Authorized Field Change

NAVISTAR®

AFC 13903

Date: October 2013

Subject File: Engine

Subject: Inspection of Air Control Valve (ACV) Connector / Engine Harness Connection for proper plug orientation and corrosion.

Model: LoneStar®, PayStar®, ProStar® , TranStar®, and WorkStar®
Start Date: 03 April 2012 End Date: 31 May 2012

Engine Family: MaxxForce® 11 and 13

DESCRIPTION

This AFC applies to certain vehicles with air control valve (ACV) 3015646C91. Some ACV connectors were produced with plugs installed backwards in empty connector cavities. This condition could permit water intrusion, which may short the terminals and lead to ACV failure. This repair involves inspecting the ACV harness connection for corrosion. If no corrosion is present, the plug orientation in the ACV connector will be corrected to establish a tight seal. If corrosion is present, the ACV will be replaced and a splice kit will be installed on the main engine harness.

This AFC is applicable only to vehicles marked in International® Service Portal℠ with AFC 13903.

CAUTION: Failure to perform this repair before any other service activity that may expose the connector to coolant, water, or other fluid may result in damage to engine.

PARTS INFORMATION

Table 1. Tools Required

Description	Tool Number / Type
Yellow paint marker	Obtain locally
Tape measure	Obtain locally
Permanent marker	Obtain locally
Wire cutters	Obtain locally
Soldering tool	Obtain locally
Heat gun	Obtain locally

PARTS INFORMATION (CONT.)

Table 1. Tools Required (cont.)

Description	Tool Number / Type
Terminal Release Tool	TX126870202 (49304)
Small flathead screwdriver	Obtain locally
Complex pick tool	Obtain locally

Table 2. A40-13903-3: Install New ACV Kit and Higher Level ACV Kit

Part Number	Description	Quantity
3015646C91	Air Control Valve Kit (Includes Tie Straps)	1
3017826C91	ACV Higher Level Kit Assembly	1
Obtain locally	Wire loom tape	1

Table 3. 3017826C91: Kit Contents

Part Number	Description	Quantity
3017820C1	Jumper Harness	1
ES20000-1	50 mm Heatshrink Tubing Raychem	7
4328077R1	Instruction Sheet	1
2421001903	160 mm x 19 mm Flex Wrap Federal Mogul	1
1800009C1	Harness M6 - M8 Zip Tie Retainer	1
1847046C1	Tie Straps	6

Table 4. A40-13903-2: Reverse Cavity Plugs Only

Part Number	Description	Quantity
291207C1	Tie Strap, 10 pack	1
1831730C1	Dielectric Grease, ¼ oz tube	1

SERVICE PROCEDURE

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

SERVICE PROCEDURE (CONT.)

Inspection of the ACV harness in this AFC can lead to three independent labor operations:

- A40-13903-1 Inspection only: Yellow paint dot present, rework already performed.
- A40-13903-2 Inspect for corrosion and reverse cavity plugs only.
- A40-13903-3 Inspect for corrosion and install new ACV kit and higher level ACV kit.

The condition of the ACV connector will determine which operation to perform. Completion of only one is necessary.

