INSTALLATION INSTRUCTIONS

Relay Service Kits 222697 and 222698

These kits replace the discontinued A-233059 relay. Due to the widespread application of the A-233059 relay, the use of the relay will need to be determined in order to choose the proper kit and installation procedure.

Examine the original A-233059 relay and determine if the relay is designated as a CC, CR, 1CR, or 2CR relay. **Do NOT disconnect any leads without taking proper notes.** Identification or relay can be established by:

1. A decal CC, CR, 1CR, or 2CR on the relay.

2. Referencing the wiring diagram. **NOTE:** Most wiring diagrams can be obtained from Kohler Generator Service Parts by indicating the proper model no. and spec no. found on the generator set nameplate.

3. If the relay is used as a CC relay, there will be a large 8-10 ga. lead running *through* the frame of the relay near the coil. See Figure 1. This lead is connected between the C relay and 2TS (thermal switch).

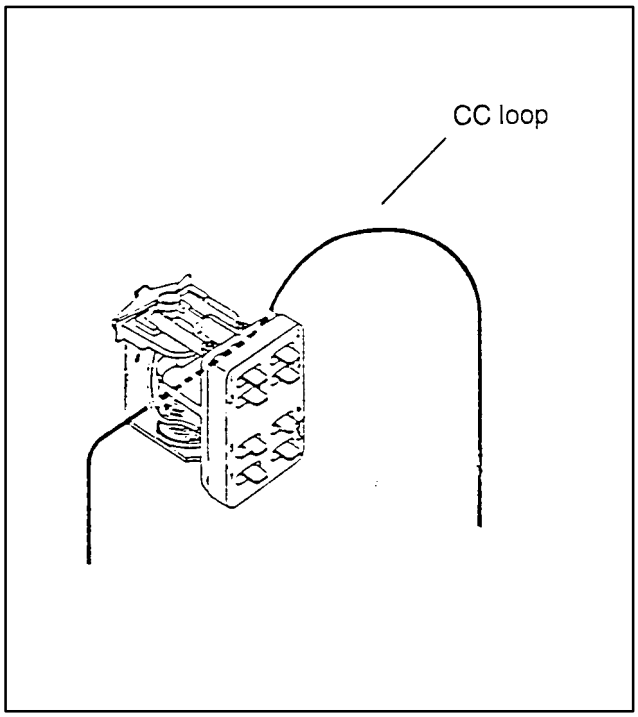
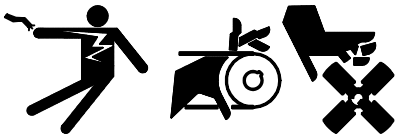


Figure 1. CC Relay with Lead

CC relay (with lead) uses the 222697 relay kit.

CR, 1CR, or 2CR relays use the 222698 relay kit.

⚠ WARNING



Accidental starting.
Can cause severe injury or death.

Disconnect battery cables before working on generator set (negative lead first and reconnect it last).

INSTALLATION OF 222698 KIT

1. Disconnect battery, negative lead first.

2. Remove controller cover or panel to access relay.

3. Examine existing CR, 1CR, or 2CR relay and compare to the illustration in Figure 2.

   Disconnect leads of existing CR, 1CR, or 2CR taking note of proper placement of leads and terminals of relay.

4. Remove 1/4 in. push-on terminals from each lead.

5. Strip end of leads and crimp on 3/16 in. push-on terminals X-431-24 (18-22 ga.) or X-431-42 (14-16 ga.). Select the proper size terminal for each lead. The kit is supplied with both size terminals. All terminals may not be used.

6. Remove existing CR, 1CR, or 2CR relay.

7. Drill two 0.187 in. (5 mm) dia. holes 2.5 in. (63.5 mm) apart to mount new relay. See Figure 3 for drilling instructions. Location should be as near as possible to old relay location.

