Engine Block Heater Service Kits (Tank Type) 17RY/20RZ/30RZ (LSG–423 Ford–Powered) Standby Generator Sets

Model	Voltage	Kit No.
17RY/20RZ	120	276368
17RY/20RZ	240	276369
30RZ	120	276370
30RZ	240	276371

This service kit details removal of the immersion type block heater and replacement with a tank type block heater kit including relocating the air bleed valve.

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

⚠ WARNING

Hazardous voltage. **Moving rotor.**

Can cause severe injury or death.

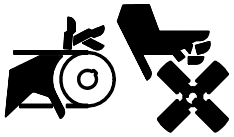
Do not operate generator set without all guards and electrical enclosures in place.

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

The Block heater will fail if not immersed in coolant. Always unplug the block heater(s) before draining coolant and fill the engine block with coolant prior to plugging in the 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 block 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

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 controller master switch to OFF position. Disconnect battery of generator set, negative lead first. Disconnect power from existing block heater. Disconnect battery charger leads.

2. With generator set sufficiently cooled, drain the coolant into a suitable container.

   Do NOT pollute the environment. Dispose of used coolant and other contaminants in a safe and approved manner.

NOTE

Petcock valve is located on radiator bottom and/or engine bottom.

3. If an immersion type block heater was previously installed, follow Step 3. Otherwise, proceed to Step 4.

NOTE

If Step 3 is not required, reference Parts Listing for components not used.

3a. Remove electrical connections to block heaters and thermostat. Remove block heater junction box from generator set. These parts will not be reused. See Figure 1.

3b. Remove thermostat, reducer coupling, and pipe nipple. These parts will not be reused.

3c. Remove block heaters from engine block. These items will not be reused.

With components clean and dry, apply Loctite® threadlocker 272 (red) or equivalent to freeze plug and hole. Install two freeze plug adapters 276212 using hardwood dowel and hammer. Drive freeze plug adapter into engine block so that it is flush with outside surface of block. Do NOT drive freeze plug adapter beyond that point or it may be forced into the water jacket. Apply pipe sealant to two 3/4 NPT pipe plugs X–75–6 and install into freeze plug adapters. Torque pipe plugs to 15 ft. lbs. (20 Nm).

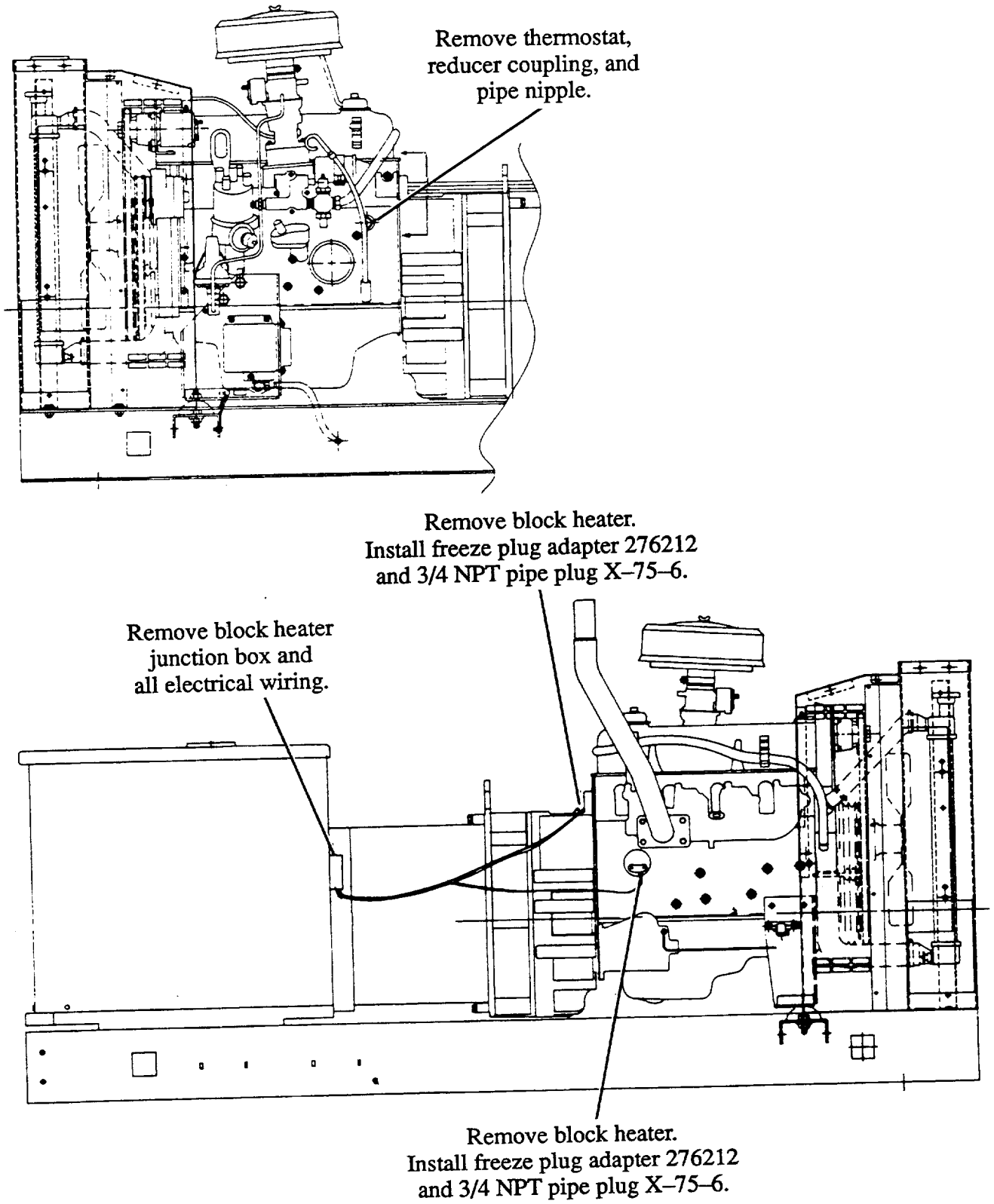


Figure 1. Block Heater Kit Removal (Immersion Type)

4. If an early version tank type block heater was installed, follow Step 4. See Figure 2. Otherwise, proceed to Step 5.

NOTE

If Step 4 is not required, reference Parts Listing for components not used.

4a. Loosen hose clamp and remove hose from hose connector. Remove hose connector from freeze plug adapter.

4b. Apply pipe sealant to pipe plug X–75–6 and install into freeze plug adapter. Torque pipe plug to 15 ft. lbs. (20 Nm).

4c. Remove remaining block heater components.

