INSTALLATION INSTRUCTIONS

Original Issue Date: **5/95**
Model: **20-2000 kW**
Market: **Industrial**
Subject: **Failure Relay Kits PA-347274, PA-347274-SD, PA-361548, PA-361548-SD**

The failure relay kit allows remote monitoring of the standby system by using one set of contacts to trigger customer-provided signaling devices if a fault condition occurs. The kit typically connects to terminal 32A on terminal strip TB1. Connection to 32A on the controller circuit board part number A-336415 monitors emergency stop, auxiliary, overspeed, high engine temp, and low oil pressure. Connection to 32A on the controller circuit board A-352160 monitors emergency stop, overspeed, low oil pressure, high engine temperature, and overcrank. Typically, lamps, audible alarms, or other devices are connected to signal the conditions. Figure 1 shows the failure relay kit.

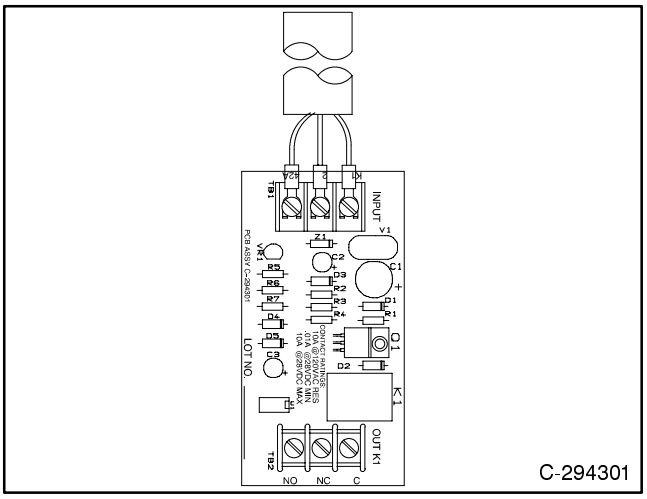


Figure 1. Failure Relay Kit

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

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

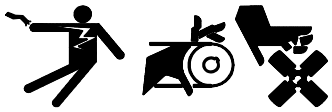
NOTE

Observe applicable local, state, and national electrical codes when installing the failure relay kit and related accessories.

NOTE

Monitor single faults by connecting to the appropriate terminal.

⚠ 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.

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 power to the battery charger, if equipped.
3. Disconnect the generator set engine starting battery(ies), negative (–) lead first.
4. Remove the generator set controller cover.
5. Mount the failure relay inside the junction box. Drill four 3/16 in. (5 mm) diameter holes in the generator panel using the relay board as a template. See Figure 3.
6. Attach the relay to the junction box. See Figure 3 for mounting styles and locations.
7. Use the supplied wiring harness and 18-gauge stranded wire to extend the failure relay wiring harness if mounting the kit in a location remote from the generator set.

NOTE

Do not mount the kit more than 200 ft. (61 m) from the generator set.

8. Connect the failure relay kit wiring harness (347275) according to one of the wiring diagrams listed in Figure 2. Use a customer connection kit (terminal strip) for easier connection and disconnection of generator set accessories. Controller/connection kit terminals 2 (ground) and 42A (battery voltage) must be connected to the failure relay terminal strip 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 letter in the circuit board part number may be different from the letter A shown. See Figure 2.

