needed to access the rear and interior of the terminal box.
3. Loosen the battery hold down strap.
4. Remove the battery from the battery tray.
5. Place the battery heater on the battery tray with the thermostat facing down as shown below. The cord for the heater should exit the battery tray through the grommet shown in [Figure 2](#).

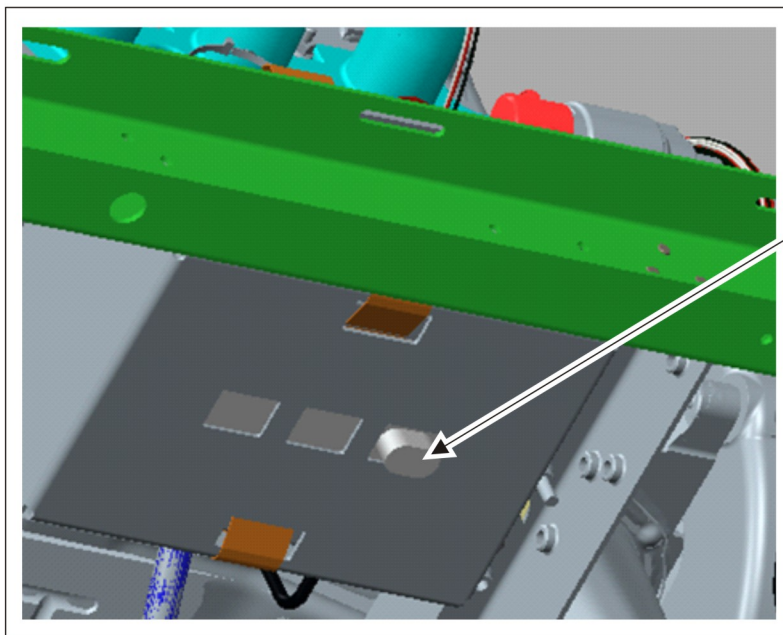
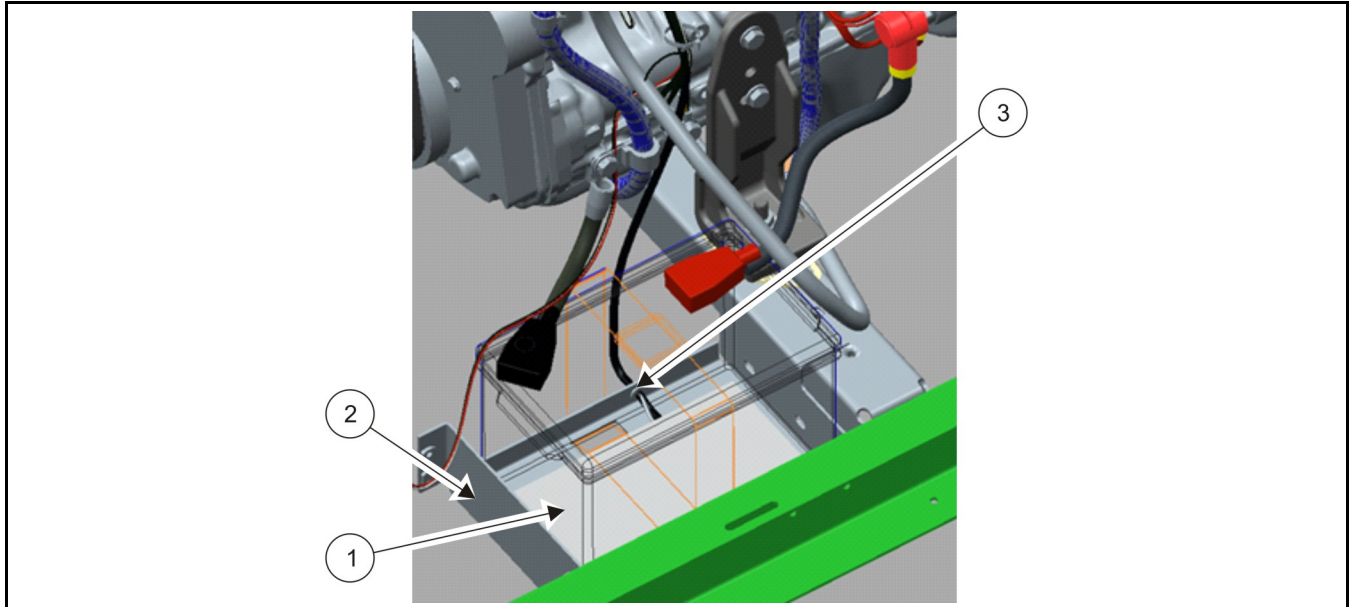