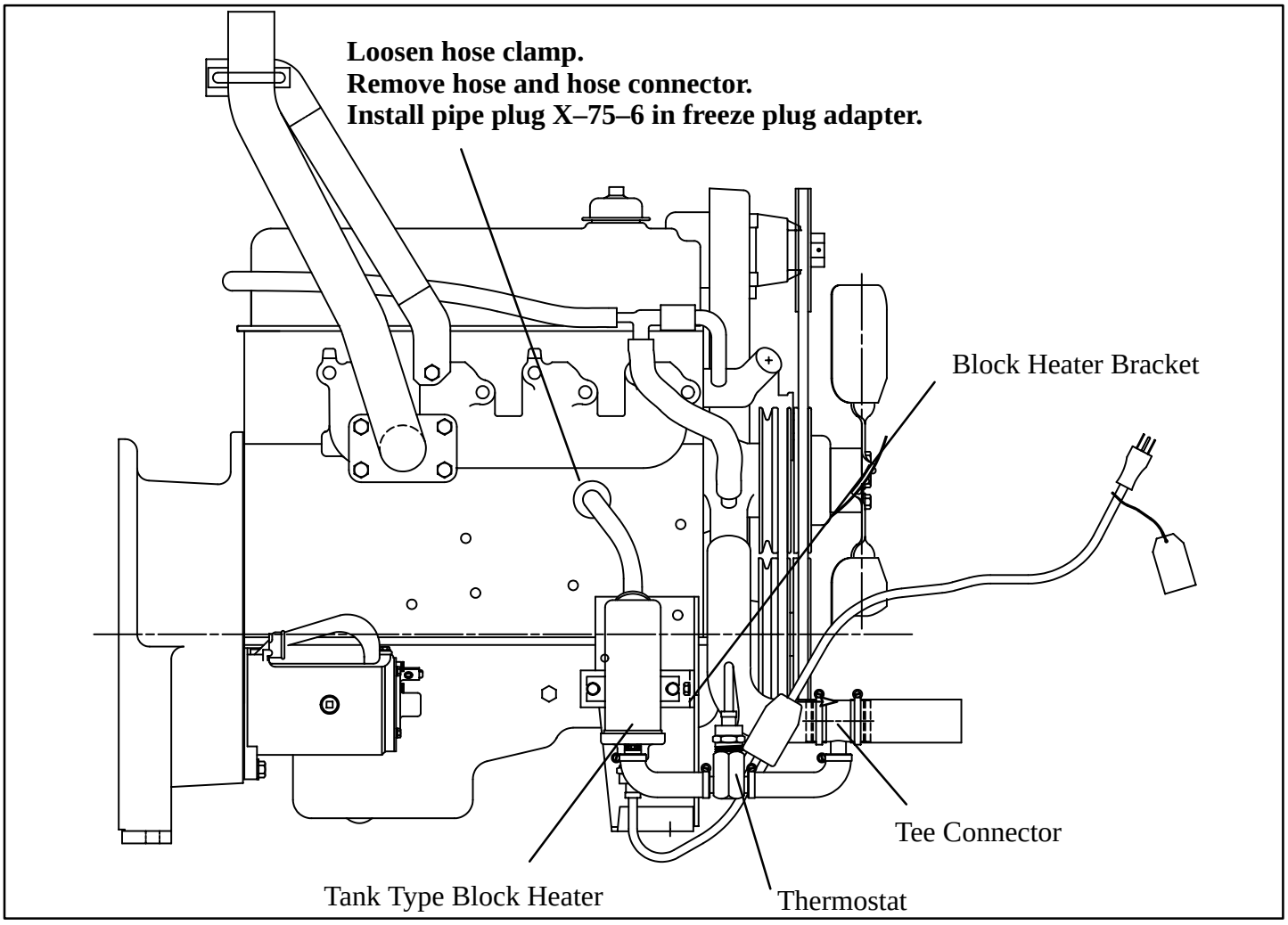


Figure 2. Removal of Early Version Tank Type Block Heater Kit

NOTE

RELOCATING SWITCHES:

When switches are configured as shown in Figure 3, follow Step 5.

When switches are configured as shown in Figure 4, follow Step 6.

When switches are configured as shown in Figure 5, follow Step 7.

When switches are configured as shown in Figure 6, proceed to Step 8. (No relocation of switches is necessary).

5.1 Relocating switches **(for units without anticipatory alarm kit)**. See Figure 3.

5.1a. Disconnect lead 34 from high water temperature (H.W.T.) shutdown switch.

5.1b. Loosen hose clamp at pipe tee and remove hose. Remove hose connector from pipe tee.

5.1c. Remove pipe tee with H.W.T. shutdown switch from pipe nipple. Remove pipe nipple from intake manifold.

NOTE

Original pipe nipple and pipe tee will not be reused. Save H.W.T. shutdown switch.

5.1d. Coat threads of hose connector (removed in Step 5.1b.) and install in lower hole of intake manifold.

5.1e. Install H.W.T. shutdown switch in position in left side of engine block (see position 1, Figure 6).

5.1f. Reconnect lead 34 to H.W.T. shutdown switch.

5.1g. Install hose to existing hose connector in lower hole of manifold. Locate hose clamp 1/4 in. (6 mm) from end of hose and tighten

Proceed to Step 8.

