

## INSTALLATION INSTRUCTIONS

Original Issue Date: **2/97**  
 Model: **900/1000 kW**  
 Market: **Industrial**  
 Subject: **Block Heater Kits PA-328648, PA-328648-SD**

The block heater kit heats engine coolant, making starting easier and warm-up quicker while reducing energy costs. The thermostat automatically turns off the heater when coolant temperature reaches 120°F (49°C).




This procedure refers to radiator-cooled models. City water cooled models are similar; however, procedures and capacities may vary. Observe the following safety precautions while installing the kit.



**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 and switchgear engine control 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 automatic transfer switch or remote start/stop switch unless these precautions are followed.

 <b>WARNING</b>	
 <p><b>Hazardous voltage.</b></p>	 <p><b>Moving rotor.</b></p>
<p><b>Can cause severe injury or death.</b></p> <p>Operate generator set only with all guards and electrical enclosures in place.</p>	

**Engine block heater. Hazardous voltage can cause severe injury or death.** Engine block heater can cause electrical shock. Remove engine block heater plug from electrical outlet before working on block heater electrical connections.

### NOTE



Pay special attention to the coolant level. After draining the coolant, allow time for complete refill of the engine water jacket. Check coolant level as prescribed in the Prestart Checklist of the Operation Manual.

### NOTE

**Engine Damage!** Failure to bleed air from cooling system may cause overheating and subsequent engine damage.

### NOTE

Do not turn on block heater before filling cooling system. Run engine until warm and refill radiator to purge air from the system before energizing block heater. If heater element is not immersed in water block heater will fail.

 <b>WARNING</b>

<p><b>Hot coolant and steam.</b>  <b>Can cause severe injury or death.</b></p> <p>Before removing pressure cap, stop generator set and allow it to cool. Then loosen pressure cap to relieve pressure.</p>

**Checking coolant level. Hot coolant can cause severe injury or death.** Allow engine to cool. Release pressure from cooling system before opening pressure cap. To release pressure, cover the pressure cap with a thick cloth; then slowly turn it counterclockwise to the first stop. Remove cap after pressure has been completely released and the engine has cooled. Check coolant level at tank if generator set is equipped with a coolant recovery tank.

# Installation

1. Place generator set master switch in the OFF position.
2. Disconnect generator set engine starting battery(ies), negative (–) lead first. Disconnect power to battery charger, if equipped.
3. With generator set sufficiently cooled, drain the coolant into a suitable container. Drain enough coolant to allow removal of pipe plug from lower radiator tube. See Figure 1 for cooling system capacity. Petcock drain valves are located on radiator bottom and/or engine bottom.

## NOTE

Dispose of used engine coolant in an environmentally safe manner. Do not pour coolant on the ground, down sewers, or into streams or other bodies of water.

