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Special Instruction**Replacement Procedure for Fuel Injection Pump on Certain CT11 and CT13 Engines in CT660 Vocational Trucks{7000}**

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Replacement Procedure for Fuel Injection Pump on Certain CT11 and CT13 Engines in CT660 Vocational Trucks{7000}

SMCS - 7000

On Highway Truck:
 CT660 (S/N: TRK100-623; TKL100-168)

Introduction

Table 1

Required Parts			
Part	Part Number	Description	Qty
1	358-0258	Washer	1
2	358-0265	Locknut	1
3	358-1080	Special Bolt	1
4	421-3155	Fuel Injection Pump Kit	1
5	N/A	high-pressure fuel line assembly	1
6	N/A	high-pressure fuel line assembly	1

The **380-9329** Fuel Injection Pump Gp on certain CT11 and CT13 engines used in CT660 may need to be replaced.

Fuel Injection Pump Removal



Before service work is begun, park the machine on a hard level surface. Block the wheels of the machine so unexpected movement will not occur. Unexpected movement of the machine can cause personal injury or death.

NOTICE

Remove the ground cable from the negative terminal of the battery box before disconnecting any electrical components. Always connect the ground cable last.

NOTICE

Always wear safe eye protection when performing vehicle maintenance. Failure to do so may result in serious eye injury.

1. Turn steering wheel to the left.
 2. Install wheel chocks.
 3. Remove battery box cover and disconnect negative cables from battery.
 4. Open hood.
 5. Remove left front fender assembly and bracket.
 6. Remove air filter housing and tube. Install the **373-4730** Caps .
 7. Remove charge air pipe and install protective caps.
-

NOTICE

To avoid damaging the steering shaft, use a pry bar to detach the steering shaft from the steering gear.

8. Detach steering shaft from steering gear and position away from injection pump. Discard bolt, flat washer, and lock nut.
9. Remove the oil dipstick brace and oil filler pipe.

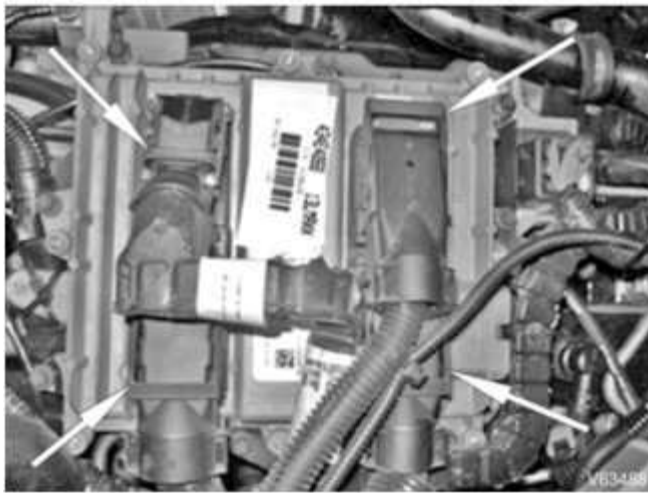


Illustration 1

g03219277

10. Unlock and disconnect all electrical connectors from Electronic Control Module (ECM).
 11. Remove eight mounting bolts and remove ECM from support.
-

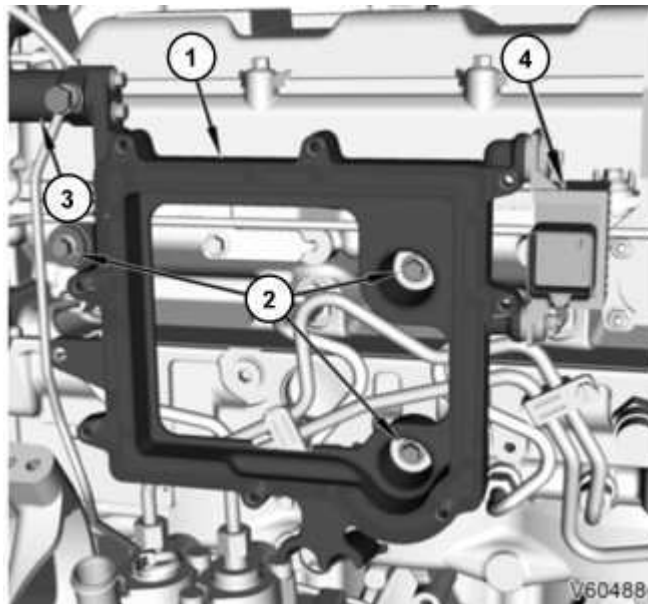


Illustration 2

g03219317

- (1) ECM support bracket
 - (2) Mounting bolts with attachment insulators
 - (3) Cold Start Solenoid (CSS)
 - (4) Cold Start Relay
-
12. Remove two attachment bolts and cold start solenoid (CSS) (3) from ECM support bracket (1) and position the ECM out of the way.
 13. Remove ECM support bracket (1). Retain mounting insulators.

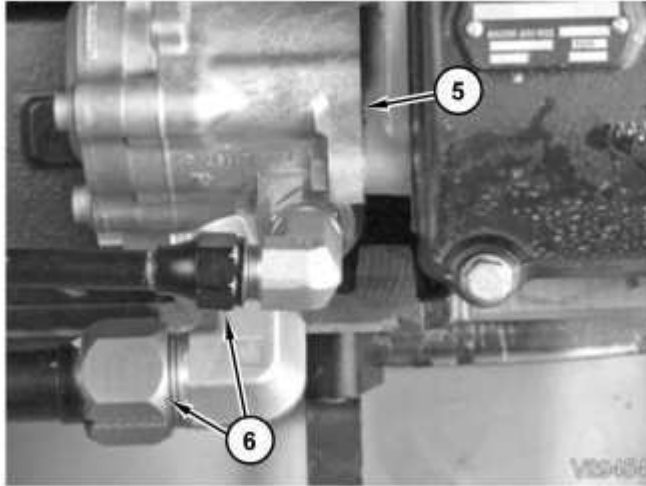


Illustration 3

g03219337

(5) Power steering pump

(6) Pressure tube fitting nuts

Note: Place a drain pan under the power steering pump to catch any fluid.

14. Disconnect power steering pressure tubes and drain power steering.

Note: To assist with fuel injection pump removal, the power steering pressure tubes, with two insulated support brackets, must be laid aside as an assembly. Secure the two support brackets with tie straps before loosening attachment fasteners, or reassembly can be difficult.



Illustration 4

g03219418

15. Install tie straps on both upper and lower support brackets to prevent opening of brackets when removed in Step 16

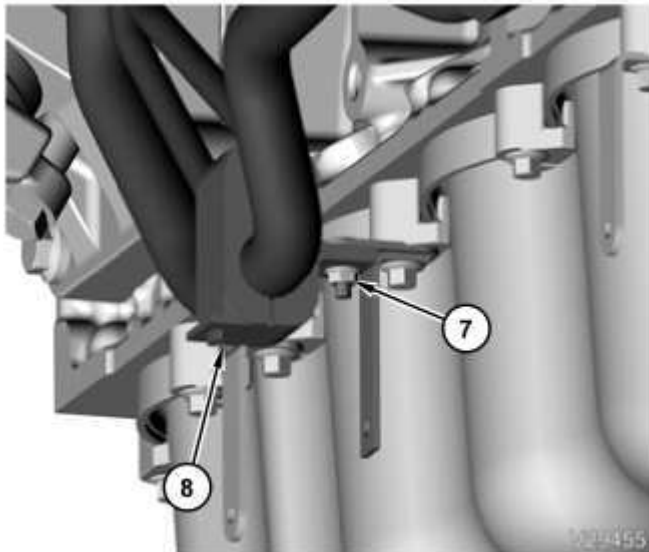


Illustration 5

g03231437

(7) Support Bracket Nut

(8) Support Bracket

16. Remove upper and lower support bracket nuts (7). Slide support brackets (8) off studs and move pressure tube assembly aside.