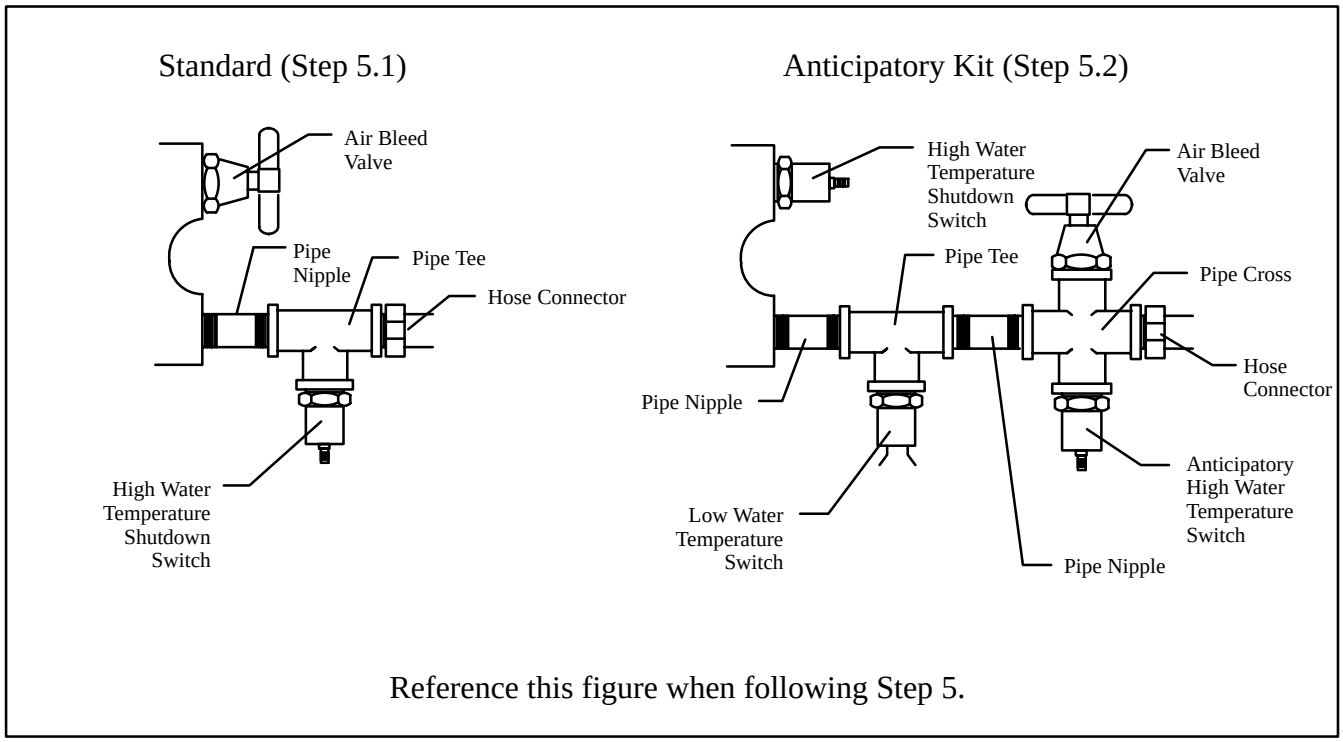


Figure 3.

5.2 Relocating switches **(for units with anticipatory alarm kit)**. See Figure 3.

5.2a. Remove air bleed valve from cross pipe.

5.2b. Disconnect lead 34 from high water temperature (H.W.T.) shutdown switch. Disconnect lead 40A from anticipatory high water temperature switch. Disconnect leads 35A and N from low water temperature (L.W.T.) switch.

5.2c. Loosen hose clamps at cross pipe and disconnect hose.

5.2d. Remove anticipatory high water temperature switch from cross pipe. Remove hose connector from cross pipe and save hose connector. Remove cross pipe and pipe nipple and discard.

5.2e. Remove H.W.T. shutdown switch from upper hole in intake manifold. Install air bleed valve in upper hole.

5.2f. Remove L.W.T. switch from pipe tee. Install Anticipatory H.W.T. switch in pipe tee.

5.2g Coat threads of existing hose connector with pipe sealant and install in pipe tee.

5.2h. Coat threads of H.W.T. shutdown switch with pipe sealant and install in position 1, see Figure 6.

5.2i. Connect hose to hose connector on pipe tee. Locate hose clamp 1/4 in. (6 mm) from end of hose and tighten.

5.2j. Reconnect lead 40A to Anticipatory H.W.T. switch. Reconnect lead 34 to H.W.T. shutdown switch. (Reconnection of L.W.T. switch will take place in Step 15.)

Proceed to Step 8.

6.1 Relocating switches **(for units without anticipatory alarm kit)**. See Figure 4.

6.1a. Disconnect lead 34 from high water temperature (H.W.T.) shutdown switch.

6.1b. Loosen hose clamp at pipe tee and remove hose. Remove hose connector from pipe tee.

6.1c. Remove pipe tee with H.W.T. shutdown switch from pipe nipple. Remove pipe nipple from intake manifold.

NOTE

Original pipe nipple and pipe tee will not be reused. Save H.W.T. shutdown switch.

6.1d. Remove pipe plug from lower hole of intake manifold and discard.

6.1e. Coat threads of hose connector (removed in Step 6.1b.) with pipe sealant and install in lower hole of intake manifold.

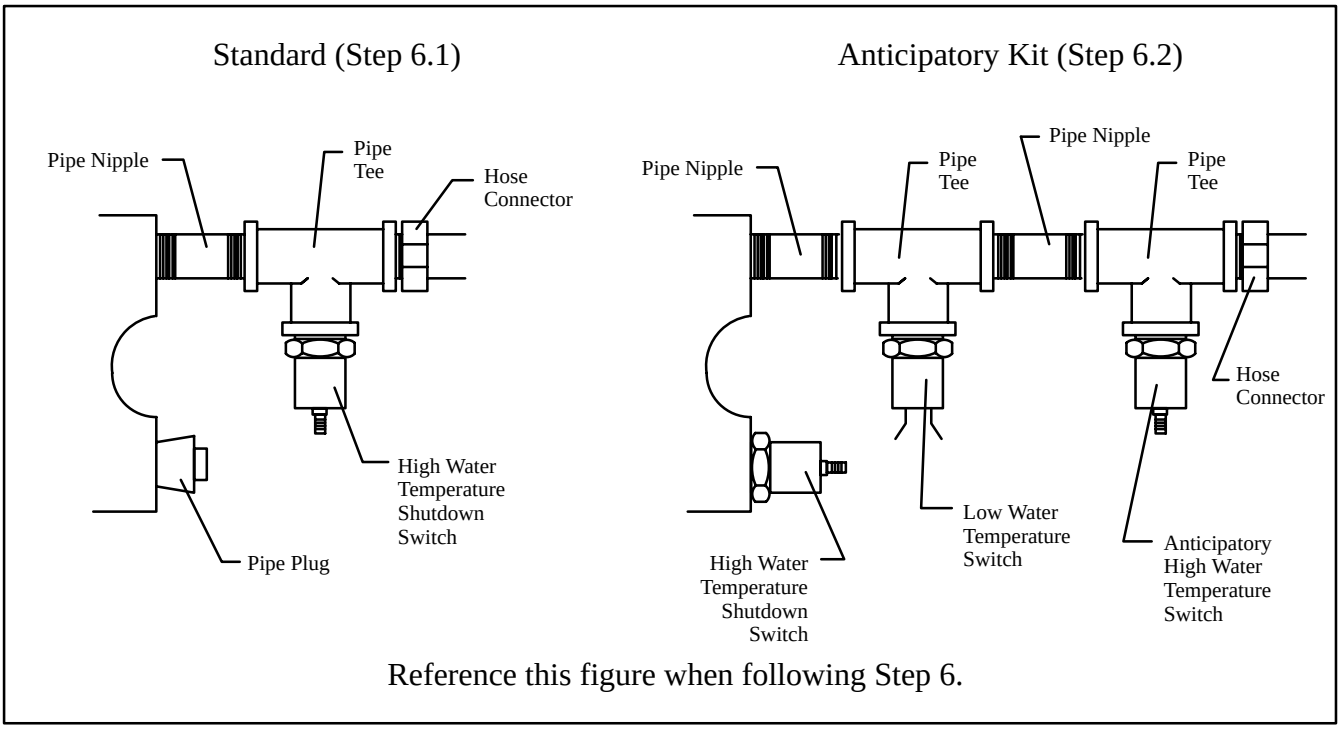
6.1f. Install H.W.T. shutdown switch in position 1 (see Figure 6) in left side of engine block.

