INSTALLATION INSTRUCTIONS

Original Issue Date: **5/01**
Model: **20–2000 kW**
Market: **Industrial Generator Sets with the 550 Controller**
Subject: **Common Failure Relay Kits: 365569-KP14, GM17028-KP2, and GM17032-KP2**

Introduction

The common failure relay kit uses one set of normally open (NO) and normally closed (NC) contacts to trigger the customer-provided signaling devices if fault conditions occur, allowing remote monitoring of the standby system. Typically, lamps, audible alarms, or other devices signal the conditions. Figure 1 shows the common failure relay circuit board.

Typically, the common failure relay connects to the defined common fault terminal 32A. The defined common fault factory settings include the emergency stop, overspeed, overcrank, high engine temperature, and low oil pressure faults. The user can choose different selections for the defined common fault using Menu 10—Output Setup. Refer to the controller operation manual for programming information. Alternatively, the user can select a single fault by connecting the signal lead to any fault terminal.

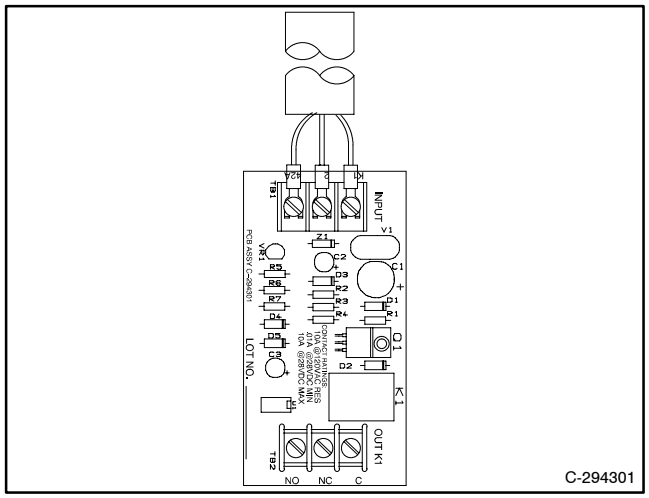


Figure 1 Common Failure Relay Kit

Check the electrical requirements of the customer-provided accessories prior to common failure relay kit installation. Customer-provided accessories require their own electrical source and must not exceed the relay contact ratings following.

Attach customer-supplied 12-volt DC accessories to the battery positive (+) connection at the starter solenoid and to the battery negative (–) connection at the engine ground. Do not use terminals 42A and N on the controller connection kit terminal strip to supply voltage to the relay contacts. The user must attach separate leads directly to the battery for the supply voltage.

Relay Contact Rating

Maximum Switching Current	10 amps
Minimum Switching Current	10 milliamps
Maximum Switching Voltage	120 volts AC or 28 volts DC

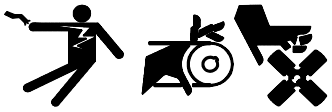
Read the entire installation procedure and compare the kit parts with the parts list in this publication before beginning installation. Perform the steps in the order shown.

Observe applicable local and national electrical codes when installing the wiring system.

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.

Installation Procedure

1. Remove the generator set from service.

1.1 Place the generator set master switch in the OFF position.

1.2 Disconnect the power to the battery charger, if equipped.

1.3 Disconnect the generator set engine starting battery(ies), negative (-) lead first.

2. Mount and connect the controller connection assembly.

2.1 **GM17032-KP2 kit (20-300 kW)**

2.1.1 Remove the junction box rear panel and hardware.

2.1.2 Attach the controller connection assembly (GM13984) to the junction box using six screws (X-51-3), spacers (X-712-9), and nuts (X-6210-4). Place the spacers between the controller connection assembly and the junction box bracket. See Figure 2 for the mounting location.

