

## INSTALLATION INSTRUCTIONS

Original Issue Date: **12/93**  
 Model: **350-1600 kW**  
 Market: **Standby Generator Sets**  
 Subject: **Safeguard Circuit Breaker Kits**

### Introduction

Safeguard Breaker Kits	
Kit No.	Amps
PA-292857 & PA-292857-SD	4.0
PA-292858 & PA-292858-SD	4.5
PA-292859 & PA-292859-SD	3.5
PA-292860 & PA-292860-SD	3.0
PA-292861 & PA-292861-SD	5.0

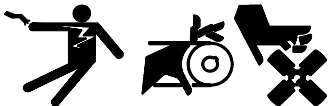
The safeguard circuit breaker kit protects the generator set in the event of an overload or short circuit. It is different than a conventional circuit breaker in that it has a trip curve matched to the generator characteristics. When an overload or short circuit occurs, the safeguard circuit breaker opens the battery voltage supply to the voltage regulator.

Generator sets equipped with the basic relay controller without meters will require installation and connection of current transformers.

### Safety Precautions

Observe the following safety precautions while installing 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**

**Hazardous voltage. Moving rotor.**  
**Can cause severe injury or death.**

Operate the generator set only when all guards and electrical enclosures are in place.

**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.

**Handling the capacitor. Hazardous voltage can cause severe injury or death.** Electrical shock results from touching the charged capacitor terminals. Discharge the capacitor by shorting the terminals together.  
*(Capacitor-excited models only)*

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. Position safeguard mounting box (293721) on engine side (rear) of junction box. Using the box as a template, drill four #17 (4.4 mm, 0.173 in.) diameter holes. See Figure 1.

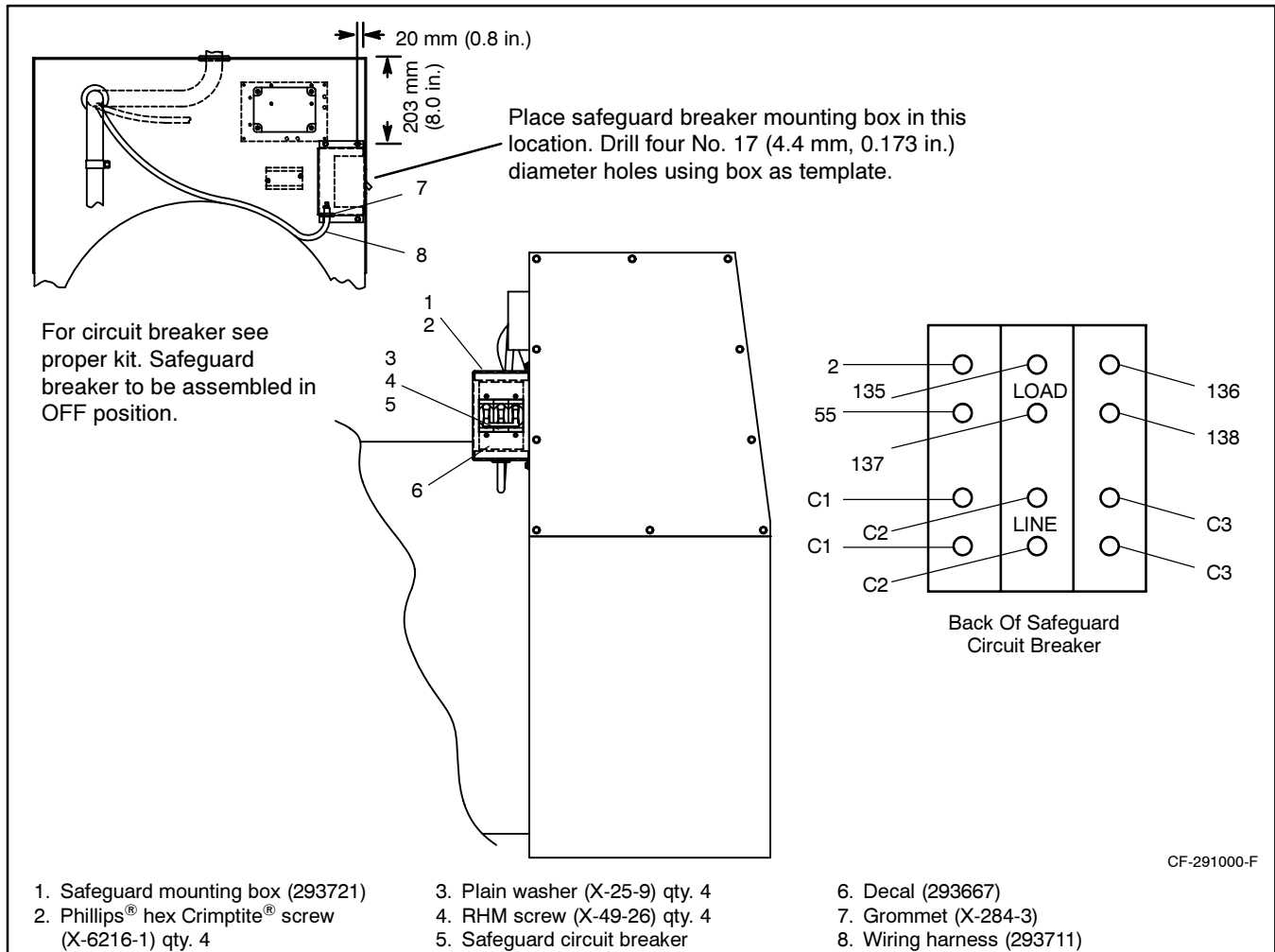
**Note:** Observe all appropriate safety procedures for use of power tools when drilling holes. Remove all burrs and metal chips from the work area before continuing installation procedure.

