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## INSTALLATION INSTRUCTIONS

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Original Issue Date: **8/93**

Model: **350/400 kW**

Market: **Industrial**

Subject: **Engine Block Heater Kits (Tank Type) PA-354487, PA-354487-SD, PA-354488, PA-354488-SD**

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

### ⚠ WARNING



**Hot coolant and steam.  
Can cause severe injury or death.**

Before removing pressure cap, stop generator set and allow it to cool. Then loosen pressure cap to relieve pressure.

**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.

#### 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

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.

## Installation

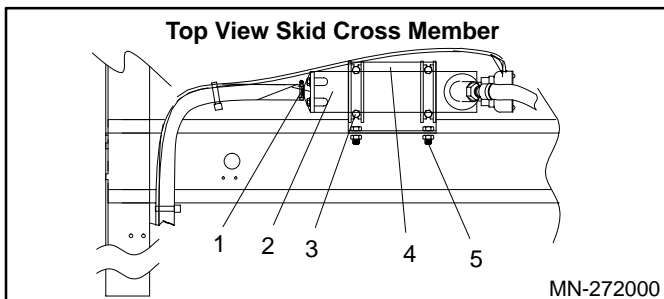
1. Place the generator set master switch in the OFF position.
2. Disconnect generator set engine starting battery, negative (–) lead first. Disconnect power to battery charger, if equipped.

#### NOTE

Drain valve is located on radiator bottom and/or on side of engine crankcase.

3. Allow engine and radiator to cool. Drain the coolant into a suitable container. Dispose of all waste materials (engine oil, fuel, coolant, etc.) in an environmentally safe manner. Contact local authorities for procedures.

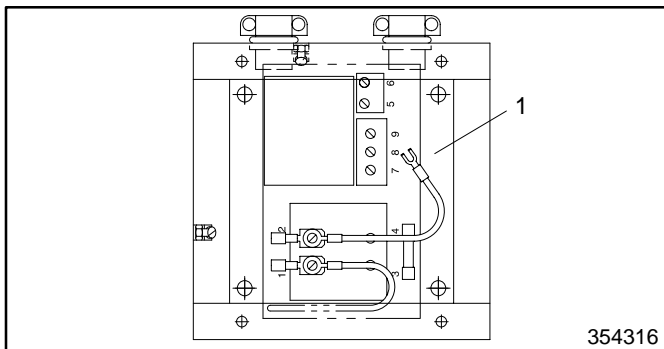
4. Secure block heater (279816) to block heater support bracket (274431) with screws (X-465-7) and nuts (X-101-8). See Figure 1.
5. Secure block heater support bracket to skid cross member with screws (X-6238-11) and spirallock nuts (X-6210-9). See Figure 1.



1. Use existing hose connector
2. Block heater (279816)
3. Screw (X-465-7) and nut (X-101-8)
4. Block heater support bracket (274431)
5. Screw (X-6238-11) and spirallock nut (X-6210-9)

**Figure 1. Block Heater Mounting**

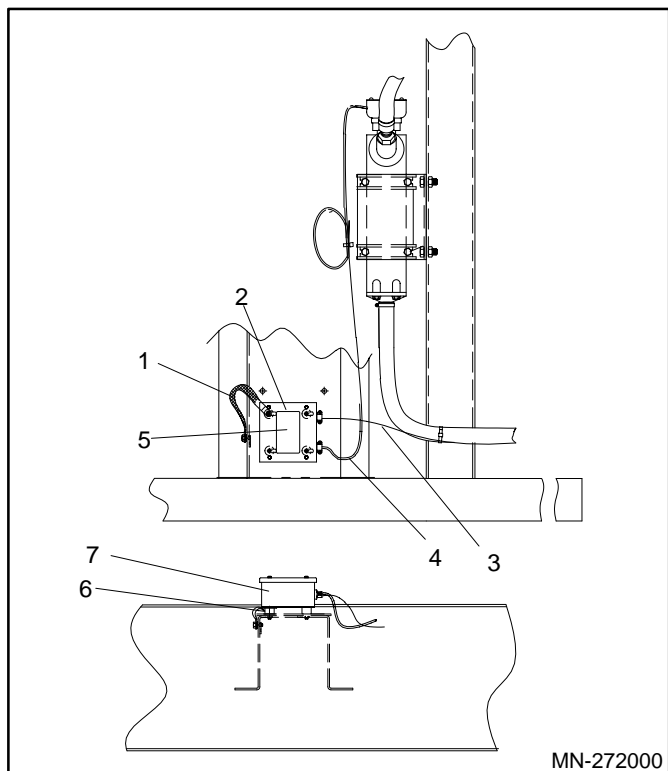
6. Install fuse block (X-6129-8) in control box (354316). Use the fuse block as a template and drill mounting hole. Secure fuse block to control box with screw (X-51-15) and nut (X-6210-4). See Figure 2 for mounting location.