2.1.3 Plug the wiring connection harness (GM17033) into the controller connection assembly's P25 connector.

2.1.4 Proceed to step 2.4.

2.2 **GM17028-KP2 kit (350/400 kW)**

2.2.1 Remove the junction box rear panel and hardware.

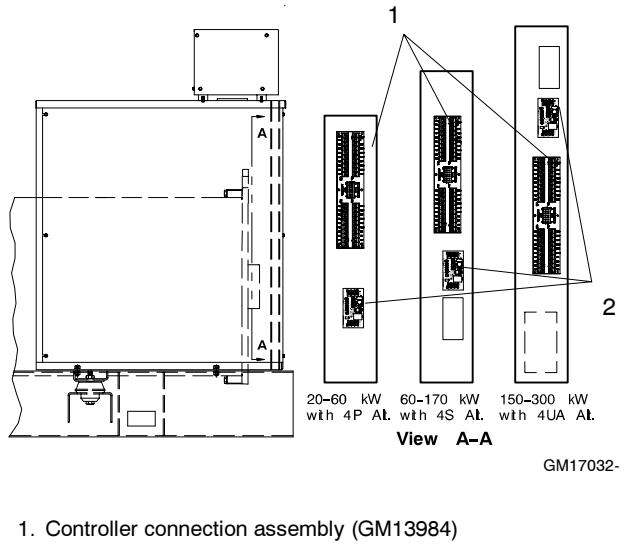
2.2.2 Remove the four screws attaching the controller to the junction box. See Figure 3.

2.2.3 Mark the drill hole locations where the terminal block bracket (347292) mounts to the junction box top panel using the dimensions given in Figure 3.

2.2.4 Move the controller away from the rear of the junction box in order to provide enough clearance to drill two 9 mm (0.344 in.) dia. holes in the top of the junction box.

2.2.5 Remove burrs from the drilled holes and cleanup all metal chips in the junction box.

2.2.6 Place the terminal block bracket (347292) on the underside of the junction box top panel with the bracket mounting holes visible from the rear of the junction box and mount using two screws (X-125-3) and nuts (X-6210-7). See Figure 3.



1. Controller connection assembly (GM13984)
2. Common failure relay (C-294301)

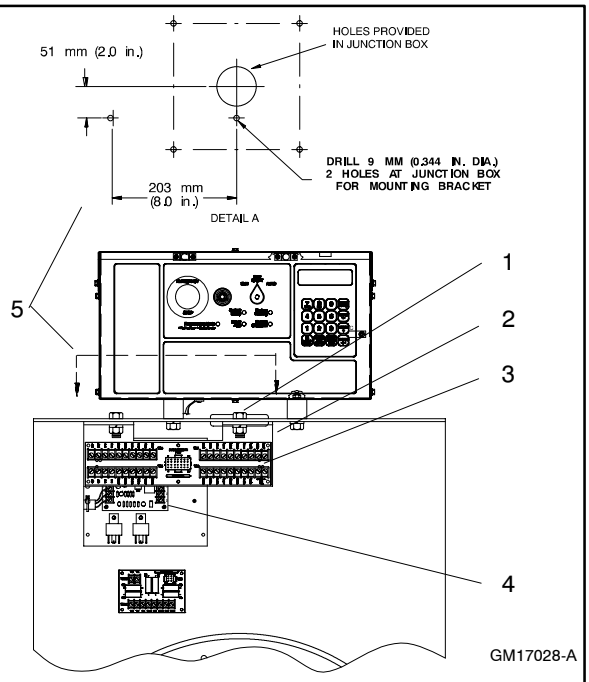
Figure 2 Controller Connection Assembly Mounting Locations in Junction Box (20-300 kW)

2.2.7 Reposition the controller over the junction box holes and install the four screws.

2.2.8 Attach the controller connection assembly (GM13984) to the terminal block bracket using six screws (X-51-3), spacers (X-712-9), and nuts (X-70-12). Place the spacers between the controller connection assembly and the mounting bracket.