5. Install grommet (X-284-3) in hole in safeguard mounting box. Insert 12-lead end of wiring harness (293711) through grommet.

6. Connect leads C1, C2, and C3 (2-inch leads) to lower terminals of safeguard breaker (line side). Connect leads C1, C2, and C3 (3-inch leads) to upper terminals of safeguard breaker (line side), as shown in Figure 2 and Figure 3.

**Note:** Wiring diagrams differ due to remote versus locally mounted voltage regulator.

7. Connect leads 2, 135, and 136 to upper terminals of safeguard breaker (load side). Connect leads 55, 137, and 138 to lower terminals of safeguard breaker (load side), as shown in Figure 2 and Figure 3.
8. Install safeguard circuit breaker in mounting box with four 6-32 x 0.500-in. RHM screws (X-49-26) and 0.156 x 0.375 x 0.049-in. plain washers (X-25-9). Install safeguard breaker so that OFF markings are to the top. See Figure 1.
9. Mount safeguard box to junction box with four 10-24 x 0.50-in. Phillips® hex CrimpTite® screws (X-6216-1).



**Figure 1** Safeguard Circuit Breaker Installation

10. With surface clean and dry, apply safeguard breaker decal (293667) to safeguard mounting box Figure 1.
11. Route harness into junction box through engine harness port.
12. Remove junction box access cover.
13. Place generator output leads through current transformers (1 turn) as shown in appropriate diagram in Figure 4.  
  
**Note:** Current transformers should be positioned with “dot” or “HI” mark toward the generator set.
14. Connect wiring harness to safeguard circuit breaker as described in the following steps. See Figure 2 and Figure 3.
  - a. Disconnect all current transformer white leads (C1, C2, and C3) and black lead (C0) from the terminal block if not already done. Remove existing terminals from leads.

**Note:** Label all leads to ensure proper reconnection.

15. Connect current transformer white leads to wiring harness leads as follows:
  - a. Connect current transformer lead C1 to wiring harness lead C1 with crimp connector.
  - b. Connect current transformer lead C2 to wiring harness lead C2 with crimp connector.
  - c. Connect current transformer lead C3 to wiring harness lead C3 with crimp connector.
  - d. Connect leads C0, C1, C2, and C3 (2-inch leads) from wiring harness to safeguard terminal block.
  - e. Connect black leads from current transformers by crimping onto the connector on lead C0 of the wiring harness.
16. Remove PMG leads from voltage regulator to capacitor and connect leads 137 and 138 from wiring harness to capacitor.