1. Fuse block mounting location

**Figure 2. Block Heater Control Box**

7. Install fuse (X-6135-6) in fuse block installed in step 6.
8. Secure control box to skid rail using bumpers (259632), screws (X-465-6 and X-465-17) and washers (X-25-40 and X-22-12). Install one shakeproof washer (X-22-12) on each end of bumpers. See Figure 3.
9. Attach ground strap (223033) from control box to ground lug on skid cross member. See Figure 3.



1. Ground strap (223033)
2. Control box cover (354317), control box cover gasket (354318), wiring diagram label (354328), and screws (X-97-13)
3. To thermostat
4. To block heater
5. Warning decal (354326)
6. Bumpers (259632), screws (X-465-17 and X-465-6) and washers (X-25-40 and X-22-12)
7. Block heater control box (354316), fuse block (X-6129-8), fuse (X-6135-6), screw (X-51-15), and nut (X-6210-4)

**Figure 3. Block Heater Control Box Mounting**

10. Remove pipe plug for thermostat installation. See Figure 4.

### NOTE

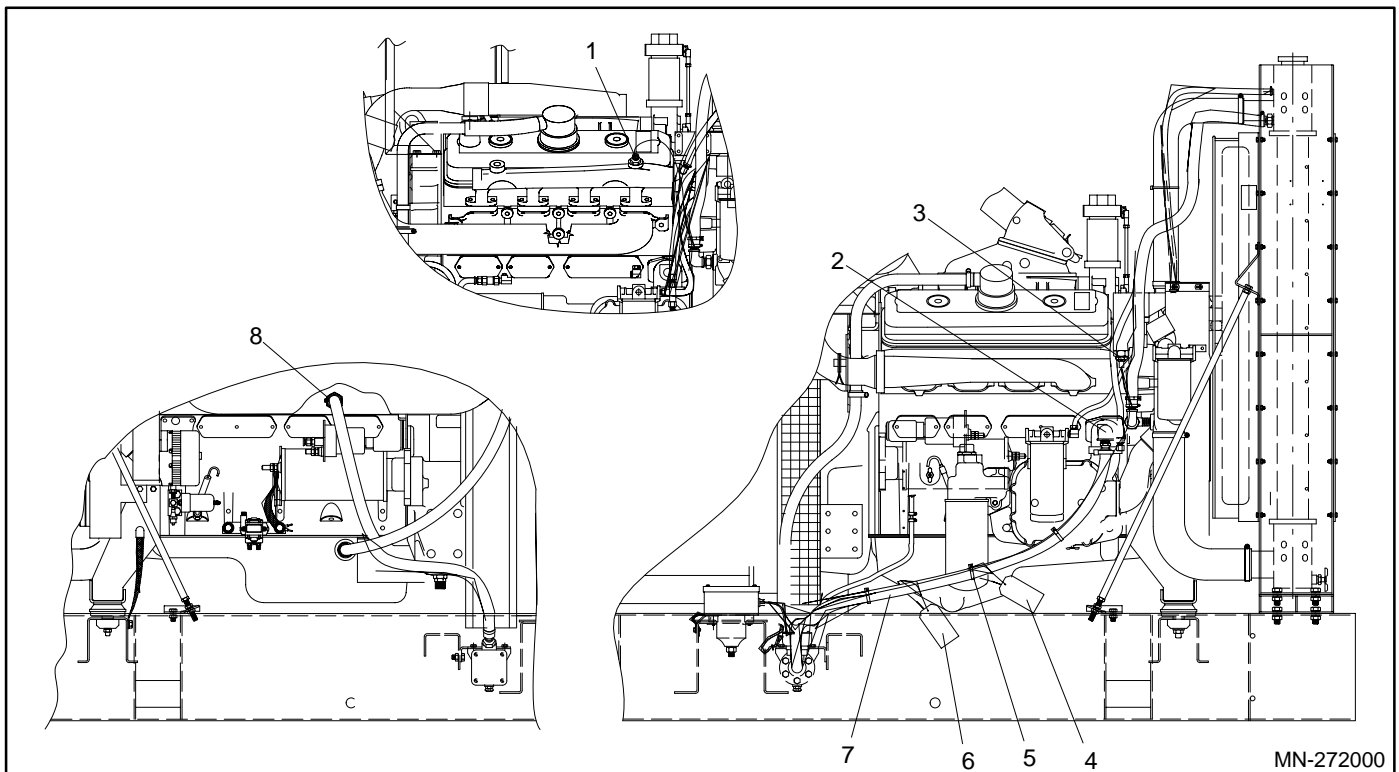
Apply pipe sealant to male threads of all components before installing the component.