FIGURE 1. EXAMPLE OF VIEW FROM BOTTOM OF BATTERY TRAY (SHOWING THERMOSTAT)



No.	Description	No.	Description
1	Battery Heater	3	Grommet
2	Battery Tray		

FIGURE 2. EXAMPLE OF BATTERY HEATER MOUNTED IN BATTERY TRAY

6. Place the battery over the heater and secure the battery with the battery hold down strap. Secure the harness with cable ties as required, spaced approximately every 200 mm (7.9 in).
7. Route the harness towards the engine and along with the engine harness as shown in the figures below.

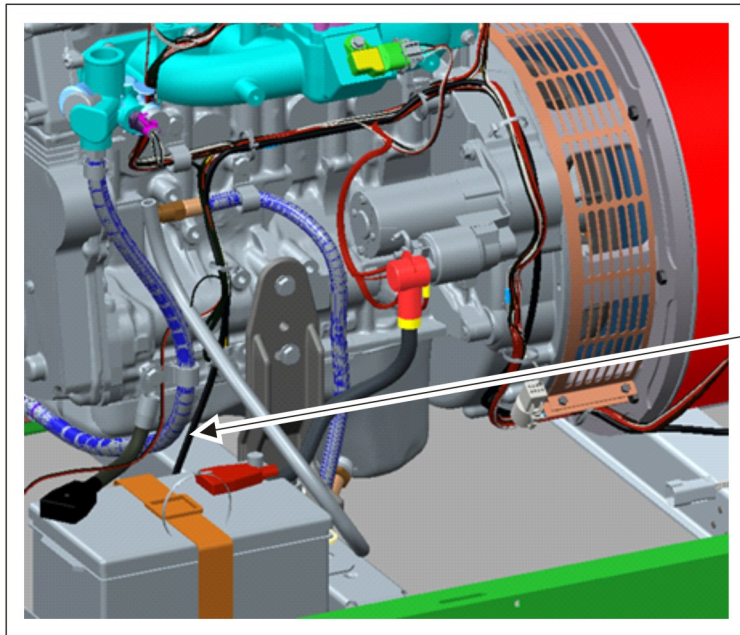


FIGURE 3. HEATER HARNESS ROUTED TOWARDS ENGINE HARNESS (A046G494 KITS ONLY)