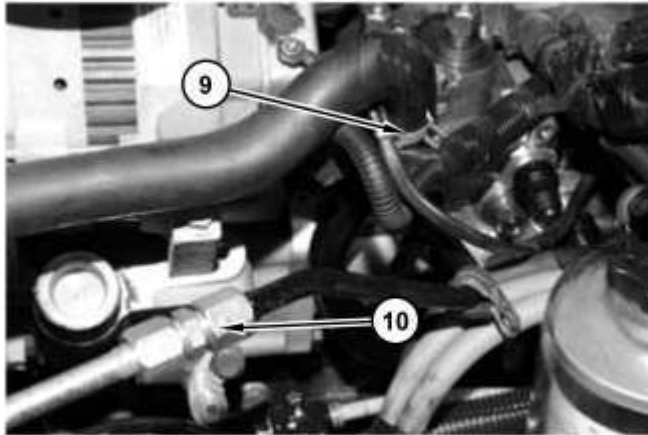


Illustration 6

g03219456

(9) Spring clamp

(10) High-pressure power steering line

17. Remove spring clamp (9) and disconnect rubber power steering hose at return tube. Disconnect high-pressure power steering line (10) and position the line out of the way.
18. Release auto-tensioner and remove drive belt.

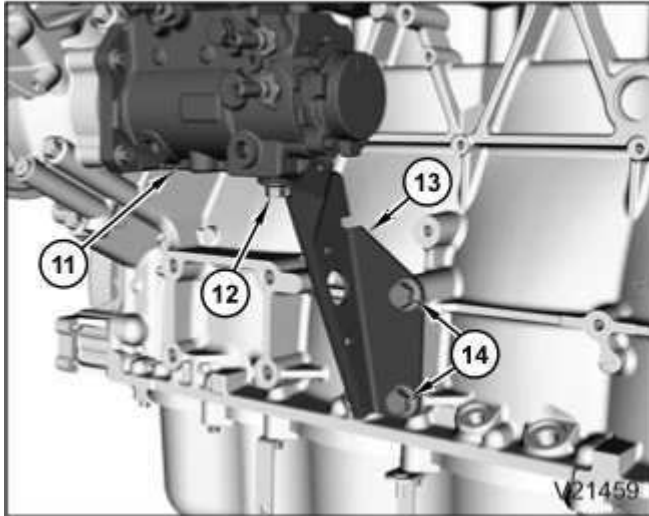


Illustration 7

g03231779

- (11) Fuel Injection Pump
- (12) Bracket to pump bolt
- (13) High-pressure pump support bracket
- (14) Bracket to crankcase bolts

19. Remove two bracket-to-pump bolts (12) and loosen but do not remove two bracket-to-crankcase bolts (14) at fuel injection pump support bracket (13) .
20. Label and disconnect alternator wiring, and remove alternator assembly.

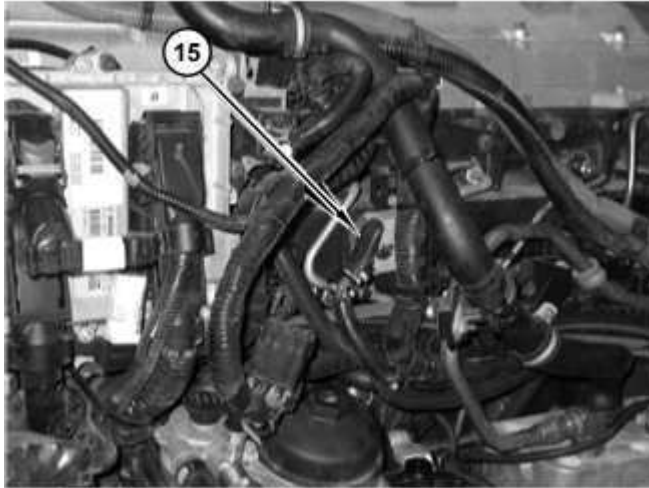


Illustration 8

g03219616

21. Disconnect 21-way harness connector at mounting bracket.
22. Disconnect harness (15) from Fuel Pressure Control Valve (FOCV) on the fuel injection pump.

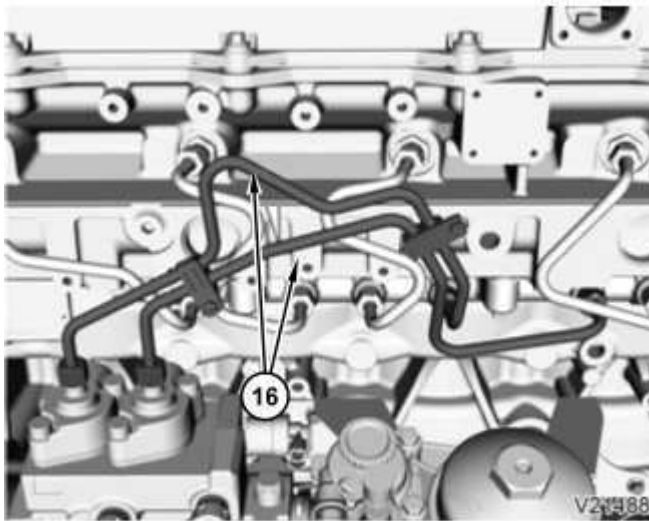


Illustration 9

g03220177



Do not open the high pressure fuel system without allowing the fuel system to purge. After the engine has shut down, allow the fuel system to purge for ten minutes. This operating fuel system contains high pressure. Exposure to high pressure fuel can result in personal injury.

NOTICE

Whenever any fuel line (tubing) in the HP fuel system is removed the fuel line must be replaced with new.

NOTICE

To prevent engine damage, install 373-4730 Disposable Air and Fuel Caps immediately after each fuel line is removed.

23. Remove the fuel injection pump to rail tube assemblies (16). Cap open fuel rail connections with clean protective cap.

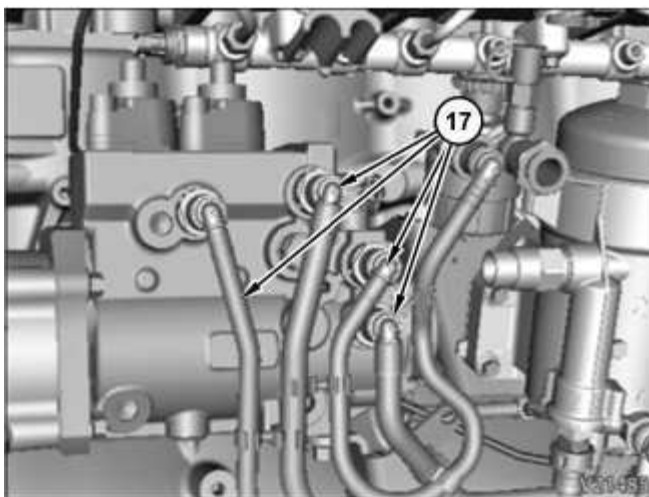


Illustration 10

g03220180

Note: Label four low-pressure fuel lines (17) on the fuel injection pump before removing the lines for proper reinstallation.

