Table of Contents:

1. Service / General Information
2. Maintenance Minder
3. DTC Index & Troubleshooting
4. DTC Advanced Diagnostics
5. Engine Mechanical System
6. Engine Cooling System
7. Engine Lubrication System
8. Engine Exhaust System
9. Turbocharger Control System
10. Fuel and Emissions Systems
11. Fuel Supply System
12. PGM-FI System
13. Catalytic Converter System
14. PCV System
15. Electronic Throttle Control System
16. Intake Air System and Exhaust System
17. Starter Overhaul
18. EVAP System
19. Ignition System
20. Cruise Control System
21. Charging System
22. Volt Battery Removal and Installation
23. Clutch
24. Manual Transmission
25. CVT System
26. TCM
27. Brake System
28. Electric Parking Brake System
29. VSA System
30. Driveline/Axle
31. Front and Rear Suspension
32. Adaptive Damper System
33. Wheel & Tire System
34. TPMS System
35. Power Steering
36. Steering Wheel and Column
37. Climate Control System
38. HVAC
39. Audio and Visual System

40. Navigation System
41. CAN Communications
42. Driving Support System
43. Lane Keeping Assist System (LKAS)
44. Keyless Access System
45. Immobilizer System
46. Interior Trim
47. Dashboard Center Console
48. Power Mirrors
49. Gauges System
50. Horn System
51. Power Window
52. Seat System
53. Seat Belts System
54. SRS Airbag System
55. Moonroof System
56. Lighting System
57. Exterior Trim
58. Windows Glass and Mirrors
59. Bumpers
60. Doors
61. Tailgate System
62. Trunk/Lid/Hood
63. Wipers/Washers
64. Body and Paint
65. Body Repair
66. Body Control Module
67. Socket/Fuse/Relay/Switch
68. Wire Harness and Ground Locations
69. Electrical Wiring Diagrams

Before doing any service on the powertrain system, read the following precautions. See also " Auto Idle Stop System Description - Operation Conditions" for additional information.

Real Time AWD (Intelligent Control System) (If Equipped)

The AWD system distributes driving torque between the front and rear wheels when accelerating and when wheel spin occurs.

The AWD with Intelligent Control does not have a manual switch to disable the AWD system. Whenever service work requires spinning the front or rear wheels with the engine, always lift and support the vehicle so all four wheels are off the ground.

Electric Powertrain System (If Equipped)

The Electric Powertrain System used in hybrid models uses high voltage circuits and a lithium-ion battery module. The high voltage cables are identified by orange cabling. The safety labels are attached to high voltage and other related parts. Touching, disassembling, removing, or replacing high voltage parts or cables can cause severe electric shock that may result in serious injury or death. You must be familiar with Electric Powertrain System before working around it. Make sure you have read the Electric Powertrain Service Precautions in the Electric Powertrain section before doing repairs or service.

Electrical Troubleshooting Information

Before Troubleshooting

1. Check applicable fuses in the appropriate fuse/relay box.

2. Check the 12 volt battery charge and whether the 12 volt battery has been damaged, and clean and tighten the connections.

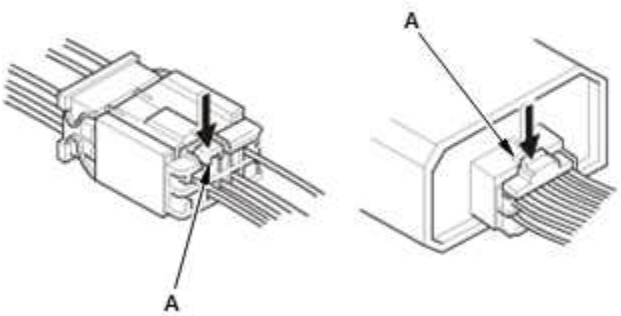
NOTICE

- Do not quick-charge a 12 volt battery unless the 12 volt battery ground cable has been disconnected, otherwise you will damage the alternator diodes.
- Do not attempt to crank the engine with the 12 volt battery ground cable loosely connected or you will severely damage the wiring.