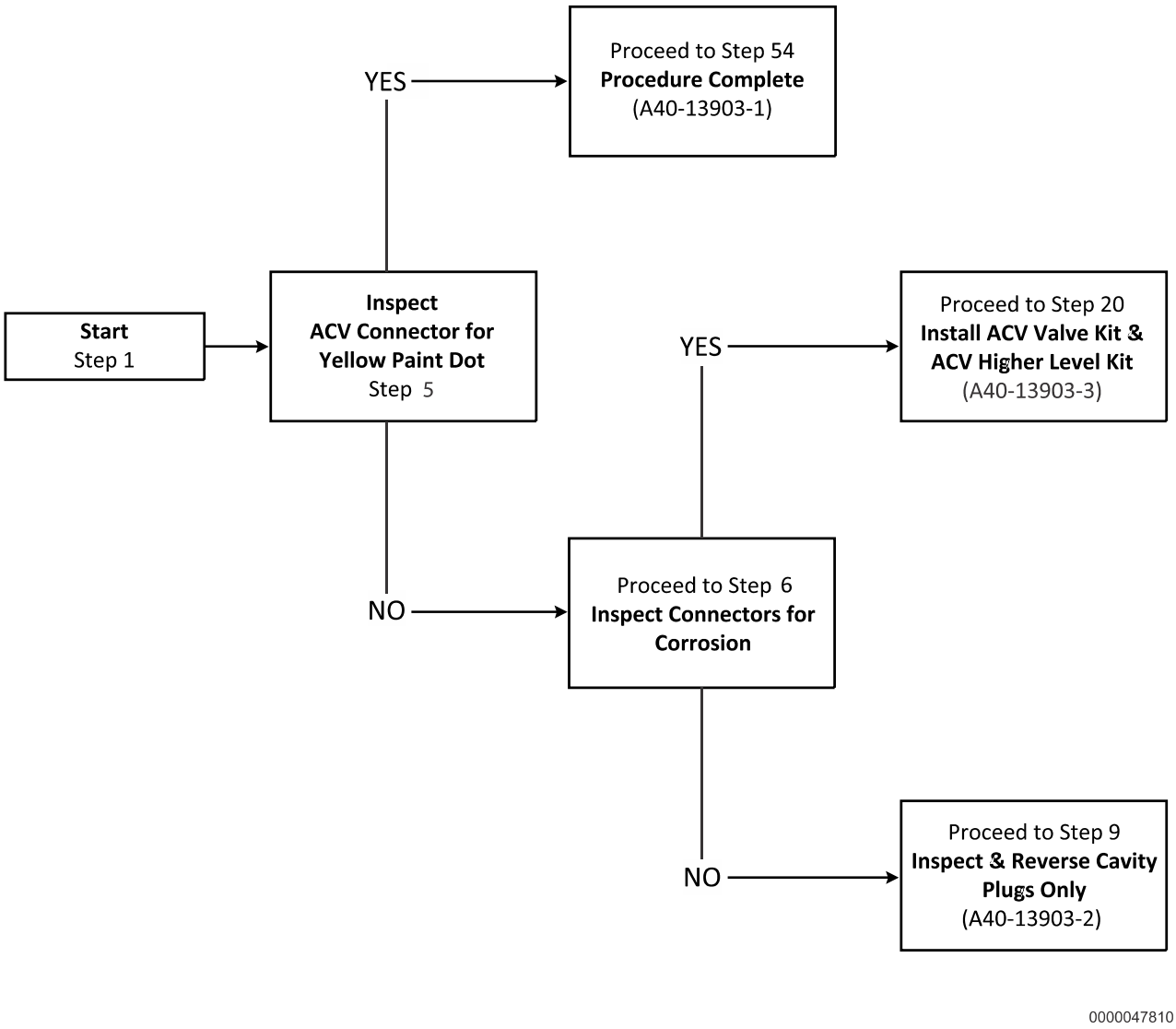

Figure 1. AFC 13903 Document Logic Flow Chart.

The flow chart (Figure 1) maps the steps leading to all three outcomes to ease navigation of the document.

SERVICE PROCEDURE (CONT.)

1. Bring truck into shop and park on flat surface.
2. Shift transmission to Park or Neutral, set parking brake, and block wheels.
3. Unlatch and open hood.

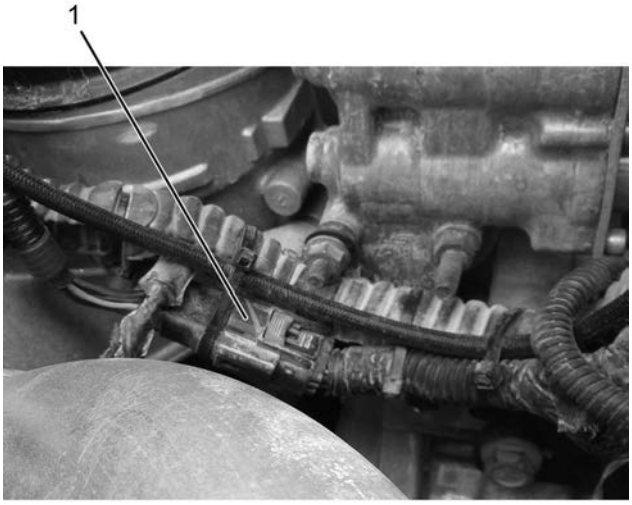

Figure 2. ACV Connector on Sensor Harness.

1. ACV connector

4. Locate ACV connector (Figure 2, Item 1) on sensor harness secured to coolant control valve (CCV) near front on passenger side of engine.

SERVICE PROCEDURE (CONT.)

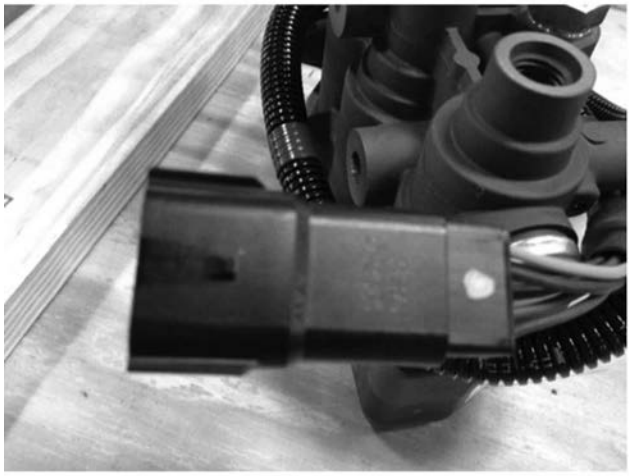

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Figure 3. Marked ACV Connector.

5. Inspect base of connector for presence of yellow paint dot (Figure 3).
   a. If yellow paint dot is present, proceed to Step 54.
   b. If no yellow paint dot is present, proceed to Step 6.

NOTE: If yellow paint dot is present, labor operation A40–13903–1 (Inspect ACV connector for yellow paint dot) is complete.

6. Disconnect battery.

7. Slide red tab, press release tab, and disconnect harness.

SERVICE PROCEDURE (CONT.)

