INSTALLATION INSTRUCTIONS

Original Issue Date: **9/01**
Model: **20–2800 kW Generator Sets with the 550 and XC500 Controllers**
Market: **Industrial**
Subject: **Single-Relay Dry Contact Kits: 365569-KP9, GM17068-KP1, and GM17068-KP2**

Introduction

The single-relay dry contact kit provides normally open and normally closed contacts in a form C configuration to activate warning devices and other user-provided accessories allowing remote monitoring of the generator set. Typically, lamps, audible alarms, or other devices signal faults or status conditions. Connect any controller fault output to the single-relay dry contact kit. See Figure 1 for an illustration of the single-relay dry contact kit.

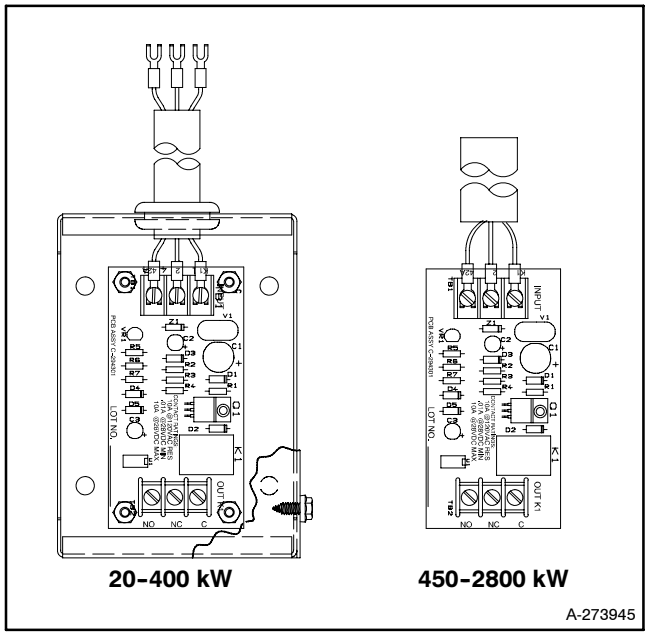


Figure 1 Single-Relay Dry Contact Kits

Check the electrical requirements of user-provided accessories prior to installation of the single-relay dry contact kit. Customer-provided accessories require their own electrical source and must not exceed the relay contact ratings that follow.

Do not use terminals 42A or N on the controller connection kit terminal strip to supply voltage to user-provided accessories. Customer-provided DC accessories require separate leads connected directly to the battery for the voltage supply. Attach user-supplied 12/24-volt DC accessories to the battery positive (+) connection at the starter solenoid and to the battery negative (–) connection at the engine ground. The 120 VAC accessories require a user-supplied voltage source.

Relay Contact Rating

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

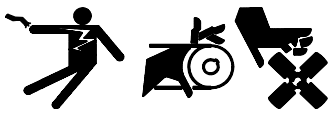
Read the entire installation procedure and compare the kit parts with the parts list in this publication before beginning installation. Perform the steps in the order shown.

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.

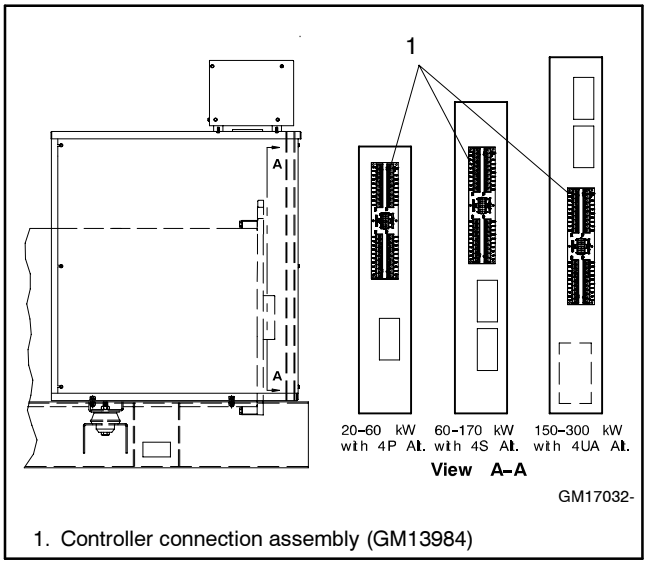
1.3 Disconnect the generator set engine starting battery(ies), negative (-) lead first.

2. Mount and connect the controller connection assembly.

2.1 **GM17068-KP1 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.