24. Disconnect four low-pressure fuel lines (17) from side of the fuel injection pump.

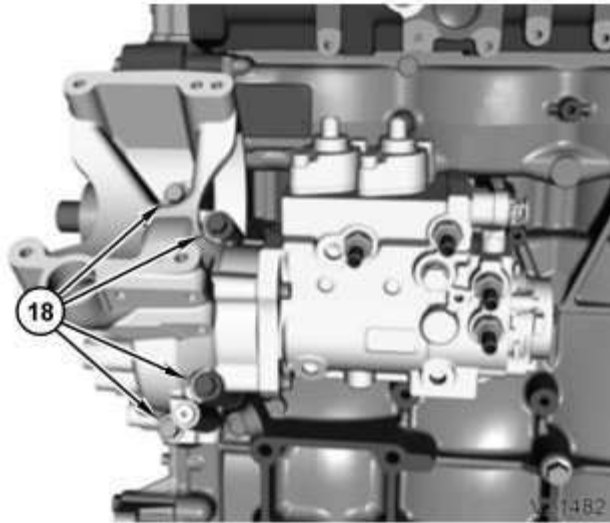


Illustration 11

g03220197

25. Remove four mounting bolts and remove fuel injection pump and drive housing assembly from crankcase.

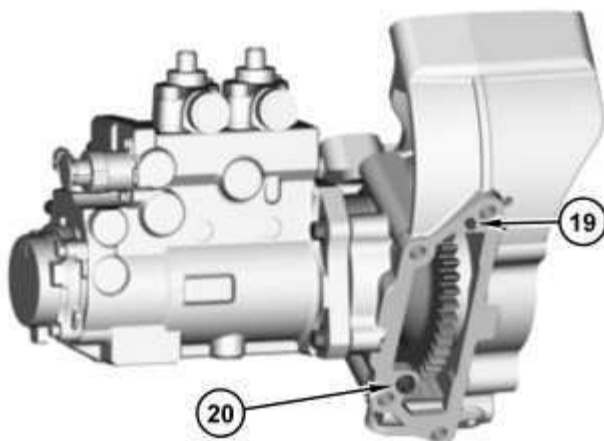


Illustration 12

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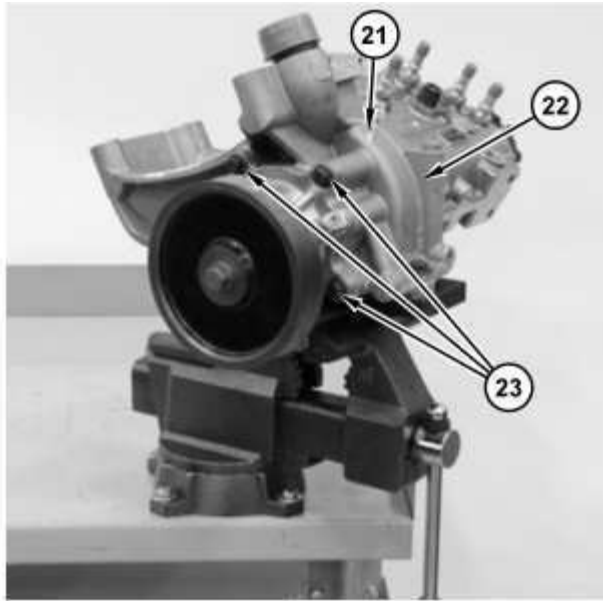


Illustration 13

g03232557

NOTICE

To prevent tool damage, make sure that the pins on holding plate align between the teeth on the pump gear when installing the drive housing on the holding plate.

26. Secure the holding plate in a vise.

Note: A dowel pin (19) and sleeve (20) are used to ensure correct placement of drive housing on the engine block. **DO NOT** bolt holding plate to the drive housing with the dowel pin and sleeve in place.

27. Install fuel injection pump drive housing (22) on the holding plate using four mounting bolts removed in previous step. Torque four mounting bolts to 47 N·m (35 lb ft). Pump gear will be locked in place by the holding plate.
28. Remove four attachment bolts (23) and remove fuel injection pump pulley housing (21) with pulley still attached.
-

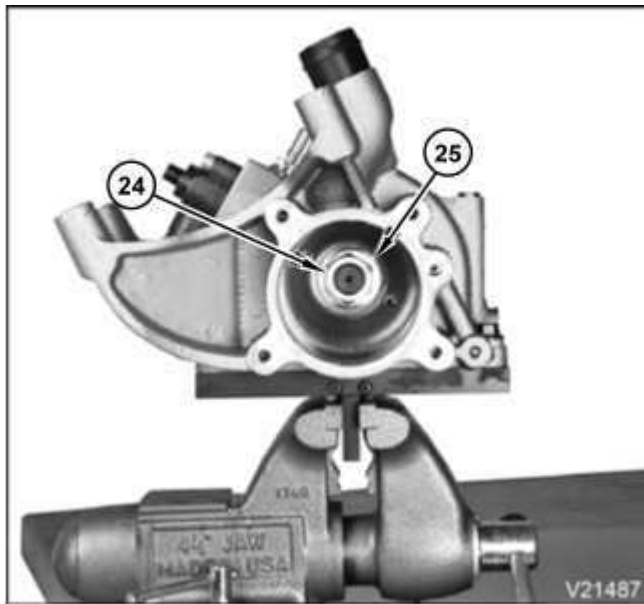


Illustration 14

g03220278

29. Remove jam nut (24) and washer (25) securing pump gear to pump shaft.

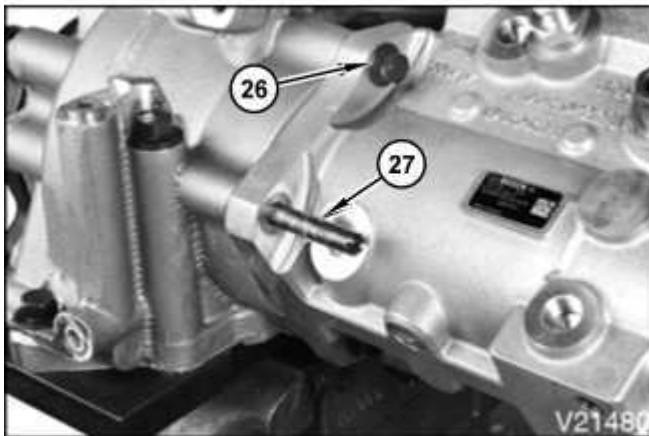


Illustration 15

g03220301

30. Remove the four pump to drive housing bolts (26) and install two alignment studs (27) on opposite sides of the fuel injection pump.