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

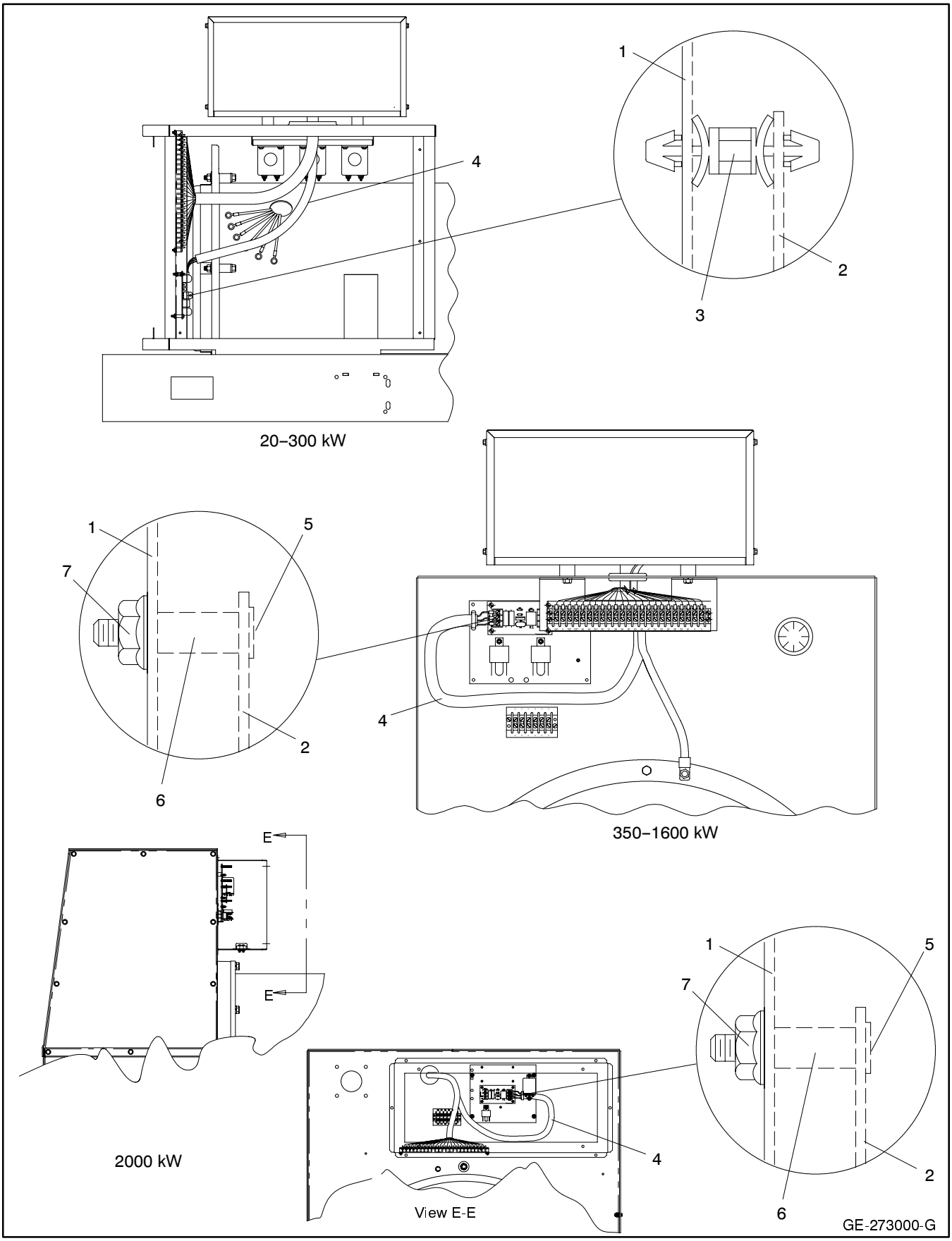
Figure 2. Generator Set Controller Identification

   Select normally open or normally closed contacts, depending upon the application. The relay contact closure corresponds to the selected controller light being activated.

9. Customer-provided devices connected to the failure relay kit must have an adequate electrical supply to operate the device. Check the electrical requirements of the customer-provided accessories prior to installation. Use 18-gauge stranded wire to connect customer-provided accessories to the failure relay terminal strip.
10. Use cable tie (X-468-1) to bundle and secure the wiring harness.
11. Reinstall the generator set controller cover.
12. Reconnect the generator set engine starting battery, negative (–) lead last.
13. Reconnect the power to the battery charger, if equipped.

Testing

Test the failure relay operation by connecting an ohmmeter across the NO and C terminals on the relay terminal strip. Start the generator set and ground the connected shutdown switch on the controller terminal strip TB1. During generator set shutdown, the relay contacts should close and the ohmmeter should display a low resistance reading (continuity). After the test is completed, place the generator controller master switch in the OFF position.



1. Circuit board
2. Relay panel
3. Circuit board standoff (360459)
4. Wiring harness
5. Screw (X-51-3)
6. Spacer (X-712-9)
7. Nut (X-6210-4)

Figure 3. Failure Relay Kit Installation

Controller Terminal Identification

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	Failure Relay/Prealarm Line 1—A/V alarm or failure relay activated by OC, 12; AUX, 26; LWT, 35; HET, 36; LOP, 38; OS, 39; AHET, 40; ALOP, 41; and LF, 63 faults
32A	Failure Relay/Prealarm Line 2—A/V alarm or failure 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*

