

Technical Service Information

NAVISTAR®

TSI-14-12-03

Date: APRIL 2014

Subject File: ENGINE

Subject: Turbo Oil Supply Tube Retrofit

Model: ProStar® 122, ProStar® 113, WorkStar®, CAT®, TranStar®, PayStar®, LoneStar®

Engine Family: MaxxForce® 11 & 13 (EPA 10)

Engine Family: 2013 MaxxForce® HD-OBD

Engine Family: N13

DESCRIPTION

This procedure provides instructions on how to install the updated turbocharger oil supply tube and T-fitting. It also provides instructions on how to reroute certain coolant hoses that may interfere with the routing of the new turbocharger oil supply tube. There are outlined instructions for each different vehicle model and configuration. Select the appropriate routing and clipping section for the vehicle being repaired.

PARTS INFORMATION

Table 1. **Engine Parts**

Part Number	Description	Quantity
3018397C91	Tube, Assy Turbo Oil Supply	1
2512772C91	Fitting, Oil Tube	1
62917010831	Spacer (If required)	1
1819245C1	Stud Bolt (If required)	1

Table 2. **ProStar® 122 Routing & Clipping Kit**

Part Number	Description	Quantity
2513145C91	ProStar® 122, Heater Hose Routing Kit	1
495967R1 (Obtain Locally)	Bolt, Carriage	1

PARTS INFORMATION (CONT.)

Table 3. 2513145C91 Kit Contents

Part Number	Description	Quantity
3821016C1	Saddle	4
31082R1	Nut	2
31054R1	Bolt	2
299615C1	Clamp, Cushioned	2
306132C1	Tie Strap	8
3666881C1	Swivel Saddle	1
31046R1	Bolt	1
31081R1	Nut	1
3919779C1	Clamp	1
120377	Nut	1
L2643486	Hose (1900 mm)	1
584067C1	Conduit (1900 mm)	1
3948245C1	Spin Huck Saddle	2
3535872C1	Clamp	2

Table 4. ProStar® 113, CAT®, TranStar®, and PayStar® Routing & Clipping Parts

Part Number	Description	Quantity
3666881C1 (Obtain Locally)	Swivel Saddle	1
306132C1 (Obtain Locally)	Tie Straps	2

Table 5. TranStar®, WorkStar®, and PayStar® (SCR Equipped Vehicles with Manual Transmission) Routing & Clipping Parts

Part Number	Description	Quantity
4037501C1	Spacer, DEF Coolant Supply	1

Table 6. TranStar® (SCR Equipped Vehicles with Automatic Transmission) Routing & Clipping Parts

Part Number	Description	Quantity
3996883C3	Hose, Rubber	1
3996910C3	Hose, Silicone (Do Not Order Unless Vehicle Is Equipped with Silicone Hoses)	1

SERVICE PROCEDURE



WARNING: Park vehicle on hard flat surface, turn the engine off, set the parking brake, and install wheel chocks to prevent the vehicle from moving in both directions. Failure to comply may result in property damage, personal injury, and / or death.



WARNING: If the vehicle must be raised, do not work under the vehicle supported only by jacks. Jacks can slip or fall over, potentially resulting in property damage, personal injury, and / or death.



WARNING: Always wear safe eye protection when performing vehicle maintenance. Failure to comply may result in personal injury and / or death.



WARNING: Keep flames or sparks away from vehicle and do not smoke while servicing the vehicle's batteries. Batteries expel explosive gases. Failure to comply may result in property damage, personal injury, and / or death.

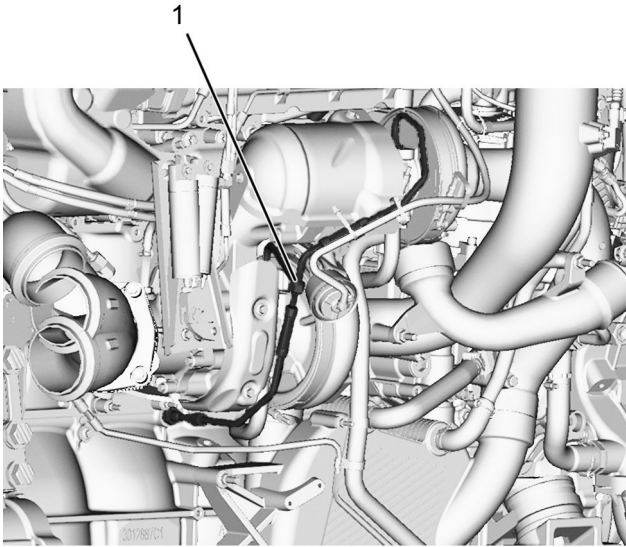


WARNING: Remove the ground cable from the negative terminal of the battery box before disconnecting any electrical components. Always connect the ground cable last. Failure to comply may result in property damage, personal injury, and / or death.

NOTE: It is recommended the technician read these instructions thoroughly prior to performing this procedure.

TURBOCHARGER OIL SUPPLY TUBE

NOTE: The oil supply tube is a **ONE TIME USE ONLY** item and must be replaced if damaged or removed. The T-fitting and adapter fitting are reusable and only need to be installed per these instructions the first time.



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Figure 1. Old Style Turbocharger Oil Supply Tube.

1. Turbocharger oil supply tube

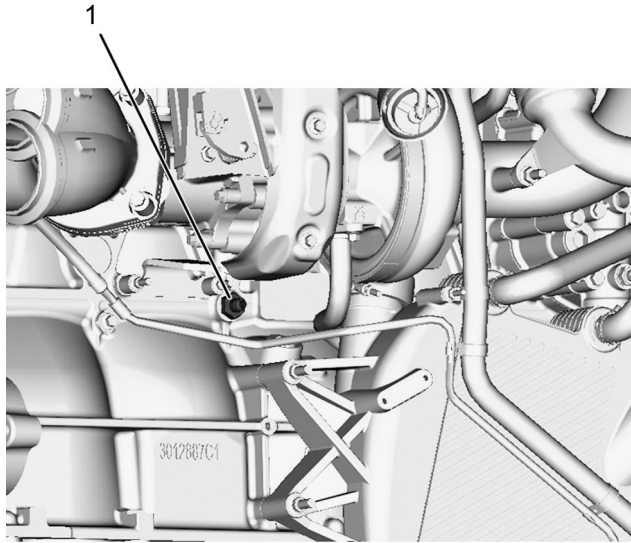
CAUTION: The oil supply tube must not be reused or damage to equipment will occur. If oil supply tube will not come out of the high-pressure turbocharger due to seizure, cut the oil supply tube into two pieces and leave the line in the high-pressure turbocharger for ease of removal, then discard oil supply tube.