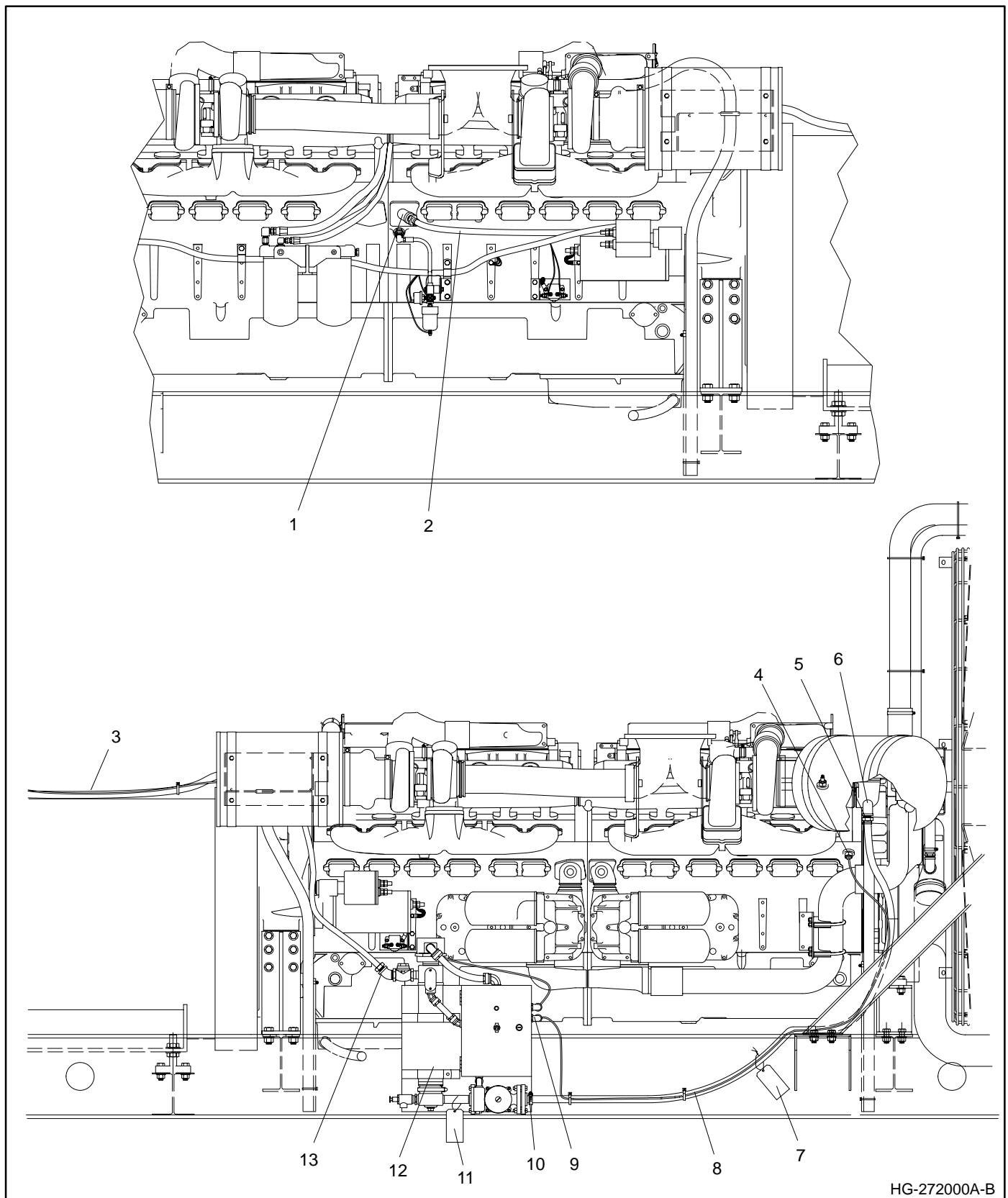
Model	Capacity U.S. Gal. (L)
900/1000	66 (252)

**Figure 1. Radiator System Coolant Capacity  
(Including Engine Water Jacket)**

4. Locate and remove pipe plug on left side of engine. See Figure 2 for location.
5. Apply pipe sealant to threads of 45° street elbow (X-274-15) and install where pipe plug was removed in step 4.
6. Apply pipe sealant to hose connector (X-582-8) and install into 45° street elbow installed in step 5.
7. Install one end of hose (X-691-36) on hose connector installed in step 6. Secure hose to hose connector with hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten. Route hose over flywheel housing. See Figure 2. Use cable ties as necessary.
8. Mount block heater (279933) to skid rail using existing holes at position indicated in Figure 2. Mount block heater with hex screws, plain washers, beveled washers, and whiz nuts. Position plain washers under bolt heads and beveled washers between whiz nuts and skid rail.
9. Apply pipe sealant to 45° street elbow (X-274-10) and install in block heater outlet. Position elbow as shown in Figure 2.
10. Apply pipe sealant to threads of hose connector (X-582-15) and install in elbow installed in step 9.
11. Attach loose end of hose installed in step 7 to hose connector. Secure hose to connector with one hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.
12. Remove pipe plug from thermostat housing on right front of engine. See Figure 2.
13. Apply pipe sealant to threads of 45° street elbow (X-274-15) and install where pipe plug was removed in step 12.
14. Apply pipe sealant to threads of hose connector (X-582-8) and install in street elbow installed in step 13.
15. Connect hose (X-691-34) to hose connector. Secure hose to connector with one hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.
16. Apply pipe sealant to threads of hose connector (X-582-15) and install in block heater inlet. See Figure 2.
17. Attach other end of hose connected in step 15 to block heater inlet. Secure hose to connector with one hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.
18. Remove pipe plug from right front of engine for thermostat installation. See Figure 2.
19. Apply pipe sealant to threads of reducer bushing (153659) and install where pipe plug was removed in step 18.
20. Apply pipe sealant to threads of block heater thermostat (279813) and install into reducer bushing installed in step 19.
21. Secure mounting track (347278) in upper right corner inside circulating pump control box using self-tapping screws (X-794-2). See Figure 4. Install socket assembly (X-6124-4) onto mounting track. Plug relay (291309) into socket assembly.
22. Attach thermostat lead from circulating pump control box to block heater thermostat. Secure thermostat lead to inlet hose with cable ties as necessary.
23. Route heater harness (279956) from circulating pump control box to generator set controller along engine harness. Use cable ties (X-468-1) to secure heater harness to engine harness.

## NOTE

Verify that block heater ON/OFF toggle switch, located on front center of control box door, is in OFF position before continuing installation. See Figure 3.