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Figure 4. Engine Harness Connector.

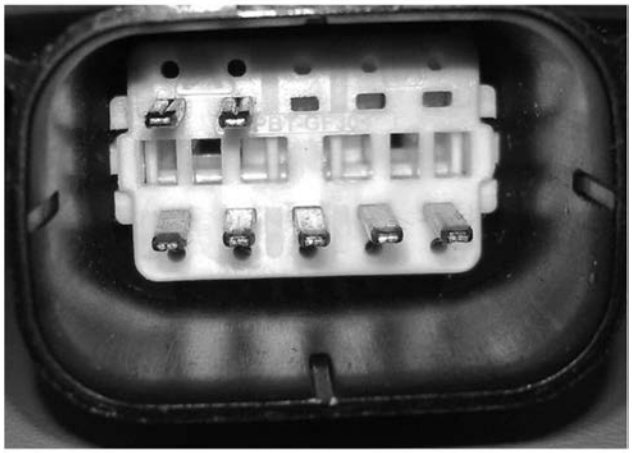

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Figure 5. ACV Harness Connector.

8. Inspect both sides of connector for corrosion (Figures 4 and 5).
   a. If corrosion is present, proceed to Step 20 and finish labor operation A40–13903–3, install new ACV kit and higher level ACV kit.
   b. If no corrosion is present, proceed to Step 9 and finish labor operation A40–13903–2, reverse cavity plugs.

SERVICE PROCEDURE (CONT.)

NOTE: Steps 9 through 19 cover the remainder of labor operation A40–13903–2 (Inspect for corrosion and reverse cavity plugs only). Steps 20 through 51 cover the remainder of labor operataion A40–13903–3 (Inspect for corrosion and install new ACV kit and higher level ACV kit).

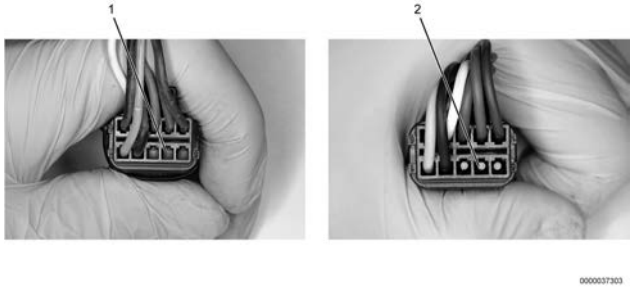

Figure 6. ACV Connector Plugs.

1. Incorrectly installed plugs
2. Correctly installed plugs

9. Inspect plugs in ACV connector to determine if they have been inserted backwards (Figure 6).
   a. If plugs are installed correctly (Figure 6, Item 2), reconnect mating ends of connector, re-latch red lock button, and proceed to Step 52.
   b. If installed incorrectly (Figure 6, Item 1), proceed to Step 10.

NOTE: Incorrectly installed plugs may cause corrosion due to moisture intrusion.

Figure 7. Terminal Release Tool.

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Figure 8. Plug Removal.

10. Locate each small rectangular hole inside ACV connector that corresponds each incorrectly installed plug (Figure 7). Using terminal release tool, gently push plastic plug out end of connector (Figure 8). Repeat for remaining plugs.

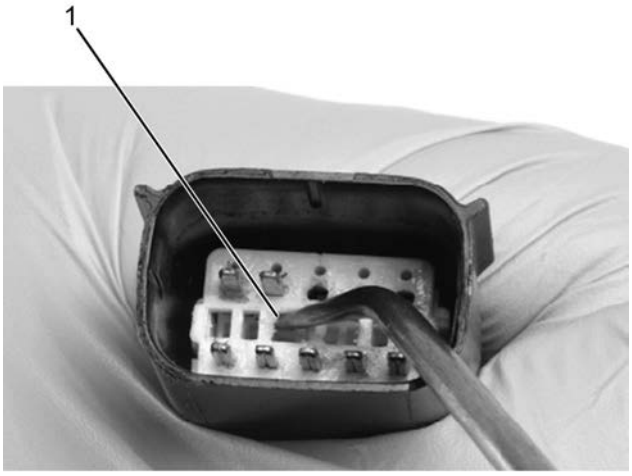

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Figure 9. Setting TPA Lock to Pre-Locked Position.

1. Pre-locked TPA

SERVICE PROCEDURE (CONT.)

11. Using complex pick tool, gently pull terminal position assurance (TPA) lock upward into pre-locked position (Figure 9, Item 1). TPA lock will move approximately 0.1 in (2.5 mm). TPA lock should click once and remain in connector housing.

NOTE: TPA lock should not be removed from connector. If TPA lock is completely removed, place lock back into connector in its pre-locked position.