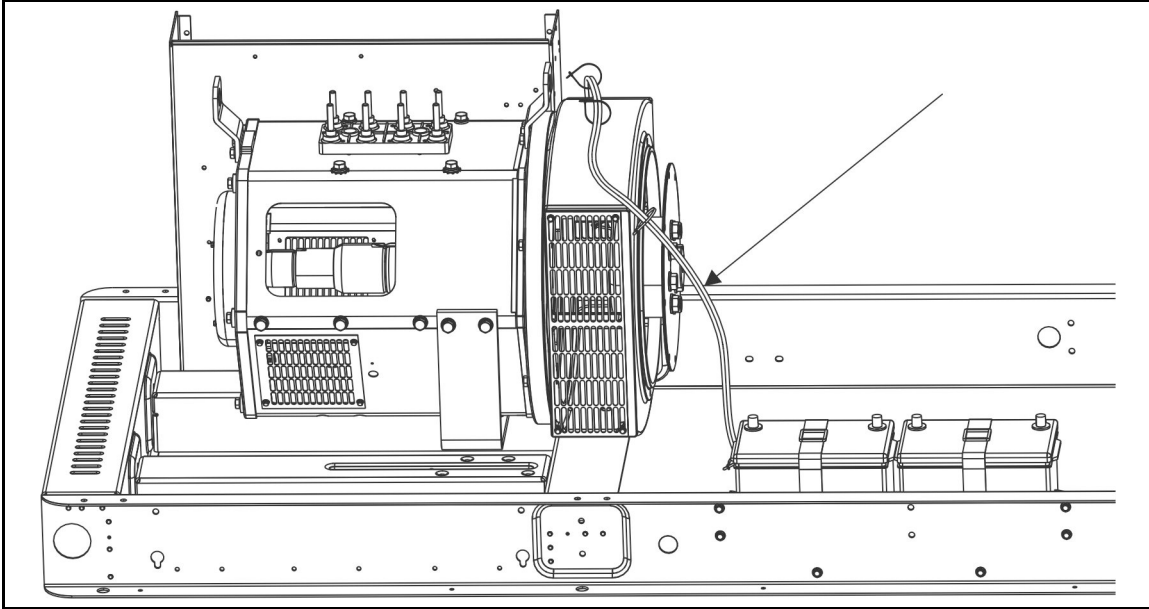


FIGURE 4. HEATER HARNESS ROUTED TOWARDS ENGINE HARNESS (A054X752 ONLY)

8. Continue to route the harness along the engine harness as it passes over the alternator's flywheel housing and along the side of the terminal box as shown in the figures below.

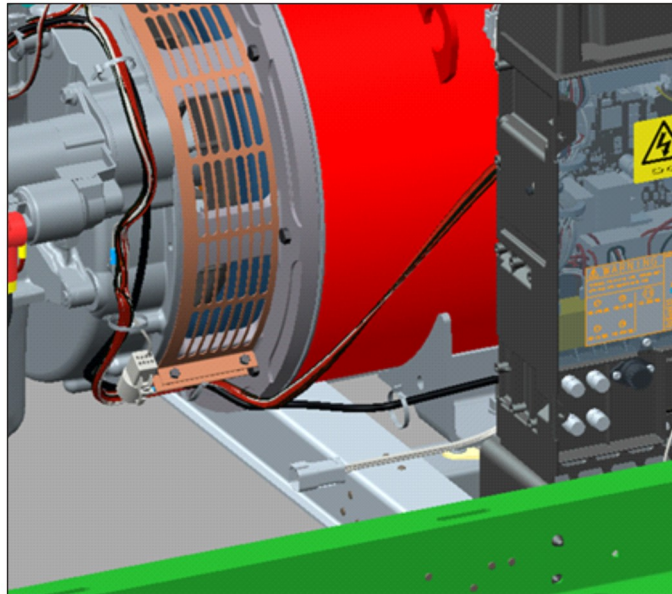


FIGURE 5. HEATER HARNESS ROUTED ALONG ALTERNATOR (A046G494 KITS ONLY)