6.1g. Reconnect lead 34 to H.W.T. shutdown switch.

6.1h. Install hose to existing hose connector in lower hole of manifold. Locate hose clamp 1/4 in. (6 mm) from end of hose and tighten.

6.1i. Coat threads of air bleed valve X–256–1, supplied in kit, with pipe sealant and install in top hole of manifold.

Proceed to Step 8.



Reference this figure when following Step 6.

Figure 4.

6.2 Relocating switches **(for units with anticipatory alarm kit)**. See Figure 4.

6.2a. Disconnect lead 34 from high water temperature (H.W.T.) shutdown switch. Disconnect lead 40A from Anticipatory H.W.T. switch. Disconnect leads 35A and N from low water temperature (L.W.T.) switch.

6.2b. Loosen hose clamp at pipe tee and disconnect hose.

6.2c. Remove pipe nipple with anticipatory H.W.T. shutdown switch, pipe tee, and hose connector from other pipe tee and save.

6.2d. Remove remaining pipe tee and pipe nipple and discard. Save L.W.T. switch.

6.2e. Remove H.W.T. shutdown switch from the lower hole in the intake manifold.

6.2f. Coat threads of pipe nipple on assembly removed in Step 6.2c with pipe sealant and install in lower hole of intake manifold. Rotate so anticipatory H.W.T. shutdown switch is pointed downward.

6.2g. Connect hose to hose connector on pipe tee. Locate hose clamp 1/4 in (6 mm) from end of hose and tighten.

6.2h. Coat threads of air bleed valve X–256–1, supplied in kit, with pipe sealant and install in top hole of manifold.

6.2i. Coat threads of H.W.T. switch with pipe sealant and install in Position 1, see Figure 6.

6.2j. Reconnect lead 34 to H.W.T. shutdown switch. Reconnect lead 40A to Anticipatory H.W.T. switch. (Reconnection of L.W.T. switch will take place in Step 15.)

Proceed to Step 8.

7.1 Relocating switches **(for units without anticipatory alarm kit)**. See Figure 5.

7.1a. Remove pipe plug X–75–10 from lower hole in manifold and discard.

7.1b. Disconnect lead 34 from high water temperature (H.W.T.) shutdown switch. Remove H.W.T. shutdown switch from pipe tee. Disconnect hose and hose connector. Remove and discard pipe nipple and pipe tee.

7.1c. Coat threads of hose connector with pipe sealant and install in lower hole of manifold. Reconnect hose to hose connector. Locate hose clamp 1/4 in (6 mm) from end of hose and tighten.

7.1d. Coat threads of air bleed valve X–256–1, supplied in kit, with pipe sealant and install in upper hole of manifold.

7.1e. Install H.W.T. shutdown switch in position 1 (Figure 6) in left side of block.

7.1f. Reconnect lead 34 to H.W.T. shutdown switch.

<u>Proceed to Step 8.</u>

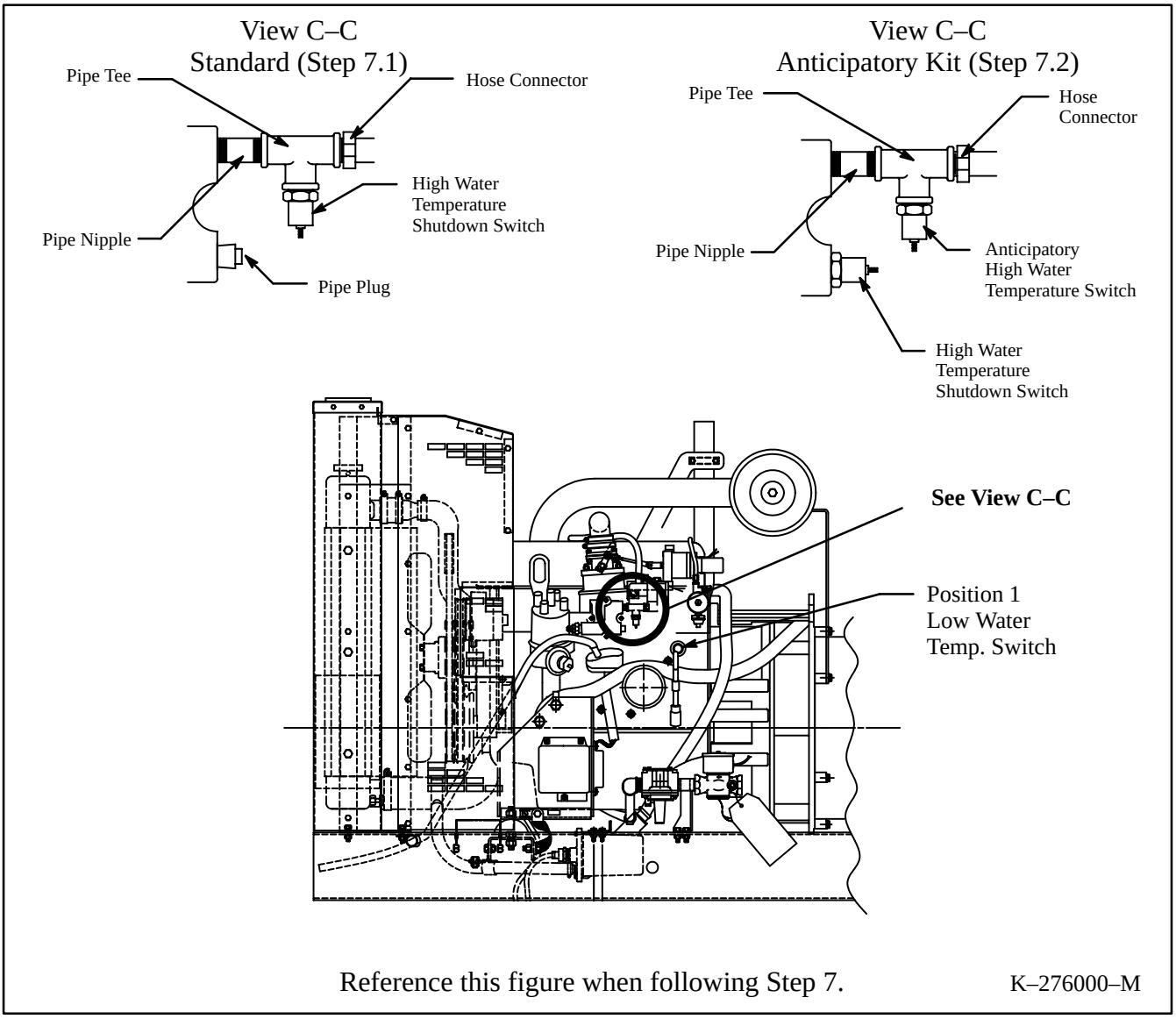


Figure 5. Removing Air Bleed Valve

7.2 Relocating switches **(for units with anticipatory alarm kit)**. See Figure 5.

7.2a. Disconnect leads 35A and N from low water temperature (L.W.T.) switch in position 1, (see Figure 5) on left hand side of block. Remove L.W.T. switch (save for Step 15).