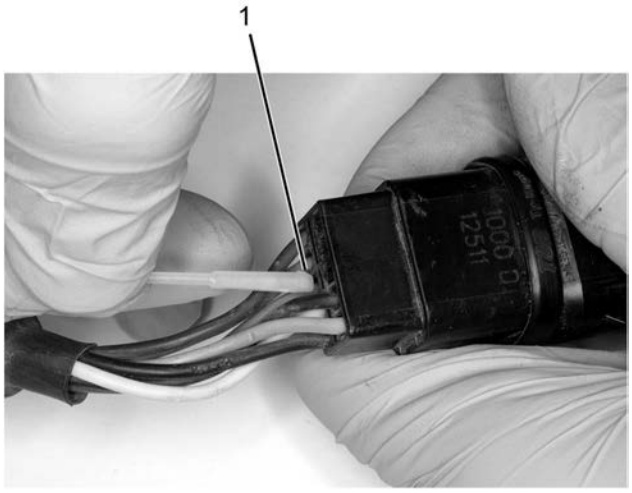

Figure 10. Plug Reinsertion.

1. Barbed tooth pointing outward

12. Reinsert plugs with square end first and barbed tooth facing outward (Figure 10, Item 1). Gently push plugs into connector, leaving approximately ⅛ inch (3.175 mm) protruding.

SERVICE PROCEDURE (CONT.)

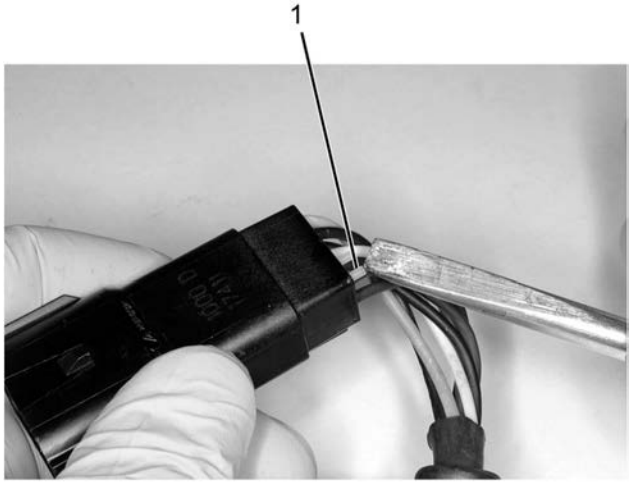

Figure 11. Plug Seating.

1. Plug seating

13. Using a small flathead screwdriver, gently push each plug into locked position (Figure 11, Item 1). Plugs will click when fully inserted.

NOTE: If excessive force is needed to insert plug, make sure it is correctly aligned to connector block before proceeding.

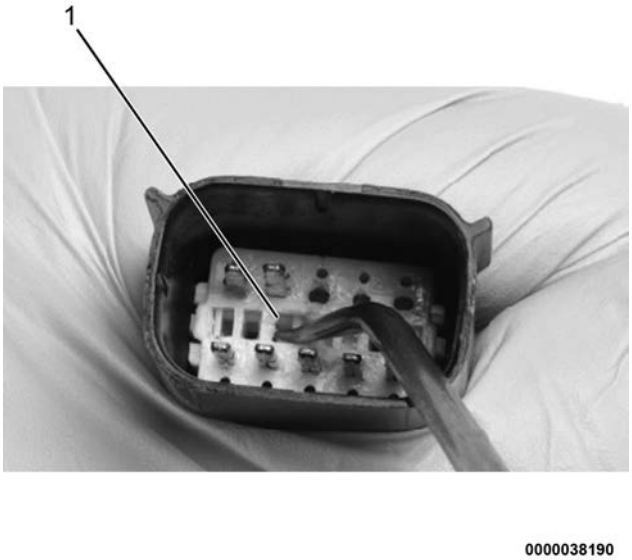

Figure 12. Setting TPA Lock to Locked Position.

1. Locked TPA lock

SERVICE PROCEDURE (CONT.)

14. Using complex pick tool, gently press TPA surface to snap back into locked position (Figure 12, Item 1).

15. Verify that no plugs were pushed out of connector during rework.

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Figure 13. Dielectric Grease.

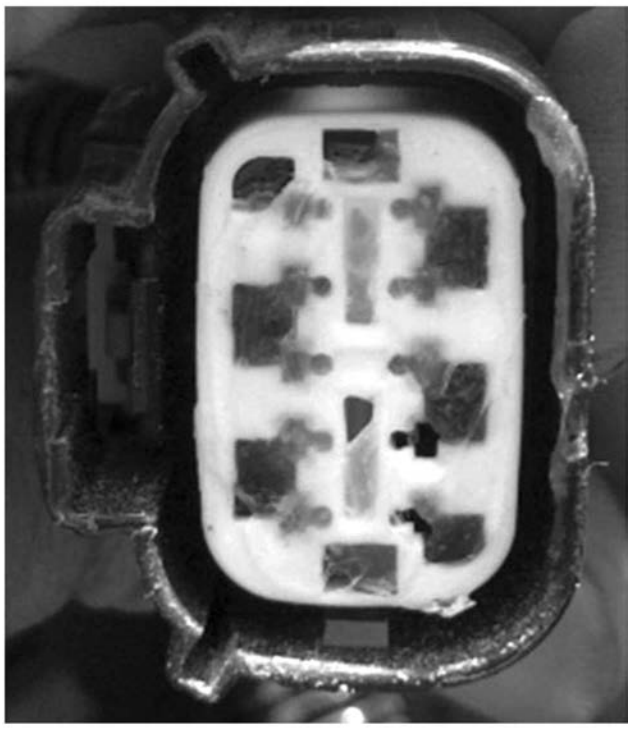

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Figure 14. Terminal Surface Area.

