INSTALLATION INSTRUCTIONS

Original Issue Date: **4/94**
Model: **20-2000 kW**
Market: **Industrial**
Subject: **Single-Relay Dry-Contact Kits PA-273912 and PA-273912-SD**

The single-relay dry-contact kit provides contact closure to activate warning devices and other customer-provided accessories allowing monitoring of the standby system from a remote location. Connect any controller fault (from TB1 terminal strip) to the single-relay dry-contact kit. Connect lamps, audible alarms, or other devices to one generator set function. Typical controller faults include overspeed, overcrank, high engine temperature, low oil pressure, or low water temperature condition. Figure 1 shows the single-relay dry-contact kit.

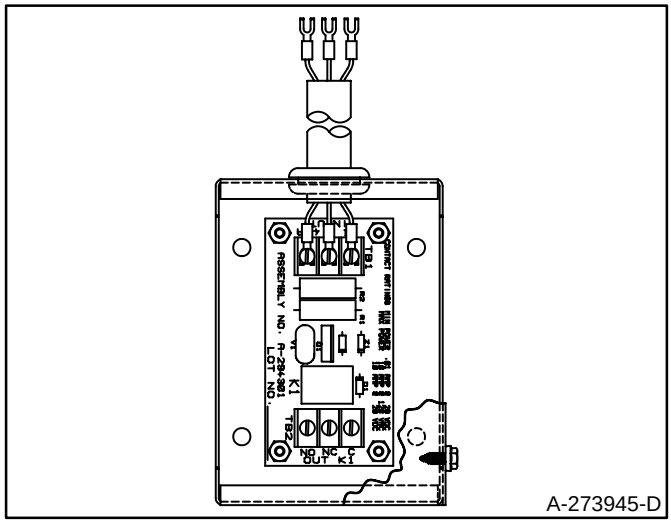


Figure 1. Single-Relay Dry-Contact Kit

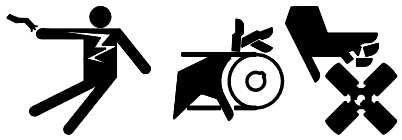
NOTE

Connect a maximum of three dry-contact relay kits to a single fault on the controller terminal strip.

Customer-provided accessories require their own electrical sources and must not exceed the relay contact ratings following.

Connect customer-supplied 12 volt DC accessories to battery positive (+) at starter solenoid and to battery negative (–) at engine ground. Do not use terminals 42A and N of dry-contact kit terminal strip to supply voltage to relay contacts. Use separate leads directly from the battery for supply voltage leads. Size leads according to appropriate local, state, and national electrical codes. Observe the following safety precautions while installing the kit.

⚠ WARNING



Accidental starting.
Can cause severe injury or death.

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

Disabling generator set. Accidental starting can cause severe injury or death. Turn generator set master switch to OFF position, disconnect power to battery charger, and remove battery cables (remove negative lead first and reconnect it last) to disable generator set before working on the generator set or connected equipment. The generator set can be started by an automatic transfer switch or remote start/stop switch unless these precautions are followed.

Relay Contact Rating

Maximum Switching Voltage	120 volts AC
Maximum Switching Current	10-amps
Minimum Switching Power	10 milliamps at 28 volts DC or equivalent

Installation

1. Place the generator set master switch in the OFF position.
2. Disconnect the generator set engine starting battery(ies), negative (–) lead first. Disconnect power to the battery charger, if equipped.
3. Remove the controller cover.

4. Mount the dry-contact box in one of the areas listed below. Use the contact assembly as a template and drill the necessary mounting holes.
   - Inside the junction box.
   - On top of the junction box. Limited by the size of the controller and the size of the junction box.
   - On top of the generator skid. Limited by the clearance and housing options.
   - In an area as near to the generator set controller as practical.
5. Attach the contact assembly with customer-supplied mounting hardware.
6. Connect the contact assembly to the controller or customer connection kit using the wiring harness provided. Connect controller/junction box terminals 2 (ground) and 42A (battery voltage) to the single-relay dry-contact providing an electrical source to operate the K1 relay.