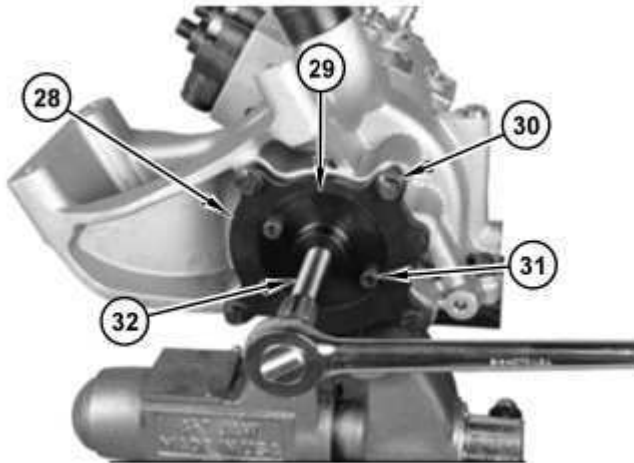


Illustration 16

g03220398

31. Install forcing screw adapter (29) using two socket head cap screws (31), thread cap screws half way into holes in pump gear.
32. Attach forcing screw adapter holder plate (28) to drive housing using four M10x40 bolts (30) .
33. Install forcing screw (32) by hand, into holding plate (28). Hand tighten until screw contacts pump shaft and forcing screw adapter (29) is flush with forcing screw adapter holder plate (28) .
34. Tighten two socket head cap screws (31) until the heads contact screw adapter plate (28) .

NOTICE

To avoid damage to components, do not use air tool to turn forcing screw.

35. Turn forcing screw (32) clockwise until HP pump is removed from drive housing.
36. Remove HP pump from guide studs.
37. Remove socket head cap screws, forcing screw, forcing screw adapter, and adapter holding plate from drive housing.

Fuel Injection Pump Install

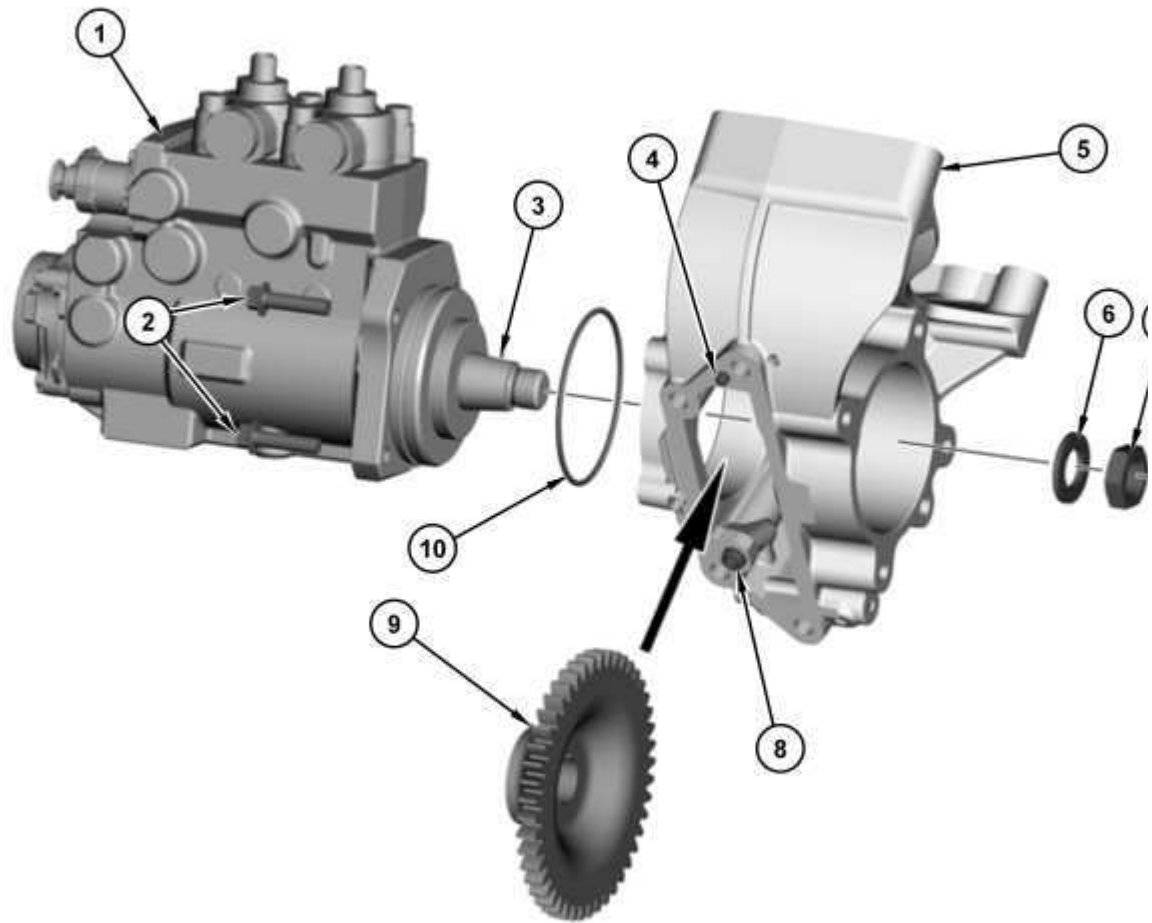


Illustration 17

- (1) HP pump
- (2) M10x40 Bolts
- (3) Key
- (4) Dowel Pin
- (5) Drive Housing
- (6) 25 X 44 X 4 Washer
- (7) M24 Jam Nut
- (8) Sleeve
- (9) HP Fuel pump gear
- (10) 100 X 3.349 O-ring

1. Install a new 100 x 3.349 O-ring on new pump mounting flange collar.

Note: Install components and tighten bolts before sealant dries.

2. Clean joining faces of pump and drive housing. Apply RTV sealant to the drive housing joining surface.
3. Slide new pump over guide studs while guiding pump shaft through center of pump gear.
4. Remove guide studs and install four M10x40 bolts. Torque bolts to 62 N·m (46 lb ft).