16. Apply small amount of dielectric grease to engine harness side of ACV connector. Use enough to cover surface area of terminals (Figures 13 and 14).

17. Plug mating ends of connector together and re-latch red lock button. Using yellow paint marker, place paint dot on base of connector to indicate connector has been reworked.

SERVICE PROCEDURE (CONT.)

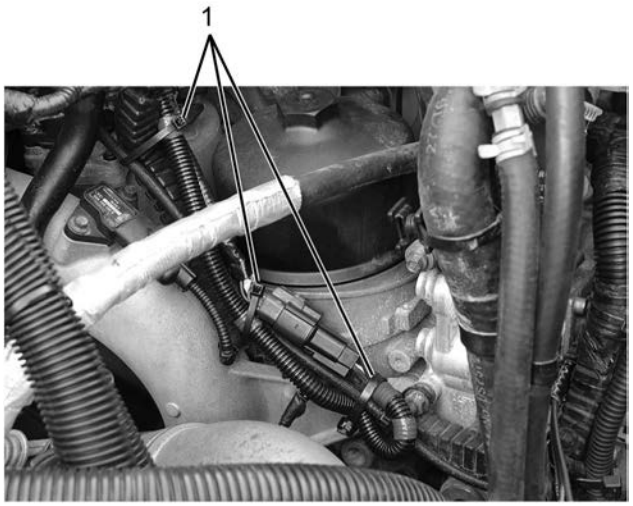

Figure 15. ACV Harness Installation.

1. ACV harness fastening points

18. Using three cable tie straps, secure ACV harness and air line to coolant control valve (CCV) (Figure 15, Item 1). Trim excess length from cable tie straps.

19. This operation is complete. Proceed to Step 52.

NOTE: Labor operation A40–13903–2 (Inspect for corrosion and reverse cavity plugs only) is complete. Steps 20 through 51 cover the remainder of labor operation A40–13903–3 (Inspect for corrosion and install new ACV kit and higher level ACV kit).

20. Replace air control valve per instructions included with Air Control Valve Kit 3015646C91, or refer to Exhaust and Back Pressure section of 2010 MaxxForce® 11 and 13 Service Manual. Then proceed to Step 21 to install ACV Higher Level Kit.

SERVICE PROCEDURE (CONT.)

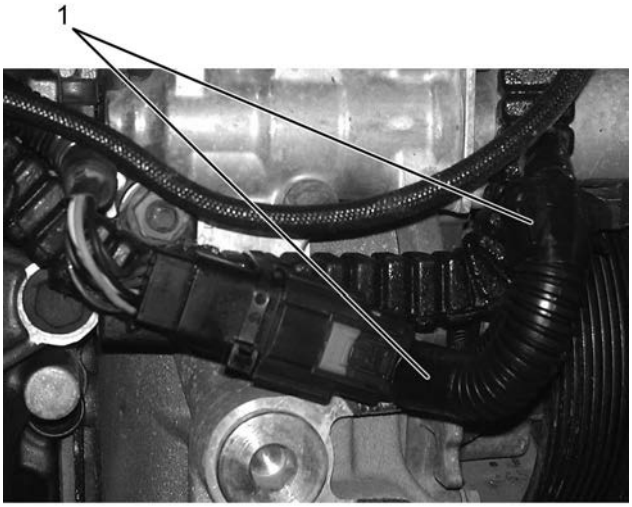

Figure 16. ACV Connector and Engine Harness.

1. Wire loom tape

21. Remove wire loom tape (Figure 16, Item 1) at end of conduit covering engine harness behind ACV connector.

22. Remove wire loom tape and conduit covering wires to remove wire loom and unbound wires.

SERVICE PROCEDURE (CONT.)

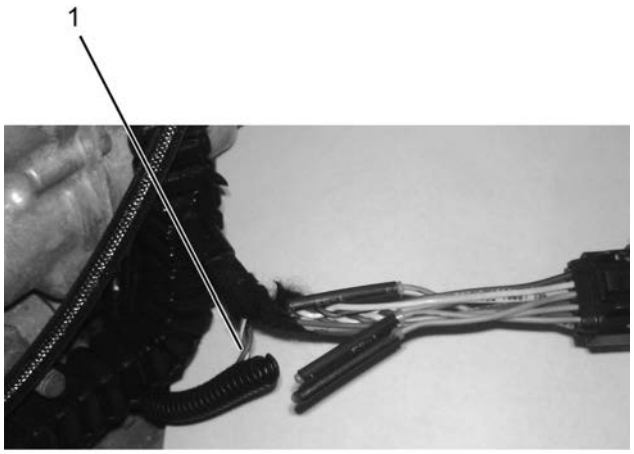

Figure 17. Coolant Flow Valve Harness.

1. Coolant flow valve harness

NOTE: Do not cut the two-pinned coolant flow valve harness (Figure 17). It is not included in the kit.