   Determine which accessory connection wiring diagram to use by identifying the type of generator set controller by the circuit board part number on the controller circuit board The alphacharacter in the circuit board part number may be different from the one shown. See Figure 2.

   When a generator fault condition occurs, the contact kit relay (K1) tied to that function energizes. Select either normally open or normally closed contacts from the relay depending upon application requirements. The relay contact closure corresponds to the controller light being activated.

Circuit Board Part Number	Terminal Strip Qty.	Wiring Diagram
A-328003	TB1	Figure 3
A-336415	TB1 and TB2	Figure 4
A-352160	TB1, TB2, TB3, and TB4	Figure 5

Figure 2. Generator Set Controller Identification

NOTE

Use a customer connection kit for easier connection and disconnection of generator accessories.

7. Choose one function to activate the alarm. The wiring diagram indicates typical functions.
8. Verify that the electrical supply meets the requirements of the customer-provided devices connected to the dry-contact kit.
9. Reinstall the controller cover.
10. Check that the generator set master switch in the OFF position.
11. Reconnect the generator set engine starting battery, negative (–) lead last. Reconnect power to battery charger, if equipped.

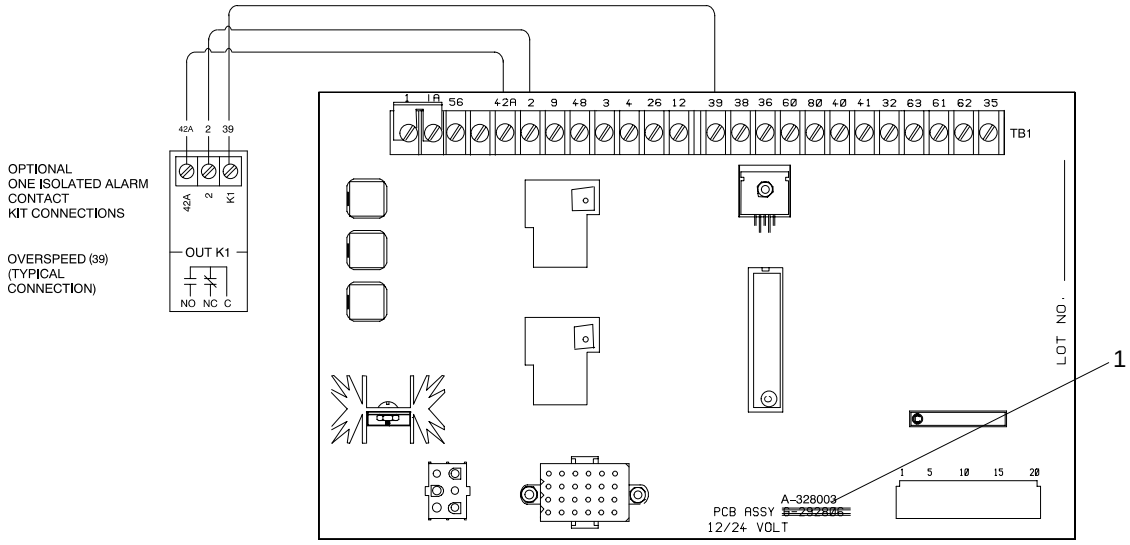
Single-Relay Dry-Contact Kit

Parts List		
Kit: PA-273912, PA-273912-SD		
Qty.	**Description**	**Part Number**
1	Assembly, contact (includes *)	A-273945
4	* Nut, hex	X-70-12
4	* Spacer	X-712-9
4	* Screw	X-6216-1
1	* Grommet	243319
1	* Box, dry-contact	273942
1	* Cover, dry-contact	273943
1	* Harness, wiring	273944

