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## INSTALLATION INSTRUCTIONS

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Original Issue Date: 2/94

Model: 6-1600 kW

Market: Industrial and Residential/Commercial

Subject: **Overvoltage Shutdown Kits PA-291746 and PA-291746-SD with Microprocessor Controllers**

### Introduction

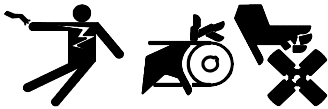
This kit triggers the auxiliary shutdown circuit on microprocessor controllers in the event of sustained generator overvoltage. It is intended for use with all microprocessor controllers. It is not compatible with relay logic controllers.

### Safety Precautions

Observe the following safety precautions while installing the kit.

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#### 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.

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**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.

**Disconnecting the electrical load. Hazardous voltage can cause severe injury or death.** Disconnect the generator set from the load by opening the line circuit breaker or by disconnecting the generator set output leads from the transfer switch and heavily taping the ends of the leads. High voltage transferred to the load during testing may cause personal injury and equipment damage. Do not use the safeguard circuit breaker in place of the line circuit breaker. The safeguard circuit breaker does not disconnect the generator set from the load.

**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.

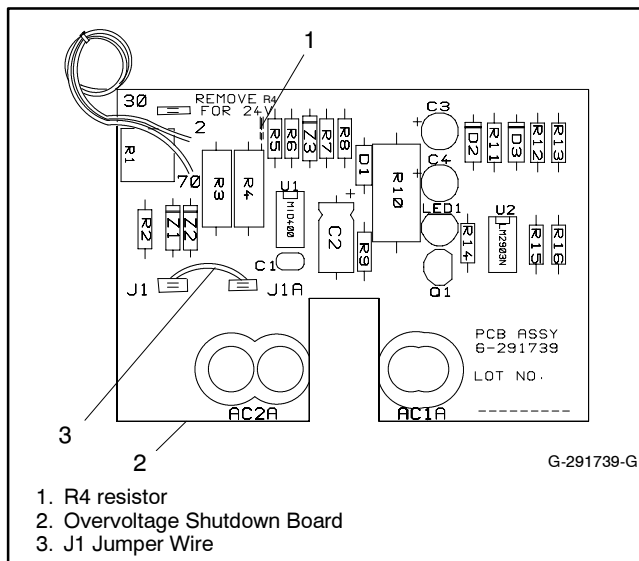
**Note:** All electrical connections should be made by a certified electrician or by an appropriately skilled and suitably-trained maintenance technician.

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.

## Installation Procedure

1. Place the generator set master switch in the OFF position.
2. Disconnect the power to the battery charger, if equipped.
3. Disconnect the generator set engine starting battery(ies), negative (-) lead first.
4. Remove the controller cover.
5. If installing the kit on a generator set with 24-volt cranking, clip and remove resistor R4 from the overvoltage shutdown board. See Figure 1.
6. Install the overvoltage shutdown board on the back of the frequency meter. See Figure 2.
  - a. Install two spacers (292372) on the frequency meter terminals.
  - b. Install four flat washers (X-25-11) on each side of the overvoltage shutdown board and secure the board to the terminals with two nuts (X-70-30).

**Note:** Use flat washers (X-25-36) as necessary to keep the overvoltage shutdown board parallel to the frequency meter when installed. Some provided hardware may not be used.



**Figure 1 Overvoltage Shutdown Board**

7. Attach the wiring using Figure 2.
  - a. Connect lead 2 to the positive (+) terminal of the AC ammeter. Identify the AC ammeter positive (+) terminal by noting that lead N (ground) is connected to it.

- b. Connect lead 70 to the water temperature gauge terminal (I).
- c. Connect lead 30 of the controller wiring harness to terminal 30 of the overvoltage shutdown board. Lead 30 is located behind the AC voltmeter near the wiring harness. Cut the cable ties, as necessary, to access the lead from the wiring harness.

Some early generator set models may not have lead 30 in the controller wiring harness. In these cases, select one of the leads (SW30-1812-8400, SW30-1825-8585, or SW30-1826-8456) and the insulink (X-367-1) supplied in the kit to make the connection between the overvoltage board terminal 30 and the controller circuit board P2-2 terminal. Select the lead which matches the terminal in the controller. Use the insulink (X-367-1) with lead SW30-1812-8400. The remaining leads in the kit will not be used.

8. Determine the output voltage of the generator set using the generator set nameplate or other documentation if the unit was reconnected. If the voltage is 139/240 volts, 3-phase, 4-wire, 60 Hz low wye or 277/480 volt, 3-phase, 4-wire, 60 Hz high wye, leave jumper wire J1 installed. For all other voltages, remove jumper wire J1 from the overvoltage shutdown board. See Figure 1.

## Test Procedure

1. If not already done, disconnect the generator set from its load. Reconnect the battery, negative (-) lead last.
2. Move the generator set master switch to the RUN position to start the generator set.
3. Loosen the locknut (if equipped) and turn the voltage adjustment rheostat on the controller slowly clockwise until the generator set shuts down and the auxiliary shutdown lamp lights. If the generator set shuts down, go to Step 4.

**Note:** If the generator set does not shut down, stop the generator set using the generator set master switch. Recheck the connection of the overvoltage kit. Retest the shutdown function.

If shutdown still does not occur, stop the generator set using the generator set master switch and use the following voltage check procedure to determine the fault.

- a. With the generator stopped, disconnect lead 30 at the overvoltage shutdown board. Connect the DC voltmeter (10-volt scale or higher) positive (+) test lead to terminal 30 on the overvoltage shutdown board and the negative (-) test lead to the controller ground lug. See Figure 3.
- b. Start the generator set. Turn the voltage adjustment rheostat to an overvoltage condition and observe the voltmeter reading.