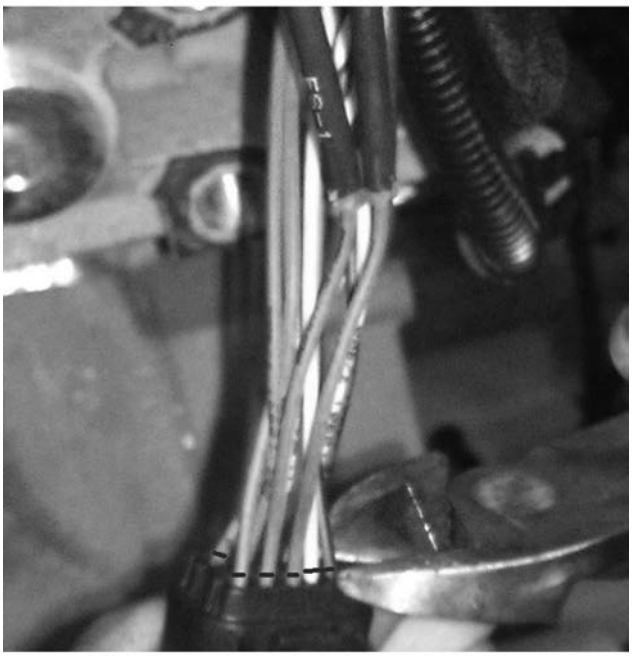

Figure 18. Marked ACV Connector Wiring.

23. Use tape measure and permanent marker to mark each engine harness ACV wire ⅛ inch from back side of ACV connector (Figure 18).

24. Use wire cutters to cut each ACV wire on markings (Figure 18).

SERVICE PROCEDURE (CONT.)

NOTE: Wires leading to Pins 3, 4, and 5 on engine harness ACV connector will not be used.

Table 5. Pin to Corresponding Wire Chart

Wire #	Connector Pin #
354	Pin 1
304	Pin 2
Not used	Pin 3
Not used	Pin 4
Not used	Pin 5
326	Pin 6
352	Pin 7
389	Pin 8
361	Pin 9
320	Pin 10

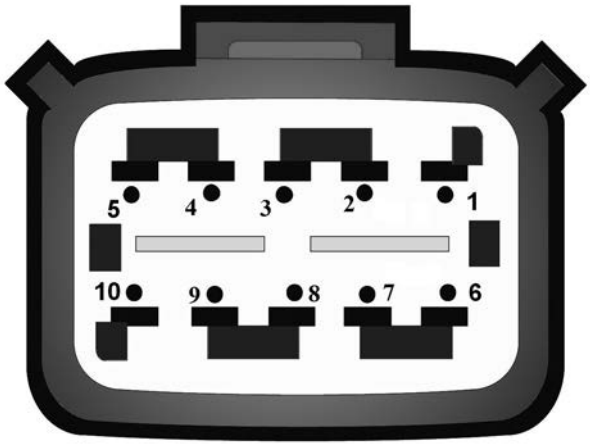

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Figure 19. ACV Connector Engine Harness Side with Pin Numbers.

25. Unwind twisted pairs of wires.

SERVICE PROCEDURE (CONT.)

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Figure 20. Engine Harness Wiring.

26. Mark wires 326 (Pin 6), 389 (Pin 8), and 352 (Pin 7) 1 inch from initial cuts (Figure 20).
27. Cut wires 326 (Pin 6), 389 (Pin 8), and 352 (Pin 7) at respective 1-inch markings.
28. Mark wires 361 (Pin 9) and 320 (Pin 10) 2 inches from initial cuts.
29. Cut wires 361 (Pin 9) and 320 (Pin 10) at respective 2-inch markings.
30. Using wire stripping tool, strip ¼ inch of wire insulation from ends of seven exposed engine harness ACV wires.
31. Twist exposed end of each wire until it is wound into a helix.

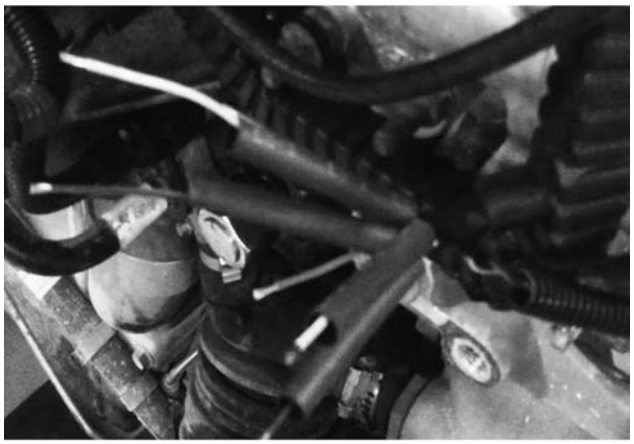

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Figure 21. Heat-Shrink Tubing on Engine Harness Wiring.