HG-272000A-B

- |  |   |
|--|---|
| 1. 45° street elbow (X-274-15) and hose connector (X-582-8)      | 8. Hose (X-691-34) and hose clamps (X-426-12)                 |
| 2. Hose (X-691-36)   | 9. Nonmetallic connector (X-567-1)                            |
| 3. Block heater harness (279956)                                 | 10. Hose connector (X-582-15)                                 |
| 4. Block heater thermostat (279813) and reducer bushing (153659) | 11. Instruction tag (299896)                                  |
| 5. Hose connector (X-582-8)                                      | 12. Block heater (279933)                                     |
| 6. 45° street elbow (X-274-15)                                   | 13. 45° street elbow (X-274-10) and hose connector (X-582-15) |
| 7. Hang tag (279047)   |   |

**Figure 2. 900/1000 kW Block Heater Installation**

24. Connect wiring inside of circulating pump control box for desired voltage. Connect control box to generator set controller. See Figure 4 for wiring connections and options.
25. Connect block heater to main power source.

#### NOTE

Have a certified electrician or qualified electrical technician make all electrical connections.

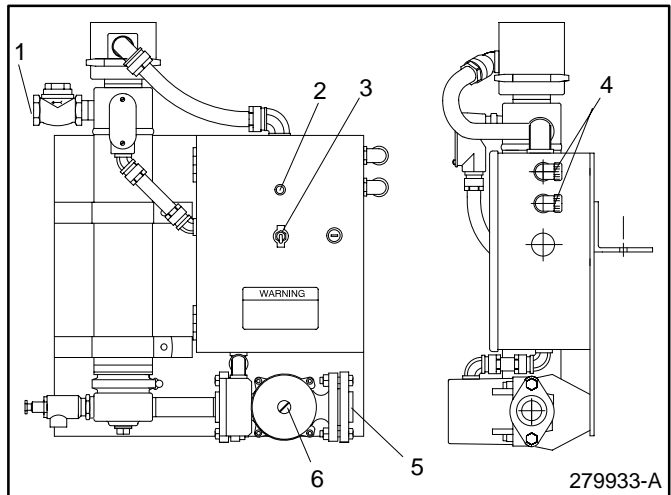
26. Close petcock valves on radiator and/or engine block.
27. Fill cooling system with fresh coolant. Use a solution of 50% ethylene glycol and 50% clean, softened water to inhibit rust/corrosion and to provide freezing protection.

#### NOTE

Coolant mixtures exceeding 50% ethylene glycol may cause block heater element failure. Failure to bleed all air from the system may cause block heater element failure.

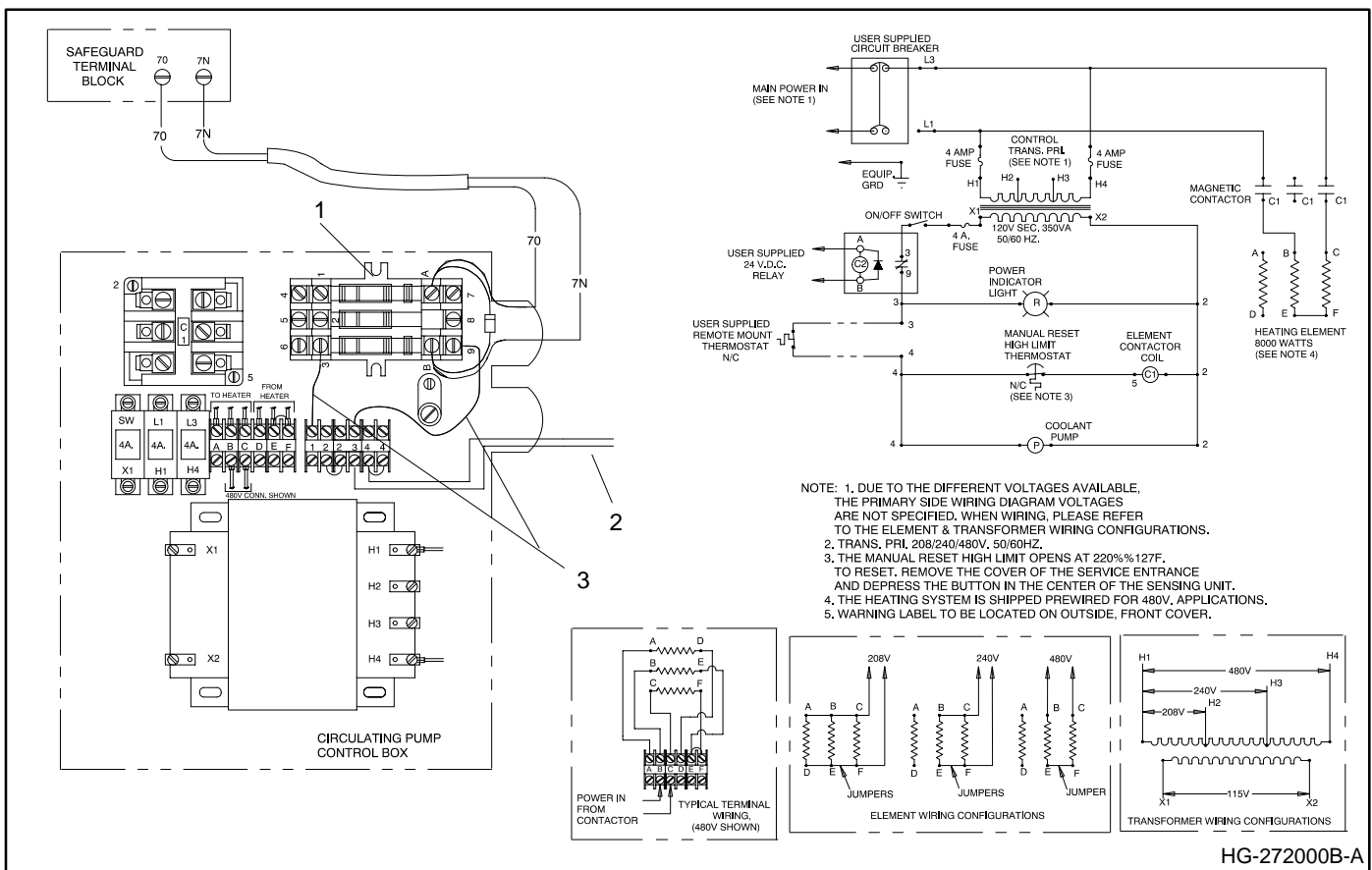
28. Check that the generator set master switch is in the OFF position. Check that the block heater ON/OFF switch is in the OFF position.