TB1 Terminal Strip

1	Ground—emergency stop relay (K4)—Connect emergency stop across terminals TB1-1 and 1A†
1A	Emergency Stop Relay (K4) coil; negative side—Connect emergency stop across terminals TB1-1 and 1A†
2	Ground terminal
3	Remote start ground—Connect transfer switch or remote start switch to TB1-3 and TB1-4
4	Remote start—Connect transfer switch or remote start switch to TB1-3 and TB1-4
9	Crank mode selection (open—cyclic crank; ground—continuous crank). Connect TB1-2 to TB1-9 for continuous cranking; leave TB1-9 open cyclic cranking—see Starting
12	Overcrank (OC) signal*
26	Auxiliary (AUX) signal*
32	Common Fault/Prealarm Line—A/V alarm or common fault relay activated by OC, 12; AUX, 26; LWT, 35; HET, 36; LOP, 38; OS, 39; AHET, 40; ALOP, 41; and LF, 63 faults
35	Low water temperature (LWT) signal
36	High engine temperature (HET) signal*
38	Low oil pressure (LOP) signal*
39	Overspeed (OS) signal*
40	Anticipatory high engine temperature (AHET) signal*
41	Anticipatory low oil pressure (ALOP) signal*
42A	Battery voltage (fuse #1 protected)—Accessory power supply; Customer may also provide separate accessory power source
48	Emergency stop (ES) signal*
56	Air damper (AD) switch, if equipped. Standard on all 200-2000 kW Detroit Diesel powered models
60	System ready signal*
61	Battery charger fault—Connect battery charger alarm contact to TB1-61 to activate fault lamp (active low), if used
62	Low battery volts—Connect battery charger alarm contact to TB1-62 to activate fault lamp (active low), if used
63	Low fuel (LF) fault—Connect fuel level sensor to TB1-63 to activate fault lamp (active low), if used
80	Not in auto signal*

NOTE: Not all terminals are used for all generator sets (see appropriate wiring diagrams for specific generator set model)
† Connect jumper across terminals 1 and 1A if emergency stop switch is not used.
* Use a remote annunciator and/or A/V alarm kit as an indicator with a dry contact kit connected to controller terminal strip TB1.



255828A-M

1. Circuit board part number location

Figure 3. Controller Circuit Board A-328003 Wiring Diagram

TB1 Terminal Strip

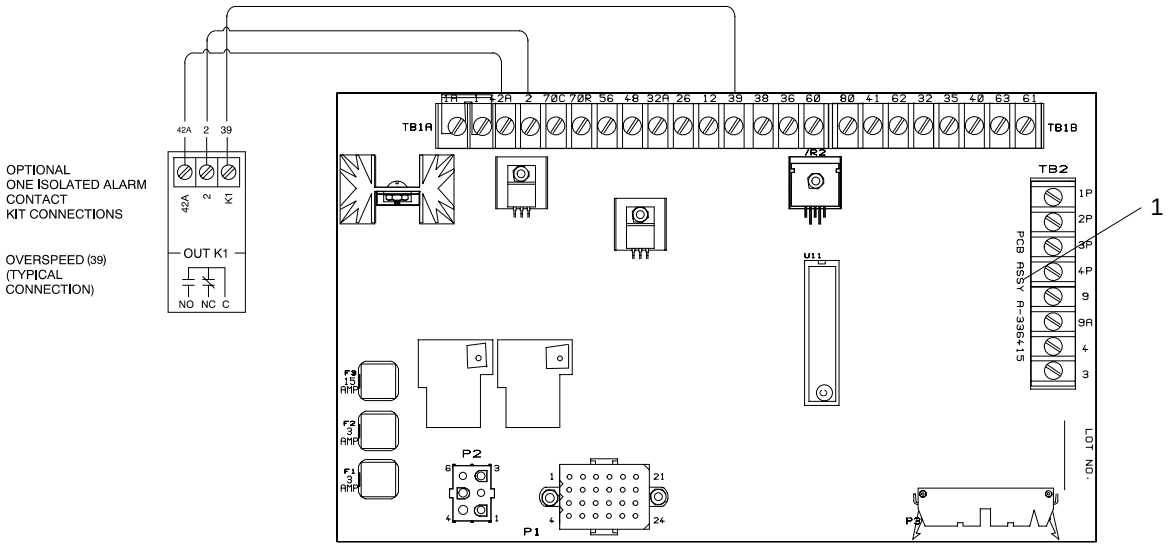
1	Ground—emergency stop relay (K4)—Connect emergency stop across terminals TB1-1 and 1A†
1A	Emergency Stop Relay (K4) coil; negative side—Connect emergency stop across terminals TB1-1 and 1A†
2	Ground terminal
12	Overcrank (OC) signal*
26	Auxiliary (AUX) signal*
32	Common Fault/Prealarm Line 1—A/V alarm or common fault relay activated by OC, 12; AUX, 26; LWT, 35; HET, 36; LOP, 38; OS, 39; AHET, 40; ALOP, 41; and LF, 63 faults
32A	Common Fault/Prealarm Line 2—A/V alarm or common fault relay activated by AUX, 26; HET, 36; LOP, 38; OS, 39; and ES, 48 faults
35	Low water temperature (LWT) signal
36	High engine temperature (HET) signal*
38	Low oil pressure (LOP) signal*
39	Overspeed (OS) signal*
40	Anticipatory high engine temperature (AHET) signal*
41	Anticipatory low oil pressure (ALOP) signal*
42A	Battery voltage (fuse #1 protected)—accessory power supply; Customer may also provide separate accessory power source
48	Emergency stop (ES) signal*
56	Air damper (AD) switch (if equipped). Standard on all 200-2000 kW Detroit Diesel powered models
60	System ready signal*
61	Battery charger fault—Connect battery charger alarm contact to TB1-61 to activate fault lamp (active low), if used
62	Low battery volts—Connect battery charger alarm contact to TB1-62 to activate fault lamp (active low), if used
63	Low fuel (LF) fault—Connect fuel level sensor to TB1-63 to activate fault lamp (active low), if used
70C	Generator in cool down mode signal
70R	Generator in running mode signal
80	Not in auto signal*