1. Controller connection assembly (GM13984)

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

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

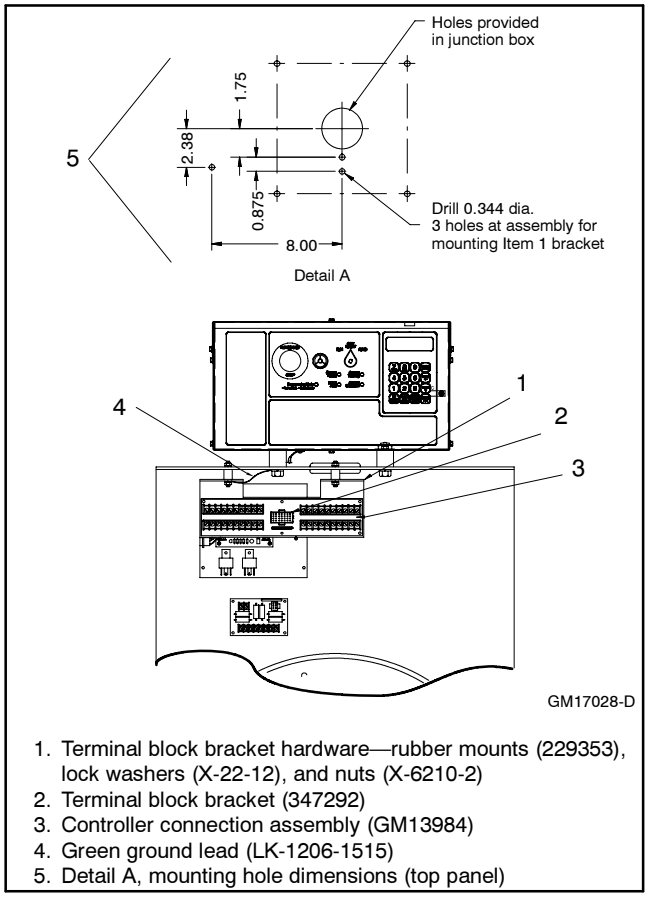
2.1.4 Proceed to step 2.4.

2.2 **GM17068-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.



1. Terminal block bracket hardware—rubber mounts (229353), lock washers (X-22-12), and nuts (X-6210-2)
2. Terminal block bracket (347292)
3. Controller connection assembly (GM13984)
4. Green ground lead (LK-1206-1515)
5. Detail A, mounting hole dimensions (top panel)

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

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

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

2.2.6 Attach three rubber mounts (229353) to the terminal block bracket (347292) using three lock washers (X-22-12) and nuts (X-6210-2). Attach one end of green ground lead (LK-1206-1515) between terminal block bracket and nut. See Figure 3.

2.2.7 Place terminal block bracket assembly from previous step on the underside of the junction box top panel and mount using three lock washers (X-22-12) and nuts (X-6210-2).

2.2.8 Reposition the controller over the junction box holes and install the four screws removed in step 2.2.2. Attach the other end of green ground lead (LK-1206-1515) between the junction box and screw.

2.2.9 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.

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

2.2.11 Proceed to step 2.4.

2.3 **365569-KP9 kit (450–2800 kW)**

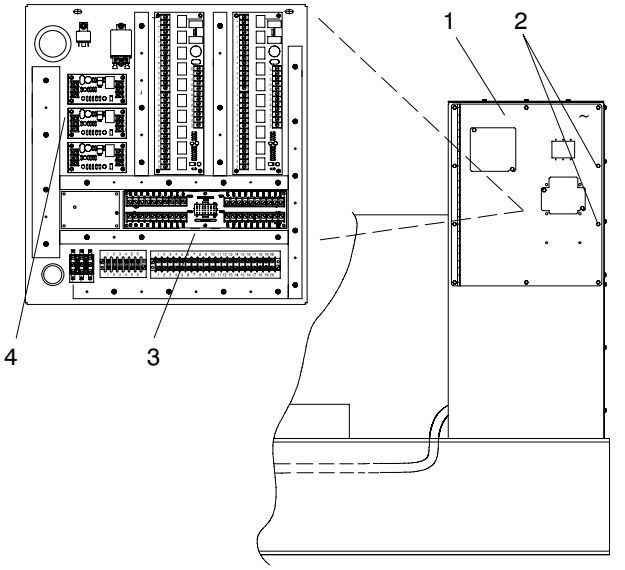
2.3.1 Remove the junction box upper rear panel and hardware.