3. Check the drive belt tension.

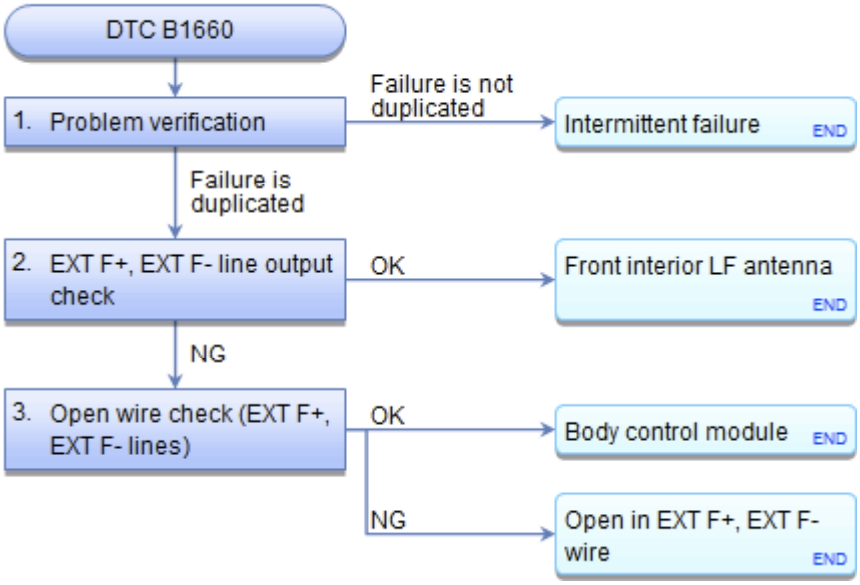
Handling Connectors

- Make sure the connectors are clean and have no loose wire terminals.
- Make sure multiple cavity connectors are packed with dielectric grease (except waterproof connectors).
- Most of the connectors have push-down release type locks (A).



- Some connectors have a clip on their side used to attach them to a mounting bracket on the body or on another component. This clip has a pull type lock.
- Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount bracket (A).

DTC Troubleshooting: B1660



DTC B1660: Front Interior LF Antenna Circuit Open

NOTE: If you are troubleshooting multiple DTCs, be sure to follow the instructions in B-CAN System Diagnosis Test Mode A.

DTC Description	DTC
B1660 Front Interior LF Antenna Circuit Open	

DTC (Keyless Access Control Unit)

1. Problem verification:

-1. Clear the DTCs with the HDS.

Clear DTCs

-2. Select the KEYLESS ACCESS CONTROL UNIT from the ONE-PUSH START system select menu with the HDS, and enter the SELF CHECK.

One-Push - KEYLESS ACCESS CONTROL UNIT - SELF CHECK

-3. Do the SELF CHECK.

-4. Check for DTCs with the HDS.

DTC Description	DTC
B1660 Front Interior LF Antenna Circuit Open	

Is DTC B1660 indicated?

YES Go to step 2.

NO Intermittent failure, the system is OK at this time. Check for loose or poor connections.■

2. EXT F+, EXT F- line output check:

-1. Turn the vehicle to the OFF (LOCK) mode.

-2. Clear the DTC with the HDS.

Clear DTC

-3. Check for Pending or Confirmed DTCs with the HDS.

DTC Description	Confirmed DTC	Pending DTC
P1659 ETCS Control Relay OFF Malfunction		

Is DTC P1659 indicated?

YES The failure is duplicated. Go to step 2.

NO Intermittent failure, the system is OK at this time. Check for poor connections or loose terminals at the relay circuit board and the PCM. If the on-board snapshot of this DTC is recorded, try to reproduce the failure under the same conditions with the on-board snapshot.■

2. Relay circuit board check:

-1. Remove and test the relay circuit board.