17. Connect leads 2, 55, 135, and 136 to voltage regulator terminal strip TG2, as shown in Figure 2 and Figure 3.

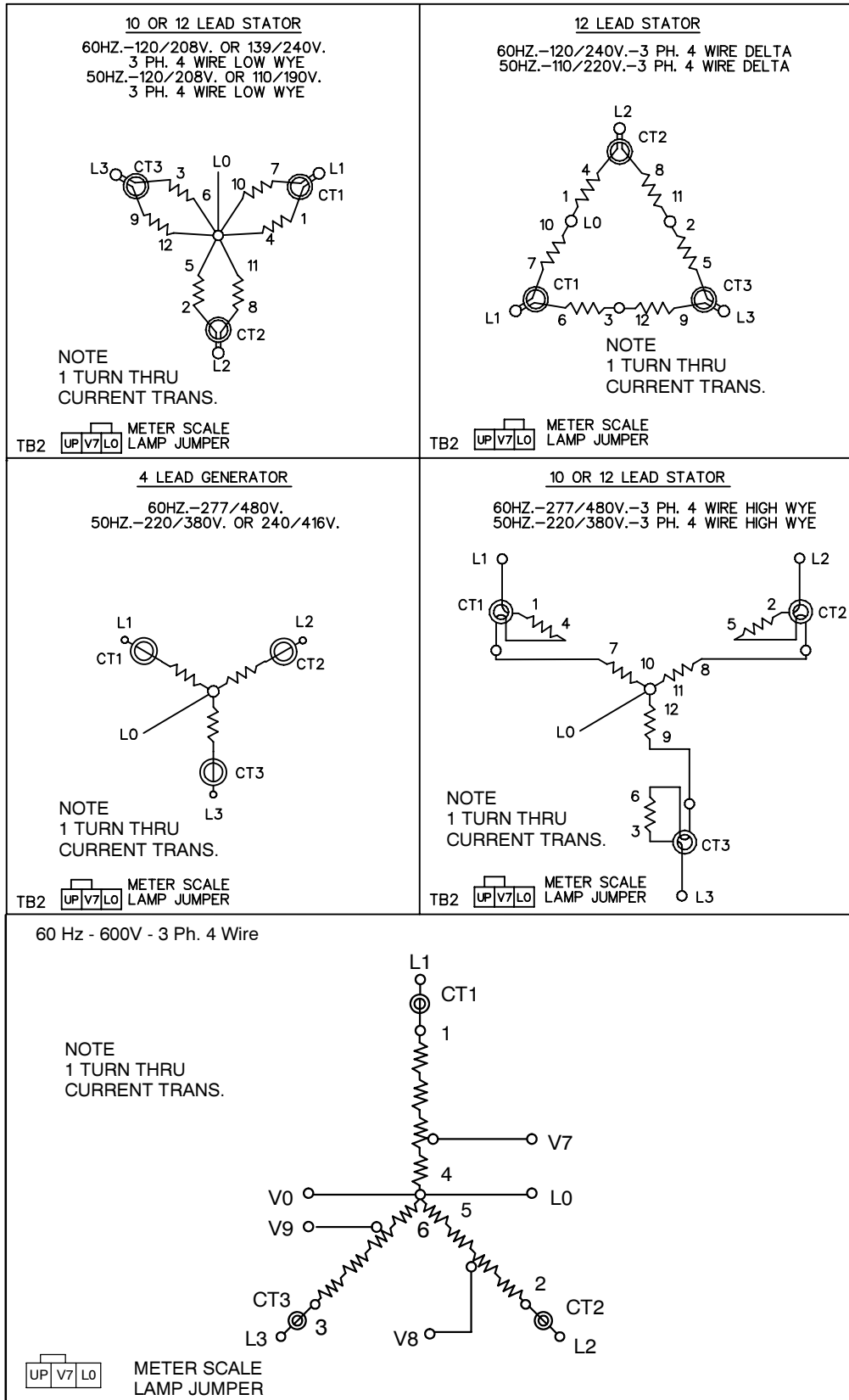
**Note:** If required, remove existing terminals and use eyelet terminals (X-283-3).

**Note:** If leads 2 and 55 are not used, insulate and secure leads with electrical tape.

18. Reinstall junction box access cover.
19. Check that the generator set master switch is in the OFF position.
20. Reconnect the generator set engine starting battery, negative (-) lead last.
21. Reconnect power to the battery charger, if equipped.