2.2.9 Plug the wiring connection harness (GM17029) into the controller connection assembly's P25 connector.

2.2.10 Proceed to step 2.4.



1. Terminal block bracket screws (X-125-3) and nuts (X-6210-7)
2. Terminal block bracket (347292)
3. Controller connection assembly (GM13984)
4. Common failure relay (C-294301)
5. Detail A, mounting hole dimensions (top panel)

Figure 3 Terminal Block Bracket and Controller Connection Assembly Mounting (350/400 kW)

2.3 **365569-KP14 kit (450–2000 kW)**

2.3.1 Remove the junction box upper rear panel and hardware.

2.3.2 Remove the inner panel access door screws and swing open the access door.

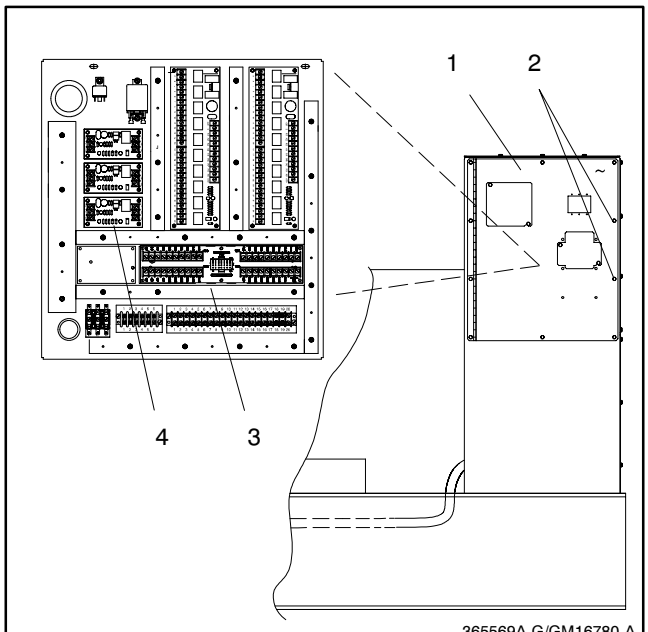
2.3.3 Attach the controller connection assembly (GM13984) to the junction box bracket studs using six spacers (X-712-9) and nuts (X-70-12). Place the spacers between the controller connection assembly and the mounting bracket. See Figure 4 for the mounting location.

2.3.4 Plug the wiring connection harness (GM16753) into the controller connection assembly's P25 connector.

2.3.5 Proceed to step 2.4.

2.4 Remove the controller cover and hardware.

2.5 Route the other end of the wiring connection harness (GM17029, GM17033, or GM16753) through the junction box port to the controller interconnection circuit board.



1. Inner panel access door
2. Inner panel access door screws (6)
3. Controller connection assembly (GM13984)
4. Common failure relay (C-294301)

Figure 4 Terminal Block Bracket Mounting in Junction Box (450–2000 kW)

2.6 Plug the wiring harness connector into the interconnection circuit board's P23 connector. Connect lead ES3 to TB-1 terminal 3 and connect lead ES4 to TB-1 terminal 4. See Figure 5. If access to the interconnection circuit board is difficult, remove the two controller panel top screws, center bottom screw, and then loosen the bottom screws to swing the rear controller panel down.

2.7 Swing the rear controller panel up and replace the screws, if previously removed. Replace the controller cover and hardware. Tighten all controller screws.

3. Mount the common failure relay.

3.1 GM17032-KP2 kit (20–300 kW)

3.1.1 Mount the common failure relay (C-294301) to the junction box using four screws (X-51-3), spacers (X-712-9), and nuts (X-6210-4). Place the spacers between the common failure relay and junction box bracket. See Figure 2 for the mounting location.

3.1.2 Connect the wiring harness (GM17030) to the common failure relay input terminals. Use the wiring harness end with the shorter individual leads. See Figure 6 for connection information.

3.1.3 Proceed to step 4.

3.2 GM17028-KP2 kit (350/400 kW)

3.2.1 Mount the common failure relay (C-294301) to the junction box bracket studs using four spacers (X-712-9) and nuts (X-70-12). Place the spacers between the common failure relay and the mounting bracket. See Figure 3 for the mounting location.

3.2.2 Connect the wiring harness (GM17030) to the common failure relay input terminals. Use the wiring harness end with the shorter individual leads. See Figure 6 for connection information.