7.2b. Disconnect lead 34 from high water temperature (H.W.T.) shutdown switch. Remove H.W.T shutdown switch from lower hole in intake manifold and install in position 1 (see Figure 6) on left hand side of block. Reconnect lead 34 to H.W.T. shutdown switch.

7.2c. Remove lead 40A from Anticipatory H.W.T. switch.

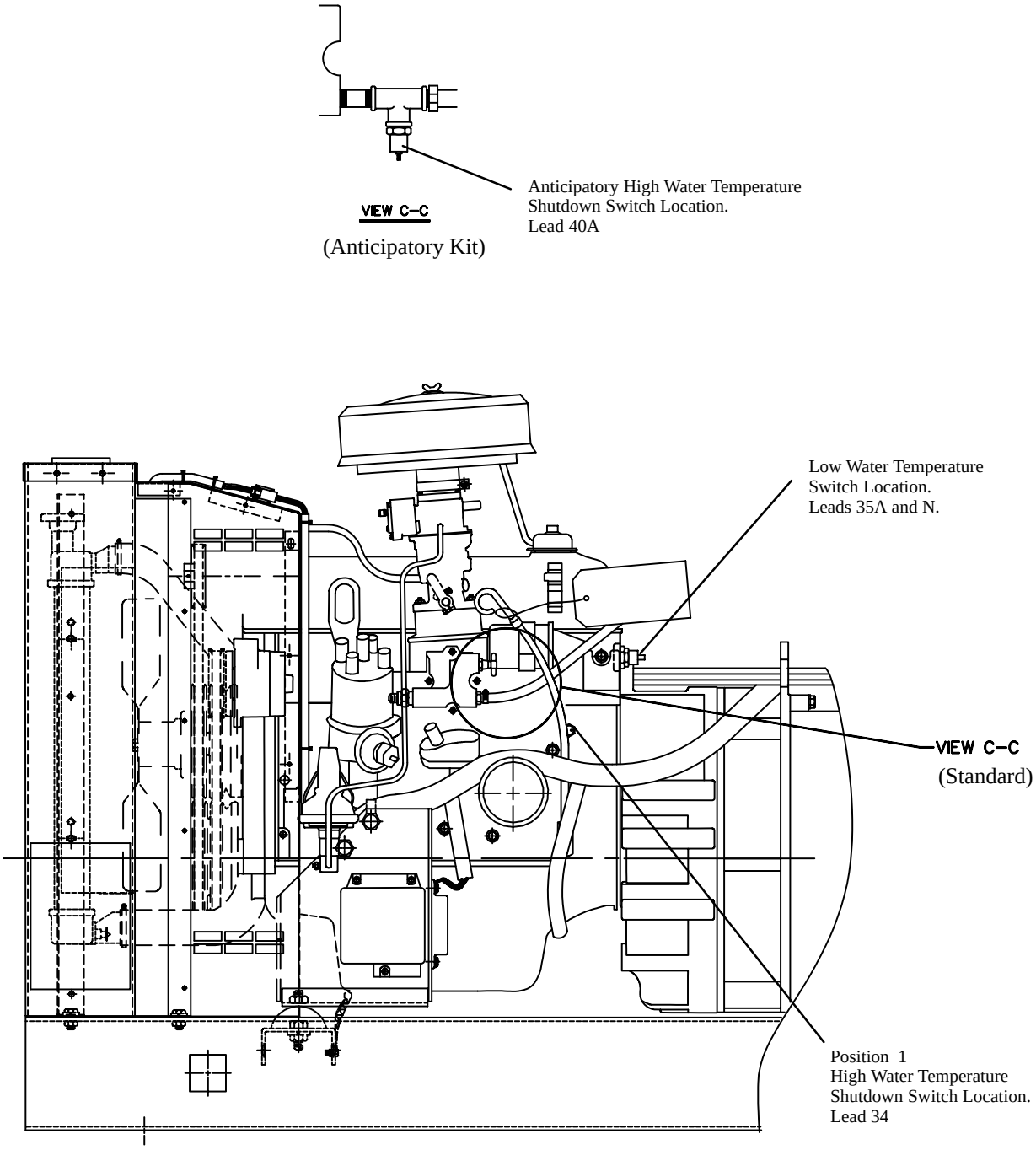
7.2d. Remove hose from hose connector. Remove pipe nipple, pipe tee with Anticipatory H.W.T. switch, and hose connector from upper hole in intake manifold.

7.2e. Install pipe nipple, pipe tee with Anticipatory H.W.T. switch, and hose connector in lower hole of intake manifold.

7.2f. Coat threads of air bleed valve X–256–1, supplied in kit, with pipe sealant and install in upper hole of manifold.

7.2g. Reconnect hose to hose connector in lower hole of manifold. Locate hose clamp 1/4 in. (6 mm) from end of hose and tighten.

7.2h. Reconnect lead 40A to Anticipatory H.W.T. switch.



This Figure illustrates the final and correct positions for:
the High Water Temperature Shutdown Switch,
the Anticipatory High Water Temperature Shutdown Switch,
and the Low Water Temperature Switch.

R–255000–AU

Figure 6.

NOTE

If air bleed valve location already resembles Figure 7, skip Step 8 and proceed to Step 9.

8. Adding air bleed valve. See Figure 7.

8a. Cut cooling hose between intake manifold and thermostat housing near engine lifting bracket. Remove approx. a 3 in. (76 mm) section of hose and discard.

8b. Coat threads of two hose connectors X–582–9 with pipe sealant and install into pipe tee X–203–15.

8c. Apply pipe sealant to threads of air bleed valve X–256–1 and install into pipe tee.

8d. Place hose clamps X–426–10 on each end of cut hose. Install air bleed valve/pipe tee assembly in hose ends with air bleed valve pointing upward. Locate hose clamps 1/4 in. (6 mm) from ends of hose and tighten.