8. Mount new relay 248362 using two screws X-51-15, lock washers X-22-7, and nuts X-72-4.

NOTE

If leads are too short to properly connect to relay, additional leads should be added using the same gauge wire and an insulink (not supplied).

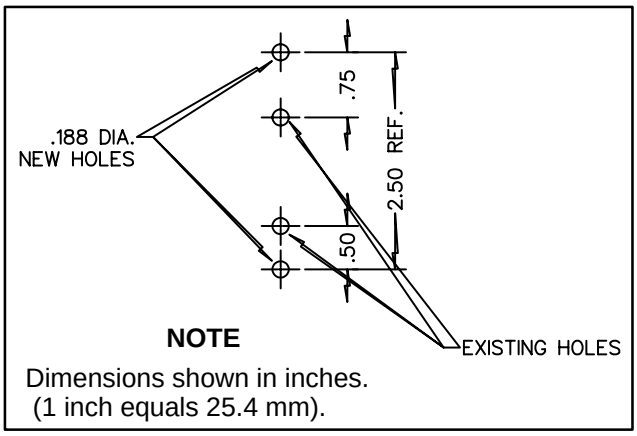


Figure 3. Relay Drilling Instructions

9. Connect controller leads to relay using wiring diagram found in Figure 2.

10. Replace controller cover or panel.

11. Reconnect battery, negative lead last.

Parts List

Qty.	Description	Part Number
2	Washer, #8 lock	X-22-7
6	Terminal, 3/16 push-on 18-22 ga	X-431-24
6	Terminal, 3/16 push-on 14-16 ga.	X-431-42
2	Screw, 8-32 x 1/2	X-51-15
2	Nut, 8-32	X-72-4
1	Relay	248362

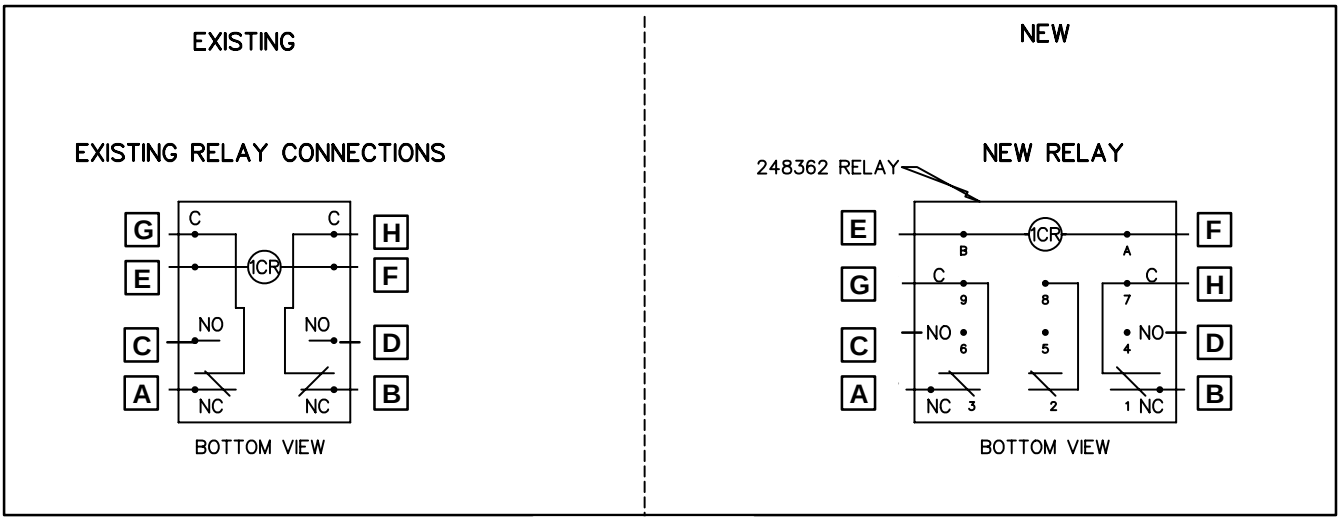


Figure 2. Wiring Diagram for CR, 1CR, and 2CR Relay

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Read this entire procedure before attempting to install the service kit. Due to the major modifications required it is recommended that a wiring diagram for the generator set be used. Additional leads and/or terminals may be required in some applications.