32. Place heat-shrink tubes over engine harness wires (Figure 21):

- 354 (Pin 1)
- 304 (Pin 2)
- 326 (Pin 6)
- 352 (Pin 7)
- 389 (Pin 8)

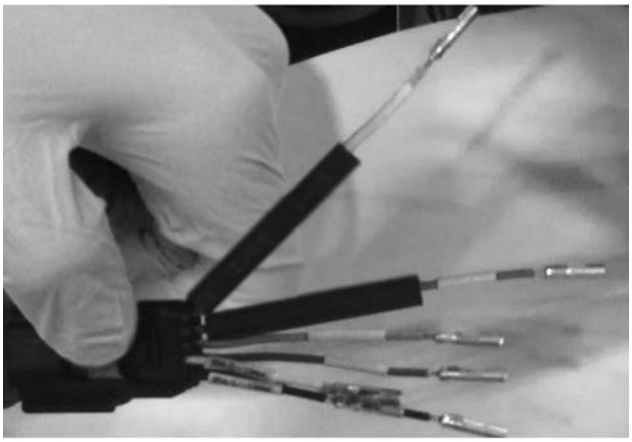

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Figure 22. Heat-Shrink Tubing on Splice Kit Connector.

33. Place heat-shrink tubes over wires 361 (Pin 9) and 320 (Pin 10) on ACV engine harness splice kit connector (Figure 22).

34. Insert exposed end of 354 wire of engine harness into 354 wire crimp connector of new ACV connector pigtail.

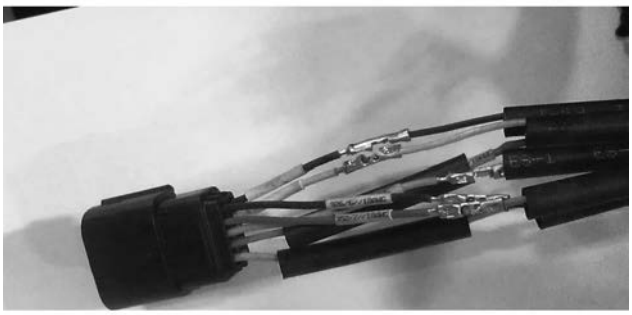

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Figure 23. Crimped Connection.

SERVICE PROCEDURE (CONT.)

35. Using crimping tool, firmly clamp crimp connector to exposed wire end (Figure 23).

36. Repeat Steps 34 and 35 for each engine harness wire.

37. Using soldering tool, solder each butt splice of seven wires at exposed crimp connections.

38. Let soldered connections cool, and then pull heat-shrink tubing over crimp connections. Cover entire exposed area of connection.

39. Using heat gun, heat shrink tubing until adhesive lining flows out ends of heat shrink, creating protective insulation over soldered connections.

40. Repeat Steps 38 and 39 to insulate each exposed crimp connection.

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Figure 24. New Wire Loom.

41. Install new wire loom (Figure 24). Fold ends of loom over (do not cut to length) to prevent fraying.

42. Cover exposed wiring and new wire loom with wire loom tape.

SERVICE PROCEDURE (CONT.)

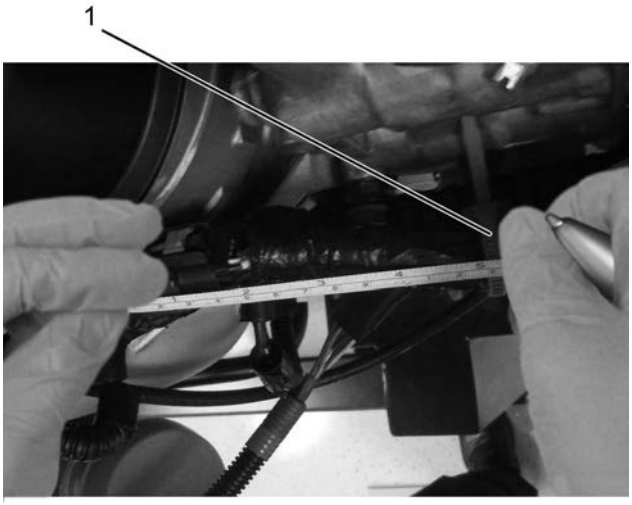

Figure 25. Wire Tie Stud Cap.

1. Wire tie stud cap

43. Install wire tie stud cap (Figure 25, Item 1) on taped wire loom 5 inches from front of ACV connector.

NOTE: Observe orientation of stud clip. Route ACV connection from harness on top of stud bolt.

SERVICE PROCEDURE (CONT.)

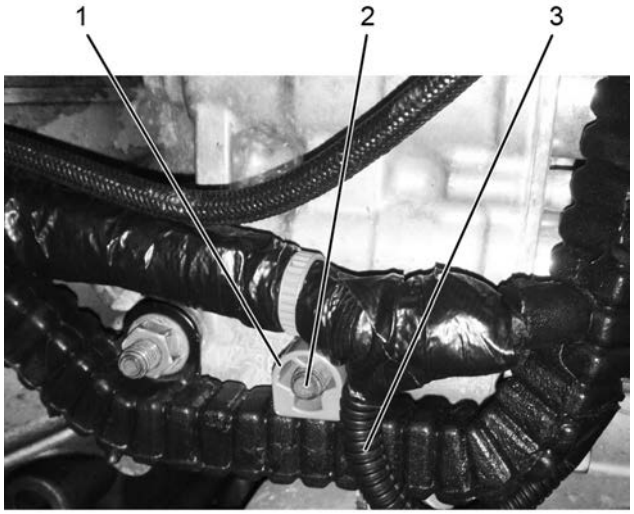

Figure 26. Cap Stud at M8 x 60 Stud Bolt.