NOTE: Not all terminals are used for all generator sets (see appropriate wiring diagrams for specific generator set model)
† Connect jumper across terminals 1 and 1A if emergency stop switch is not used.
* Use a remote annunciator and/or A/V alarm kit as an indicator with a dry contact kit connected to controller terminal strip TB1.

TB2 Terminal Strip

1P	Prime power operation
2P	Prime power operation
3	Remote start ground—Connect transfer switch or remote start switch to TB2-3 and TB2-4
3P	Prime power operation
4	Remote start—Connect transfer switch or remote start switch to TB2-3 and TB2-4
4P	Prime power operation
9	Crank mode selection (open—cyclic crank; ground—continuous crank). Connect TB2-9 to TB2-9A for continuous cranking; leave TB2-9 open cyclic cranking—see Starting
9A	Crank mode ground

NOTE: To use prime power mode—place jumpers across TB2-1P to TB2-2P, TB2-3P to TB2-4P, and TB2-3 to TB2-4. To deactivate prime power mode—remove jumpers across TB2-1P to TB2-2P, TB2-3P to TB2-4P, and TB2-3 to TB2-4.



1. Circuit board part number location

Figure 4. Controller Circuit Board A-336415 Wiring Diagram

TB1 Terminal Strip—Output Connections

1	Engine ground	18	42A battery voltage—accessory power supply
2	Engine ground	19	42A battery voltage—accessory power supply
3	Engine ground	20	42A battery voltage—accessory power supply
4	Engine ground	21	Digital voltage regulator (DVR) adjustment down
5	Panel lamp layout	22	Digital voltage regulator (DVR) adjustment common
6	Relay driver output (RDO)—10 high battery voltage	23	Digital voltage regulator (DVR) adjustment up
7	Relay driver output (RDO)—9 speed sensor fault	24	Relay driver output (RDO)—8 EPS supplying load
8	Relay driver output (RDO)—7 low coolant level	25	Relay driver output (RDO)—6 overvoltage
9	Relay driver output (RDO)—5 air damper (56)	26	Relay driver output (RDO)—4 engine cooldown (70C)
10	Not in auto relay output (80)	27	Relay driver output (RDO)—3 generator running (70R)
11	Overcrank relay output (12)	28	Relay driver output (RDO)—2 defined comm. fault (32A)
12	Low battery voltage relay output (62)	29	Relay driver output (RDO)—1 NFPA comm. fault (32)
13	Low coolant temperature relay output (35)	30	System ready output (60)
14	Low oil pressure relay output (38)	31	Emergency stop relay output (48)
15	High coolant temperature relay output (36)	32	Battery charger fault relay output (61)
16	Low oil pressure warning relay output (41)	33	Low fuel relay output (63)
17	High coolant temperature warning relay output (40)	34	Overspeed relay output (39)