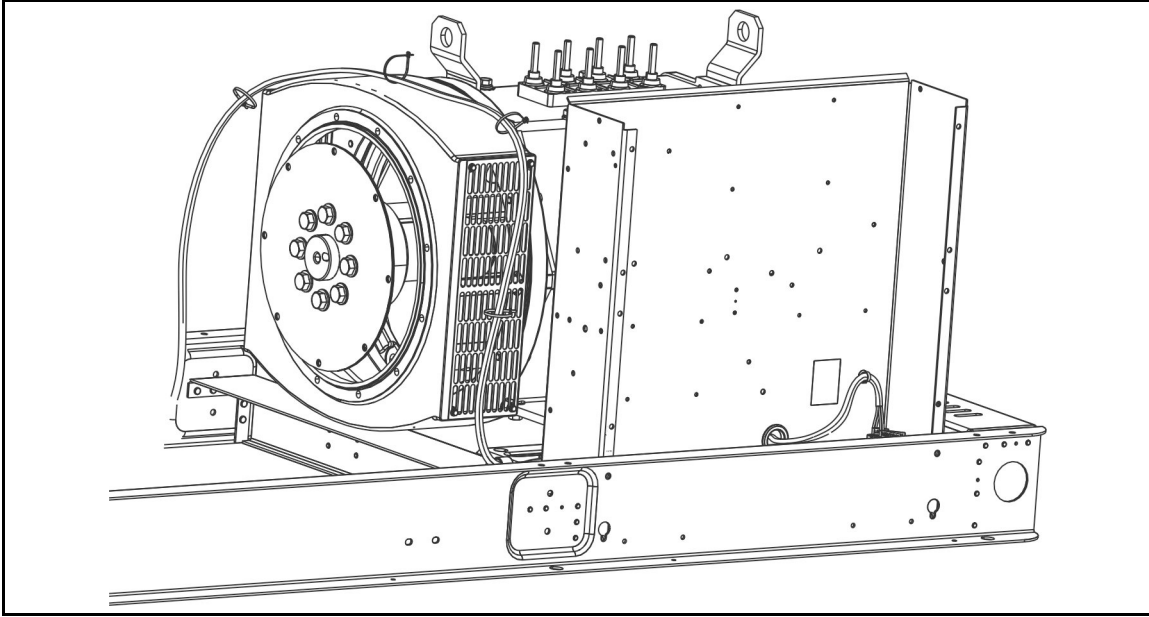


FIGURE 6. HEATER HARNESS ROUTED ALONG ALTERNATOR (A054X752 ONLY)

9. Use cable ties to secure the harness behind the terminal box as shown in the figures below.

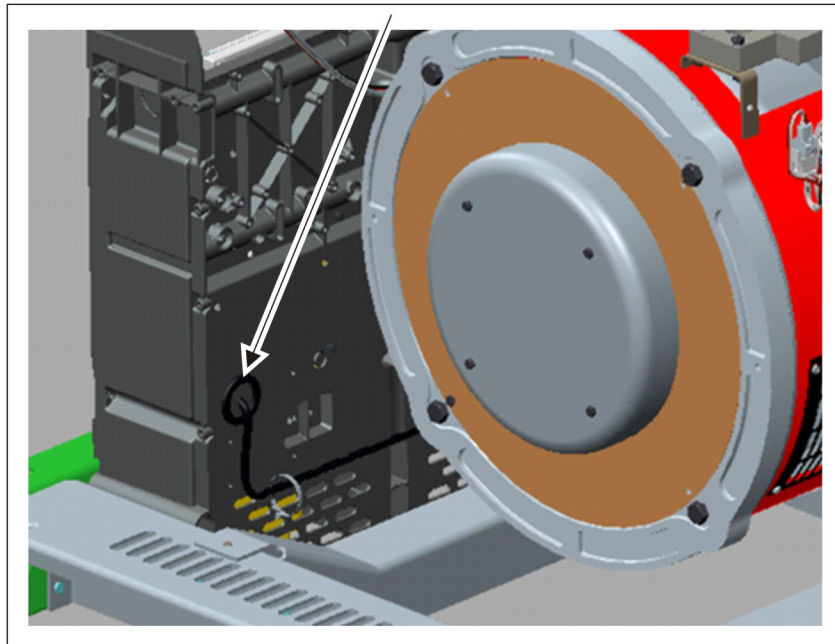


FIGURE 7. HEATER HARNESS ROUTED BETWEEN ALTERNATOR AND TERMINAL BOX (SHOWING THE AC CABLE ENTRY) (A046G494 KITS ONLY)

