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## INSTALLATION INSTRUCTIONS

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### Block Heater (Tank Type) Kit PA-292928 (240 Volt, 4000 Watt) For 750/1000 kW (Cummins Powered) Standby Generator Sets

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

#### NOTE

The block heater will fail if the heating element is not immersed in coolant. Always disconnect power to the block heater(s) before draining coolant. Fill the engine block with coolant prior to reconnecting power to block heater(s). The block heater element **MUST** be immersed in engine coolant before being energized. Air must be purged from the system before energizing the block heater or the heater element may fail.



#### ⚠ WARNING

**Accidental starting.**

**Can cause severe injury or death.**

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

**Accidental starting can cause severe injury or death.** Turn generator 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 any equipment connected to generator. The generator set can be started by automatic transfer switch or remote start/stop switch unless these precautions are followed.

#### ⚠ WARNING



**Hazardous voltage.**



**Moving rotor.**

**Can cause severe injury or death.**

Do not operate generator set without all guards and electrical enclosures in place.

**Exposed moving parts can cause severe injury or death.** Keep hands, feet, hair, and clothing away from belts and pulleys when unit is running. Replace guards, covers, and screens before operating generator set.

#### ⚠ WARNING



**Hot coolant and steam.**

**Can cause severe injury or death.**

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

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

## INSTALLATION

1. Place generator master switch in OFF position. Disconnect battery charger leads (if equipped). Disconnect battery cables, negative lead first.
2. With engine sufficiently cooled, drain the coolant from the radiator and engine block into a suitable container. Dispose of used engine coolant in an environmentally safe manner. **DO NOT POUR USED COOLANT ON THE GROUND, DOWN SEWERS, OR INTO STREAMS OR OTHER BODIES OF WATER.**

### NOTE

Engine coolant petcock valves are located on bottom of radiator and engine block.

3. Using the block heater bracket (282923) as a template, drill two 0.406-in. (10 mm) diameter holes on both sides of the generator skid. Locate the center of the front bracket hole according to the dimensions shown in Figures 1 and 2. Hole positions will vary depending on engine series. Verify position before drilling.

### NOTE

Observe all appropriate safety procedures for use of power tools when drilling holes. Remove all burrs and metal chips from the work area before continuing installation procedure.

## BLOCK HEATER INSTALLATION—RIGHT SIDE

1. Install block heater bracket (282923) on skid rail with two 3/8-16 x 1.250-in. hex screws (X-6238-4), plain washers (X-25-37) and whiz nuts (X-6210-9). See Figure 1.
2. Install conduit junction box (245804) on mounting bracket with two 1/4-20 x 0.625-in. hex screws (X-465-2), plain washers (X-25-40) and whiz nuts (X-6210-2).
3. Install block heater (A-290251) on bracket with four 1/4-20 x 0.875-in. hex screws (X-465-18), plain washers (X-25-40), and whiz nuts (X-6210-2).
4. Assemble one street elbow (X-211-6) and drain valve (X-256-3). Remove drain plug from block heater (A-290251) and install elbow assembly in heater. Tighten all connections.

### NOTE

Apply pipe sealant to all threaded connections to prevent leakage.

5. Assemble one 1-in. NPT x 1.50-in. pipe nipple (X-218-24) to each end of pipe tee (X-203-2). Install reducer bushing (AC-1459) in middle position of pipe tee. Install 90° oil connection elbow (X-447-4) in reducer bushing. Install assembly in intake of block heater. Tighten all connections.
6. Install thermostat (A-289340) on pipe nipple. Route thermostat wiring to junction box. Install hose connector (X-751-1) in thermostat outlet.
7. Remove pipe plug from engine block and install one reducer bushing (X-202-32), 1-in. NPT x 1.50-in. pipe nipple (X-218-24), street elbow (151385) and two hose connectors (X-751-1) as shown in Figure 1, View A-A. Tighten all connections.
8. Slide one hose clamp (X-426-8) over each end of hose (X-356-30) and slide hose over hose connectors. Locate the hose clamps 1/4 inch (6 mm) from hose ends and tighten clamps.
9. Assemble one pipe nipple (X-218-24) in one end of pipe tee (X-203-2) and hose adapter (X-751-1) in other end. Install reducer bushing (AC-1459) in middle position. Install the assembly in outlet of block heater. Tighten all connections (reducer bushing should be facing to the front of the engine when tight).
10. Connect 1/4-in. ID x 16-in. flexible line (285639) to pipe fittings as shown.
11. Remove plate from engine block and install tube assembly (292939). Use existing O-ring between plate and flare on tube (see Figure 1, View B-B).