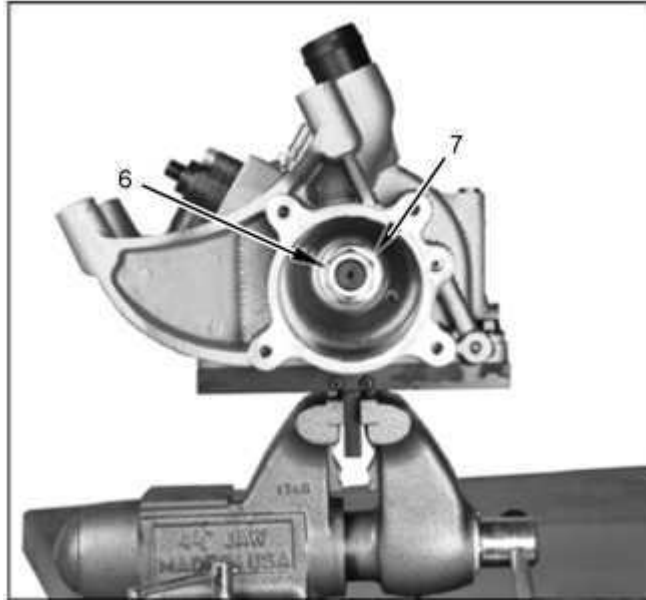


Illustration 18

g03222236

5. Install spacer (7) and jam nut (6). Torque nut to 285 N·m (210 lb ft).
-

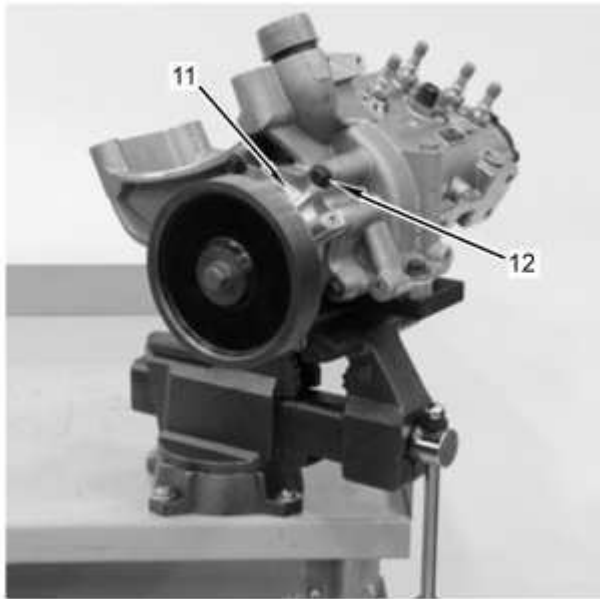


Illustration 19

g03222516

6. Clean joining faces of pump drive housing and pump pulley housing (11). Apply RTV sealant to pump drive housing. Install four M10 X 40 bolts (12) and torque to 62 N·m (45 lb ft).
7. Remove drive housing and pump from holding plate.

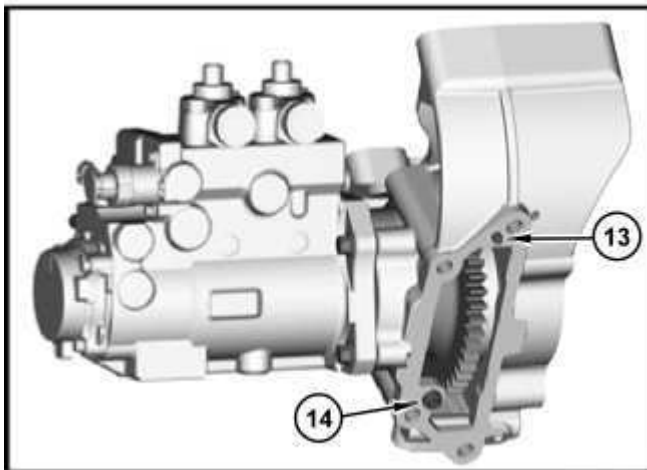


Illustration 20

g03222756

8. Insure that dowel pins (13) and sleeves (14) are properly installed in pump drive housing and crank case.

9. Clean joining surfaces of the drive housing and the crank case. Apply RTV Sealant to the crank case joining surface.

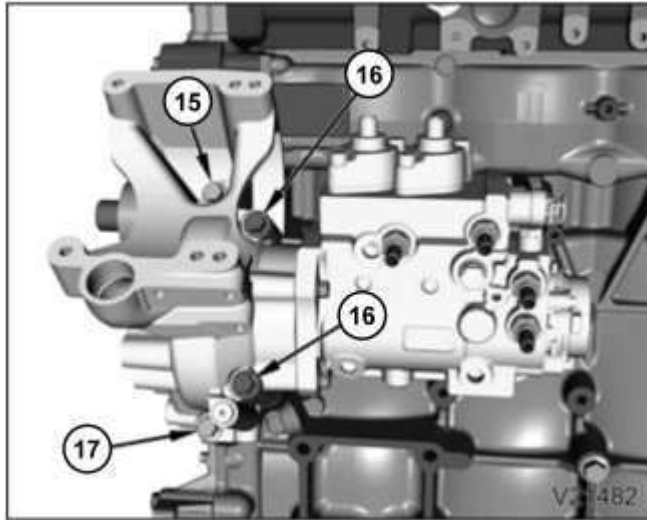


Illustration 21

g03222900

10. Position the fuel injection pump and the drive housing assembly on the crankcase using care to align the pump drive gear with the idler gear. Install 1 M12 x 40 (17), 1 M12 x 90 (15), and 2 M12 x 130 (16) bolts and torque bolts to 105 N·m (77 lb ft).

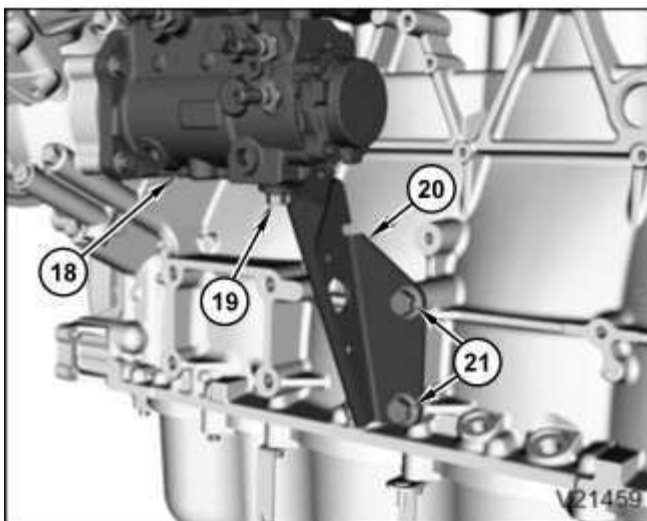


Illustration 22

g03222978

11. Install the pump support bracket.

- a. Attach support bracket (20) to pump (18) with 2 M12 X 30 bolts (19), tighten finger tight.
- b. Attach support bracket (20) to the crank case using 2 M14 X 30 bolts (21), tighten finger tight.
- c. Torque the M12 X 30 bolts (19) to 107 N·m (78 lb ft).
- d. Torque the M14 X 30 bolts (21) to 172 N·m (126 lb ft).

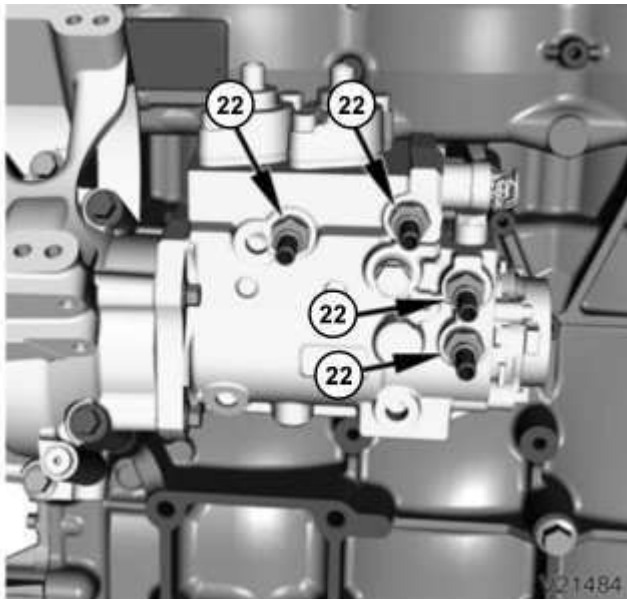


Illustration 23

g03219282

12. Install four M16 X 1.5 quick connect fitting with 16.7 X 24 seal ring to the pump. Torque fittings to 30 N·m (22 lb ft).
-

