Special Bulletin SP16-301B

Date	Expiration	Release	Page
02.2016	**02.2018**	**4**	**1(12)**

Revision B: This document supersedes previous revisions.
Procedure modified as per JZ

VARIABLE GEOMETRY TURBOCHARGER - ACTUATOR REPLACEMENT (**SRA**)

Prevost vehicles

DESCRIPTION

On the vehicles affected by this bulletin, replace the turbocharger actuator (SRA).

MODEL YEAR(S) AND VEHICLES INVOLVED

NOTICE TO SERVICE CENTERS

*Verify vehicle eligibility by checking warranty bulletin status with **SAP** or via **ONLINE WARRANTY SYSTEM** available on Service / Warranty tab of Prevost website.*

Model	VIN
X3-45 Commuter Model Year : 2012	From 2PCG33495CC73***5053*** up to 2PCG33495CC73***5232*** incl.
This bulletin does not necessarily apply to all the above-mentioned vehicles, some vehicles may have been modified before delivery. The owners of the vehicles affected by this bulletin will be advised by a letter indicating the Vehicle Identification Number (VIN) of each vehicle concerned.	

MATERIAL NEEDED

Order kit "**SP16-301**" which consists in:

Part No.	Description	Qty
85013731	ACTUATOR, TURBOCHARGER – SERVICE KIT	1

NOTE
Material can be obtained through regular channels.

PROCEDURE

DANGER

Park vehicle safely, apply parking brake, stop engine. Prior to working on the vehicle, set the ignition switch to the OFF position and trip the main circuit breakers equipped with a trip button. On Commuter type vehicles, set the battery master switch (master cut-out) to the OFF position.

PREPARATION

1. Apply the parking brake and shift the transmission to neutral. Shut off all electrical loads. Turn the ignition key to the OFF position.

2. Open the engine compartment door. Set the rear start selector switch to the OFF position (FIGURE 1).

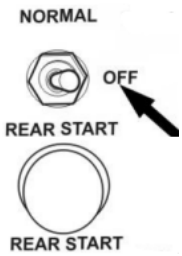

FIGURE 1

3. Using pressure wash equipment, clean the turbocharger actuator while it is still mounted.

Note: *Make sure all electrical connections and coolant pipes in the area of the turbocharger actuator are securely fastened.*

4. Use a coolant extractor (FIGURE 2) to drain the coolant from the engine. An alternate method is to drain the coolant into a suitable container using the drain hose.

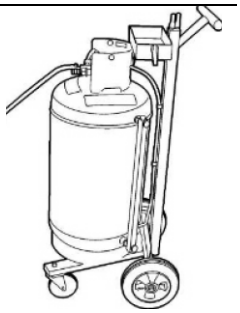

FIGURE 2

GAINING ACCESS TO THE AREA

5. In order to reach the turbocharger area, the radiator coolant return pipe shown on FIGURE 3 along with the furthest flexible hose must be removed.