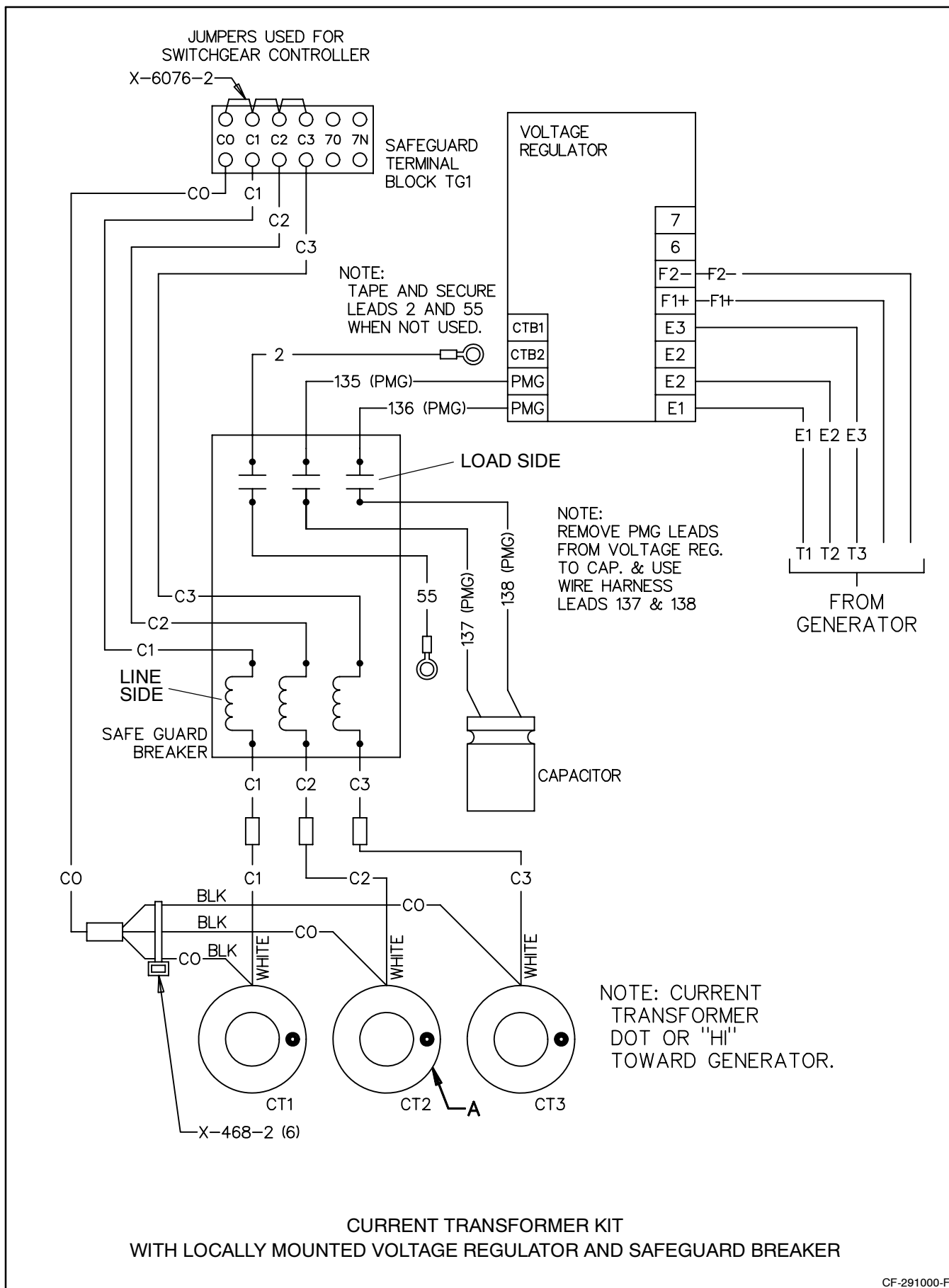
## Parts List

Kit: PA-292857, PA-292857-SD, PA-292858, PA-292858-SD, PA-292859, PA-292859-SD, PA-292860, PA-292860-SD, PA-292861, and PA-292861-SD		
Qty.	Description	Part Number
4	Washer, 0.156 x 0.375 x 0.049 in. plain	X-25-9
10	Terminal, eyelet	X-283-3
1	Grommet, 1.00 x 1.38 x 0.44 in.	X-284-3
4	Screw, 6-32 x 0.500 in. RHM	X-49-26
4	Screw, 10-24 x 0.50 in. Phillips® hex CrimpTite®	X-6216-1
1	Breaker, 4.0 amp circuit (Kits PA-292857 & PA-292857-SD)	X-796-1
1	Breaker, 4.5 amp circuit (Kits PA-292858 & PA-292858-SD)	X-796-2
1	Breaker, 3.5 amp circuit (Kits PA-292859 & PA-292859-SD)	X-796-3
1	Breaker, 3.0 amp circuit (Kits PA-292860 & PA-292860-SD)	X-796-4
1	Breaker, 5.0 amp circuit (Kits PA-292861 & PA-292861-SD)	X-796-6
1	Decal, safeguard breaker	293667
1	Harness, wiring	293711
1	Box, safeguard mounting	293721