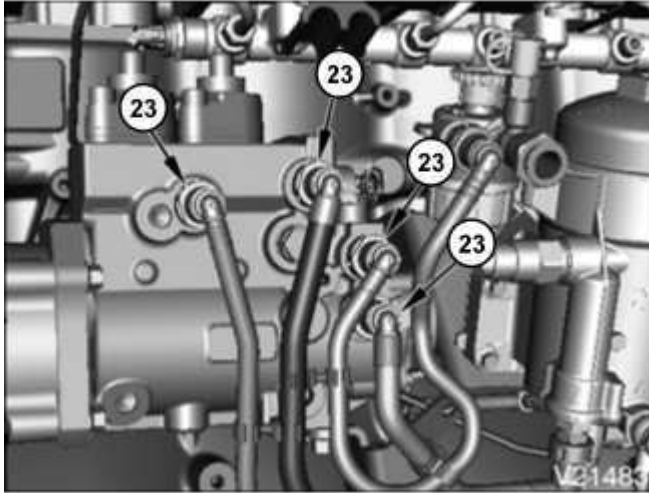


Illustration 24

g03223017

13. Connect four low-pressure fuel lines to fittings.

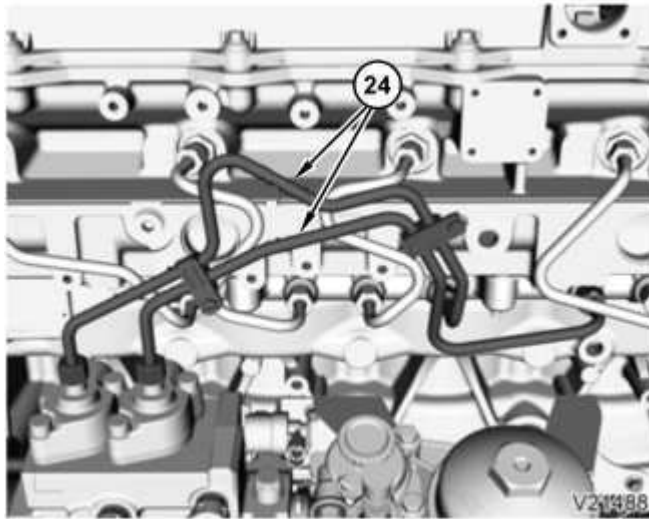


Illustration 25

g03223077

14. Install new high-pressure fuel lines assembly (23) between the fuel injection pump and the fuel rail. Hand tighten line fitting nuts. Start with the lines at the fuel rail first and then at the fuel pump.

15. Using a crow's-foot wrench, torque fittings at the fuel rail first and then at fuel pump. Torque fittings to 23 N·m (17 lb ft). Tighten fittings an additional 60°.
16. Install alternator with four mounting bolts. Torque bolts to 61 N·m (45 lb ft) and connect alternator wiring.

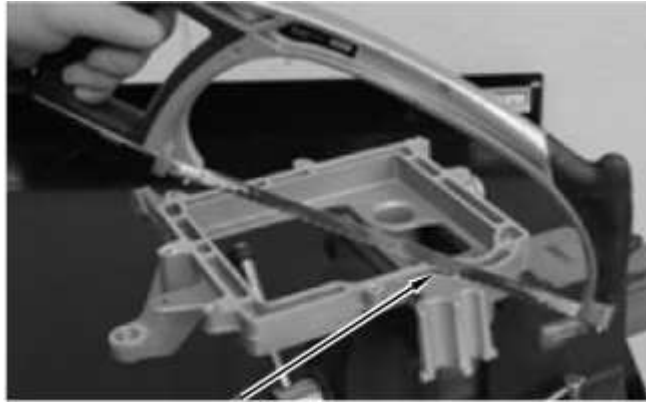


Illustration 26

g03391694

17. Using a hack-saw or other acceptable method, cut off harness support bracket from bottom of ECM bracket.

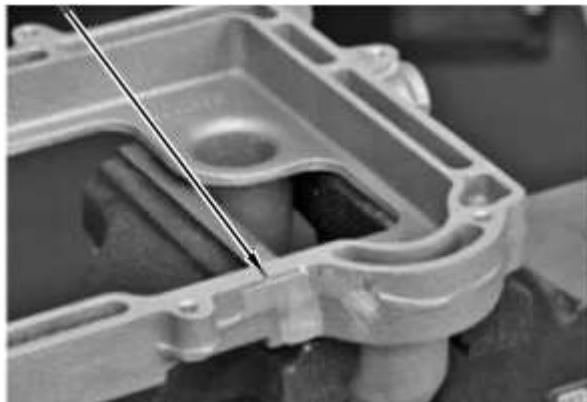


Illustration 27

g03391695

18. Using grinder or other acceptable method, grind off any remaining stock close to profile of ECM bracket. Remove any burrs or sharp edges.
19. Inspect harness and repair harness if evidence of rubbing through to copper is observed.

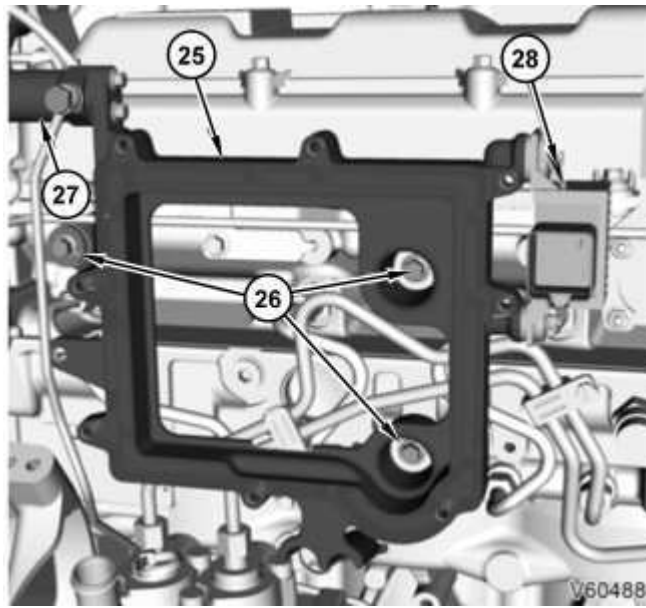


Illustration 28

g03223117

20. Position ECM support bracket (25) on engine and reinstall six bracket insulators and three M8 x 40 bolts (26). Torque bolts to 13 N·m (120 lb in).
21. Install cold start solenoid (27) and cold start relay (28) on ECM support bracket. Torque 2 M6 X 20 bolts to 6 N·m (53 lb in).

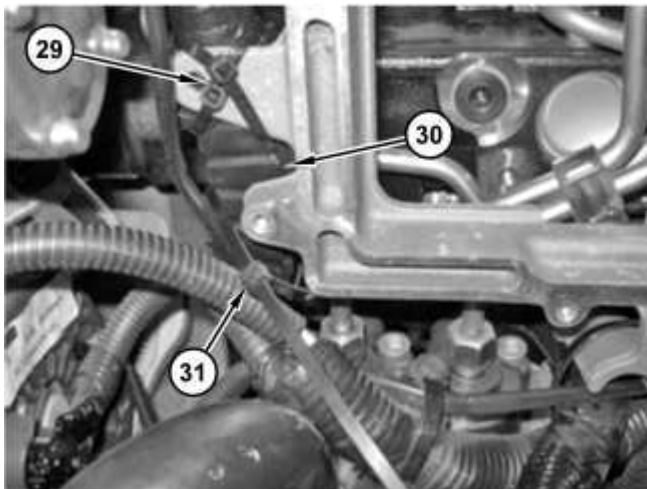


Illustration 29

g03223126

22. Install two tie straps around the main vertical molded harness that runs near the ECM support bracket. Install and tighten tie straps in an "X" configuration. The procedure will pull the molded harness tightly against the ECM support bracket and away from the HP fuel tube assemblies.