### NOTE

Tube assembly (292939) must be attached to block heater connection. Do not attach to the engine oil connection nearby. (See Figure 1, View B-B.)

12. Slide one hose clamp (X-426-8) over each end of hose (X-356-14) and then slide over hose connector and tube assembly. Locate the hose clamps 1/4 inch (6 mm) from hose ends and tighten clamps.
13. Install instruction tag (279047) on block heater electrical contact housing.



## BLOCK HEATER INSTALLATION—LEFT SIDE

1. Install block heater bracket (282923) on skid rail with two 3/8-16 x 1.250-in. hex screws (X-6238-4), plain washers (X-25-37) and whiz nuts (X-6210-9). See Figure 2.
2. Install conduit junction box (245804) on mounting bracket with two 1/4-20 x 0.625-in. hex screws (X-465-2), plain washers (X-25-40) and whiz nuts (X-6210-2).
3. Install block heater (A-290251) on bracket with four 1/4-20 x 0.875-in. hex screws (X-465-18), plain washers (X-25-40), and whiz nuts (X-6210-2).
4. Assemble one street elbow (X-211-6) and drain valve (X-256-3). Remove drain plug from block heater (A-290251) and install elbow assembly in heater. Tighten all connections.

### NOTE

Apply thread sealant to all threaded connections to prevent leakage.

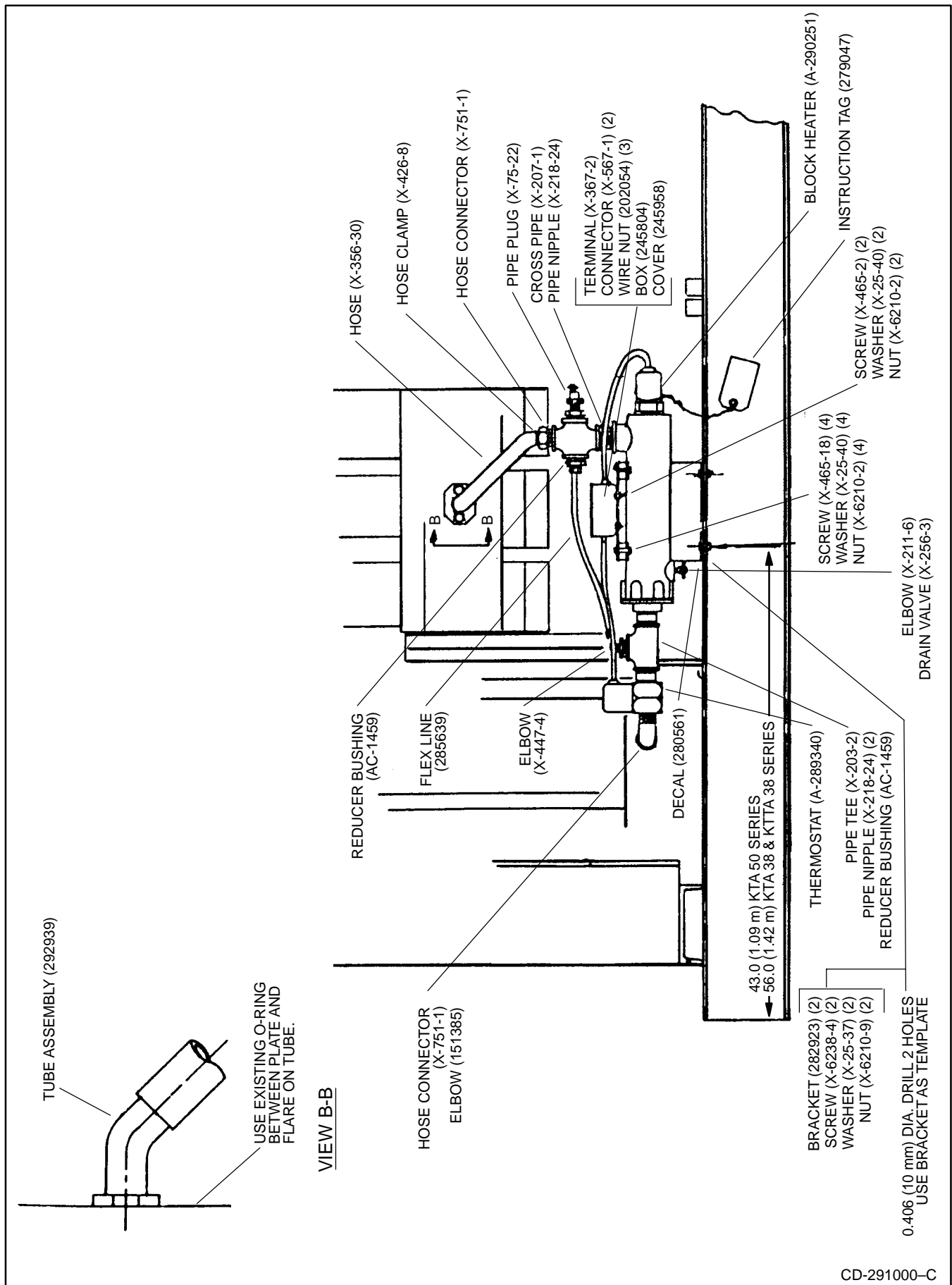
5. Assemble 1-in. NPT x 1.50-in. pipe nipple (X-218-24) to each end of pipe tee (X-203-2). Install reducer bushing (AC-1459) in middle position of pipe tee. Install 90° oil connection elbow (X-447-4) in reducer bushing. Install assembly in intake of block heater. Tighten all connections.
6. Install thermostat (A-289340) on pipe nipple. Route thermostat wiring to junction box.
7. Assemble one hose connector (X-751-1) and street elbow (151385). Install elbow assembly in thermostat outlet.