3.2.3 Use a cable tie (X-468-1) to bundle and secure the wiring harness.

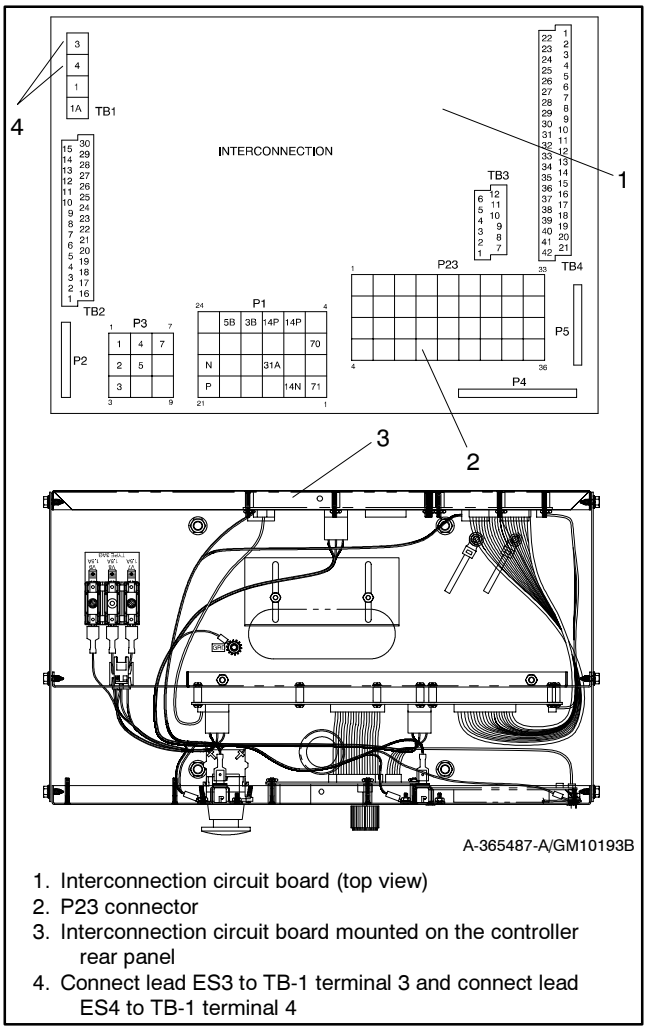
3.2.4 Proceed to step 4.

3.3 365569-KP14 kit (450–2000 kW)

3.3.1 Mount the common failure relay (C-294301) to the junction box bracket studs using four spacers (X-712-9) and nuts (X-70-12). Place the spacers between the common failure relay and the mounting bracket. See Figure 4 for the mounting location.

3.3.2 Connect the wiring harness (GM10187) to the common failure relay input terminals. See Figure 6 for connection information.

3.3.3 Proceed to step 4.



1. Interconnection circuit board (top view)
2. P23 connector
3. Interconnection circuit board mounted on the controller rear panel
4. Connect lead ES3 to TB-1 terminal 3 and connect lead ES4 to TB-1 terminal 4

Figure 5 Attaching Wiring Connection Harness to Controller Circuit Board

4. Connect the common failure relay to the controller connection kit.

Connect the wiring harness (GM17030 or GM10187) to the controller connection kit. See Figure 6 for connection information.

Typically, the common failure relay connects to the defined common fault terminal 32A. The defined common fault factory settings include the emergency stop, overspeed, overcrank, high engine temperature, and low oil pressure faults. The user can choose different selections for the defined common fault using Menu 10—Output Setup. Refer to the controller operation manual for programming information.

Alternatively, the user can select a single fault by connecting the signal lead to any fault terminal. See Figure 7 and Figure 8 for alternate terminal connections.