NOTE

The original A-233059 relay was used in a wide variety of applications and this kit may not function properly in all controller applications. Contact an authorized service distributor if difficulty occurs when installing this kit.

NOTE (Shunt Jumper)

If the original application of the A-233059 relay uses a shunt jumper across the CC winding, this kit does NOT provide a diode suitable for the current draw. See Figure 4 for a typical example. Contact an authorized service distributor for applications using the shunt jumper.

The following is a description of how the existing relay functioned in the circuit. The unique function of the CC (crank control) relay is to disconnect at the proper moment the cranking circuit of exciter cranking models. To provide this a loop of heavy wire is placed next to the coil of the relay. During cranking the magnetic flux around the wire cancels the flux of the coil to prevent movement of the relay armature. After the engine starts and exciter voltage becomes higher than voltage of the series field, current will reverse direction through the loop allowing the relay armature movement and resulting de-energization of the cranking circuit will occur. If the direction of the loop was incorrect the contacts of the CC relay would chatter.

This loop of wire represents a second winding of the relay coil and is illustrated with the ⌒ symbol in Figure 4. The main coil of relay CC is connected to S1. As long as current flows from the battery through the cranking circuit a magnetic field will be induced in the CC loop. During the time when voltage is building up in the exciter circuit, the main CC relay coil is also energizing. The two windings are configured so that the magnetic fields oppose each other. As long the fields oppose each other, there is insufficient force to operate the normally open CC contacts. When the engine starts to run, the exciter current reverses direction and the magnetic fields of the windings combine to energize the CC relay.

The new relay functions differently. The CC relay coil loop is replaced by a diode. The diode allows exciter voltage to build up and prevents the exciter voltage to backfeed the starting battery before the generator output energizes the new CC relay. The main CC relay coil is removed from the exciter circuit and is connected to the main AC output at L1/L2. On three-phase units connect the CC relay across L0/L1. When sufficient AC output is achieved the CC relay is energized and normally closed CC contacts open to de-energize C relay. Normally open C contacts open to de-energize exciter circuit. See Figure 5. All other leads to relay contact terminals remain the same. If there is any question as to proper connection, refer to the appropriate wiring diagram.