11. **350 kW:** Apply pipe sealant to threads of reducer bushing (153659) and install where pipe plug was removed in step 10.
12. Apply pipe sealant to threads of thermostat (279813) and install in reducer bushing installed in step 11 or where pipe plug was removed in step 10.
13. Remove pipe plug from right side of engine for inlet hose. See Figure 4.
14. Apply pipe sealant to threads of 90° street elbow (X-211-5) and install where pipe lug was removed in step 13.
15. Apply pipe sealant to threads of hose connector (X-582-8) and install in elbow installed in step 14.

16. Install one end of hose (X-691-21) on hose connector installed in step 15. Secure hose to hose connector with hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.
17. Connect other end of hose (X-691-21) to block heater inlet. Secure hose to connector with hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.
18. Remove pipe plug from left side of engine for outlet hose. See Figure 4.
19. Apply pipe sealant to threads of hose connector (X-582-8) and install where pipe plug was removed in step 18.
20. Connect hose (X-691-26) to hose connector installed in step 19. Secure hose to connector with hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.
21. Connect loose end of hose (X-691-26) installed in step 20 to block heater outlet. Secure hose to connector with hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.
22. Attach thermostat lead from control box to block heater thermostat. See Figure 4.
23. Route thermostat leads to control box. Secure to inlet hose with cable ties (X-468-1) as required.
24. Connect thermostat leads to control box. See Figure 5 for connections.
25. Route block heater leads to control box. Secure excess cord with cable ties (X-468-1).
26. Connect block heater leads to control box. See Figure 5 for connections.
27. Connect wiring inside of control box for desired voltage. See Figure 5.
28. Remove adhesive backing from control box cover gasket (354318) and install gasket on backside of control box cover (354317).
29. Remove adhesive backing from wiring diagram label (354328) and install label on backside of control box cover.
30. Install control box cover. Secure cover to box with four screws (X-97-13).
31. Remove adhesive backing from warning decal (354326) and install decal on top center of control box cover.
32. Connect block heater to main power source.

#### NOTE

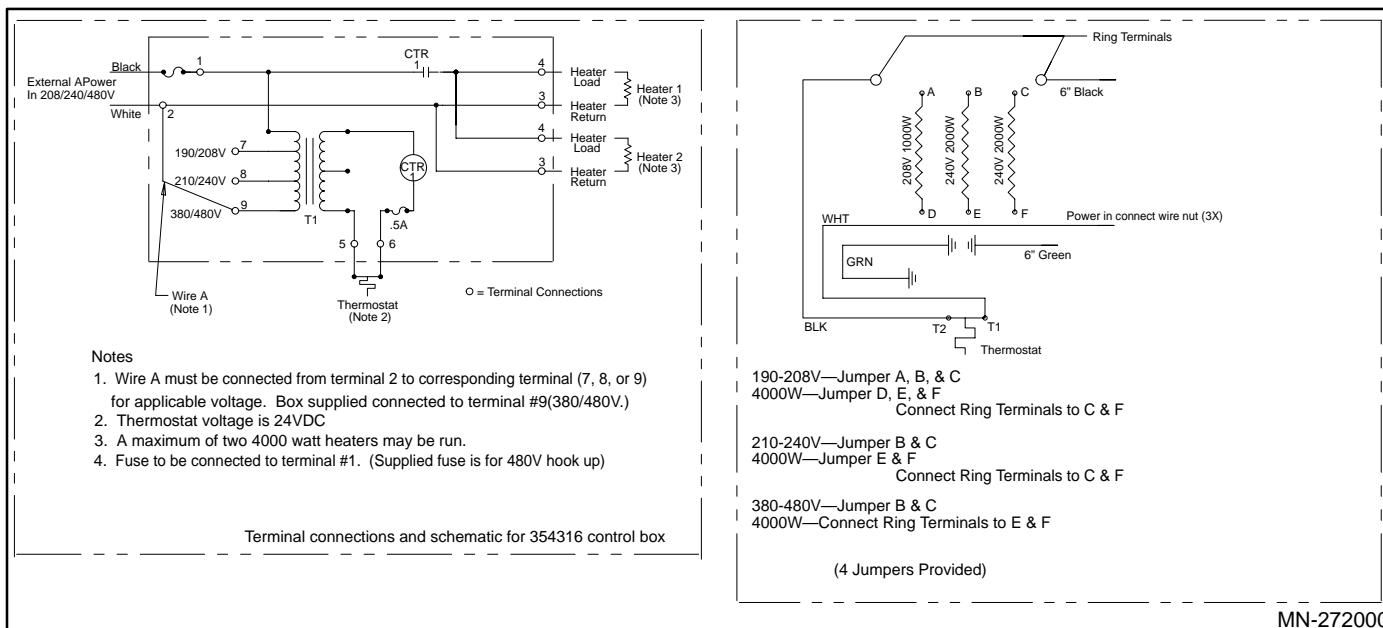
Have a certified electrician or qualified electrical technician make all electrical connections.