1. Bring vehicle into shop and park on flat surface.
2. Shift transmission to Park or Neutral, set parking brake, and install wheel chocks.
3. Unlatch and open hood.
4. Remove right side inner fender.
5. Remove air intake and pipe.
6. Remove CAC pipe from high-pressure charge air cooler and high-pressure turbo outlet elbow.
7. Remove high pressure turbo outlet elbow from high-pressure turbocharger.
8. Remove air inlet duct from low-pressure turbocharger.

TURBOCHARGER OIL SUPPLY TUBE (CONT.)

NOTE: Save two M6 X 16 bolts for reuse.

9. Remove and discard turbocharger oil supply tube (Figure 1, Item 1).



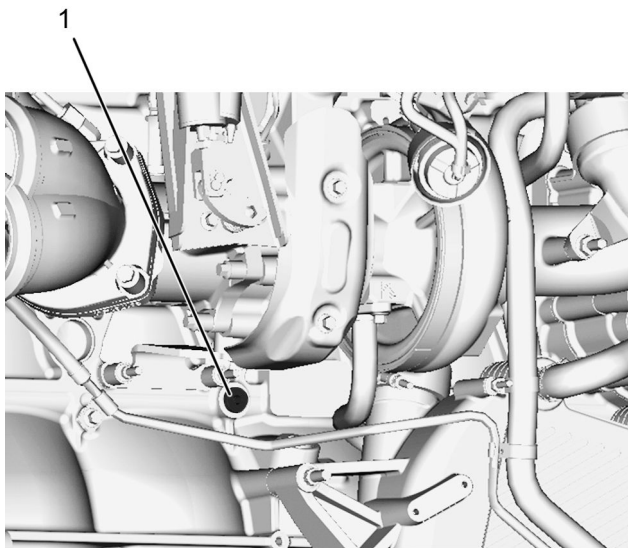
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Figure 2. Turbocharger Oil Supply Line Male Stud Fitting.

1. Turbocharger oil supply tube male stud fitting

10. Remove and discard turbocharger oil supply tube male stud fitting (Figure 2, Item 1).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)



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Figure 3. Oil Supply Tube Hex Socket Plug.

1. Oil supply tube hex socket plug

11. Install oil supply tube hex socket plug (Figure 3, Item 1) into oil supply inlet port in block. Using torque wrench, tighten socket plug to 52 lb-ft (70 N · m).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)

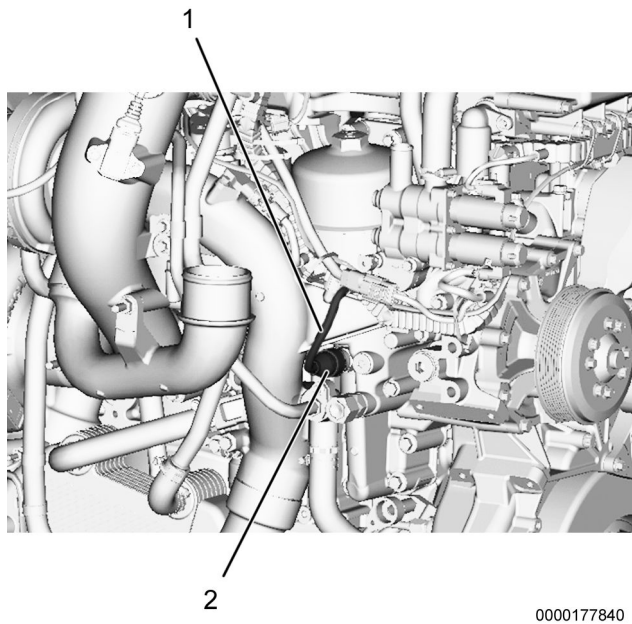


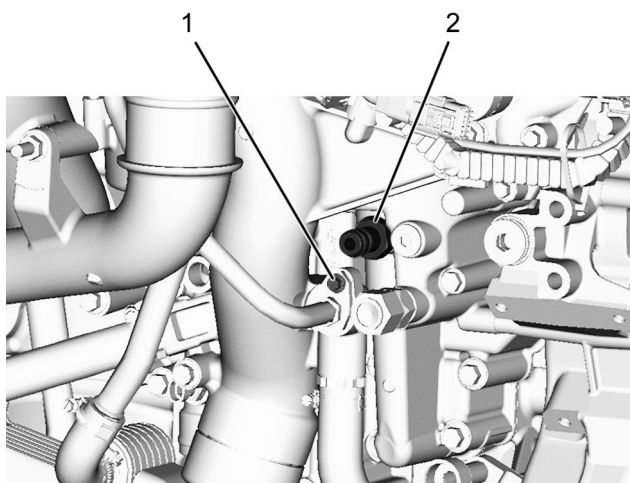
Figure 4. Engine Oil Pressure (EOP) Sensor.

- 1. EOP sensor connector
- 2. EOP sensor

12. Disconnect connector (Figure 4, Item 1) from EOP sensor (Figure 4, Item 2).

13. Remove EOP sensor and gasket, and **save for reuse**.

TURBOCHARGER OIL SUPPLY TUBE (CONT.)



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Figure 5. Adapter Assembly Fitting.

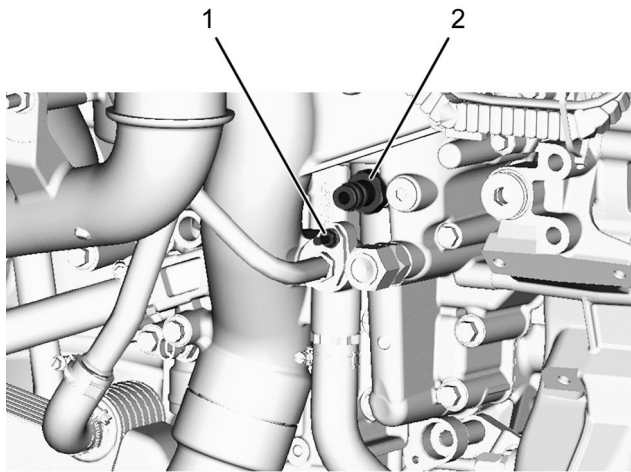
- 1. M6 bolt
- 2. Adapter assembly fitting

14. Remove M6 bolt (Figure 5, Item 1) from heater return tube and discard.

NOTE: Install adapter fitting with the two O-rings facing out towards the operator.

15. Install adapter assembly fitting (Figure 5, Item 2). Using torque wrench, tighten fitting to 52 lb-ft (70 N • m).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)



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Figure 6. M6 Stud Bolt.