8e. Secure air bleed valve/pipe tee assembly to engine lifting bracket using cable tie X–468–1. Position air bleed valve so that it is the highest point in hose.

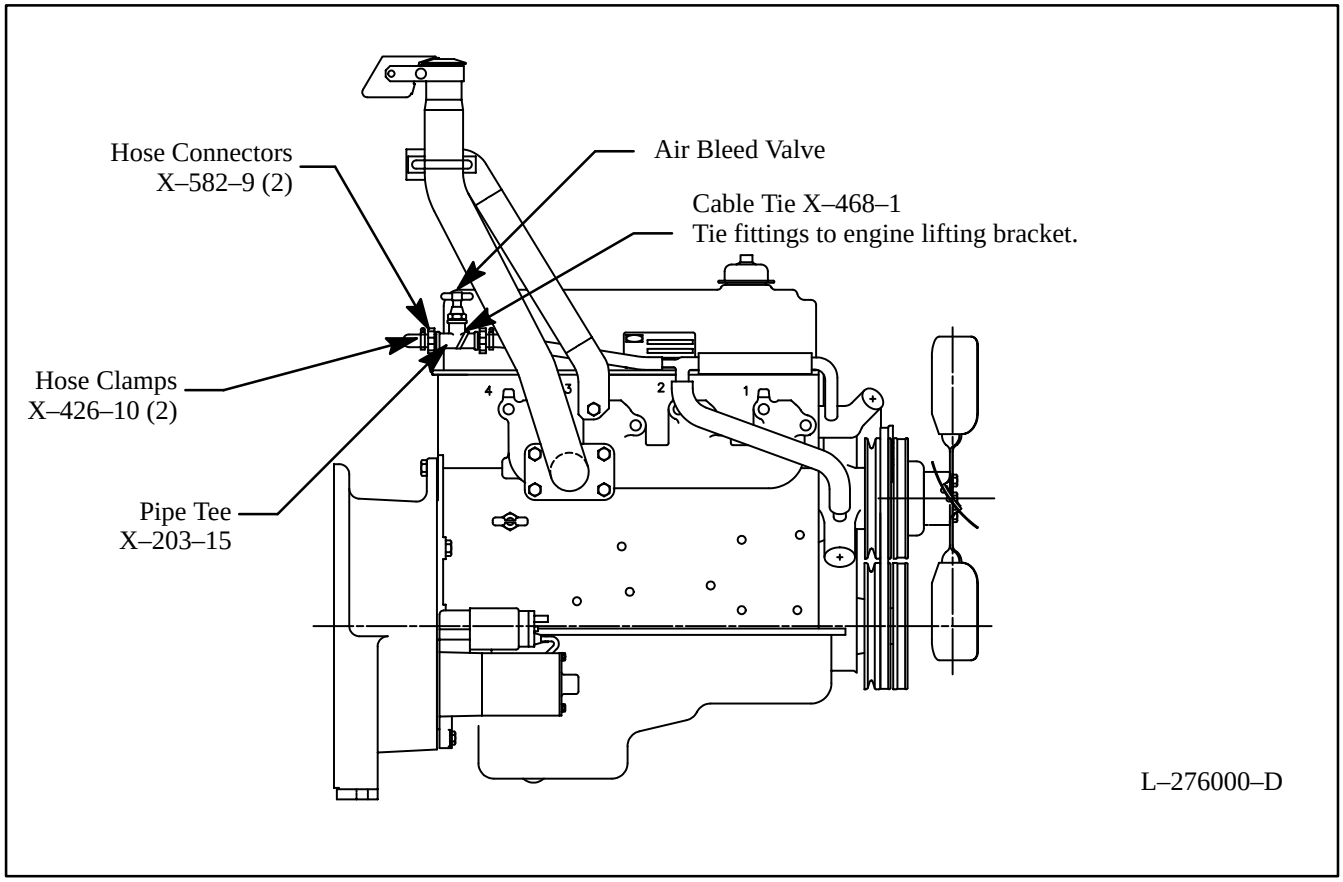


Figure 7. Locating Air Bleed Valve

9. Remove freeze plug from rear of cylinder head. See Figure 8 for location. To remove freeze plug, use a freeze plug puller, or puncture center with punch and pry out. Clean hole and remove burrs.

NOTE

Be careful not to damage sealing surface.

10. With components clean and dry, apply Loctite® threadlocker 272 (red) or equivalent to freeze plug and hole. Install freeze plug adapter 276212 using hardwood dowel and hammer. Drive freeze plug adapter into engine block so that it is flush with outside surface of block. Do NOT drive freeze plug adapter beyond that point or it may be forced into the water jacket.

11. Apply pipe sealant to threads of reducer bushing X–202–41 and install into freeze plug adapter.

12. Apply pipe sealant to male threads of pipe nipple X–209–2 and install into reducer bushing.

13. Apply pipe sealant to remaining threads of pipe nipple. Install pipe tee X–203–13 onto pipe nipple.

14. The bottom end of the pipe tee should be pointing to the 7 o'clock position (as viewed from the generator end.) Torque reducer bushing, pipe nipple, and pipe tee to 15 ft. lbs. (20 Nm.)

15. **If unit is not equipped with an anticipatory alarm kit:** Install pipe plug X–75–28 to top end of pipe tee.

    If unit is equipped with an anticipatory alarm kit: Install Low Water Temperature (L.W.T.) switch to top end of pipe tee. Connect leads 35A and N to L.W.T. switch.

16. Apply pipe sealant to hose connector X–582–1 and install into the bottom hole of the pipe tee.

17.1. **Kits 276368 and 276369 (17RY/20RZ)**

Loosen hose clamps on lower radiator hose and remove hose. Place existing hose clamps over each end of lower radiator hose 276186 and install new hose. Locate hose clamps 1/4 in. (6 mm) from end of hose and tighten.

NOTE

Original lower radiator hose will not be reused.

Mark hose at 4–1/2 in. (114 mm) and 5–1/2 in. (140 mm) from radiator outlet. Cut at these marks to remove 1 in. (25 mm) from hose.

17.2. **Kits 276370 and 276371 (30RZ)**

Locate lower radiator hose and mark hose at 4–1/2 in. (114 mm) and 5–1/2 in. (140 mm) from radiator outlet. Cut at these marks to remove 1 in. (25 mm) from hose.

18. Place two *large* hose clamps 250081/X–426–4 on cut radiator hose (one on each end). Install tee hose connector 276205/276222 with nipple pointing to the 4 o'clock position (as viewed from the radiator end). Locate hose clamps 1/4 in. (6 mm) from end of hose and tighten.