29. Reconnect generator set engine starting battery, negative (–) lead last. Reconnect power to battery charger, if equipped.



1. Block heater outlet
2. Power indicator light
3. On/off switch
4. Conduit connectors
5. Block heater inlet
6. Air bleed screw

**Figure 3. Block Heater Assembly**



HG-272000B-A

1. Mounting track (347278), relay (291309), socket (X-6124-4), and screws (X-794-2)

2. Thermostat leads
3. Loose control box leads to relay terminals 3 and 9

**Figure 4. Circulating Pump Control Box and Wiring**

30. Bleed air from the circulating pump by removing the screw located on the front side of the pump. See Figure 3.

**NOTE**

DO NOT discard air bleed screw.

31. Turn block heater ON/OFF toggle switch to ON position. Look into air bleed screw hole and verify that pump is rotating.

**NOTE**

If pump fails to rotate, check that pump toggle switch is in the ON position and/or that pump is correctly wired to main power source.

32. Allow pump to run for a few seconds before placing toggle switch back in the OFF position. Replace air bleed screw removed in step 30.
33. Test run generator set for a few minutes to check for leaks and to ensure that all air is purged from the system. Failure to purge air from the system may cause block heater element failure.

**NOTE**

Pay special attention to the coolant level. After draining the coolant, allow time for complete refill of the engine water jacket. Check coolant level as prescribed in the Prestart Checklist of the Operation Manual.

**NOTE**

**Engine Damage!** Failure to bleed air from cooling system may cause overheating and subsequent engine damage.

**NOTE**

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34. Stop generator set.

**Block Heater Kit**

Parts List		
Kits: PA-328648, PA-328648-SD		
Qty.	Description	Part Number
2	Washer, plain	X-25-37
1	Elbow, 45° (black iron)	X-274-10
1	Elbow, 45° (brass)	X-274-15
1	Elbow, 45° (black iron)	X-274-2
4	Clamp, hose 1.25 max	X-426-12
9	Tie, cable	X-468-1
2	Connector, nonmetallic	X-567-1
2	Hose, connector 3/4 N.P.T.	X-582-8
2	Hose, connector 1 N.P.T.	X-582-15
2	Washer, beveled	X-6011-4
1	Socket, assembly	X-6124-4
2	Nut, spiralock	X-6210-9
2	Screw, h.c.	X-6238-11
1	Hose, 6.5 ft.	X-691-34
1	Hose, oil proof 7.75 ft.	X-691-36
2	Screw, drill	X-794-2
1	Bushing, reducer 3/4 x 1/2	153659
1	Tag, hang	279813
1	Heater, block	279933
1	Harness, block heater	279956
1	Relay, 10a 24 vdc	291309
1	Track, mounting	347278