1. M6 stud bolt
2. Adapter assembly fitting

16. Install M6 stud bolt (Figure 6, Item 1). Using torque wrench, tighten stud bolt to 10 lb-ft (13 N • m).

17. Using P-80®, lubricate adapter fitting (Figure 6, Item 2).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)

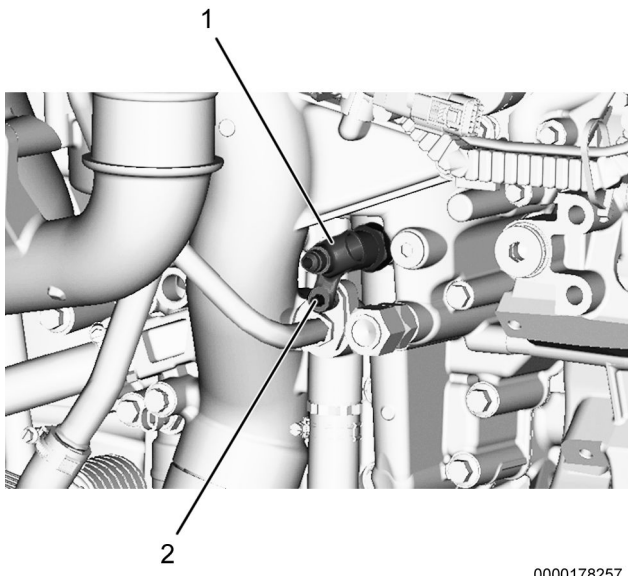
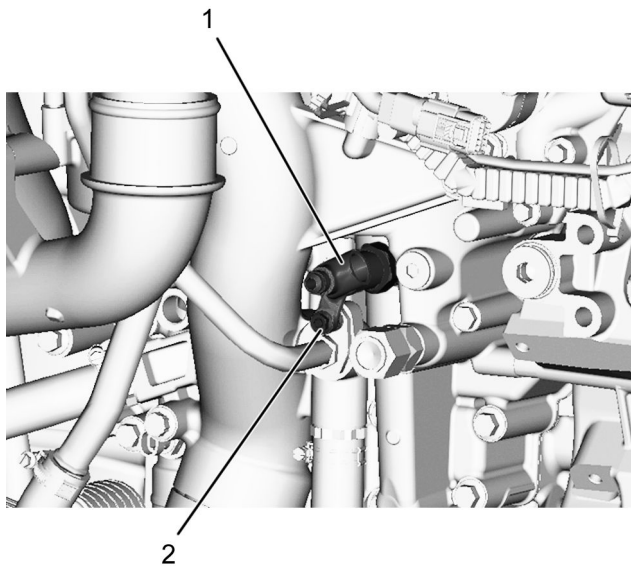


Figure 7. Oil Supply T-fitting.

- 1. Oil supply T-fitting
- 2. M6 stud bolt

18. Slide oil supply T-fitting (Figure 7, Item 1) over adapter assembly fitting and M6 stud bolt (Figure 7, Item 2).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)



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Figure 8. Install Oil Supply T-fitting.

- 1. Oil supply T-fitting
- 1. M6 nut

19. Install M6 nut (Figure 8, Item 2) to oil supply T-fitting (Figure 8, Item 1). Using torque wrench, tighten nut to 10 lb-ft (13 N·m).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)

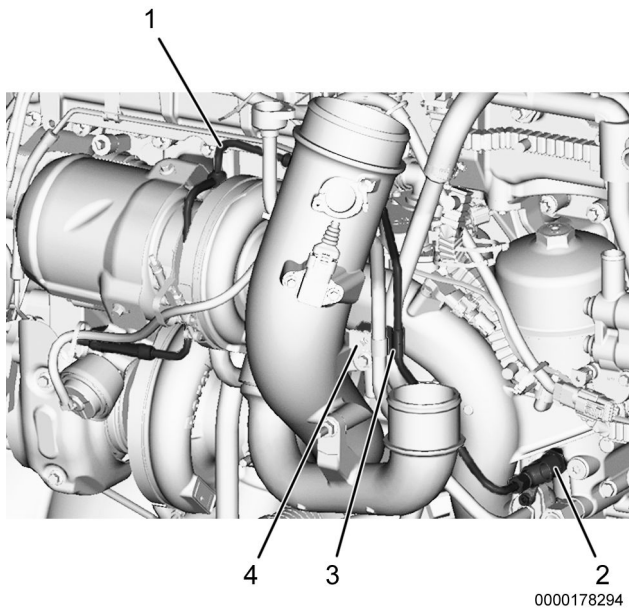


Figure 9. Turbo Oil Supply Tube Position.

1. Turbo oil supply tube
2. Oil supply T-fitting
3. Turbo oil supply tube bracket
4. Heater and cooler line bracket (2)

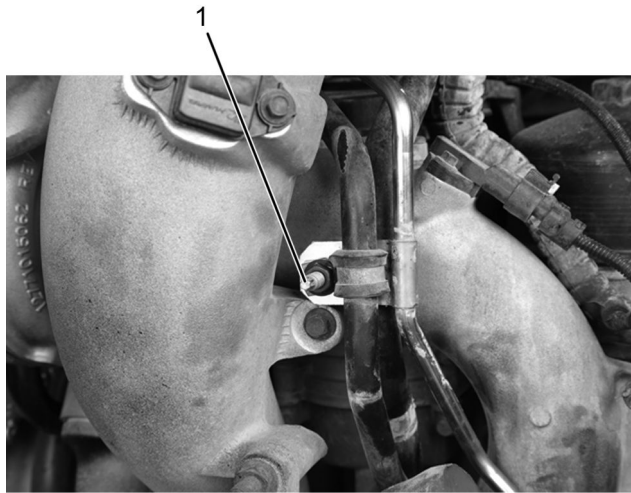
20. Remove M8 bolt from heater and cooler line brackets (Figure 9, Item 4) and discard.

NOTE: Do not tighten any bolts or flare nuts at this time.

NOTE: If repairing a ProStar® 122, disconnect sleeper heater return hose from lower radiator hose and maneuver out of chassis before continuing.

21. Align turbo oil supply tube (Figure 9, Item 1) with oil supply T-fitting (Figure 9, Item 2) and turbocharger oil supply openings.
22. Loosely install turbo oil supply tube flare nut end onto oil supply T-fitting.
23. Position turbo oil supply tube bracket (Figure 9, Item 3) BETWEEN heater and cooler line brackets (Figure 9, Item 4).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)



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Figure 10. Heater and Cooler Line Bracket Stud Bolt.

1. M8 stud bolt

NOTE: Do not exceed torque.