19. Attach block heater bracket 276311 to skid using two screws X–465–18 and whiz nuts X–6210–2.

NOTE

Early generator sets may not have pre–drilled holes in skid. Use bracket as a template and drill two 19/64 in. (7 mm) dia. holes in skid. See Figure 8 and View B–B for location.

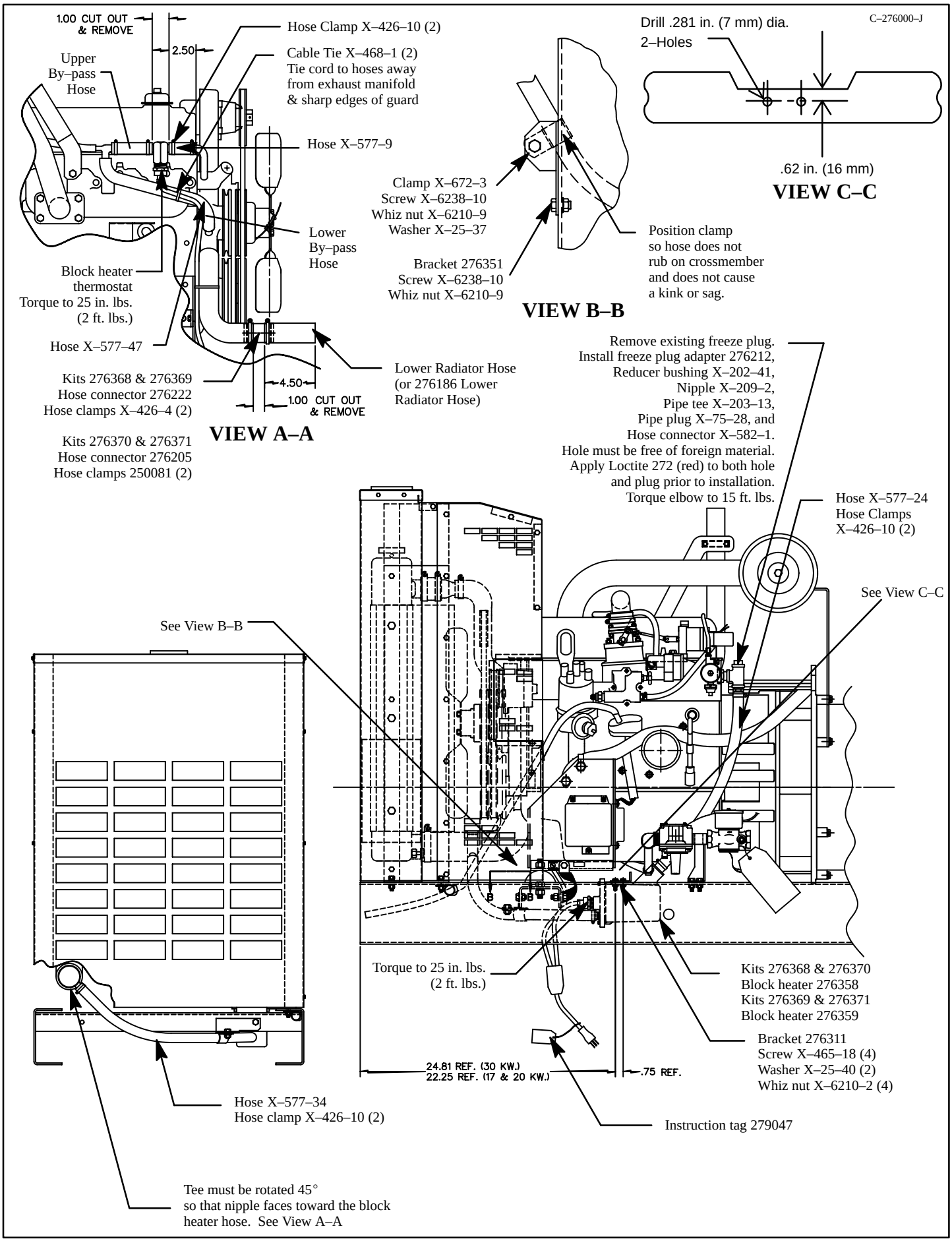


Figure 8. Block Heater Installation

20. Install block heater 276358/276359 to bracket using two screws X–465–18, plain washers X–25–40, and whiz nuts X–6210–2. Note the torque specification in Figure 8.

21. Place two hose clamps X–426–10 on each end of hose X–577–24. Connect hose to hose connector on engine block and to block heater outlet. Locate hose clamps 1/4 in. (6 mm) from end of hose and tighten.

22. Place two hose clamps X–426–10 on hose X–577–34. Connect hose to tee hose connector (installed in Step 18) and block heater. Locate hose clamps 1/4 in. (6 mm) from end of hose and tighten.

23. Install the support bracket 276351 to the generator's cross member (see Figure 8, view B–B) using screw X–6238–10 and whiz nut X–6210–9. Route hose X–577–34 through clamp X–672–3. Attach clamp to bracket using screw X–6238–10, whiz nut X–6210–9, and washer X–25–37. Position clamp so that hose does not kink, sag, or rub on cross member.

24. Remove existing by–pass hoses and clamps. Discard hoses, save clamps. See Figure 8. Position new hoses X–577–47 and X–577–9 using existing clamps to secure.

25. Locate upper by–pass hose X–577–9 (see Figure 8, view A–A) and mark at 2–1/2 in. (64 mm) and 3–1/2 in. (89 mm) from end of hose. Cut at these marks to remove 1 in. (25 mm) from hose.

26. Place two hose clamps X–426–10 on cut by–pass hose X–577–9 (one on each end.) Install thermostat end of harness between cut ends of by–pass hose and tighten. Tie the thermostat's cord to hoses away from exhaust manifold and sharp edges of guard using cable ties X–468–1.

NOTE

It may be necessary to trim part of the top fan guard in order to allow adequate space for the thermostat's new location. See Figure 9. No trimming is necessary on 20RZ generator sets equipped with a cover plate (276352) on the top fan guard, simple discard cover plate and screws. 17RY generator sets, trim top fan guard so hose and thermostat don't rub.

27. Use cable ties, as necessary, to protect and secure wiring from sharp objects, exhaust system, and any moving parts.

28. Close petcock drain valves on bottom of radiator and/or engine block. Open air bleed valves located on top right side of engine (as viewed from the generator end), and on left side of generator set in intake manifold.

29. 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. See Table 1 for coolant capacities. Close air bleed valves.

NOTE

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

Model	Standard Radiator	Remote Radiator	City–Water Cooled
17RY	2 (7.6)	3.5 (13.25)	3 (11)
20RZ	2 (7.6)	3.5 (13.25)	3 (11)
30RZ	4 (15.1)	3.5 (13.25)	4 (14.7)

NOTE: Capacities shown may vary from model to model and are subject to change.