1. Thermostat (279813)
2. Street elbow 90° (X-211-5) and hose connector (X-582-8)
3. Reducer bushing (153659) and thermostat (279813)
4. Hang tag (279047)
5. Cable ties (X-468-1)

6. Instruction tag (279280)
7. Hose (X-691-21) and hose clamp (X-426-12)
8. Hose connector (X-582-8), hose clamp (X-426-12), and hose (X-691-26)

**Figure 4. Block Heater Kit Installation**



**Figure 5. Block Heater Wiring Diagrams**

33. Close all coolant drain valves on radiator and/or engine block.
34. Fill cooling system with fresh coolant consisting of a mixture of 50% ethylene glycol and 50% clean, softened water. This mixture provides the necessary freeze protection and inhibits corrosion.

**NOTE**

Coolant mixtures exceeding 50% ethylene glycol may cause the block heater heating element to fail and void the block heater warranty.

35. Check that the generator master switch is in the OFF position.
36. Reconnect the generator set engine starting battery, negative (–) lead last. Reconnect power to battery charger, if equipped.
37. Test run generator set for a few minutes to check for coolant leaks and to purge air from system. Stop generator set. After engine and radiator have cooled, correct any leakage.

**NOTE**

Failure to purge trapped air may cause block heater element to fail.

38. Recheck coolant level after allowing engine and radiator to cool. After draining the cooling system, allow some time for all air cavities to refill in the system. Add coolant as necessary.
39. Tie hang tag (279047) as noted on Figure 4.
40. Connect block heater electrical plug to correct voltage outlet.
41. Verify that the heater cycles.

## Engine Block Heater Kits

Parts List				
Kits: PA-354487, PA-354487-SD, PA-354488, PA-354488-SD			Unique Parts	
Qty.	Description	Common Parts	PA-354487 PA-354487-SD	PA-354488 PA-354488-SD
10	Washer, shakeproof	X-22-12	153659	
5	Washer, plain	X-25-40		
1	Screw, r.h.m. 8-32 x 1/2	X-51-15		
4	Screw, 10-32 x 0.438	X-97-13		
4	Nut, elastic stop 1/4-20	X-101-8		
1	Elbow, street 90°	X-211-5		
4	Clamp, hose 1.25 max.	X-426-12		
2	Screw, 1/4-20 x 0.50	X-465-6		
4	Screw, 1/4-20 x 1.0	X-465-7		
3	Bolt, 1/4-20 x 0.375	X-465-17		
5	Tie, cable	X-468-1		
2	Connector, hose	X-582-8		
1	Hose	X-691-21		
1	Hose	X-691-26		
1	Block, fuse	X-6129-8		
1	Fuse	X-6135-6		
1	Nut, whiz 8-32	X-6210-4		
2	Nut, spiralock 3/8-16	X-6210-9		
2	Screw, h.c. 3/8-16 x 1.0	X-6238-11		
1	Bushing, reducer 3/4 x 1/2 brass			
1	Strap, ground 3/8 x 5	223033		
4	Bumper	259632		
1	Bracket, support	274431		
1	Tag, hang	279047		
1	Tag, instruction	279280		
1	Thermostat, block heater	279813		
1	Heater, block	279816		
1	Box, block heater control	354316		
1	Cover, block heater	354317		
1	Gasket, control box	354318		
1	Decal, wiring	354326		
1	Label, wiring diagram	354328		