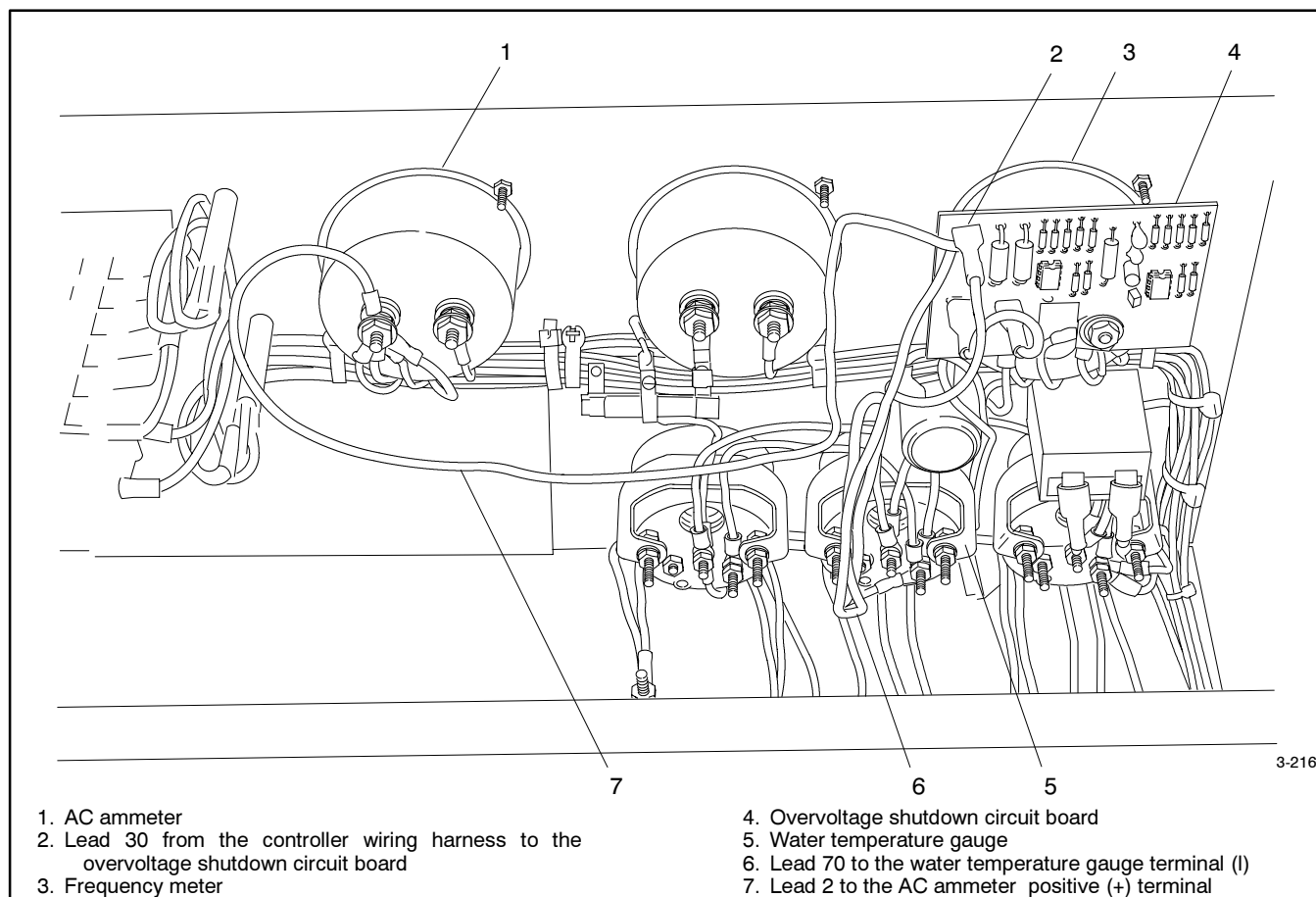
A reading of less than 5 volts indicates the overvoltage board is defective. A reading of 5 volts or higher indicates the controller board is defective.

- c. Stop the generator set. Disconnect the DC voltmeter and replace the defective component. Reconnect lead 30 to the overvoltage shutdown board. Repeat the testing procedure.
4. Turn the voltage adjustment rheostat on the controller slightly counterclockwise. Move the generator set master switch to the OFF/RESET position.

5. Move the generator set master switch to the RUN position to start the generator set. Turn the voltage adjustment rheostat as necessary for the AC voltmeter to read the proper voltage for the phase indicated by the selector switch. Retighten the locknut (if equipped) on the voltage adjustment rheostat to hold the setting. Stop the generator set. Reinstall the controller cover.
6. Disconnect the battery, negative (-) lead first. Reconnect the generator set to the load.
7. Reconnect the battery, negative (-) lead last.

## Parts List

Kit: GM-PA-291746 and PA-291746-SD		
Qty.	Description	Part Number
1	Circuit board, overvoltage	G-291739
1	Lead, 0.062 F pin/stripped end	SW30-1812-8400
1	Lead, 0.062 M pin/0.062 M pin	SW30-1825-8585
1	Lead, 0.062 F pin/3/16 F push-on	SW30-1826-8456
4	Washer, 0.198 x 0.500 x 0.040 plain (brass)	X-25-11
2	Washer, 0.219 x 0.500 x 0.049 plain	X-25-36
1	Terminal	X-367-1
2	Nut, hex	X-70-3
2	Spacer	292372



**Figure 2** Overvoltage Shutdown Board Connections



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