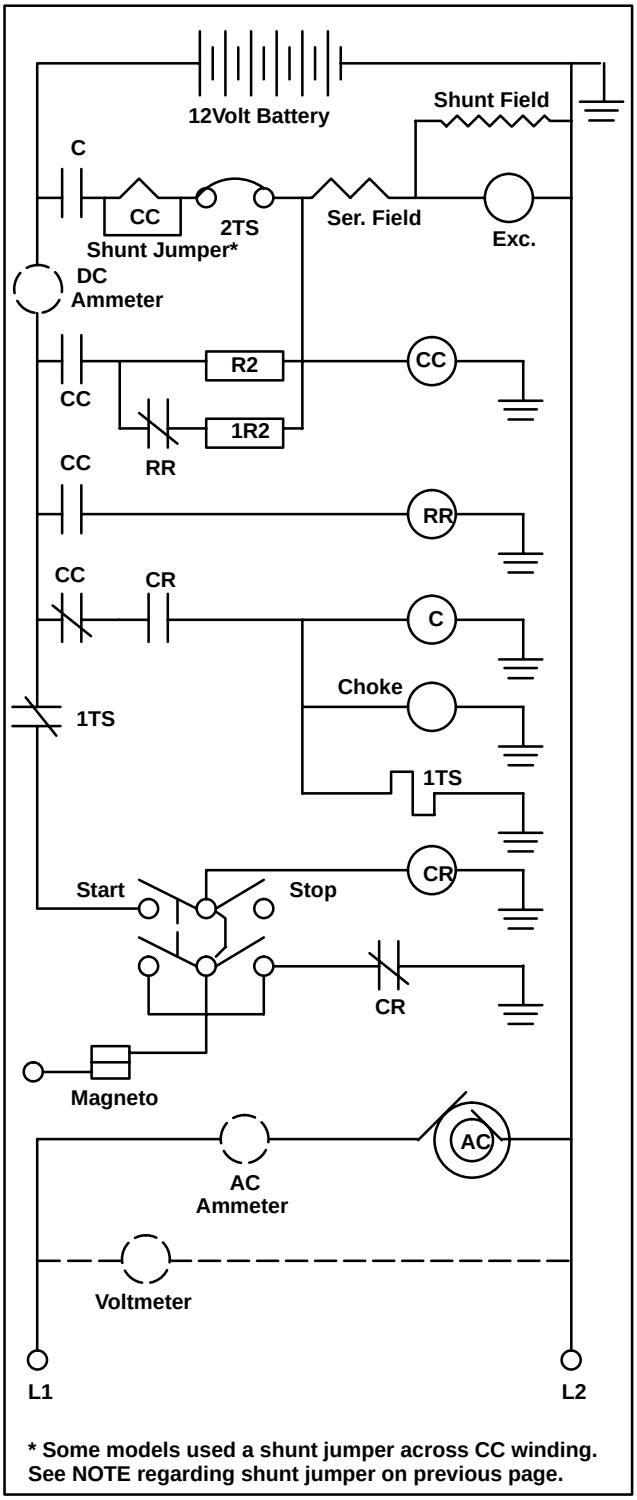

Figure 4. Existing Relay Connections (typical)