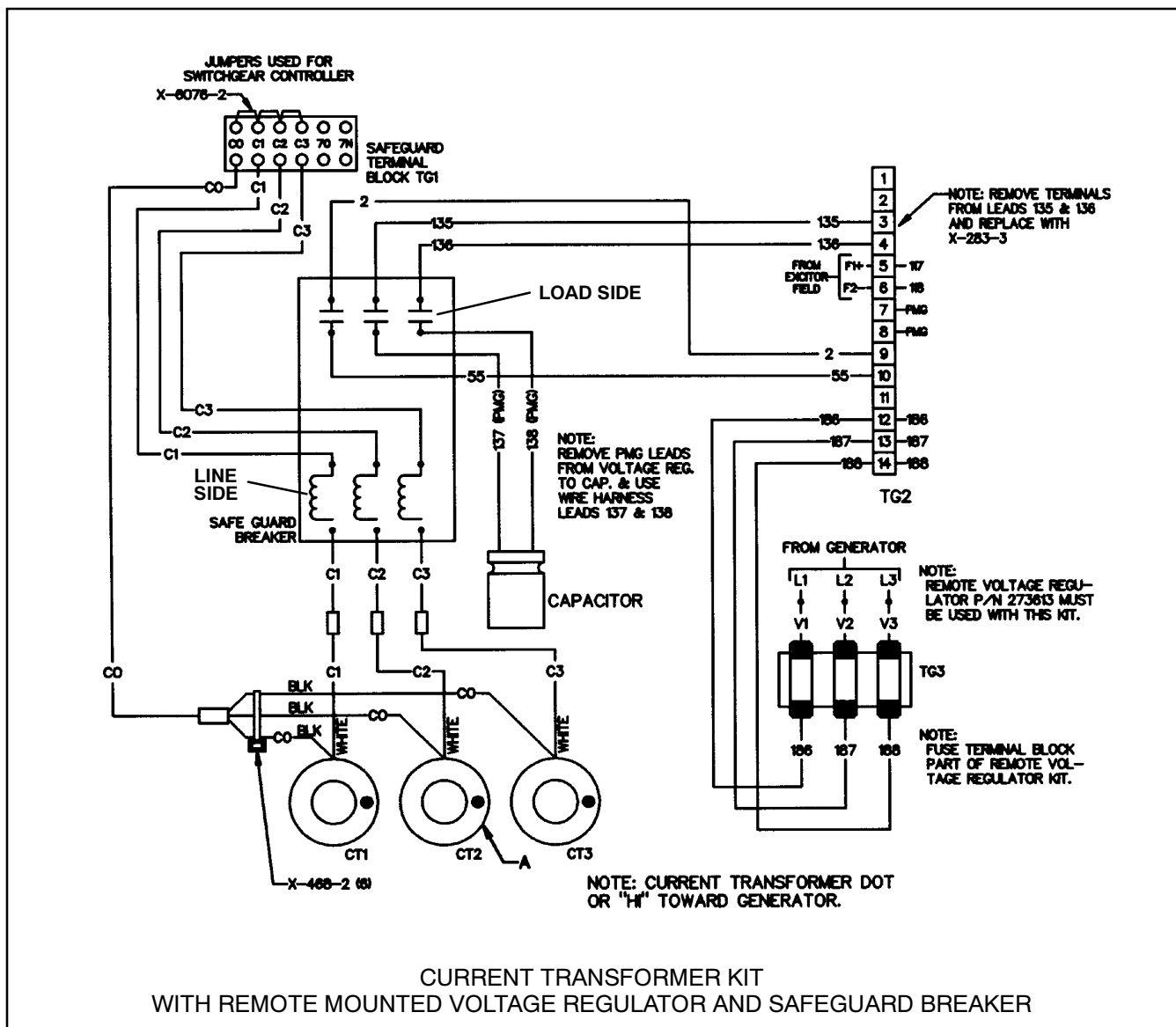


CM-272000-D

**Figure 2** Current Transformer Connections



**Figure 3** Wiring Diagram, Locally Mounted Voltage Regulator



**Figure 4** Wiring Diagram, Remote Mounted Voltage Regulator