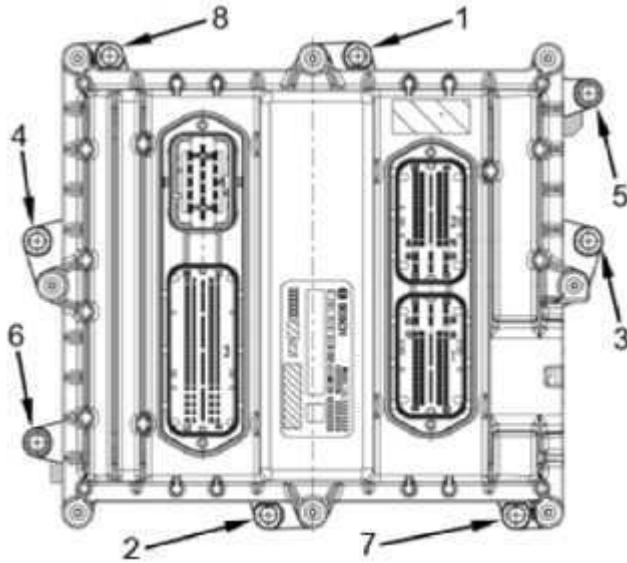


Illustration 30

g03223438

23. Position the ECM on the ECM support and install eight M6 x 30 bolts finger tight. Torque bolts in sequence shown to 10 N·m (89 lb in).

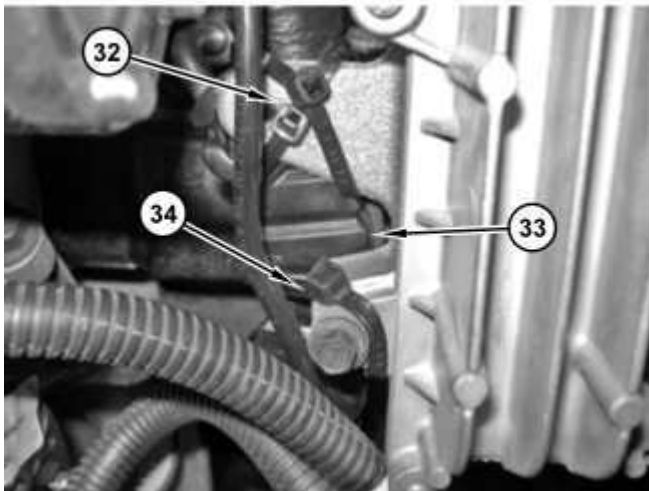


Illustration 31

g03223596

24. Tighten previously loose tie strap around the lower left ECM support bolt.

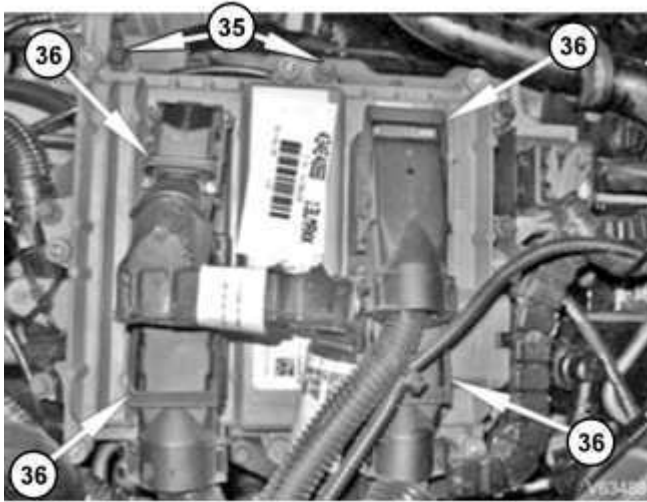


Illustration 32

g03223598

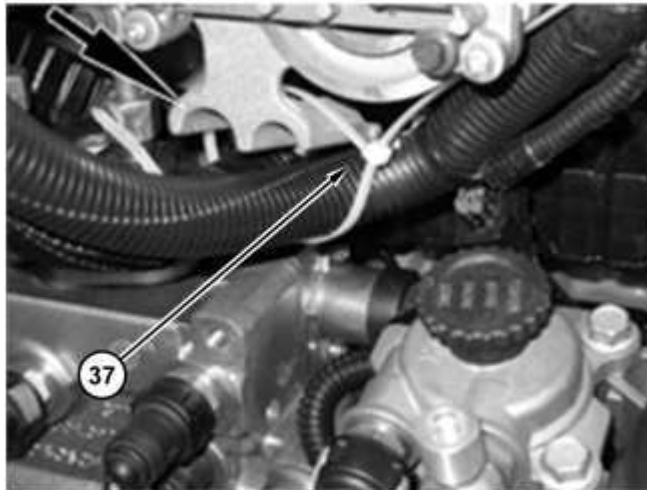


Illustration 33

g03223599

25. Align engine harness connectors (36) with mating terminals and push connectors straight in. Push down on lock lever to draw in and secure connectors.
26. Install new tie straps to one lower (37) and two upper (35) tie strap locations.

Note: Insure that no harness is rubbing.

27. Secure harnesses to lower tie strap location to prevent harness chafing on top of the fuel injection pump. Use more than one tie strap if needed to support harnesses.

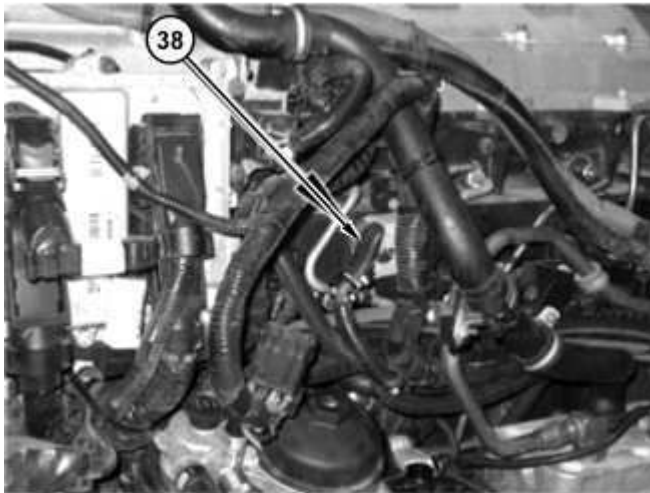


Illustration 34

g03223616

28. Connect 21-way chassis harness connector (38) at connector bracket.
 29. Position high-pressure and low-pressure tube as an assembly. Align HP power steering line at union and tighten finger tight.
-

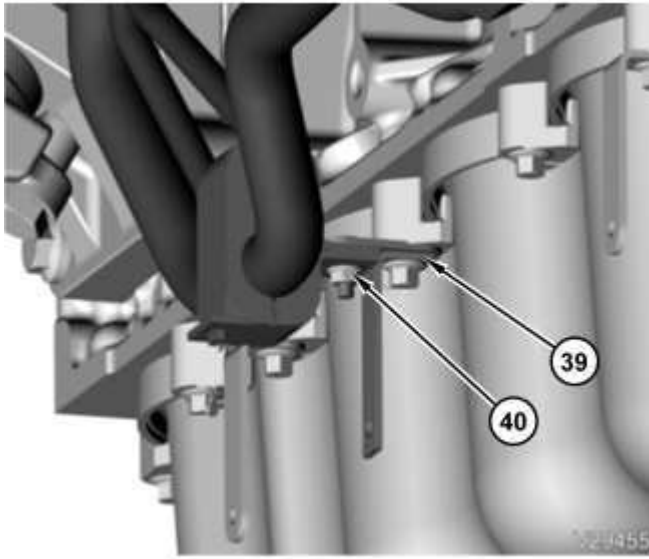


Illustration 35

g03223618

30. Install M6 x 1.0 nut (40) onto extension clip stud (39) to secure rear support bracket at the oil pan. Do not tighten at this time.
31. Install the upper support bracket.
32. If equipped, install front support bracket to stud on front engine support and tighten with M6 x 1.0 flange nut finger tight.
33. Torque both nuts to 13 N·m (115 lb in).