24. Install M8 stud bolt (Figure 10, Item 1) through turbo supply line bracket, heater and cooler line brackets, and into high-pressure turbocharger air inlet duct. Using torque wrench, tighten stud bolt to 23 lb-ft (31 N•m).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)

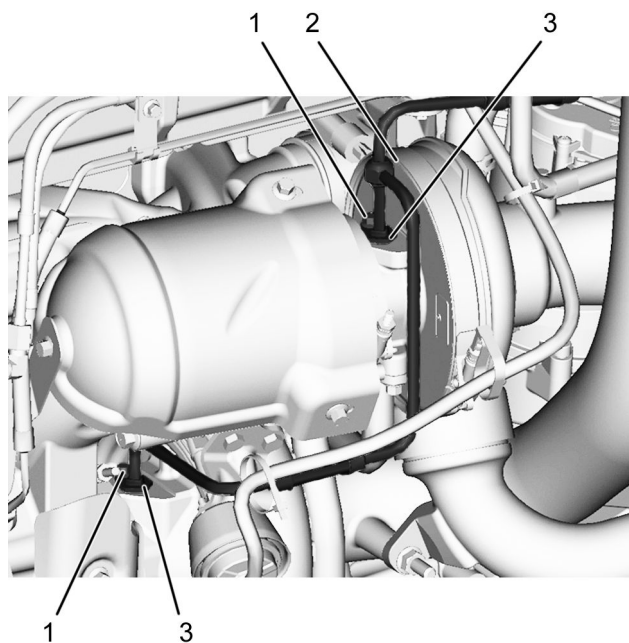


Figure 11. Turbocharger Oil Supply Openings.

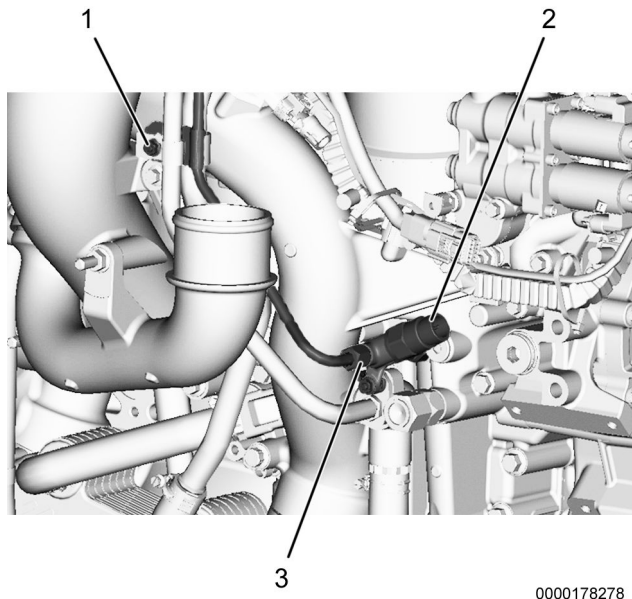
- 1. M6 x16 bolt (2)
- 2. Turbocharger
- 3. Turbo oil supply tube flange (2)

25. Using P-80®, lubricate turbocharger oil supply tube O-rings.

26. Press turbo oil supply tube fittings into openings on turbocharger (Figure 11, Item 2).

27. Align turbo oil supply tube flanges (Figure 11, Item 3) and loosely install the two previously removed M6 X 16 bolts (Figure 11, Item 1). Using torque wrench, tighten bolts to 10 lb-ft (13 N·m).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)



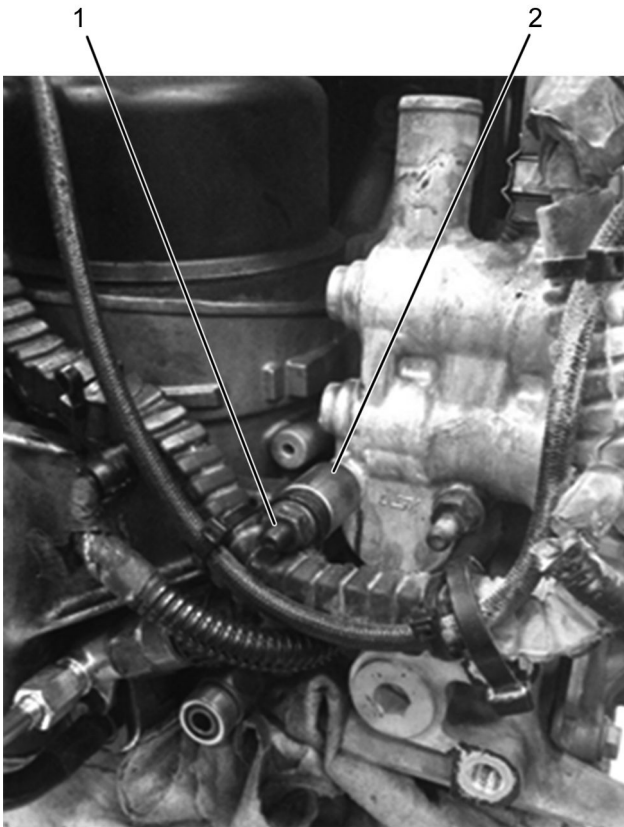
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Figure 12. Turbo Oil Supply Tube T-fitting Flare Nut.

1. M8 nut
2. EOP sensor
3. Turbo oil supply tube T-fitting flare nut

28. Install M8 nut (Figure 12, Item 1) over turbo supply line bracket, heater and cooler line brackets and stud bolt in high-pressure turbocharger air inlet duct. Using torque wrench, tighten nut to 23 lb-ft (31 N • m).
29. Install turbo oil supply tube flare nut (Figure 12, Item 3) to T-fitting. Using torque wrench, tighten nut to 19 lb-ft (26 N • m).
30. Install EOP sensor (Figure 12, Item 2) to T-fitting. Using torque wrench, tighten sensor to 33 lb-ft (45 N • m).

TURBOCHARGER OIL SUPPLY TUBE (CONT.)



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Figure 13. Rear CCV Stud.

1. 1819245C1 Stud Bolt
2. 62917010831 Spacer

NOTE: The EOP connector may contact the engine harness on early MaxxForce® 11 & 13 (EPA 10) Engines.

31. If EOP sensor connector contacts engine harness:

- Remove rear coolant control valve (CCV) stud bolt, and install spacer with longer stud bolt (Figure 13, Items 1 and 2).
- Install EOP sensor connector.
- Secure engine harness to longer stud with original nut. Tighten nut to standard torque.

32. Install low-pressure air inlet duct to low-pressure turbocharger.

33. Install high-pressure turbo outlet elbow to high-pressure turbocharger.

34. Install CAC pipe.

TURBOCHARGER OIL SUPPLY TUBE (CONT.)

35. Install air intake and pipe.
36. Install inner fender.
37. Verify routing and clipping for various coolant hoses has been performed before repairs are complete.

HOSE ROUTING AND CLIPPING

NOTE: Refer to the manufacturer sticker located in the operator-side door jamb for identifying what truck model you are repairing. Select the appropriate routing and clipping section for that vehicle.