NOTE: Not all terminals are used for all generator sets (see appropriate wiring diagrams for specific generator set model)
Use a remote annunciator and/or A/V alarm kit as an indicator with a dry contact kit connected to controller terminal strip TB1.
RDO outputs are active low (–).

TB2 Terminal Strip—Input Connections

RMT RST	Remote reset*
GND FLT	Ground fault*
SP1	Not used
SP2	Not used
BCF	Battery charger fault*
LF	Low fuel*
PP	Prime power mode*
GND	Engine ground
GND	Engine ground
GND	Engine ground

* Connect to ground to activate

TB3 Terminal Strip—Input Connections

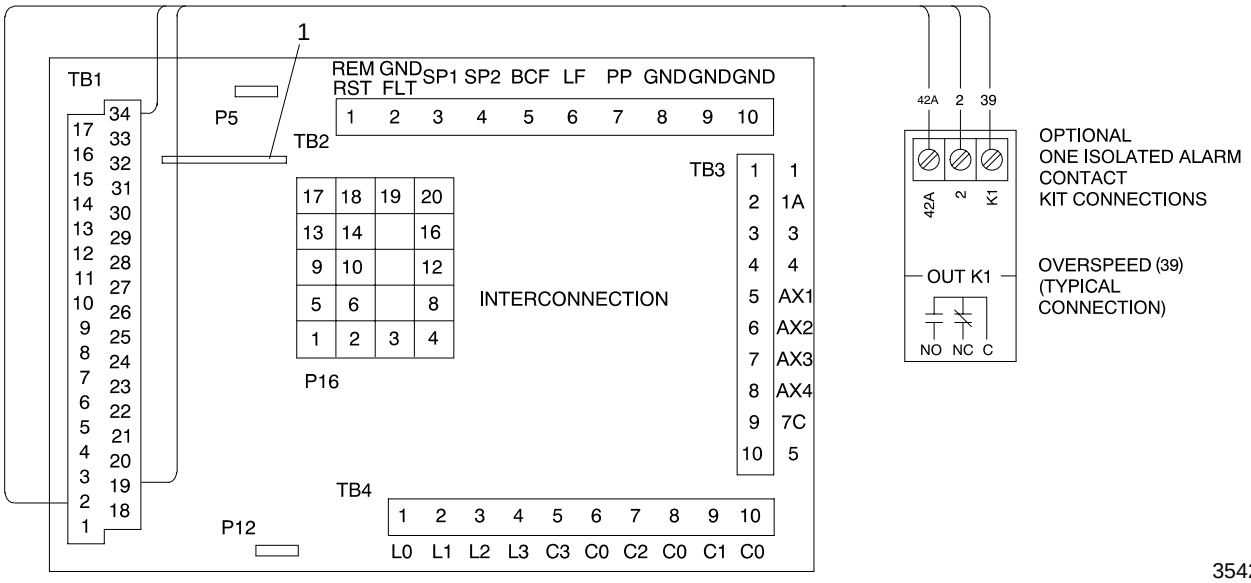
1	Emergency stop ground
1A	Emergency stop
3	Remote start
4	Remote start
AX1	Auxiliary 1*
AX2	Auxiliary 2*
AX3	Auxiliary 3*
AX4	Auxiliary 4*
7C	Oil pressure
5	Coolant temperature

* Connect to ground to activate

TB4 Terminal Strip—AC Input Connections

L0	L0 (V0)
L1	L1 (V7)
L2	L2 (V8)
L3	L3 (V9)
-	Not used
C3	C3
C2	C2
C1	C1
C0	C0

* Connect to ground to activate



1. Circuit board part number location

Figure 5. Controller Circuit Board A-352160 Wiring Diagram