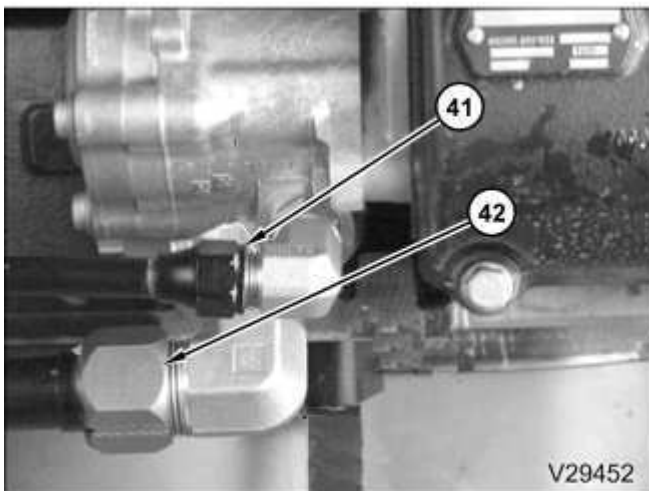


Illustration 36

g03223637

34. Torque high-pressure tube fitting nut (41) to 62 N·m (45 lb ft).
35. Torque the low-pressure tubing nut (42) to 164 N·m (120 lb ft).
36. Install the dipstick brace and oil filler pipe and torque the three bolts to 24 N·m (18 lb ft). Attach power steering supply tube and dipstick tube P-clamps and bolt.

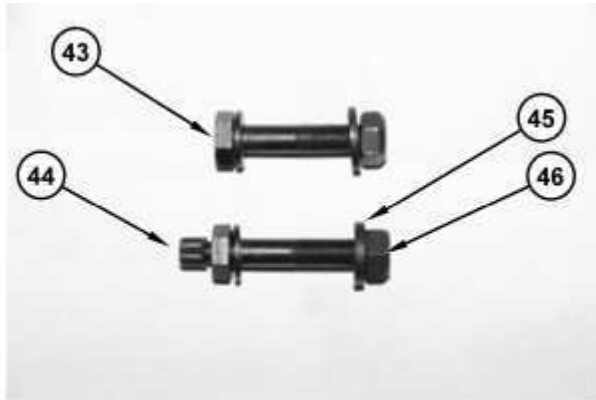


Illustration 37

g03223656

- (43) Old bolt
- (44) New bolt
- (45) Washer
- (46) Locknut

Note: A new special bolt (44), washer (45), and lock nut (46) must be used when connecting the steering shaft to the steering gear.

37. Connect steering shaft to power steering gear, observing alignment keyway. Install the 358-1080 special bolt (44), 358-0258 washer (45), and 358-0265 locknut (46). Tighten bolt until the head breaks off.
 38. Install power steering return tube, supply line, and P-clamp. Torque to 62 N·m (45 lb ft).
-

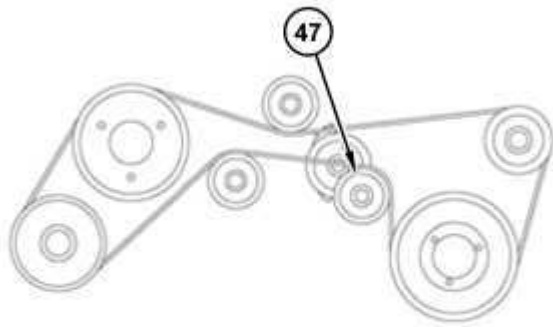


Illustration 38

g03223676

39. Release auto-tensioner and install drive belt.
40. Remove protective caps and install the charge air cooler outlet hose.
41. Remove protective caps and install air filter housing and tube.
42. Add 15W-40 motor oil to the power steering reservoir.
43. Connect negative battery cables and install battery box cover.

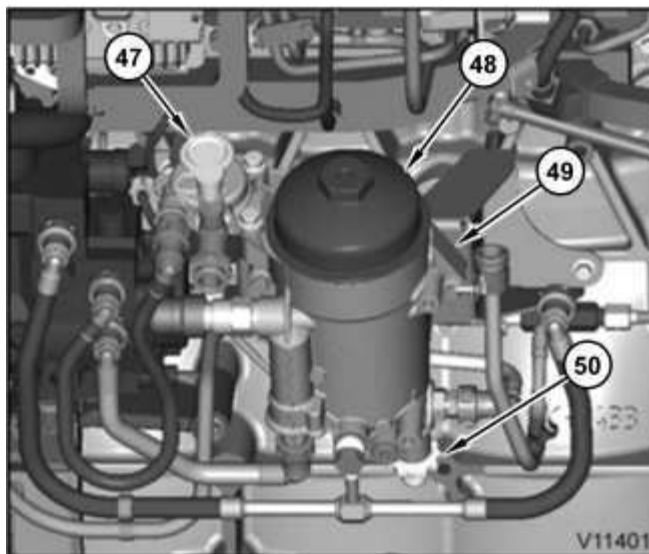


Illustration 39

g03272136

- (47) Fuel primer pump
- (48) Fuel filter cover
- (49) Fuel filter housing
- (50) Water Drain

NOTICE

Do not crank the engine for more than 30 seconds. Allow the starter to cool for two minutes before cranking again. Turbocharger damage can result if the engine rpm is not kept low until the oil gauge display verifies that the oil pressure is sufficient.

- 44. Prime fuel system.
 - a. Prime engine at hand primer pump.
 - b. Turn fuel primer pump knob (47) counterclockwise to unlock the pump stem.
 - c. Pump the fuel priming pump a minimum of 250 times (approximately 3 minutes). Continue pumping even after higher pumping force is required. Make sure to raise and lower the knob completely on each stroke.
 - d. After priming, depress the fuel primer pump knob fully and turn the fuel primer pump knob clockwise until tight to secure the pump stem.
- 45. Connect negative battery cables and install battery box cover.
- 46. Start engine and check for fuel leaks. If engine does not start, prime again. Let engine run at 1,200 RPM for 2 minutes.
- 47. Verify that power steering reservoir is full.
 - a. Turn steering wheel to right until the wheel hits the axle stop.
 - b. Turn steering wheel to the left until the wheel hits the axle stop.
 - c. Refill power steering reservoir.
- 48. Install left front fender assembly and bracket.
- 49. Close and secure hood
- 50. Remove wheel chocks.

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