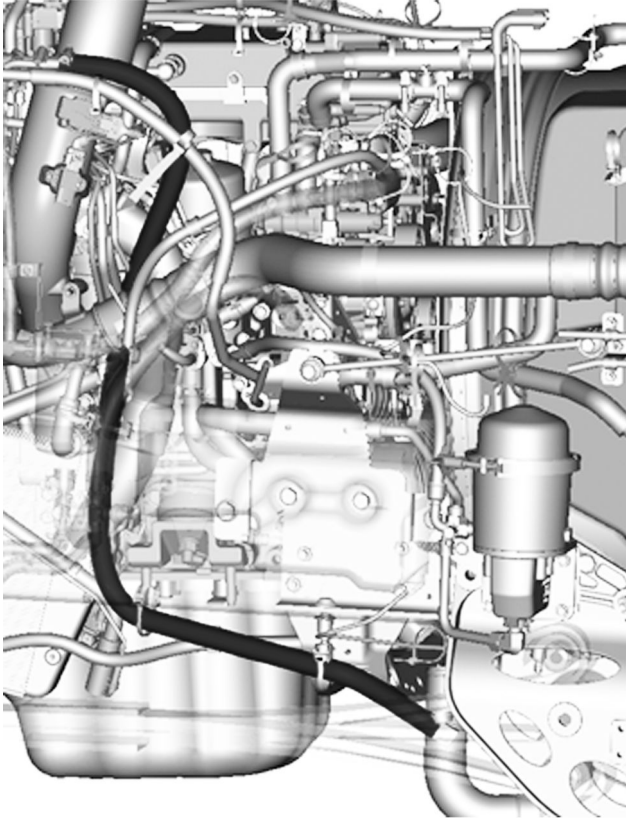
NOTE: Refer to the table below.

Table 7. Vehicle Model Hose Routing

Vehicle Model	Description
ProStar® 122	<u>Sleeper heater hose rerouting</u>
ProStar® 113 and TranStar®	<u>Deaeration tank hose routing</u>
CAT®	<u>Deaeration tank hose routing</u>
PayStar® and TranStar®	<u>Water bypass hose routing</u>
PayStar®, Workstar® and TranStar® Models Equipped With SCR And Manual Transmission	<u>DEF coolant supply hose routing</u>
TranStar® Models Equipped with SCR and Automatic Transmission	<u>Water bypass hose routing</u>

PROSTAR® 122 MODELS – SLEEPER HEATER HOSE ROUTING

Some ProStar® 122 vehicles experience the sleeper heater hose routed in the way of the new turbocharger oil supply tube. Use the following procedure to reroute the sleeper heater return hose away from the oil supply tube.



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Figure 14. Sleeper Heater Hose Existing Routing.

1. Sleeper heater hose
1. Drain cooling system.
2. Remove sleeper heater hose (Figure 14, Item 1) from bottom radiator hose.
3. Maneuver heater hose out of chassis.
4. Install 584067C1 conduit over heater hose.

PROSTAR® 122 MODELS – SLEEPER HEATER HOSE ROUTING (CONT.)

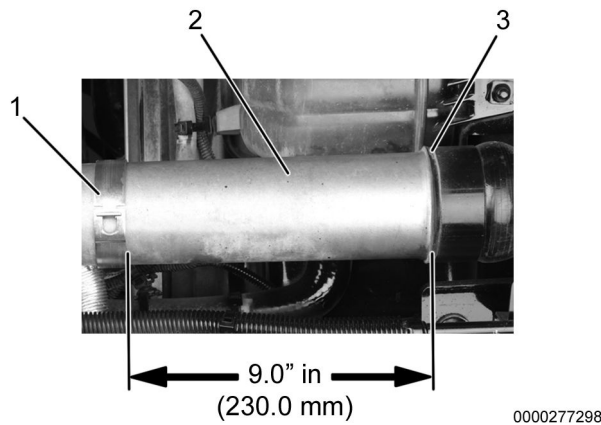


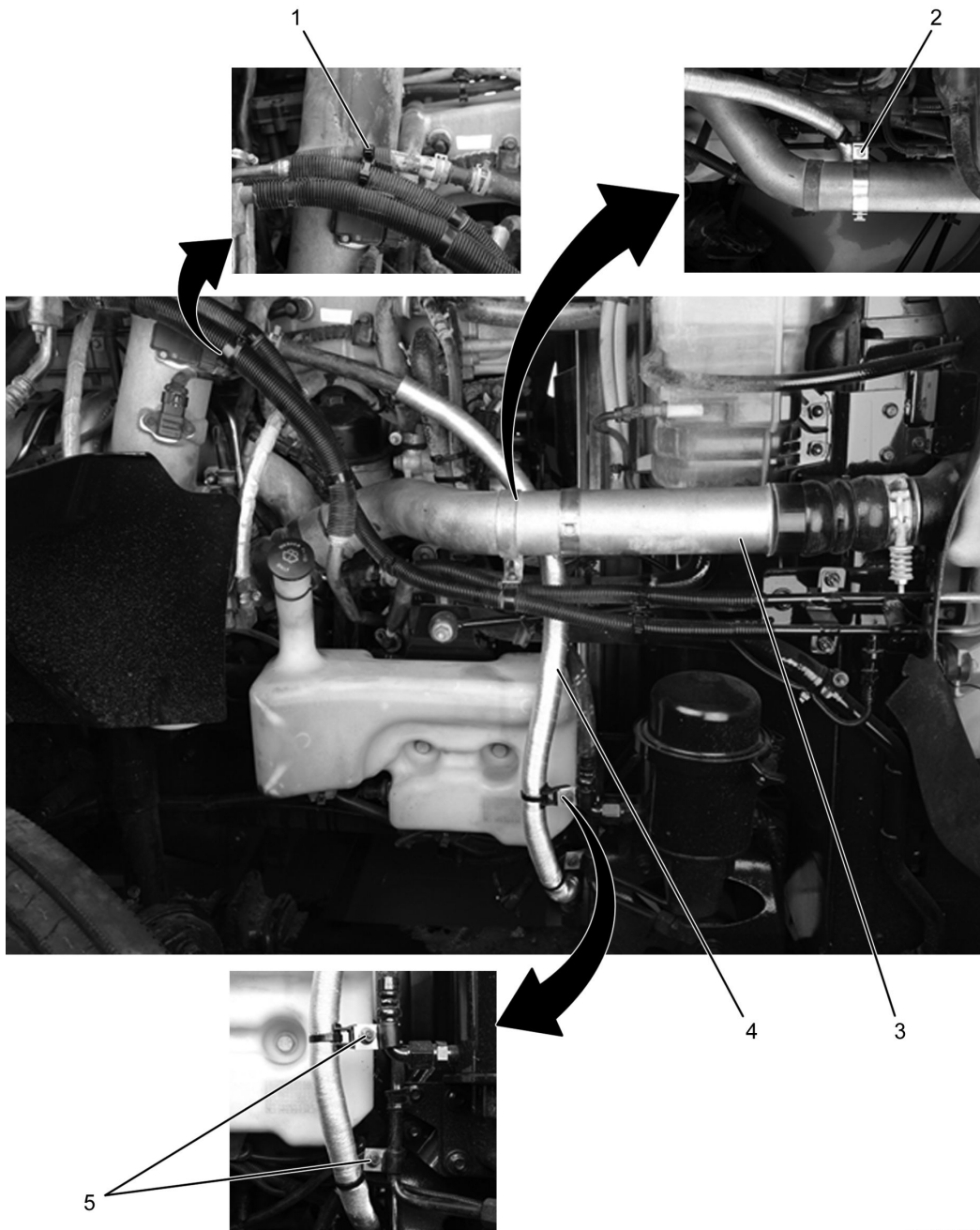
Figure 15. Clamp Measurement.