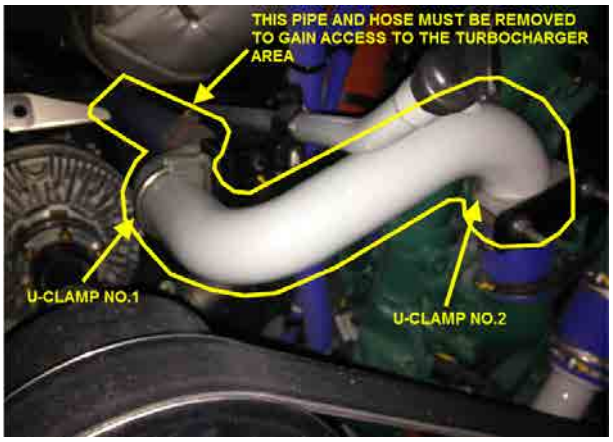

FIGURE 3

6. Loosen the hose clamps (4 clamps) shown on FIGURE 4.
7. Remove the two (2) U-clamps shown on FIGURE 4.

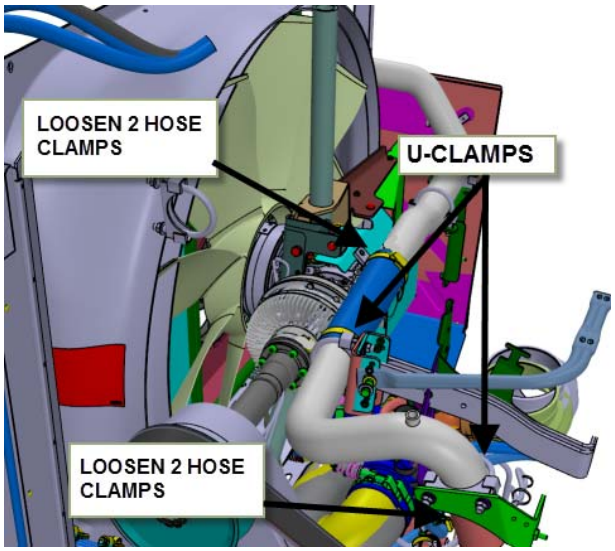

FIGURE 4

8. To ease removal, remove the transmission dipstick tube clamp identified on FIGURE 5 (see also FIGURE 6: DIPSTICK TUBE CLAMP REMOVED).
9. Take the coolant pipe out and the flexible hose with it.

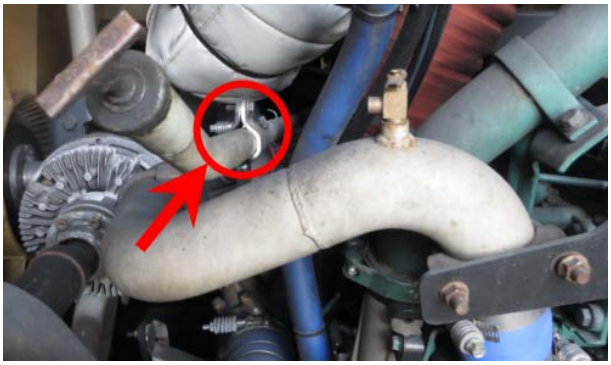

FIGURE 5: TRANSMISSION DIPSTICK TUBE CLAMP

FIGURE 6: DIPSTICK TUBE CLAMP REMOVED

REMOVAL

10. Disconnect the actuator assembly electrical connector at the wiring harness (FIGURE 7). Cut any tie straps as needed.

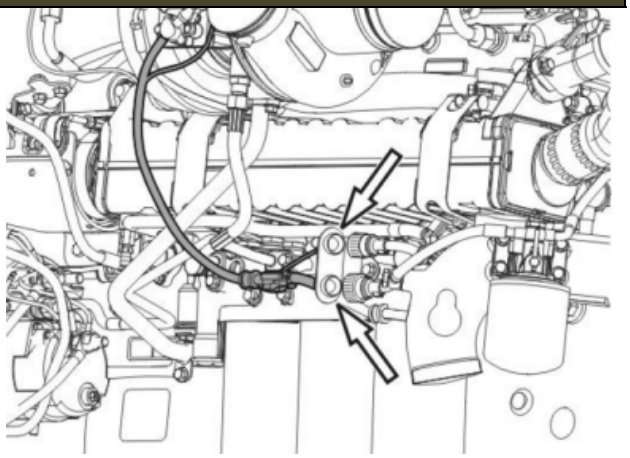

FIGURE 7

11. Disconnect the coolant lines from the actuator (FIGURE 8).

Caution: *Protect the insides of the actuator assembly and the exposed parts from contamination when removed. Failure to do so can result in component malfunction or failure.*

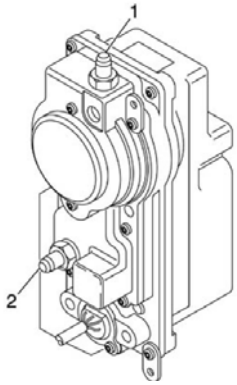

FIGURE 8

1) Coolant Return Port
2) Coolant Inlet Port

12. Unscrew the four hex socket head bolts (item 4) holding actuator to the turbocharger and remove the actuator. Remove and discard the gasket (FIGURE 9).