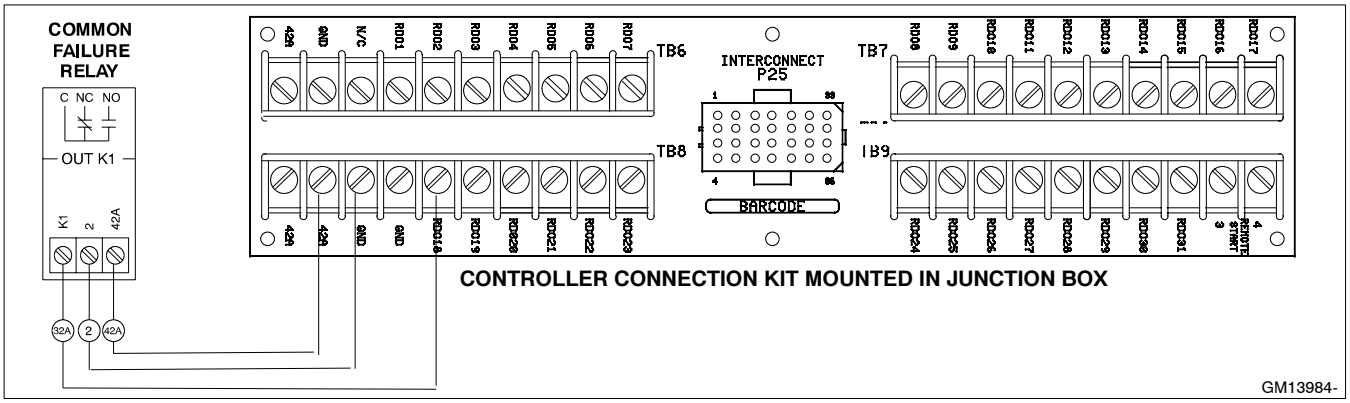


Figure 6 Common Failure Relay Kit Connections

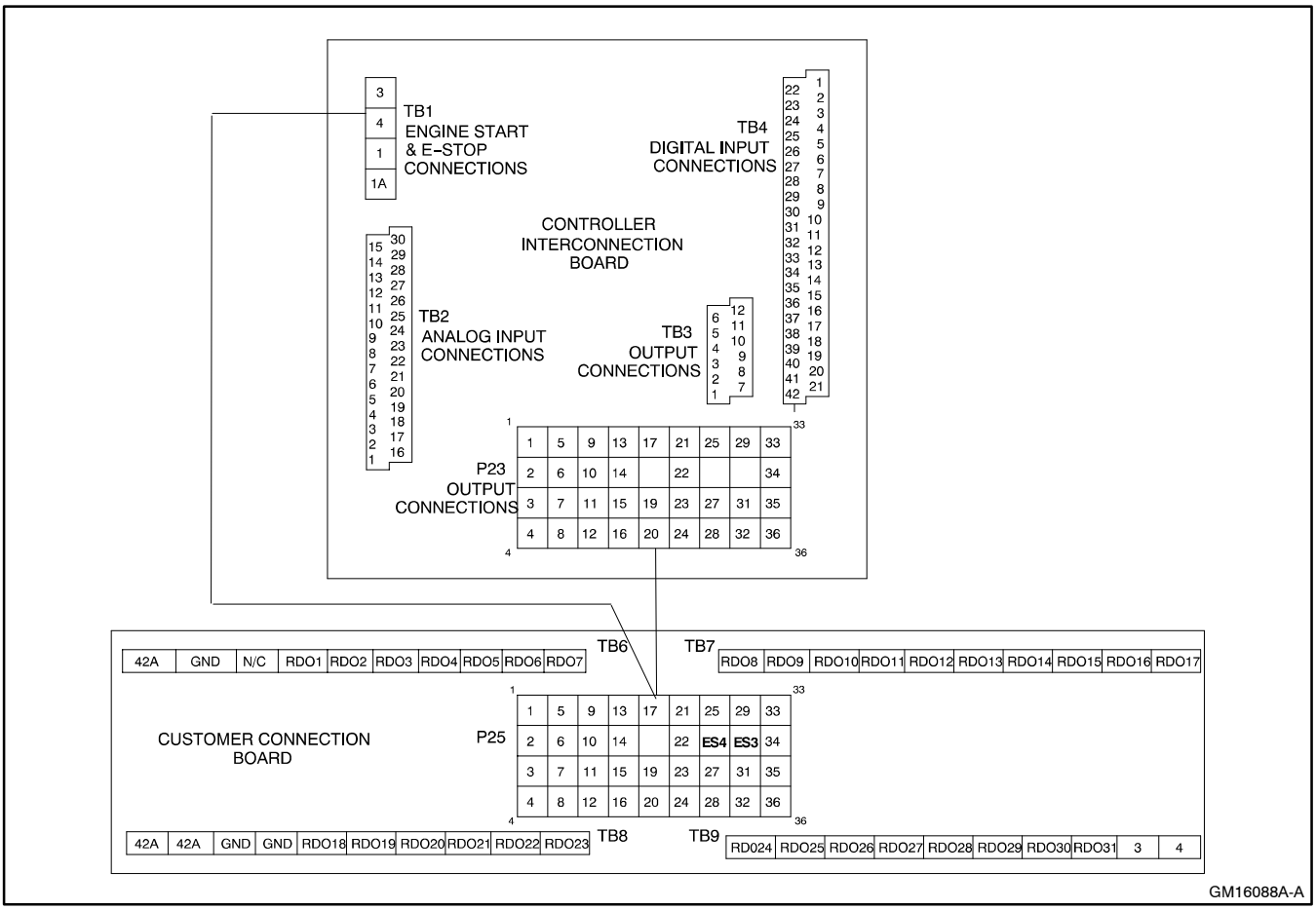


Figure 7 Controller Connection Kit

TB6 Terminal Strip—RDOs 1-7

Term.	Description
42A	Battery (+)
GND	Battery (-)
N/C	
RDO1	Overspeed (lead 39)
RDO2	Overcrank (lead 12)
RDO3	High coolant temperature shutdown (lead 36)
RDO4	Low oil pressure shutdown (lead 38)
RDO5	Low coolant temperature (lead 35)
RDO6	High coolant temperature warning (lead 40)
RDO7	Low oil pressure warning (lead 41)

TB7 Terminal Strip—RDOs 8-17

Term.	Description
RDO8	Low fuel (lead 63)
RDO9	Master switch not in auto (lead 80)
RDO10	NFPA 110 common alarm (lead 32)*
RDO11	Battery charger fault (lead 61)
RDO12	Low battery voltage (lead 62)
RDO13	High battery voltage
RDO14	Emergency stop (lead 48)
RDO15	Generator running (lead 70R)
RDO16	Time delay engine cooldown (TDEC) (lead 70C)
RDO17	System ready (lead 60)

TB8 Terminal Strip—RDOs 18-23

Term.	Description
42A	Battery (+)
42A	Battery (+)
2	Battery (-)
2	Battery (-)
RDO18	Defined common fault (lead 32A)
RDO19	Low coolant level
RDO20	Overvoltage (lead 26)
RDO21	Idle mode
RDO22	EPS supplying load
RDO23	Air damper indicator (lead 56)

TB9 Terminal Strip—RDOs 24-31

Term.	Description
RDO24	Speed sensor fault
RDO25	Loss of AC sensing
RDO26	ECM loss of communication