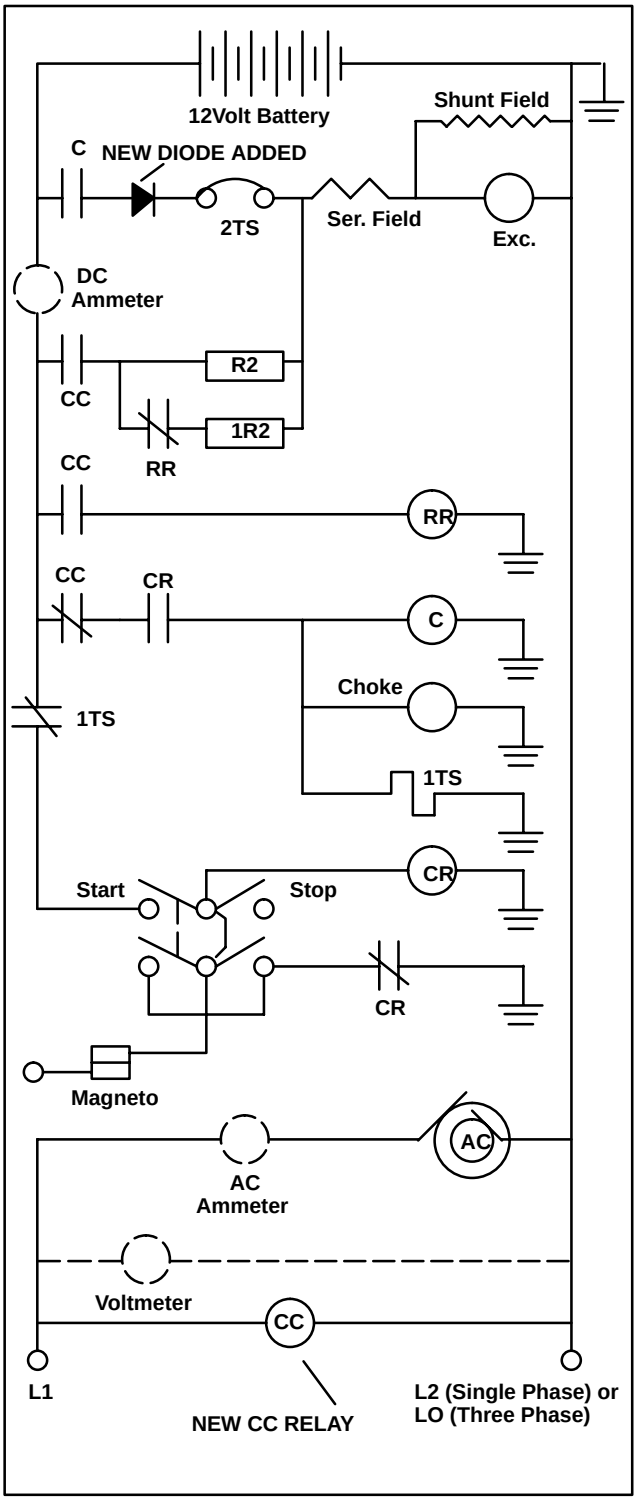

Figure 5. New Relay Connections (typical)

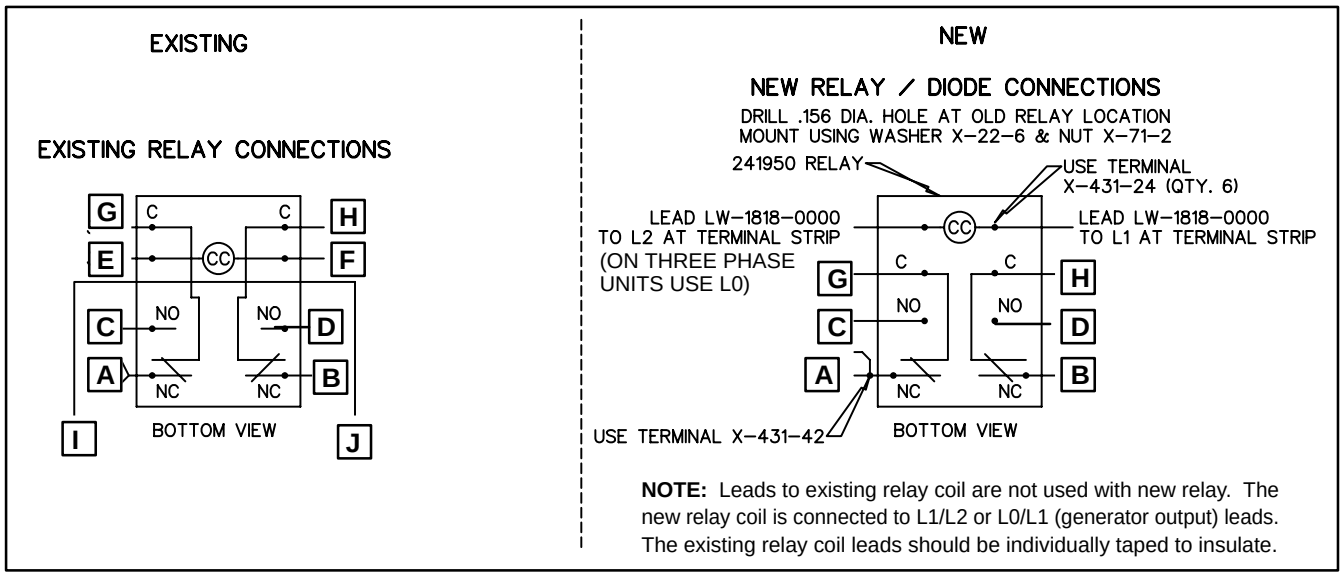

Figure 6. Wiring Diagram for CC Relay

1. Disconnect battery, negative lead first.

2. Remove controller cover or panel to access relay.

3. Examine existing CC relay and compare to the illustration in Figure 6. Identify the leads using the letters shown in Figure 6. Do this using masking tape or some other means to properly identify each lead.