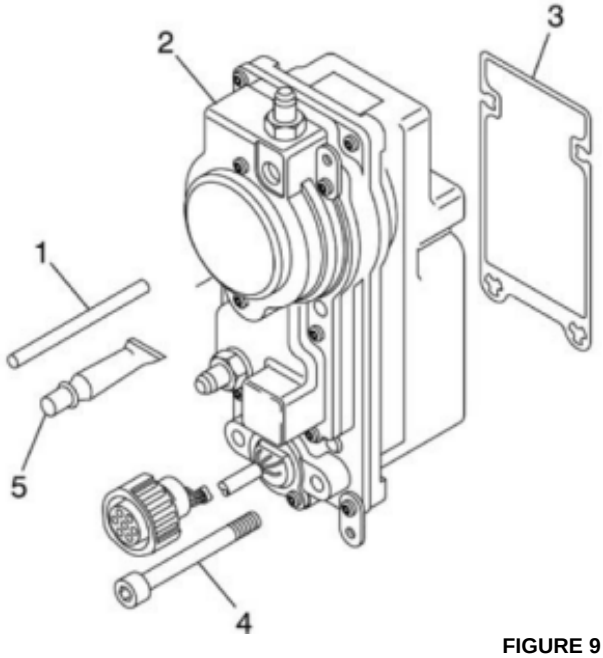

FIGURE 9

1) Alignment Pin
2) Actuator Housing
3) Gasket
4) Screw (4 Required)
5) Grease Applicator Tube

INSTALLATION

13. Using gloves, manually rotate the turbocharger sector gear back and forth (counterclockwise and clockwise) (FIGURE 10). It should be noted that when the sector gear is at the end of travel, or at an end stop, it can require significant force to overcome friction then, start its motion in the opposite direction. This is normal and not cause for concern. Apply more force to move the sector gear. Once in motion, the sector gear movement should be smooth, without binding or sticking until it reaches its end of travel (end stop).

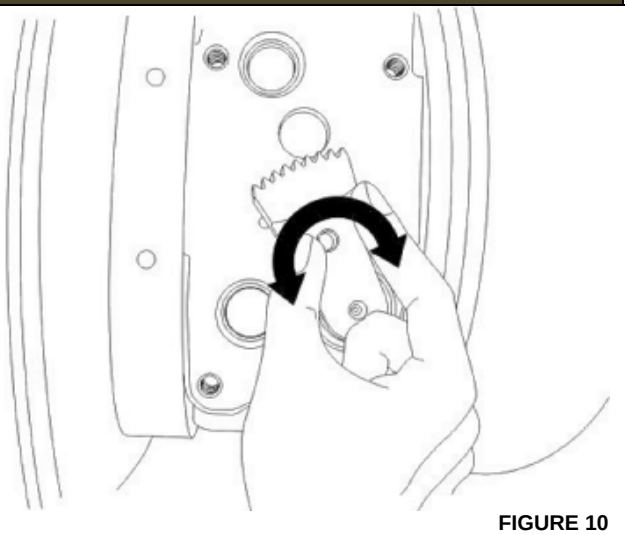

FIGURE 10

14. Rotate the sector gear fully counterclockwise until contact is made with the end stop of the variable geometry internal mechanism. 1/4 to 3/4 of the 3mm (0.118 inch) reference hole should be visible at the edge of the sector gear nearest the turbine housing (FIGURE 11).

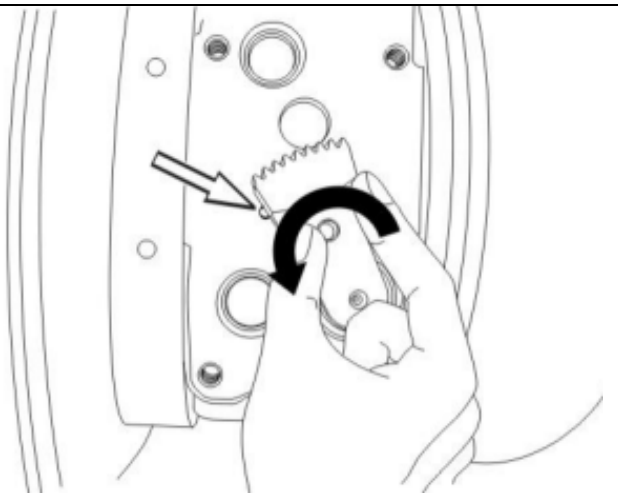

FIGURE 11
ALIGNMENT HOLE INSPECTION, 3MM (0.118 INCH) HOLE

15. For turbochargers manufactured without the small 3mm (0.118 inch) alignment hole, a portion (half) of the 5mm (0.197 inch) alignment hole should be exposed at the compressor housing side of the sector gear when the sector gear is fully rotated toward the turbine housing (FIGURE 12).