Table 1. Coolant Capacities – U.S. Gal. (L)

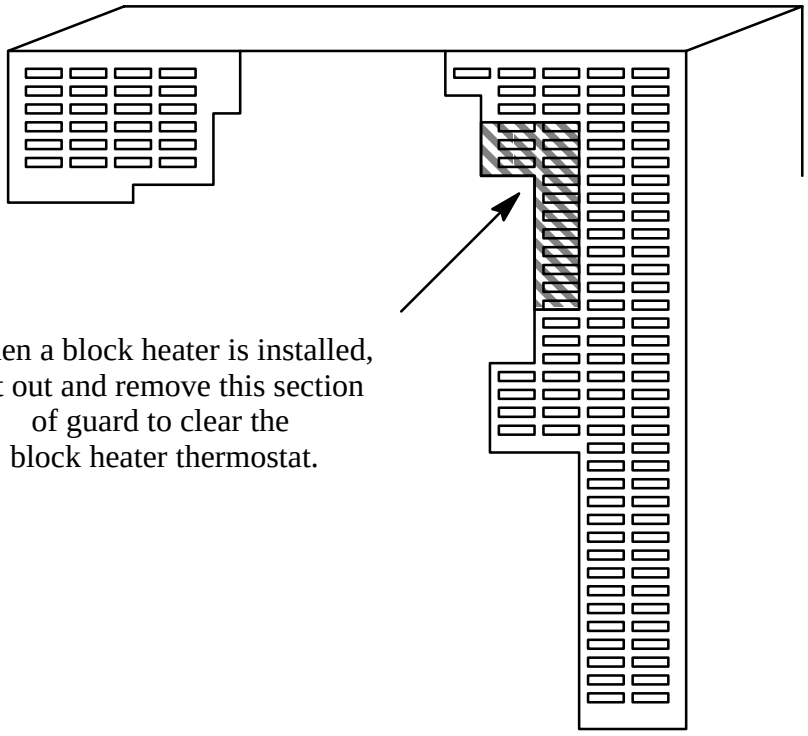
30. Check that the controller master switch is in the OFF position. Reconnect battery, negative lead last. Reconnect battery charger if equipped.

31. Test run the generator set for a few minutes to check for leaks and to insure that all air is purged from the 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 all air cavities takes place. Failure to purge all air from the system may cause block heater element failure.

32. Connect block heater electrical plug to proper voltage outlet. Tie hang tag 279047 to the electrical cord coming from block heater.

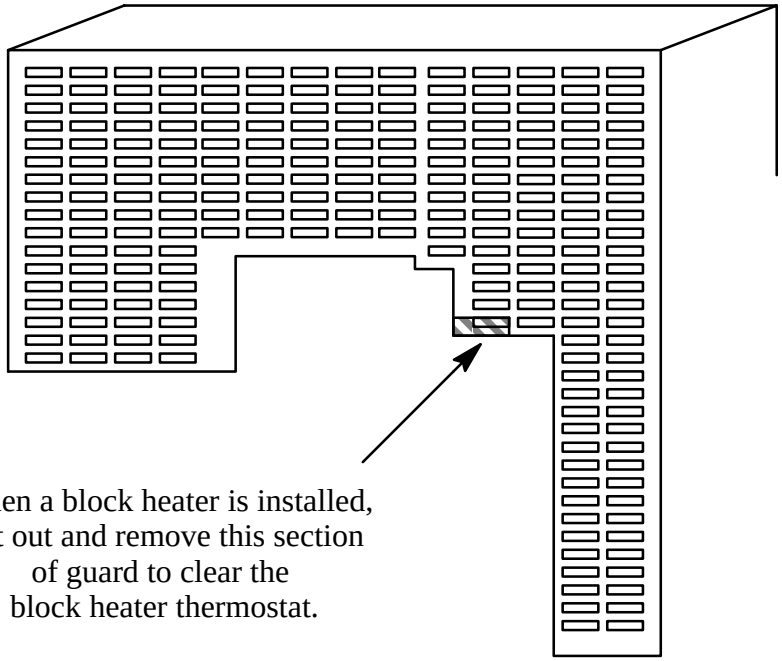


When a block heater is installed, cut out and remove this section of guard to clear the block heater thermostat.

Note:
If the fan guard has a cover plate, simply discard the cover plate. (No trimming is necessary.)

20RZ Top Fan Guard

254418



When a block heater is installed, cut out and remove this section of guard to clear the block heater thermostat.

30RZ Top Fan Guard

254980

Figure 9. Top Fan Guard Cut–Outs

Parts Listing

Qty.	Description	Common Parts	Kit Numbers 276368	276369	276370	276371
1	Washer, plain 13/32 x 13/16 x 1/16	X–25–37				
1	Tee, 3/8 NPT black iron	X–203–15				
2	Washer, 9/32 x 5/8 x 1/16 plain	X–25–40				
8	Clamp, 1 in. hose	X–426–10				
2	Clamp, 2–1/4 in. hose		X–426–4	X–426–4		
4	Screw, 1/4–20 x 7/8, Gr. 5	X–465–18				
3	Tie, cable	X–468–1				
2	Connector, 3/8 NPT hose	X–582–9				
1 **	Plug, 3/4 NPT pipe	X–75–6				
2 *	Plug, 3/4 NPT pipe	X–75–6				
2	Clamp, 3 in. hose				250081	250081
1	Hose, lower radiator		276186	276186		
1	Connector, tee hose		276222	276222	276205	276205
1	Heater, block		276358	276359	276358	276359
1	Adapter, freeze plug	276212				
2 *	Adapter, freeze plug	276212				
1	Bracket, mounting	276311				
1	Hose, 5/8 in. I.D. x 21 in.	X–577–24				
1	Hose, oil proof 24 in.	X–577–34				
1	Hose, oil proof 15 in.	X–577–47				
1	Hose, 0.625 in. x 7–1/2 in.	X–577–9				
4	Nut, whiz 1/4–20	X–6210–2				
2	Nut, whiz 3/8–16	X–6210–9				
2	Screw H.C. 3/8–16 x 0.75	X–6238–10				
1	Clamp, insulating	X–672–3				
1	Bracket, support	276351				
1	Valve, Air Bleed 3/8	X–256–1				
1	Bushing, reducer	X–202–41				
1	Plug, pipe 1/2	X–75–28				
1	Nipple 1/2 x 1–3/16	X–209–2				
1	Tee, pipe	X–203–13				
1	Connector, Hose	X–582–1				
1	Tag, hang	279047				

* Items used only if Step 3 applies.

** Items used only if Step 4 applies.