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

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



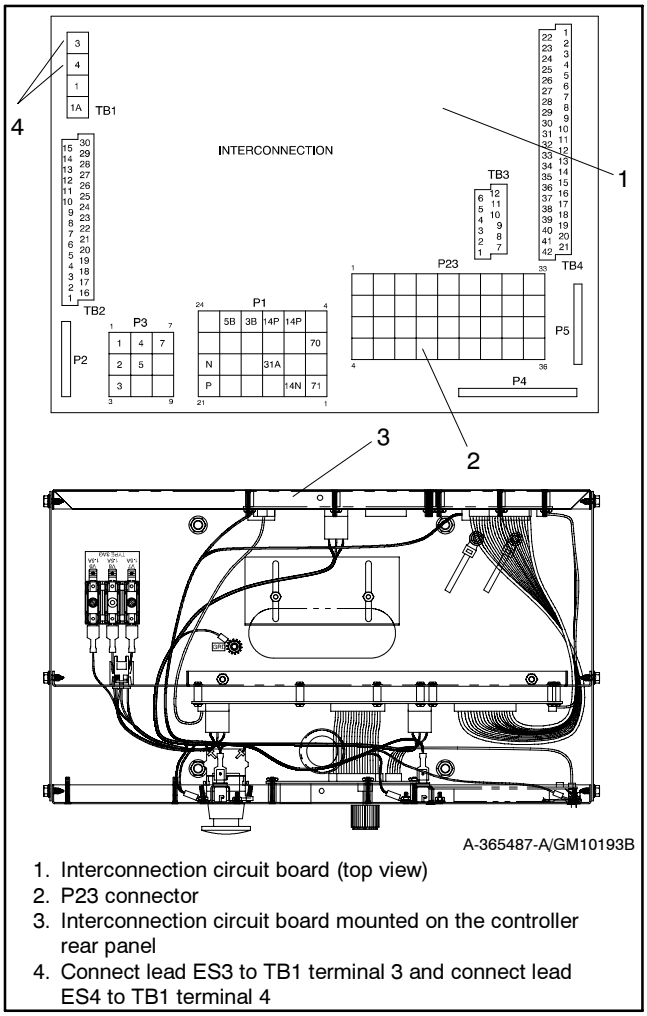
1. Inner panel access door
2. Inner panel access door screws (6)
3. Controller connection assembly (GM13984)
4. Single-relay dry contact circuit board (C-294301)

Figure 4 Terminal Block Bracket Mounting in Junction Box (450–2800 kW)

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.

2.6 Plug the wiring harness connector into the interconnection circuit board's P23 connector. Connect lead ES3 to TB1 terminal 3 and connect lead ES4 to TB1 terminal 4. See Figure 5. If access to interconnection circuit board is difficult, remove two controller panel top screws and center bottom screw and then loosen bottom screws to swing rear controller panel down.



1. Interconnection circuit board (top view)
2. P23 connector
3. Interconnection circuit board mounted on the controller rear panel
4. Connect lead ES3 to TB1 terminal 3 and connect lead ES4 to TB1 terminal 4

Figure 5 Attaching Wiring Connection Harness to Controller Circuit Board

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 single-relay dry contact assembly.

3.1 **GM17068-KP1 kit (20–300 kW)**

3.1.1 Drill four 4.7 mm (0.187 in.) dia. holes in the junction box as shown in Figure 6. The single-relay dry contact kit mounts behind the controller.

3.1.2 Remove burrs from the drilled holes and clean up all metal chips in the junction box.

3.1.3 Remove the cover from the single-relay dry contact assembly (A-273945) by removing four screws.

3.1.4 Using Figure 6, mount the single-relay dry contact box (A-273945) to the junction box using eight nuts (X-6210-4) and four vibromounts (282829).