8. Slide one hose clamp (X-426-8) over each end of hose (X-356-29) and then slide over hose connectors (other hose connector located on engine right side, see Figure 1, View A-A). Locate the hose clamps 1/4 inch (6 mm) from hose ends and tighten clamps.
9. Install one 1-in. NPT x 1.50-in. pipe nipple (X-218-24) in outlet of block heater.
10. Assemble one reducer bushing (AC-1459), hose connector (X-751-1) and pipe plug (X-75-22) on cross pipe (X-207-1). Install cross pipe assembly on pipe nipple (reducer bushing should face the front of engine when tight).
11. Connect 1/4-in ID x 16-in. flexible line (285639) to pipe fittings as shown.
12. Remove plate from engine block and install tube assembly (292939). Use existing O-ring between plate and flare on tube.

### NOTE

Tube assembly (292939) must be attached to block heater connection. Do not attach to the engine oil connection nearby. (See Figure 2, View B-B.)

13. Slide one hose clamp (X-426-8) over each end of hose (X-356-30) and then slide over hose connector and tube assembly. Locate the hose clamps 1/4 inch (6 mm) from hose ends and tighten clamps.
14. Install instruction tag (279047) on block heater electrical contact housing.
15. With surfaces clean and dry, apply water drain decals (280561) to skid rails below drain valve.



CD-291000-C

Figure 2. Block Heater Installation—Left Side

## REFILL COOLING SYSTEM

1. Verify all drain valves on engine and radiator are closed.
2. Fill cooling system to proper level with fresh coolant. A solution of 50% ethylene glycol and 50% clean, softened water is recommended to inhibit rust/corrosion and provide freezing protection. Ensure that all air is bled from the cooling system before energizing the block heater.