Is the relay circuit board OK?

YES Go to step 3.

NO Replace the relay circuit board.■

3. Fuse check:

-1. Turn the vehicle to the OFF (LOCK) mode.

-2. Check the following fuse.

Fuse	No. A8 (15 A)
Location	Under-hood fuse/relay box

Is the fuse OK?

YES Go to step 4.

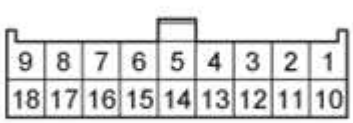
NO Go to step 7.

4. Open wire check (+B DBW line):

-1. Measure the voltage between test points 1 and 2.

Test condition	Vehicle OFF (LOCK) mode
	Relay circuit board: removed
Test point 1	Relay circuit board connector C (18P) No. 14
Test point 2	Body ground

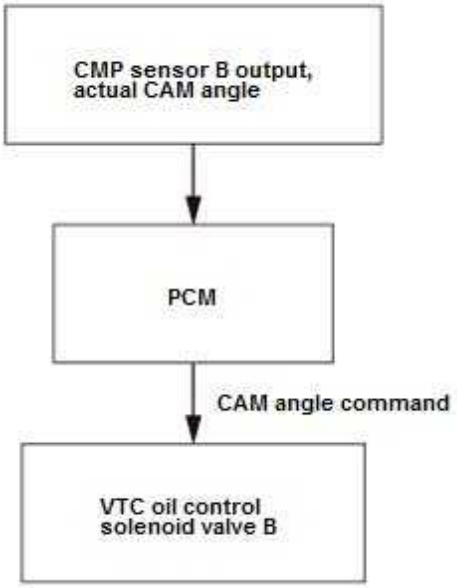
RELAY CIRCUIT BOARD CONNECTOR C (18P)



Wire side of female terminals

DTC P0014:Variable Valve Timing Control (VTC) B System Malfunction

General Description



The variable valve timing control (VTC) system controls the phase of the intake camshaft and exhaust camshaft. It uses oil pressure to operate the VTC actuator A/B so the valve timing is optimized depending on driving conditions. The powertrain control module (PCM) monitors the phase control command and the actual phase of the exhaust camshaft by using camshaft position (CMP) sensor B. If the phase difference between them is excessive for a certain time period, the PCM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	10 seconds or more
DTC Type	Two drive cycles, MIL on