3.1.5 Proceed to step 4.

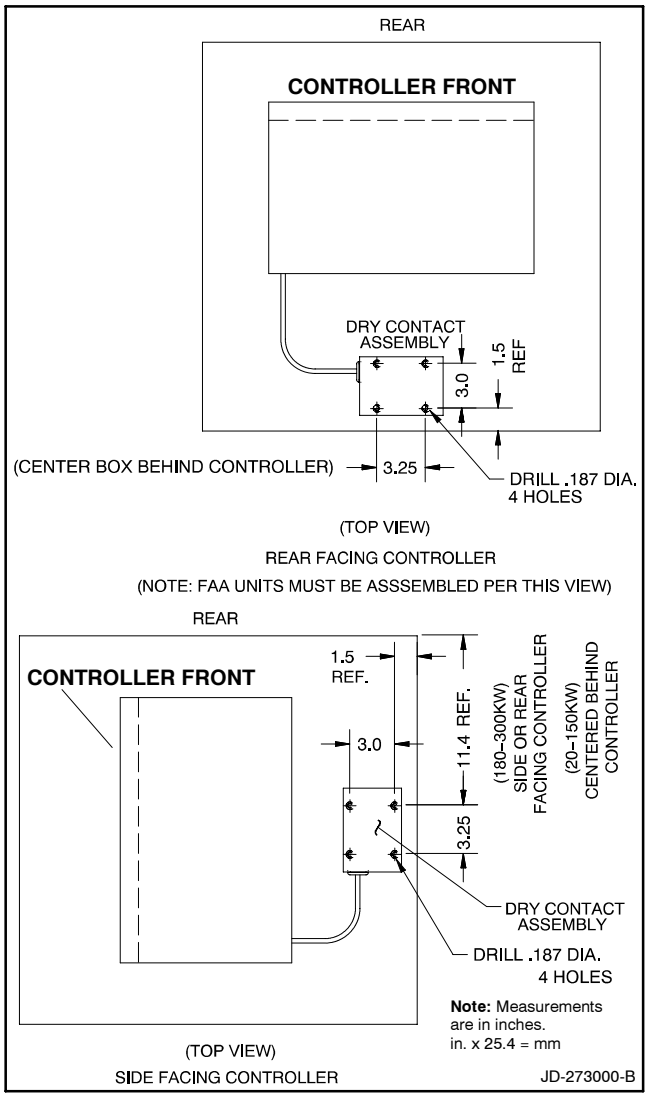


Figure 6 Junction Box Drilling Information (20–300 kW)

3.2 **GM17068-KP2 kit (350/400 kW)**

3.2.1 Drill four 4.7 mm (0.187 in.) dia. holes in the junction box as shown in Figure 7.

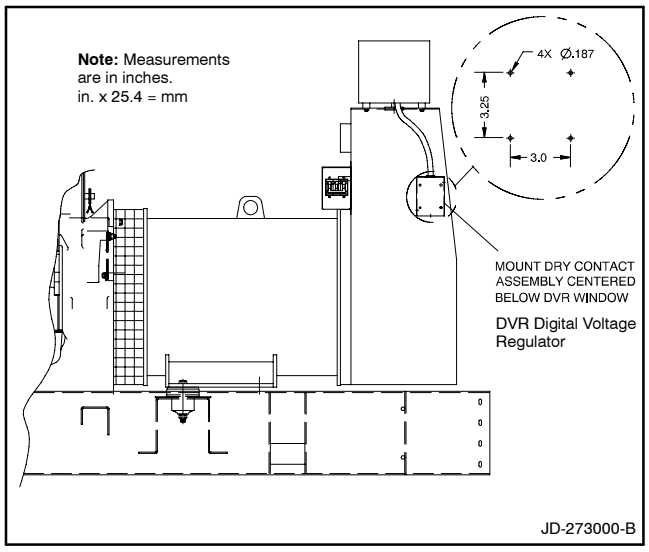


Figure 7 Junction Box Drilling Information (350/400 kW)

3.2.2 Remove burrs from the drilled holes and clean up all metal chips in the junction box.

3.2.3 Remove the cover from the single-relay dry contact assembly (A-273945) by removing four screws.

3.2.4 Mount the single-relay dry contact box (A-273945) to the junction box using eight nuts (X-6210-4) and four vibromounts (282829). See Figure 7 for the mounting position.

3.2.5 Proceed to step 4.

3.3 **365569-KP9 kit (450-2800 kW)**

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

3.3.2 Connect the wiring harness (GM10186) to the single-relay dry contact kit relay input terminals. See Figure 8 for connection information.

3.3.3 Proceed to step 4.

4. Connect the single-relay dry contact kit to the controller connection kit.

Connect the single-relay dry contact wiring harness to the controller connection assembly in the junction box. See Figure 8. Leads 42A and N provide power to the relay. The user must select a RDO fault terminal for connecting the K1 signal lead. See Figure 9 and Figure 10 for terminal connections.