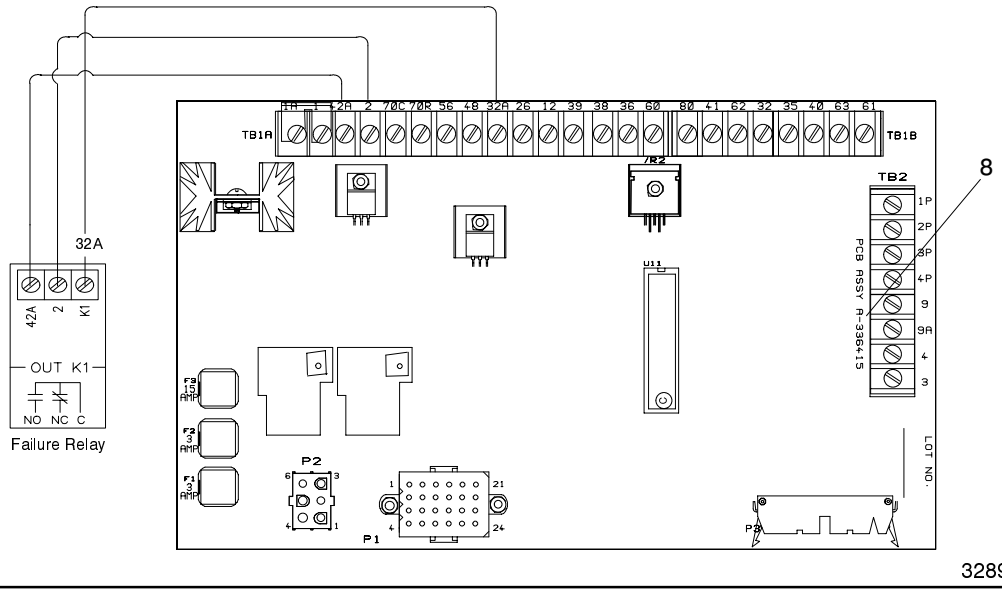
NOTE: Not all terminals are used for all generator sets (see appropriate wiring diagrams for specific generator set model)
† Connect jumper across terminals 1 and 1A if emergency stop switch is not used.
* Use a remote annunciator and/or A/V alarm kit as an indicator with a dry contact kit connected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

Note: Wiring harness leads connected to controller/connection kit terminals 2 and 42A connect to failure relay terminals 2 and 42A respectively. The remaining wiring harness lead connects to selected generator output on the controller/connection kit terminal strip and to failure relay K1 terminal. If wiring harness is connected to terminal other than 32A mark lead according to new terminal connection.



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8. 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

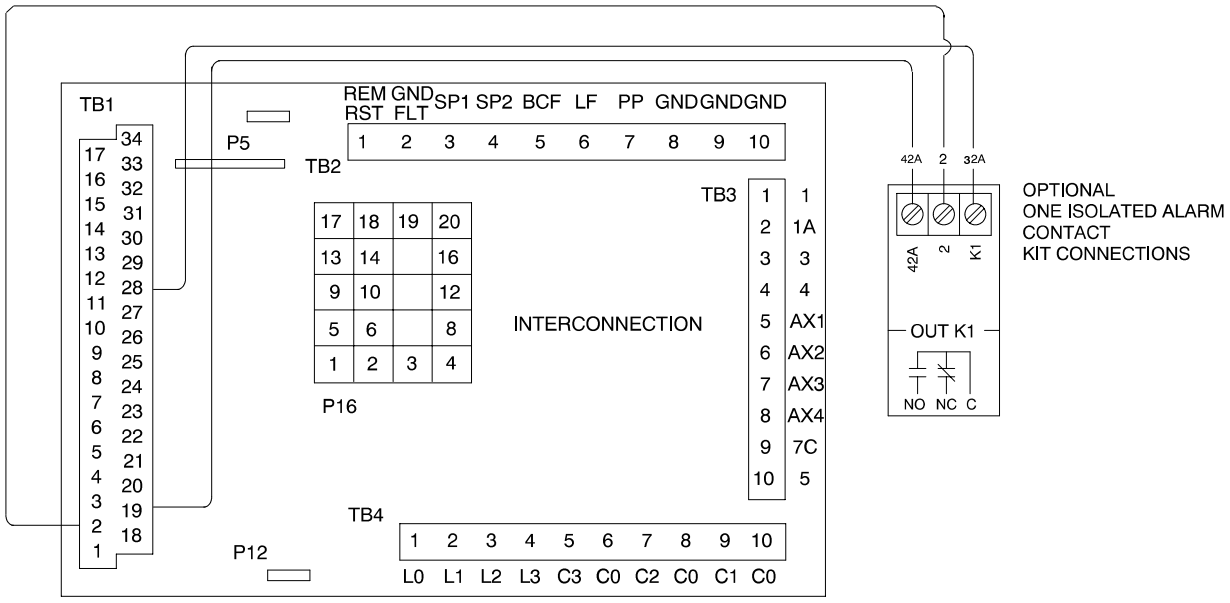

Figure 5. Controller Circuit Board A-352160 Wiring Diagram

Failure Relay Kit

Parts List				
Kits: PA-347274, PA-347274-SD, PA-361548, PA-361548-SD			Unique Parts	
Qty.	Description	Common Parts	PA-347274 PA-347274-SD	PA-361548 PA-361548-SD
1	Circuit board assembly, failure relay	C-294301		
4	Screw, r.h.m., 8-32 x 1.0 in.		X-51-3	
1	Tie, cable	X-468-1		
4	Spacer, 1/2 in.		X-712-9	
4	Nut, 8-32		X-6210-4	
1	Harness, wiring	347275		
4	Standoff, circuit board			360459