1. Wire tie stud cap
2. M8 x 60 stud bolt
3. Coolant flow valve (CFV) wiring loom

44. Secure cap stud to M8 x 60 stud bolt (Figure 26, Item 2).

45. Connect ACV pigtail connector to ACV engine harness connector. An audible click will be heard. Make sure red locking tab is fully seated in forward position.

46. Using yellow paint marker, place yellow paint dot on base of connector to indicate connector has been reworked.

SERVICE PROCEDURE (CONT.)

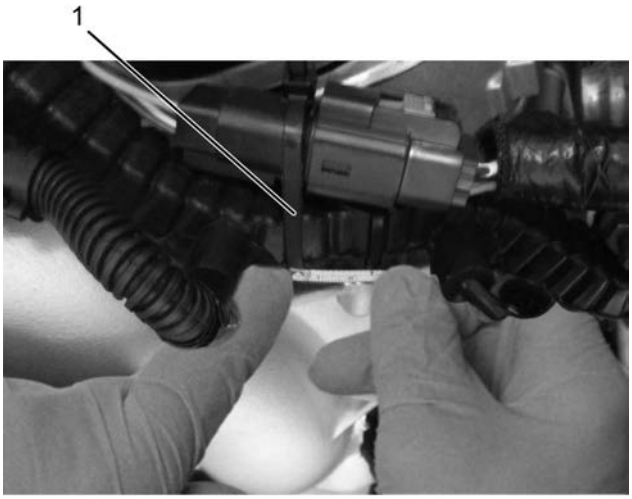

Figure 27. First Cable Tie Strap.

1. Cable tie strap

47. Install cable tie strap (Figure 27, Item 1) over mated ACV connector and engine harness 1 inch from fir tree location at air supply duct.

Figure 28. Second Cable Tie Strap.

1. Cable tie strap

48. Install second cable tie strap (Figure 28, Item 1) at first blue marking.

SERVICE PROCEDURE (CONT.)

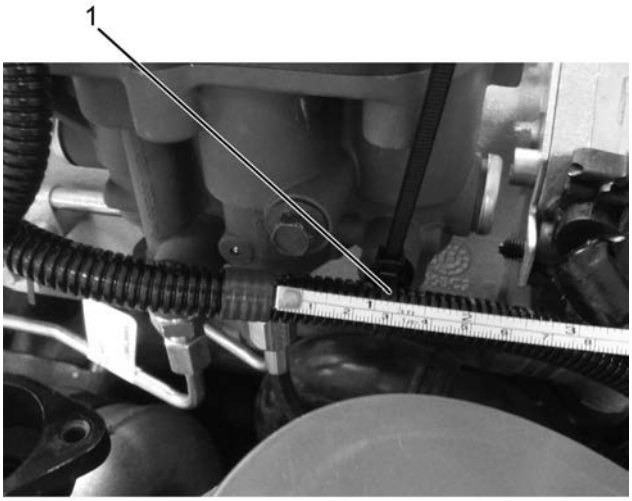

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Figure 29. Third Cable Tie Strap.

1. Cable tie strap

49. Install third cable tie strap (Figure 29, Item 1) 1 inch from second blue marking.

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Figure 30. ACV Wiring at Wiring Port.

50. Wrap excess ACV wiring around ACV wiring port with two cable tie straps (Figure 30).

SERVICE PROCEDURE (CONT.)

NOTE: If exhaust gas recirculation cooler has third boss and bolt installed, anchor strap to boss and bolt.

51. Trim excess length from cable tie straps.

52. Reconnect battery.

53. Run an air management test and verify no fault codes are present.

54. Close and latch hood.

55. Remove wheel chocks.

LABOR INFORMATION

Operation number must appear on all claims.

Table 6. Labor Information

Operation No.	Description	Time
A40-13903-1	Inspection only: Yellow paint dot present, rework already performed	0.2 hrs
A40-13903-2	Inspect for corrosion and reverse cavity plugs only	0.3 hrs
A40-13903-3	Inspect for corrosion and install new ACV kit and higher level ACV kit	1.4 hrs

NOTE: Submit for one operation only.

ADMINISTRATIVE PROCEDURE

Expense is to be charged to Warranty. Claims are to be submitted in the normal manner, making reference to Authorized Field Change Number 13903.

It is important that the coding be completed properly to assist in processing the warranty claim. Complete instructions will be found in the Warranty Policy Manual, Section 7.1.8.

As with all claim submissions, items acquired locally must be submitted in the “Other Charges” tab. The cost of any bulk items (such as a bag of cable tie straps, roll of wire, barrel of oil, or tube of silicone) should be prorated for the cost of the individual pieces / amount used during each repair.

To ensure this important improvement is made in a timely manner, all claims for 13903 activity must be submitted by 31 October 2014 or within the normal warranty period for the vehicle, if after 31 October 2014.