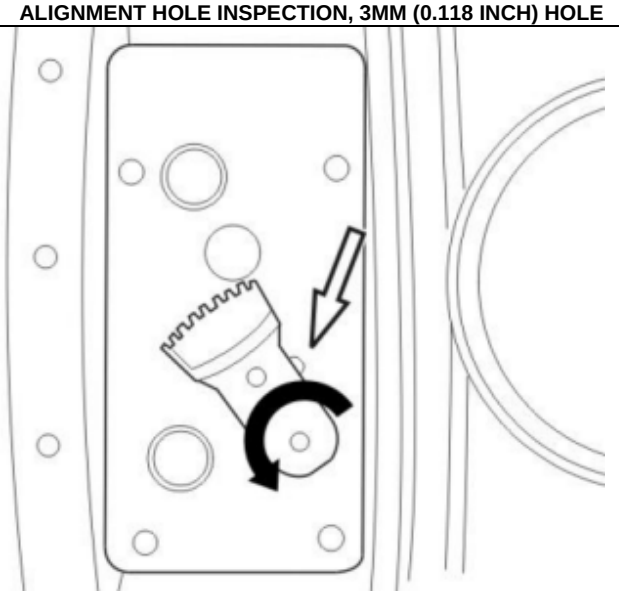

FIGURE 12
ALIGNMENT HOLE INSPECTION, 5MM (0.197 INCH) HOLE

16. Rotate the sector gear fully clockwise. Make sure that the alignment pin fits through the sector gear into the alignment hole in the housing (FIGURE 13). The diameter of the alignment hole is 5mm (0.197 inch).

    Note: *If the sector gear does not align properly with the alignment hole or does not rotate properly in either direction, replace the turbocharger.*

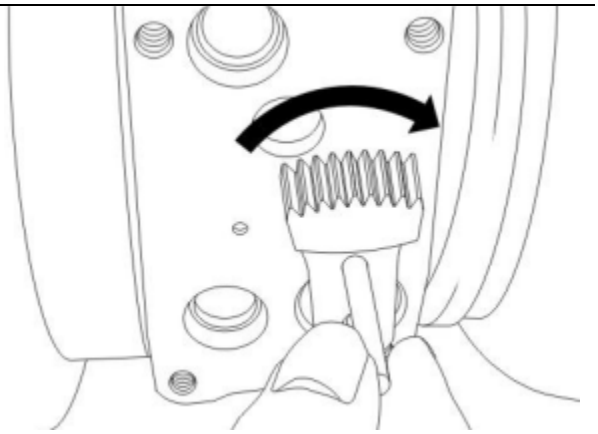

FIGURE 13

IMPORTANT NOTE: *Make sure that the actuator and turbocharger housing mating surfaces (where the gasket sits) are clean and smooth (see the mating surface on the turbocharger housing on* FIGURE 14*).*

FIGURE 14

17. Lubricate the sector gear teeth using the grease applicator tube that comes in the installation kit (FIGURE 15).

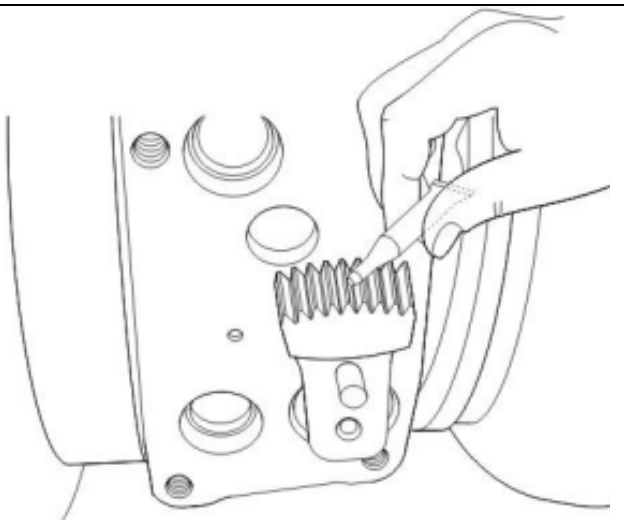

FIGURE 15

18. Remove the alignment pin without disturbing the position of the sector gear. The gear must not be moved from this position (FIGURE 16).