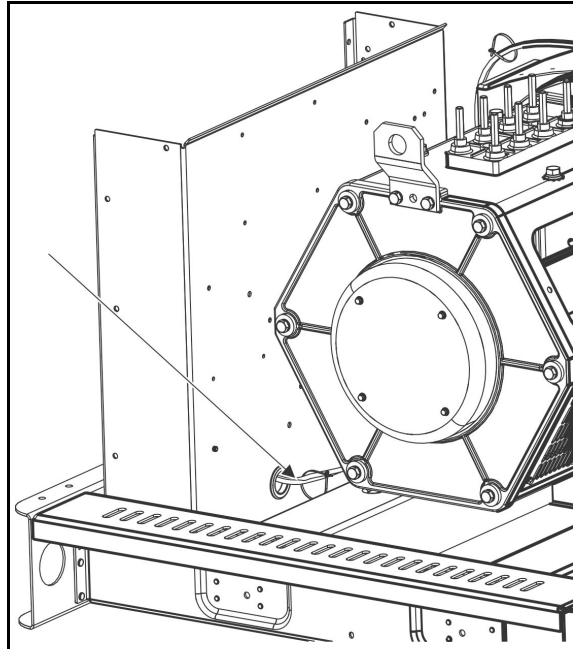
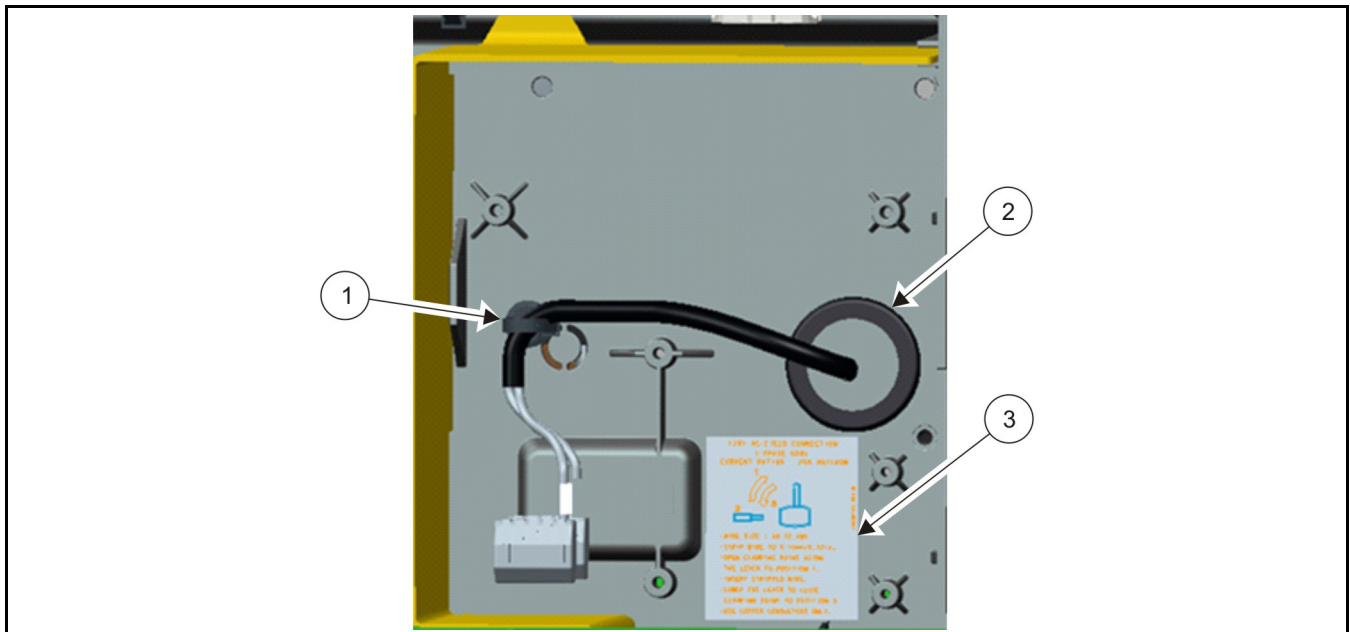