1. 3535872C1 Clamp
2. CAC pipe
3. CAC rubber boot

NOTE: Orientate CAC clamp saddle parallel with CAC pipe.

5. Measure approximately 9.0 in (230 mm) on CAC pipe (Figure 15, Item 2) from end of CAC rubber boot (Figure 15, Item 3) towards rear of vehicle for clamp (Figure 15, Item 1) installation.

PROSTAR® 122 MODELS – SLEEPER HEATER HOSE ROUTING (CONT.)
VEHICLES EQUIPPED WITH CHASSIS MOUNTED OIL CENTRIFUGE



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Figure 16. ProStar® 122 Heater Hose Route Overview.

1. Tie strap
2. 3535872C1 Clamp
3. CAC pipe
4. Heater hose
5. Swivel clamp (2)

PROSTAR® 122 MODELS – SLEEPER HEATER HOSE ROUTING (CONT.)

NOTE: Vehicles equipped with chassis mounted oil centrifuge.

NOTE: Use one swivel clamp for each oil centrifuge line.

6. Install clamp (Figure 16, Item 2), carriage bolt, and nut onto CAC pipe (Figure 16, Item 3). Using torque wrench, tighten nut to standard torque value.
7. Secure heater hose (Figure 16, Item 4) to CAC pipe clamp using sideways saddle, bolt nut, and one tie strap.
8. Using tie strap (Figure 16, Item 1), secure heater hose (Figure 16, Item 4) to A/C hose.
9. Using two sideways swivel clamps (Figure 16, Item 5), two tie straps, two M8 bolts, and two M8 nuts, secure heater hose to oil centrifuge supply and return lines.
10. Attach heater hose (Figure 16, Item 4) to lower radiator hose. Using torque wrench, tighten clamp to standard torque value.

PROSTAR® 122 MODELS – SLEEPER HEATER HOSE ROUTING (CONT.)

VEHICLES NOT EQUIPPED WITH CHASSIS MOUNTED OIL CENTRIFUGE

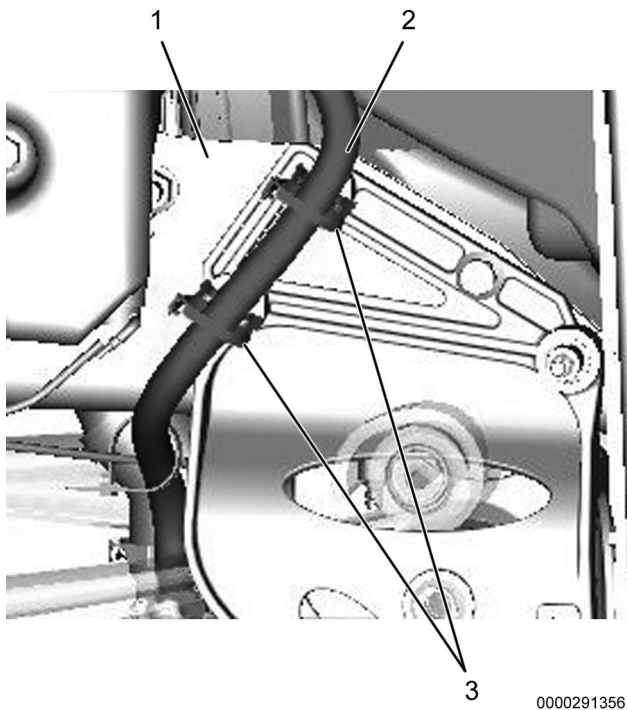


Figure 17. Frame Mounted Heater Hose Routing.

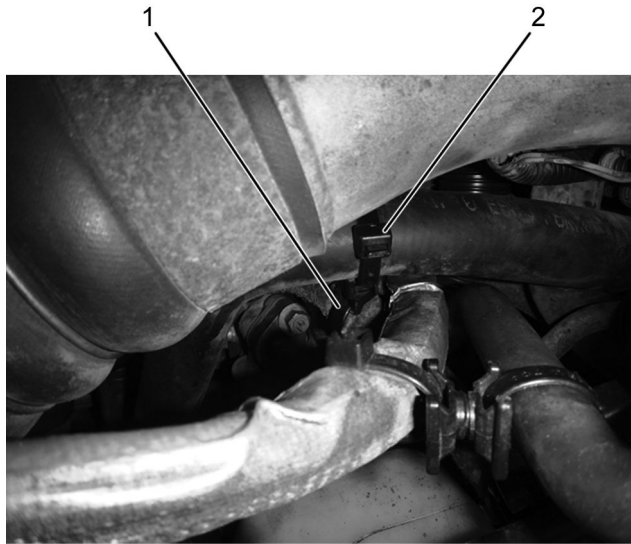
1. Frame
2. Heater hose
3. Tie strap (4) (2 not shown)

NOTE: Following steps are unique to vehicles not equipped with chassis mounted oil centrifuge.

11. Using two 3948245C1 spin huck saddles and four tie straps (Figure 17, Item 3), secure heater hose (Figure 17, Item 2) to frame (Figure 17, Item 1).
12. Attach heater hose to lower radiator hose. Using torque wrench, tighten clamp to standard torque value.
13. Fill cooling system.

PROSTAR® 113 AND TRANSTAR® MODELS – DEAERATION TANK HOSE ROUTING

Some ProStar® 113 and TranStar® vehicles may experience the coolant deaeration tank hose or an in-transit heat hose rubbing on the turbocharger oil supply tube. Use the following procedure to secure either hose away from the oil supply tube.



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Figure 18. Deaeration Tank Hose.

1. Deaeration tank hose
2. Tie strap (2) (1 not shown)

NOTE: This routing procedure does not require draining the cooling system.

1. Pull deaeration tank hose (Figure 18, Item 1) towards deaeration tank until it clears turbocharger oil supply tube.
2. Using two tie straps (Figure 18, Item 2), and a swivel saddle, secure deaeration tank hose to oil centrifuge supply line.
3. Verify deaeration tank hose or in-transit heat hose is not rubbing on turbocharger oil supply tube or CAC pipe.
4. Close hood.
5. Remove wheel chocks.