### NOTE

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

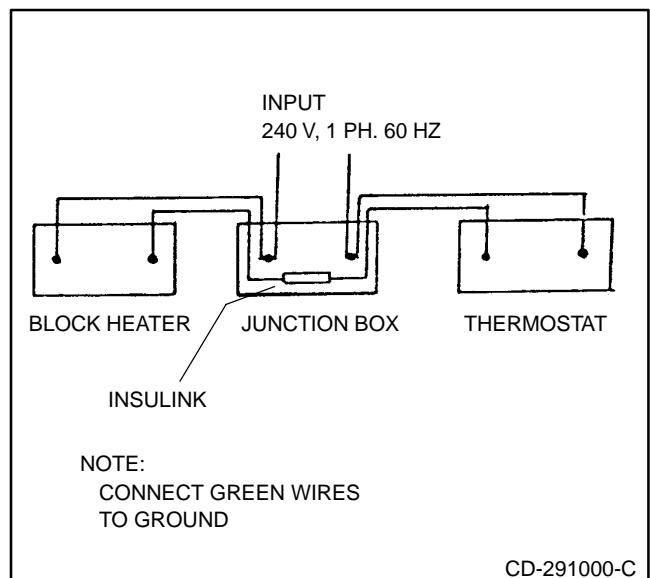
3. Check that controller master switch is OFF. Reconnect battery cables, negative lead last. Reconnect battery charger (if equipped).
4. Test run generator for a few minutes to check for leaks. Shut off generator set and allow to cool. Check coolant level to insure that all air is purged from the system. Add coolant as necessary to fill system.

### NOTE

Special attention should be given when checking for proper coolant level. After a radiator has been drained, it normally requires some time before complete refill of air cavities takes place. Failure to purge all air from the coolant system may cause damage to the block heater element.

## ELECTRICAL CONNECTIONS

5. Remove one knock-out from each end of the conduit junction boxes and install conduit connectors (X-567-1).
6. Route leads from block heaters and thermostats through connectors. Allow sufficient wire to make connections and tighten clamps.
7. Strip approximately 3/8 inch (9 mm) of insulation from wires from thermostats and block heaters. Make connections as shown in Figure 3 with Insulink terminals (X-367-2) and wire nuts (202054).
8. Install conduit junction box cover (245958).



**Figure 3. Wiring Diagram**

Parts List		
Kit PA-292928		
Qty.	Description	Part Number
2	Thermostat	A-289340
2	Heater, block	A-290251
4	Bushing, reducer, black iron, 1 to 1/8 in.	AC-1459
1	Bushing, reducer, black iron, 1 1/4 to 1 in.	X-202-32
5	Tee, pipe, black iron, 1-in. NPT, 1 x 1 x 1 in.	X-203-2
1	Pipe, cross, black iron, 1-in. NPT, 1 3/8 x 1 3/8 in.	X-207-1
2	Elbow, street, black iron, 1/4-in. NPT	X-211-6
7	Nipple, pipe, 1-in. NPT x 1.50 in.	X-218-24
4	Washer, plain, 0.406 x 0.812 x 0.064 in.	X-25-37
12	Washer, plain, 0.281 x 0.625 x 0.065 in.	X-25-40
2	Valve, drain, 1/4-in. NPT	X-256-3
1	Hose, 1 in. ID x 22 in.	X-356-14
1	Hose, 1 in. ID x 60 in.	X-356-29
2	Hose, 1 in. ID x 14 in.	X-356-30
2	Insulink Terminal, 10-12 gauge	X-367-2
7	Clamp, hose, 0.81-1.75 in. x 0.56 in.	X-426-8
2	Elbow, oil line connection, 90°, 1/2-20 - 1/8-in. NPT	X-447-4
8	Screw, hex, 1/4-20 x 0.875 in., Gr. 5	X-465-18
4	Screw, hex, 1/4-20 x 0.625 in., Gr. 5	X-465-2
4	Connector, non-metallic conduit, 3/8 in.	X-567-1
12	Nut, whiz, 1/4-20	X-6210-2
4	Nut, whiz, 3/8-16	X-6210-9
4	Screw, hex, 3/8-16 x 1.250 in., Gr. 5	X-6238-4
1	Plug, pipe, black iron, 1-in. NPT	X-75-22
6	Connector, hose, 1 in. OD x 1-in. NPT x 2.75 in.	X-751-1
2	Elbow, street, black iron, 1-in. NPT	151385
6	Nut, wire	202054
2	Box, conduit junction	245804
2	Cover, conduit box	245958
2	Tag, instruction	279047
2	Decal, water drain	280561
2	Bracket, block heater	282923
2	Line, flex, SAE 30R2, 1/2-20 - 1/8-in. NPT x 16.0 in.	285639
2	Tube Assembly	292939