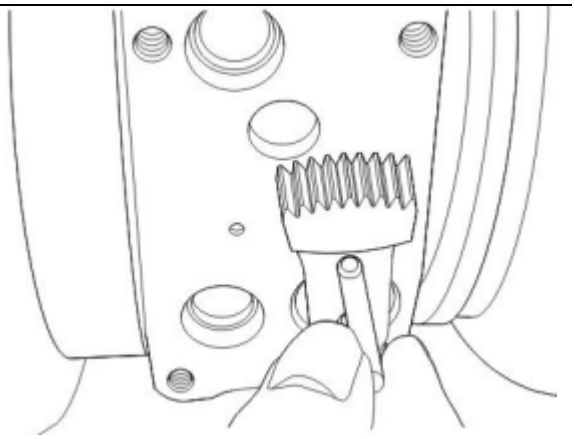

FIGURE 16

19. Connect the actuator electrical wiring harness connector to the engine wiring harness connector. Install tie straps as needed to secure the harness (FIGURE 17).

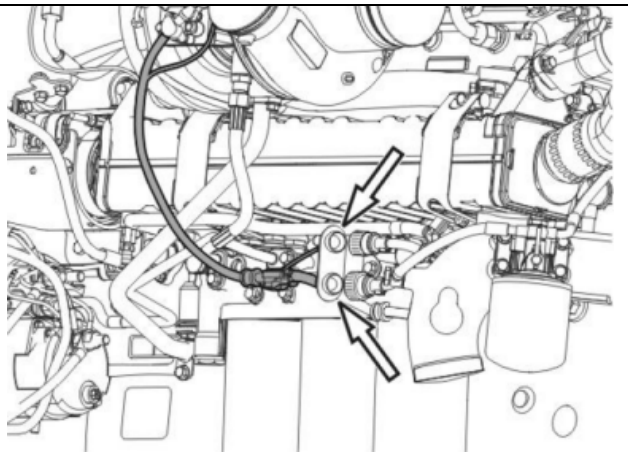

FIGURE 17

20. Connect the VCADS Pro PC (PTT) to the vehicle diagnostic data connector and turn the ignition switch ON. Using the on screen directions in VCADS Pro, perform the VGT calibration procedure. Perform the actuator drive gear install position, which is step 2 of the calibration procedure.

    VGT CALIBRATION

    PTT OPERATION NUMBER: 2551-07-03-01

Note: *Do not disturb the actuator drive gear after the gear is in the install position. Proper calibration of the actuator drive gear to the turbocharger sector gear must be maintained for proper operation.*

Turn the ignition switch to the OFF position when done.

21. Install two new mounting screws diagonally across the actuator. Place a new gasket over the protruding screws at the back of the actuator (FIGURE 18).

Note: *Always use the new screws and gasket provided in the actuator installation kit.*

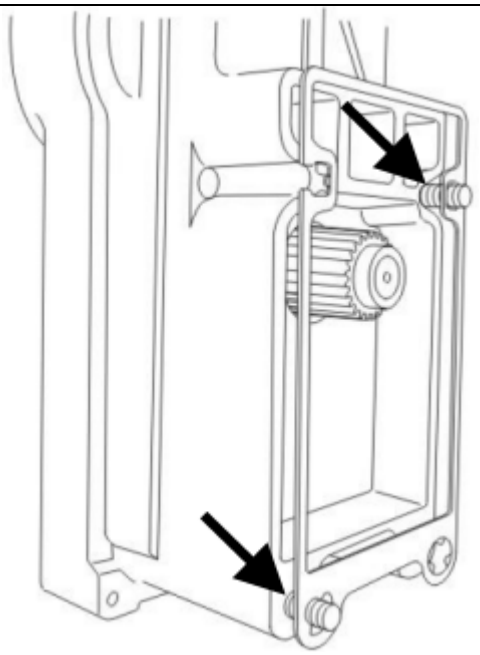

FIGURE 18

22. Carefully align the actuator with the turbocharger and install it into position. Hold the actuator in place and hand tighten the two screws. Install the two remaining new screws and finger-tighten. Use the following steps to tighten the screws (FIGURE 19).

    a) tighten the screws in the pattern shown to: 27 in-lbf (3 Nm)

    b) tighten the screws in the pattern shown to: 97 in-lbf (11 Nm)