CAT® MODELS – DEAERATION TANK HOSE ROUTING

Some CAT® vehicles equipped with MaxxForce® 11 & 13 (EPA 10) engines could experience coolant deaeration tank hose rubbing on turbocharger oil supply tube.

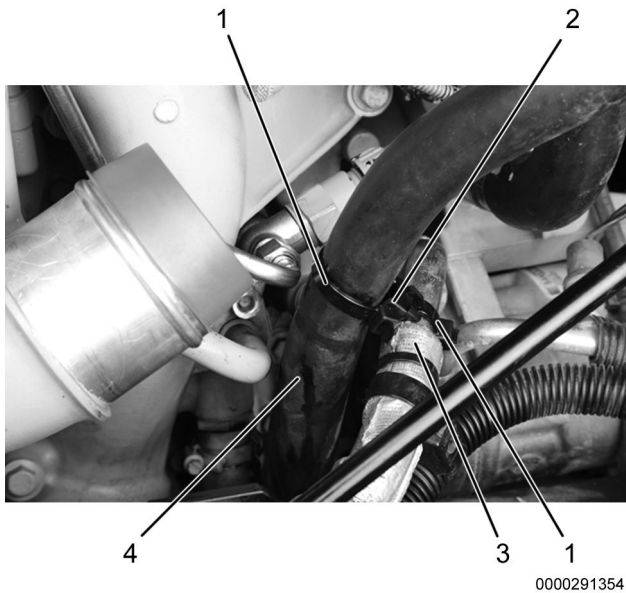


Figure 19. Surge Tank Hose.

1. Tie strap (2)
2. Swivel saddle
3. A/C suction line
4. Deaeration tank hose

NOTE: This routing procedure does not require draining cooling system.

NOTE: CAC pipe removed from graphic for clarity.

1. Pull deaeration tank hose (Figure 19, Item 4) back to its original location towards deaeration tank until it clears turbocharger oil supply tube.
2. Using two tie straps (Figure 19, Item 1), and a swivel saddle (Figure 19, Item 2) secure deaeration tank hose to A/C suction line (Figure 19, Item 3).
3. Verify deaeration tank hose is not rubbing on turbocharger oil supply line or CAC pipe.
4. Close hood.
5. Remove wheel chocks.

PAYSTAR® AND TRANSTAR® MODELS – WATER BYPASS HOSE ROUTING

NOTE: Some PayStar® and TranStar® vehicles may experience water bypass hose rubbing on turbocharger oil supply tube. Use following procedure to secure bypass hose away from turbocharger oil supply tube.

NOTE: This routing procedure does not require draining cooling system.

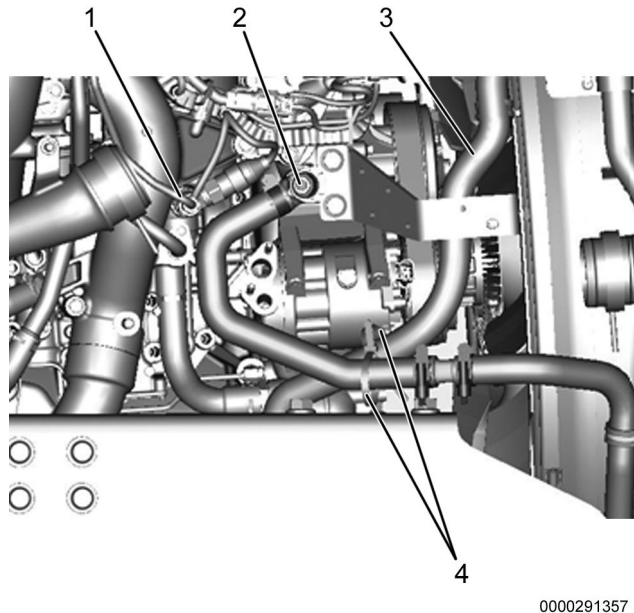


Figure 20. Water Bypass Hose.

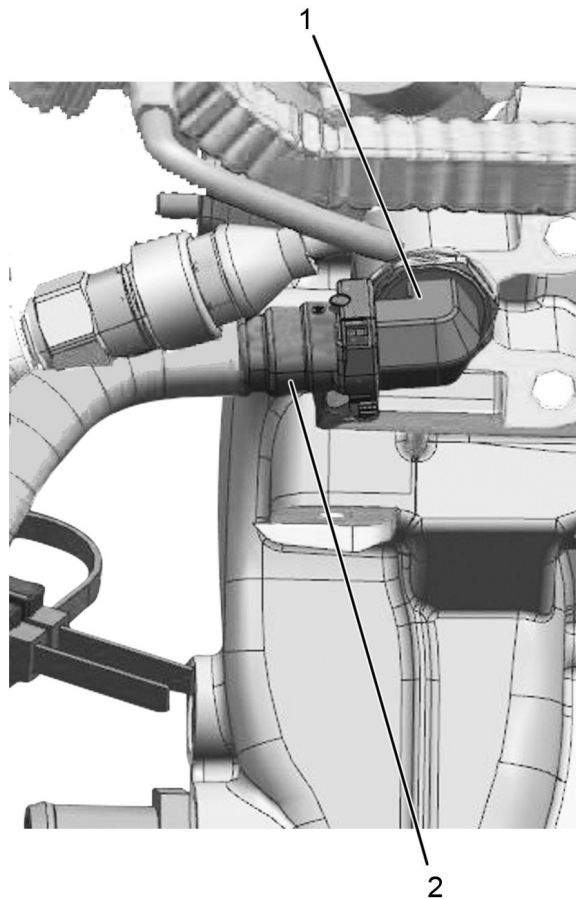
1. Turbo oil supply tube
2. 90-degree elbow fitting
3. Deaeration tank hose
4. Tie strap (2)

NOTE: CAC pipe was removed from graphic for clarity.

1. Rotate 90-degree elbow fitting (Figure 20, Item 2) down until bypass hose clears turbo oil supply tube (Figure 20, Item 1).
2. Using two tie straps (Figure 20, Item 4), and a swivel saddle, secure water bypass hose to deaeration tank hose (Figure 20, Item 3).
3. Verify no other hoses are rubbing on turbocharger oil supply line or CAC pipe.
4. Close hood.
5. Remove wheel chocks.

PAYSTAR®, WORKSTAR® AND TRANSTAR® MODELS EQUIPPED WITH SCR AND MANUAL TRANSMISSION – DEF COOLANT SUPPLY HOSE ROUTING

NOTE: Some PayStar®, WorkStar®, and TranStar® vehicles equipped with SCR and manual transmissions may experience DEF coolant supply hose rubbing on turbocharger oil supply tube. Use the following procedure to install a spacer for manual transmission equipped chassis.