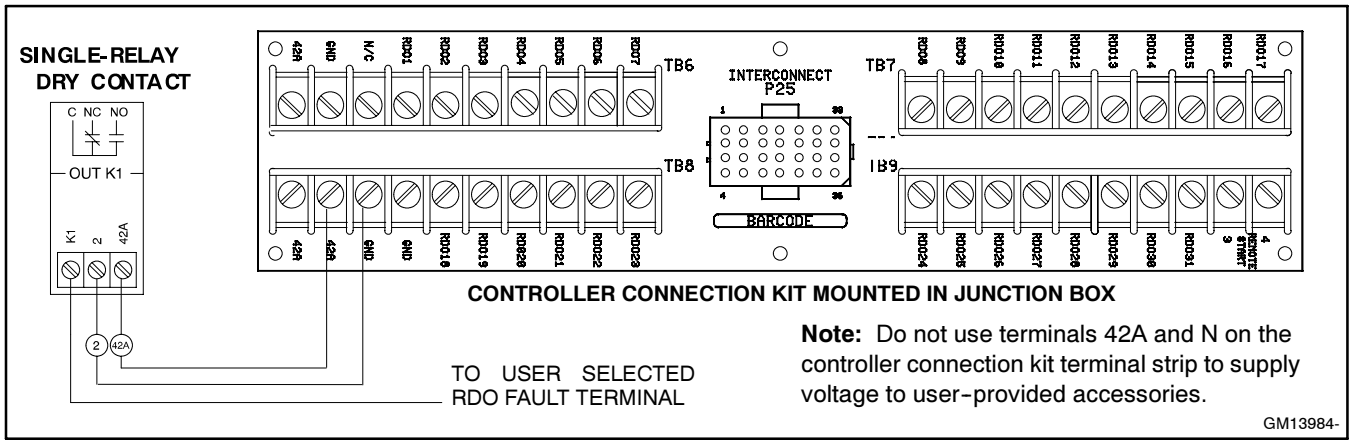


Figure 8 Single-Relay Dry Contact Relay Kit Connections

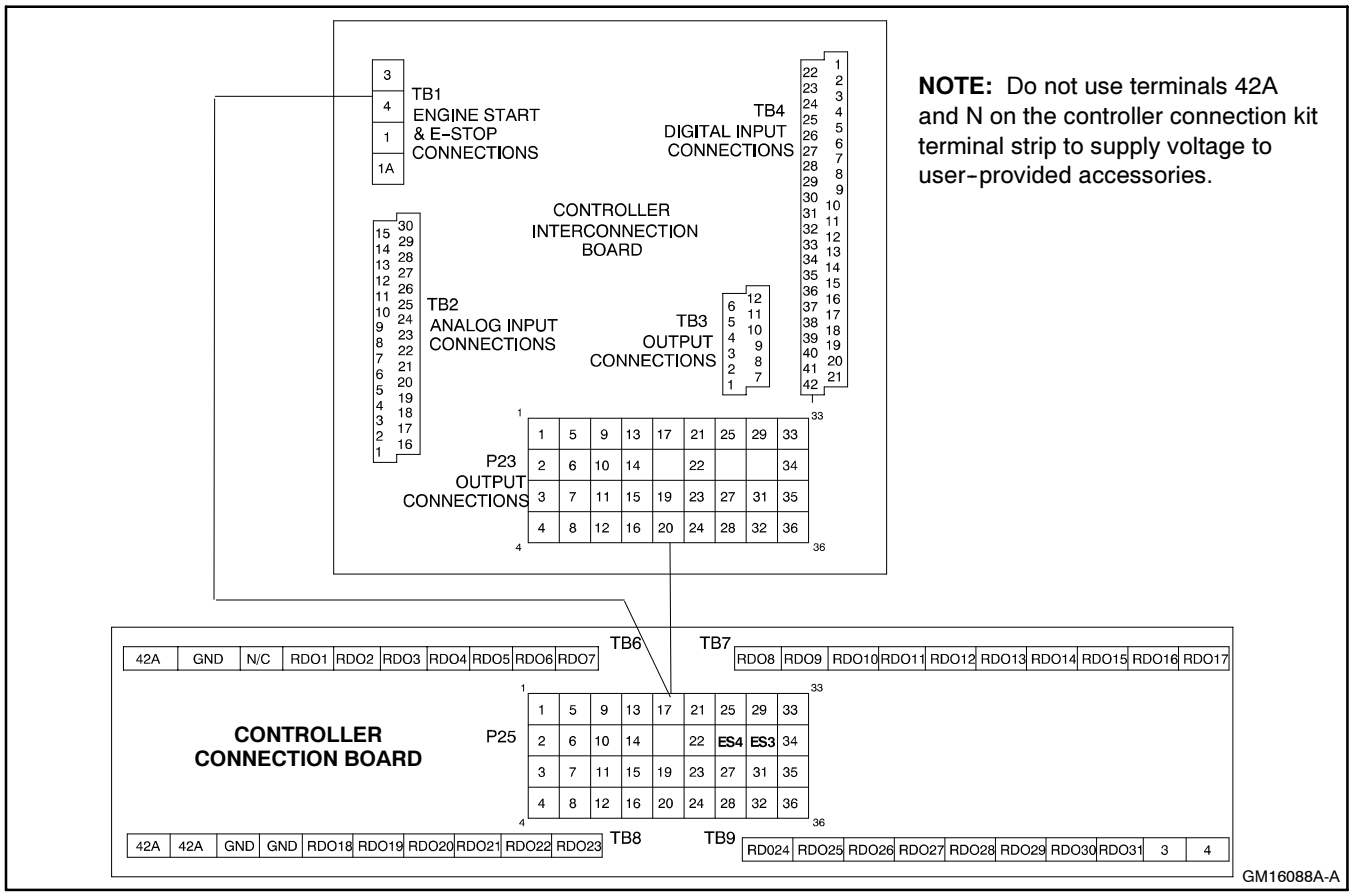


Figure 9 Controller Connection Kit

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 user 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 10 Controller Connection Kit Terminal Strip Identification with Relay Driver Outputs (RDOs)

5. Connect the single-relay dry contact to the user-supplied device.

Select the normally open (NO) and/or normally closed (NC) contacts of the single-relay, form C dry contact, 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 user-supplied device to the single-relay dry 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 single-relay dry contact wiring.

5.2 **12/24-Volt DC Devices.** Attach the user-supplied 12/24-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 12/24-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 user-supplied accessories to a separate 120-volt AC power supply. The circuit must include fuse or circuit breaker protection.

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

5.5 **GM17068-KP1 and GM17068-KP2 kits only (20–400 kW).** Replace the cover of the single-relay dry contact assembly (A-273945) and install the four screws.

5.6 **365569-KP9 kit only (450–2800 kW).** Swing the access door closed and install the screws.

5.7 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 Dry Contact Relay

Verify that the dry contact relay functions by using the following procedure when troubleshooting.

Test Procedure

1. De-energize the power supply to the user-supplied device.
2. Remove the user-supplied device and power supply wiring from the dry contact relay terminals.