    Once properly torqued, apply torque seal

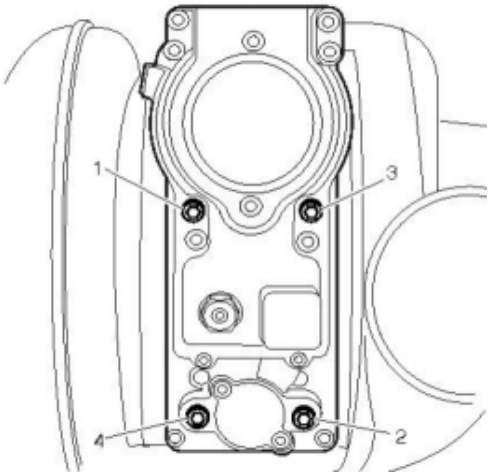

FIGURE 19

23. Turn the ignition key back ON. Using the on screen directions in VCADS Pro, complete the final step of the VGT calibration procedure. If the actuator is installed correctly, the procedure indicates a successful VGT calibration with a green check mark.

    The SRA runs from full open to close nozzle positions to ensure proper calibrated SRA travel.

    If the calibration fails, either the pre-positioning of the actuator drive gear is incorrect, the sector gear positioning is incorrect, the actuator is faulty or the turbocharger sector gear and nozzle ring mechanism is damaged. Turn OFF the ignition switch when done.

24. If the actuator is suspected of being faulty and requires replacement, follow the preceding installation steps with the new actuator.

25. Connect the coolant lines to the actuator and tighten the fittings (FIGURE 20).

    coolant inlet & return port fitting:

    Torque 9±2 lbf-ft (12±3 Nm)

    Once properly torqued, apply torque seal

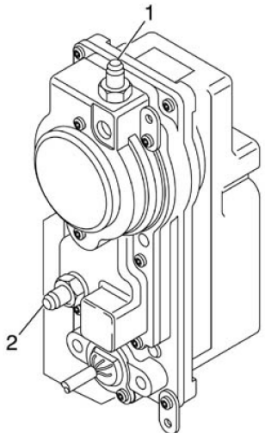

FIGURE 20

1) Coolant Return Port
2) Coolant Inlet Port

REINSTALLATION OF COOLANT PIPE

26. Reinstall the coolant pipe loosely (**A** on FIGURE 21).
27. Place the two (2) hose clamps (**B** on FIGURE 21).

Note: Pay attention to the position of the clamp. Refer to *FIGURE 21***.**

Do not tighten to final torque

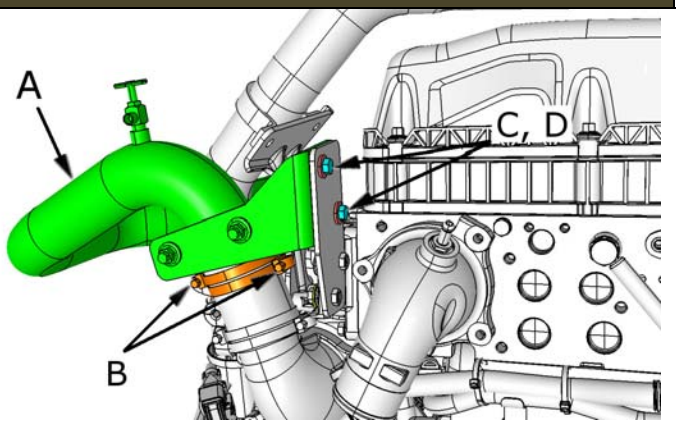

FIGURE 21

28. Connect the flexible hose at the furthest end of the coolant pipe.
29. Reinstall the U-clamps (2 U-clamps) loosely (FIGURE 22).