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Figure 21. Coolant Deaeration Tank Supply Hose.

1. 90-degree elbow fitting
2. DEF coolant supply hose

1. Drain cooling system.
2. Remove DEF coolant supply hose (Figure 21, Item 2).
3. Remove 90-degree elbow fitting (Figure 21, Item 1).

**PAYSTAR®, WORKSTAR® AND TRANSTAR® MODELS EQUIPPED WITH SCR AND
MANUAL TRANSMISSION – DEF COOLANT SUPPLY HOSE ROUTING (CONT.)**

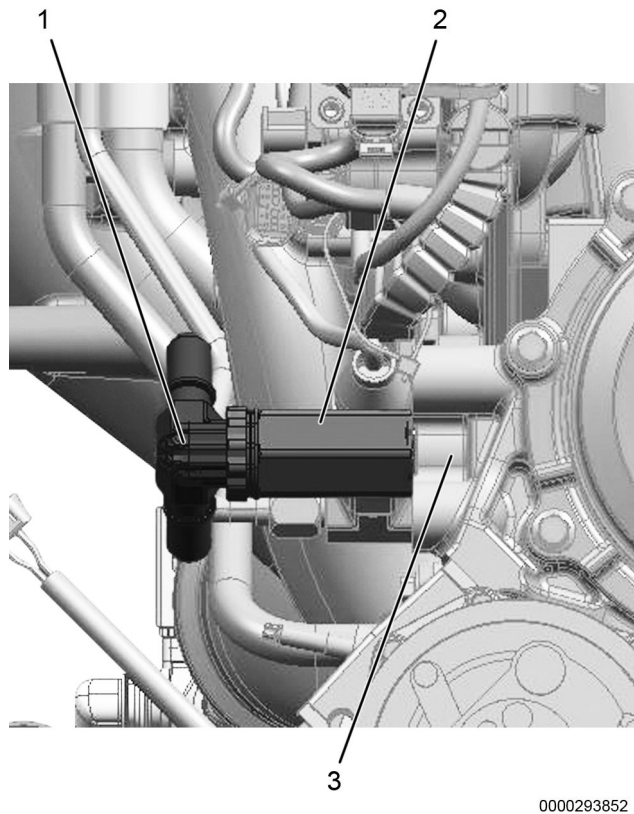
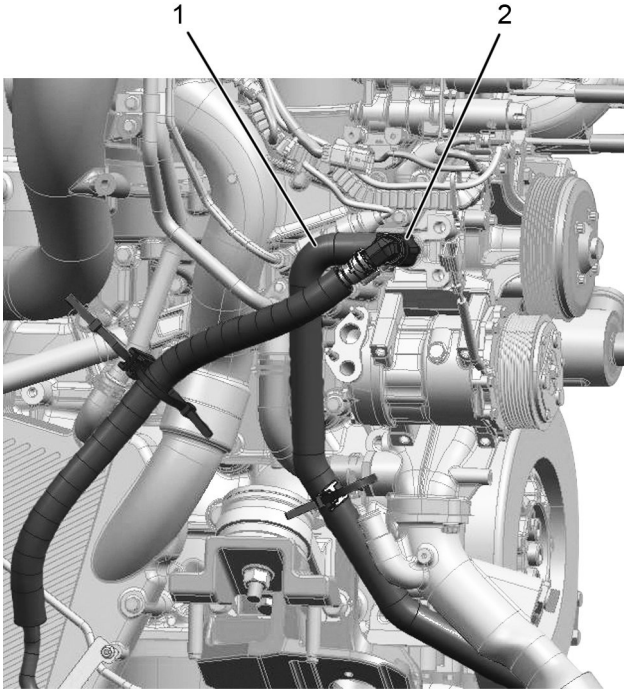


Figure 22. Coolant Deaeration Tank Supply Hose Spacer.

1. 90-degree elbow fitting
 2. 4037501C1 Spacer
 3. Coolant distribution housing
4. Install spacer (Figure 22, Item 2) into coolant distribution housing (Figure 22, Item 3).
 5. Install 90-degree elbow fitting (Figure 22, Item 1) and DEF coolant supply hose.
 6. Fill cooling system.
 7. Close hood.
 8. Remove wheel chocks.

TRANSTAR® MODELS EQUIPPED WITH SCR AND AUTOMATIC TRANSMISSION – WATER BYPASS HOSE ROUTING

NOTE: Some TranStar® vehicles equipped with SCR and automatic transmissions may experience DEF coolant supply hose rubbing on turbocharger oil supply tube. Use the following procedure to install a spacer for manual transmission equipped chassis.



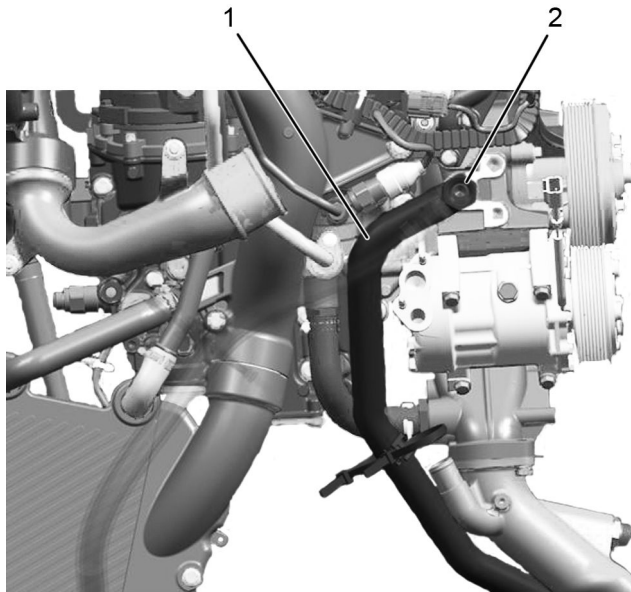
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Figure 23. SCR Equipped Water Bypass Hose.

1. 90-degree elbow fitting
2. Water bypass hose

1. Drain cooling system.
2. Remove water bypass hose (Figure 23, Item 2) from 90-degree elbow fitting (Figure 23, Item 1).
3. Remove water bypass hose from deaeration tank and discard.

TRANSTAR® MODELS EQUIPPED WITH SCR AND AUTOMATIC TRANSMISSION – WATER BYPASS HOSE ROUTING (CONT.)



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Figure 24. SCR Equipped Water Bypass Hose Replacement.

1. Water bypass hose
 2. 90-degree elbow fitting
4. Rotate 90-degree elbow fitting (Figure 24, Item 2) down 1/8 turn.
 5. Install new water bypass hose (Figure 24, Item 1) to deaeration tank and 90-degree elbow fitting.
 6. Clip new bypass hose in original location.
 7. Fill cooling system.
 8. Close hood.
 9. Remove wheel chocks.