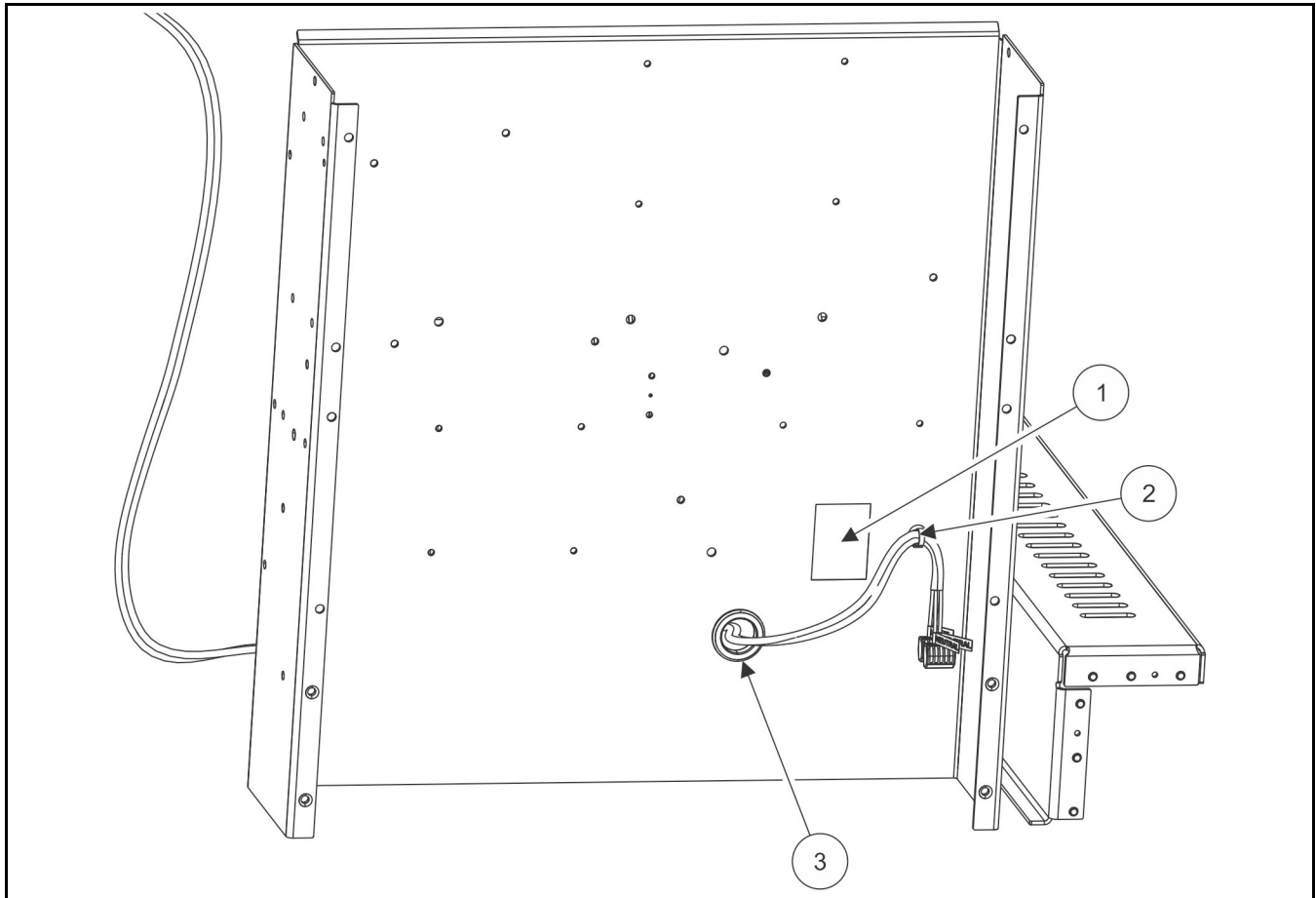
FIGURE 8. HEATER HARNESS ROUTED BETWEEN ALTERNATOR AND TERMINAL BOX (SHOWING THE AC CABLE ENTRY) (A054X752 ONLY)

10. Route the harness through the AC cable entry opening.
11. Pass the harness through the cable tie as shown in the figures below.



No.	Description	No.	Description
1	Cable Tie	3	Instruction Label
2	AC Cable Entry		

FIGURE 9. TERMINAL BOX CONNECTIONS (A046G494 KITS ONLY)



No.	Description	No.	Description
1	Instruction Label	3	Cable Tie
2	AC Cable Entry		

FIGURE 10. TERMINAL BOX CONNECTIONS (A054X752)

12. Maintain approximately 50 mm (2 in) free length after the cable tie.
13. Connect the harness terminals to the terminal block. Follow the instruction label for terminal block connections. One of the leads should attach to line, and the other to neutral. Do not connect either lead to ground.
14. Re-install all panels and guards removed during this installation.
15. Energize the AC circuit to ensure that the installation has been performed correctly.
16. Reconnect the negative (-) cable to the battery.
17. Connect the battery charger (if applicable).
18. Press the Run/Manual button on the control display to start the generator set.