RDO27	Undervoltage
RDO28	Overfrequency
RDO29	Underfrequency
RDO30	Load shed kW overload
RDO31	Load shed underfrequency
3	Remote start
4	Remote start

Note: Lead numbers shown in parentheses are the factory default wire designations.

Note: RDO-1 though RDO-31 are customer definable with the following factory defaults: emergency stop, high coolant temperature, low oil pressure, overcrank, and overspeed

***NFPA-110 common alarm faults include:**

Air damper indicator (RDO-23)
Battery charger fault (RDO-11)
EPS supplying load (RDO-22)
High battery voltage (RDO-13)
High coolant temperature warning (RDO-06)
High coolant temperature shutdown (RDO-03)
Low battery voltage (RDO-012)
Low coolant level (RDO-19)
Low coolant temperature warning (RDO-05)
Low fuel (level or pressure) (RDO-08)
Low oil pressure warning (RDO-07)
Low oil pressure shutdown (RDO-04)
Master switch not in auto (RDO-09)
Overcrank (RDO-02)
Overspeed (RDO-01)

Figure 8 Controller Connection Kit Terminal Strip Identification with Relay Driver Outputs (RDOs)

5. Connect the common failure relay to the customer-supplied device.

Select the normally open (NO) and/or normally closed (NC) contacts of the common failure relay, depending upon the application. Use a two-wire harness for either NO or NC connections. Use a three-wire harness for both NO and NC connections.