3. Test the relay operation by connecting an ohmmeter across the NO and C terminals on the relay terminal strip.
4. Use a jumper wire to ground the selected fault terminal on the controller connection terminal strip. The relay contacts should close and the ohmmeter should display a low resistance reading (continuity).
5. Install the user-supplied device and power supply wiring on the dry contact relay terminals.
6. Energize the power supply to the user-supplied device.

Parts List

Single-Relay Dry Contact Kits

Kit: GM17068-KP1 (20–300 kW)		
Qty.	**Description**	**Part Number**
1	Dry contact assembly, single-relay	A-273945
4	Vibromount	282829
6	Screw, round head machine	X-51-3
6	Spacer, 0.25 in OD x 0.5 in.	X-712-9
14	Nut, 8-32 whiz	X-6210-4
1	Connection assembly, controller	GM13984
1	Harness, controller connection wiring	GM17033

Kit: GM17068-KP2 (350/400 kW)		
Qty.	**Description**	**Part Number**
1	Dry contact assembly, single-relay	A-273945
3	Mount, rubber	229353
4	Vibromount	282829
1	Bracket, terminal block	347292
1	Lead	LK-1206-1515
6	Screw, 8-32 x 1 in. hex head	X-51-3
6	Washer, 1/4 in. lock	X-22-12
6	Nut, 8-32 hex	X-70-12
6	Spacer, 0.25 in OD x 0.5 in.	X-712-9
6	Nut, 1/4-20 flange	X-6210-2
8	Nut, 8-32 whiz	X-6210-4
2	Nut, 5/16-18	X-6210-7
1	Connection assembly, controller	GM13984
1	Harness, controller connection wiring	GM17029

Kit: 365569-KP9 (450–2800 kW)		
Qty.	**Description**	**Part Number**
1	Dry contact, single-relay	C-294301
1	Harness, dry contact relay wiring	GM10186
4	Nut, 8-32 hex	X-70-12
4	Spacer, 0.25 in OD x 0.5 in.	X-712-9
1	Connection device and hardware includes:	GM28632-1
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, controller connection wiring	GM16753