4. Cut the lead (I, J) running through frame of relay at the midpoint. The diode will be connected in series with this lead.

   Strip ends of 10 ga. leads. Connect insulink X-367-7 and eyelet terminal X-283-11 to each lead. Strip ends of lead which was running through frame of existing relay and connect to 10 ga. leads using insulinks.

   Locate diode 222663 in a convenient location where 10 ga. leads will reach and drill two 0.25 in. (6 mm) dia. holes to mount diode. See Figure 7. Mount diode using two screws X-50-3, lock washers X-22-9, and nuts X-70-2. Connect leads (I, J) to diode observing proper connection, see Figure 7.

5. Disconnect leads of original CC relay. The leads (E, F) connected the original CC relay coil to the exciter circuit. These leads will not be reused. Individually tape to insulate each relay coil lead.

6. Remove original CC relay.

7. Drill one 0.156 in. (4 mm) dia. hole to mount new relay. See Figure 6 for drilling instructions. Location should be as near as possible to old relay location.

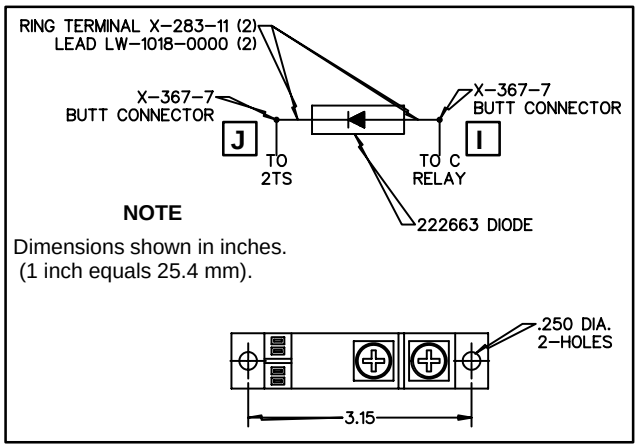

Figure 7. Diode Mounting Instructions

8. Mount new relay 241950 using lock washer X-22-6 and nut X-71-2.

9. The new relay coil will be connected to the main AC output of the generator set.

   Strip end of each 18 ga. lead and crimp on 3/16 in. push-on terminal X-431-24 to one end. Connect these leads to relay coil terminals and to L1/L2 terminals at terminal strip in controller. On three-phase units connect the new CC relay across L0/L1. See Figures 5 and 6 and the appropriate wiring diagram.

NOTE

Some units may require terminals (not supplied) for connection of leads to L1/L2 (single phase) or L0/L1 (three phase).

10. Remove 1/4 in. push-on terminals from each remaining controller lead.

11. Strip end of leads and crimp on 3/16 in. push-on terminals X-431-24 (18-22 ga.) or X-431-42 (14-16 ga.). Select the proper size terminal for each lead. The kit is supplied with both size terminals. Some terminals may not be used.

NOTE

If leads are too short to properly connect to relay, additional leads should be added using the same gauge wire and an insulink (not supplied).

12. Connect remaining controller leads to relay using Figure 6 and appropriate wiring diagram.

13. Replace controller cover or panel.

14. Reconnect battery, negative lead last.

Parts List

Qty.	Description	Part Number
2	Lead, 10 ga.	LW-1018-0000
2	Lead, 18 ga.	LW-1018-0000
1	Washer, #6 lock	X-22-6
2	Washer, lock	X-22-9
2	Terminal, #10 eyelet (ring)	X-283-11
2	Insulink	X-367-7
8	Terminal, 3/16 push-on 18-22 ga	X-431-24
1	Terminal, 3/16 push-on 14-16 ga.	X-431-42
2	Screw, 10-24 x 3/4 in.	X-50-3
2	Nut, 10-24	X-70-2
1	Nut, 6-32	X-71-2
1	Diode	222663
1	Relay	241950