5.1 Supply two or three lengths of stranded wire to make leads long enough to connect the customer-supplied device to the common failure relay contact terminals and power supply. Use color-coded wire for easy identification. Make leads long enough to allow for walls, ductwork, and other obstructions. Use separate conduit for the common failure relay contact wiring.

5.2 **12-Volt DC Devices.** Attach the customer-supplied 12-volt DC accessories to the starting battery positive (+) connection at the starter solenoid and to the battery negative (-) connection at the engine ground. Otherwise, use a separate 12-volt DC supply. Do not use terminals 42A and N on the controller connection kit terminal strip to supply the voltage to the relay contacts. Supply separate leads directly to the battery for the supply voltage. The circuit must include fuse or circuit breaker protection.

5.3 **120-Volt AC Devices.** Connect the customer-supplied accessories to a separate 120-volt AC power supply. The circuit must include fuse or circuit breaker protection.

5.4 Connect the customer-supplied device per the installations and/or schematic supplied with the device to a power source and to the common failure relay contact terminals. Cut the customer-supplied leads to length, strip lead ends, crimp on spade terminals (not supplied), and connect the leads to the common failure relay contact screw terminals. Keep the common failure relay wiring away from the generator set output leads.

5.5 **365569-KP14 kit only (450-2000 kW).** Swing the access door closed and install the screws.

5.6 Replace the junction box panel and hardware.

6. Restore the generator set to service.

6.1 Check that the generator set master switch is in the OFF position.

6.2 Reconnect the generator set engine starting battery, negative (–) lead last.

6.3 Reconnect power to the battery charger, if equipped.

6.4 Move the generator set master switch to AUTO for startup by remote transfer switch or remote start/ stop switch.

Test the Common Failure Relay

Verify the common failure relay function by using the following procedure when troubleshooting.

Test Procedure

1. Remove the customer-supplied device wiring from the common failure relay output terminals.

2. Test the failure relay operation by connecting an ohmmeter across the NO and C terminals on the relay terminal strip.

3. Start the generator set by moving the generator set master switch switch to the RUN position.

4. Use a jumper wire and ground the selected fault terminal on the controller connection terminal strip. During generator set shutdown, the relay contacts should close and the ohmmeter should display a low resistance reading (continuity).

5. After completing the test, place the generator set master switch in the OFF position.

6. Install the customer-supplied device wiring on the common failure relay output terminals.

Parts List

Common Failure Relay Kits

Kit: GM17032-KP2 (20–300 kW)		
Qty.	**Description**	**Part Number**
1	Relay, common failure	C-294301
10	Screw, mounting	X-51-3
10	Spacer, 0.25 in OD x 0.5 in.	X-712-9
10	Nut, 8-32 whiz	X-6210-4
1	Connection assembly, controller	GM13984
1	Harness, common failure relay wiring	GM17030
1	Harness, controller connection wiring	GM17033

Kit: GM17028-KP2 (350/400 kW)		
Qty.	**Description**	**Part Number**
1	Relay, common failure	C-294301
1	Tie, cable	X-468-1
6	Screw, mounting	X-51-3
10	Nut, 8-32 hex	X-70-12
10	Spacer, 0.25 in OD x 0.5 in.	X-712-9
1	Bracket, terminal block	347292
1	Connection assembly, controller	GM13984
1	Harness, controller connection wiring	GM17029
1	Harness, common failure relay wiring	GM17030

Kit: 365569-KP14 (450–2000 kW)		
Qty.	**Description**	**Part Number**
1	Relay, common failure	C-294301
4	Nut, 8-32 hex	X-70-12
4	Spacer, 0.25 in OD x 0.5 in.	X-712-9
1	Harness, controller connection wiring	GM10187
1	Connection device and hardware includes:	GM16759-1
6	Nut, 8-32 hex	X-70-12
6	Spacer, 0.25 in OD x 0.5 in.	X-712-9
1	Connection assembly, controller	GM13984
1	Harness, common failure relay wiring	GM16753