Do not tighten to final torque

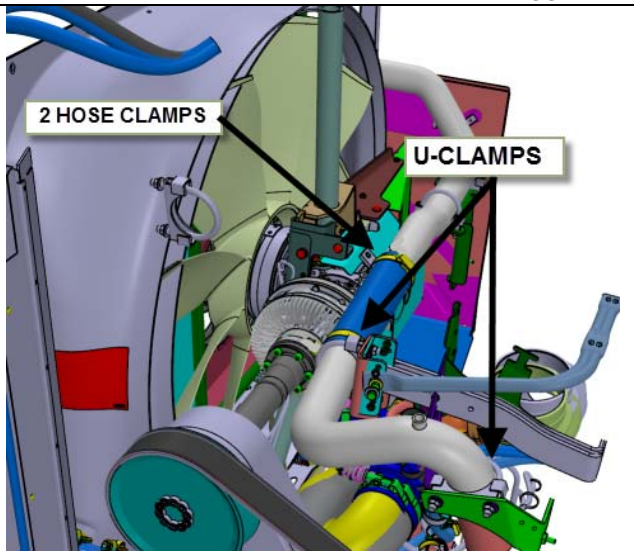

FIGURE 22

Note: Pay attention to the position of the hose clamps. Refer to FIGURE 23. The screw should be oriented to 45°.

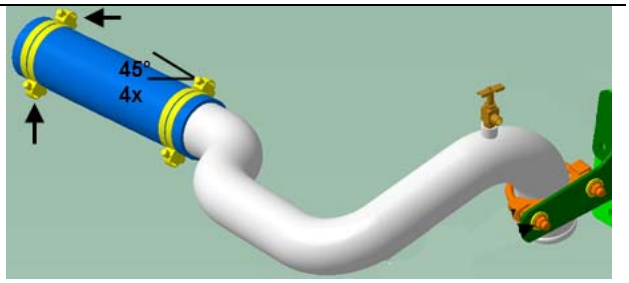

FIGURE 23

30. Place a 13/64” (5mm) shim between the coolant pipe and the EGR pipe so that a functional clearance will remain once the clamps and U-clamps will be tightened (FIGURE 24).
31. Tighten the U-clamps. No specific torque value for this piece of hardware.
32. Tighten the hose clamps to 30 lbf-in.
33. Reinstall the transmission dipstick tube clamp.
34. Replenish the cooling system.

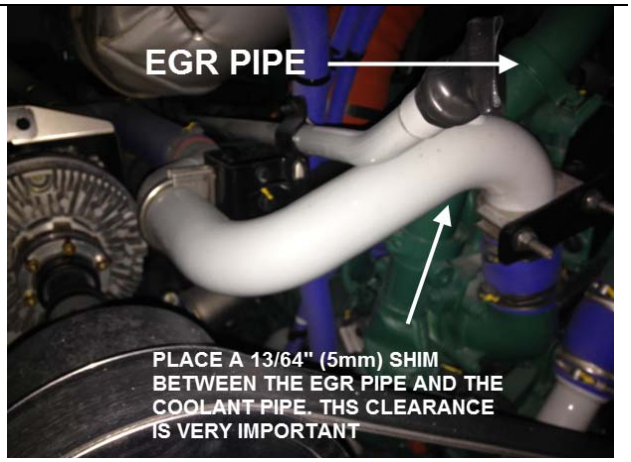

FIGURE 24

35. Use the coolant extractor to refill the cooling system.

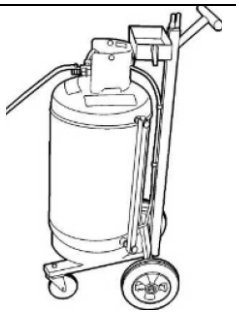

FIGURE 25

36. Reset the main circuit breakers equipped with a trip button if applicable. Set the battery master switch (master cut-out) to the ON position.
37. Turn the ignition key to the ON position. Set the starter selector switch to the rear start position.
38. Press the starter push-button switch (FIGURE 26). Release push-button after the engine starts. Check for leaks and proper operation. To check proper operation, use PTT VGT function test, Operation 2551-08-03-02.
39. After shutdown, replenish fluids as necessary.
40. Set the starter selector switch to the NORMAL position. Close the engine compartment door.

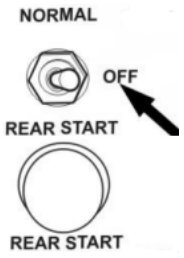

FIGURE 26

PARTS / WASTE DISPOSAL

Discard waste according to applicable environmental regulations (Municipal/State[Prov.]/ Federal)

ESTIMATED TIME

The time required to perform this special bulletin is approximately six (6) hours.

OTHER

VBC Bulletin	N/A
Fail Code	01.00-2
Defect Code	09
System Condition	B
Causal Part	021517180

Prevost engages in a continuous program of testing and evaluating to provide the best possible product. Prevost, however, is not committed to, or liable for updating existing products.