Enable Conditions

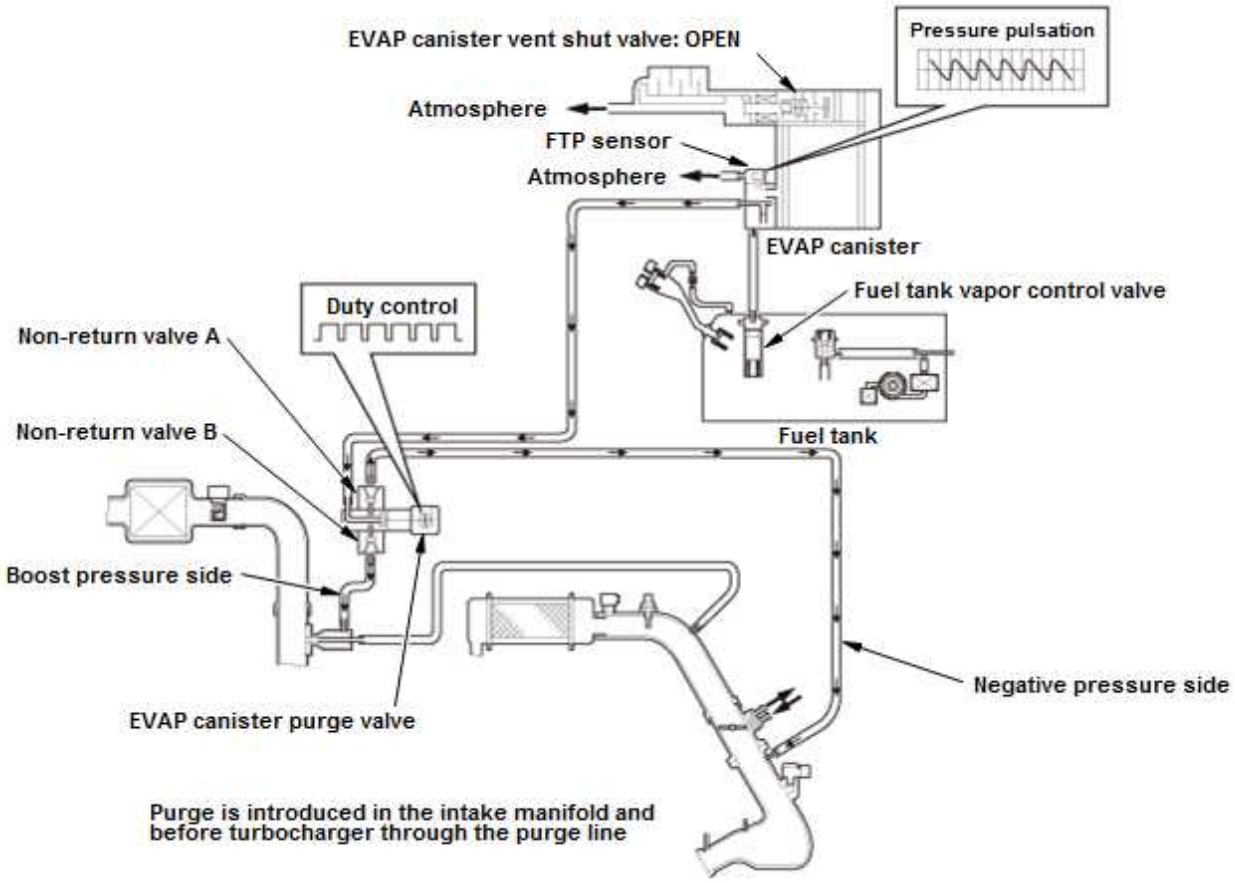
Either one of the conditions is met:

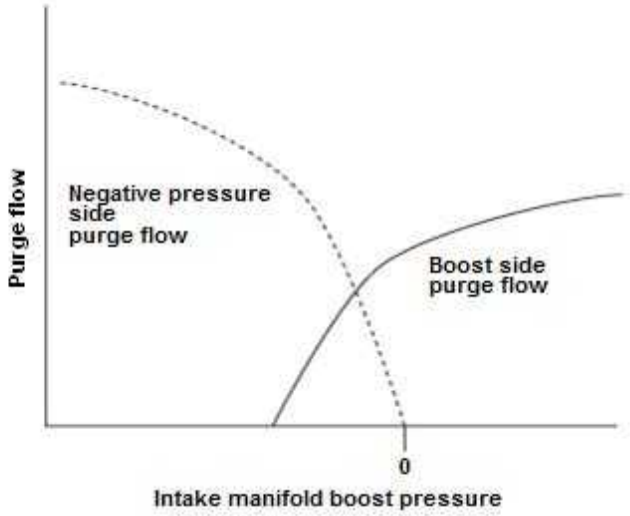
Case 1:

Condition		Minimum	Maximum
Elapsed time after starting the engine		10 seconds	–
Engine coolant temperature [ECT SENSOR 1]	23 °F (-5 °C)*	77 °F (25 °C)	–
	-13 °F (-25 °C)*	77 °F (25 °C)	
Engine speed [ENGINE SPEED]	194 °F (90 °C)**	900 rpm	–
	229 °F (109 °C)**	1,300 rpm	
12 volt battery voltage [BATTERY]		10.5 V	–

DTC P04F0: Evaporative Emission (EVAP) System Incorrect Purge Flow Detected

General Description

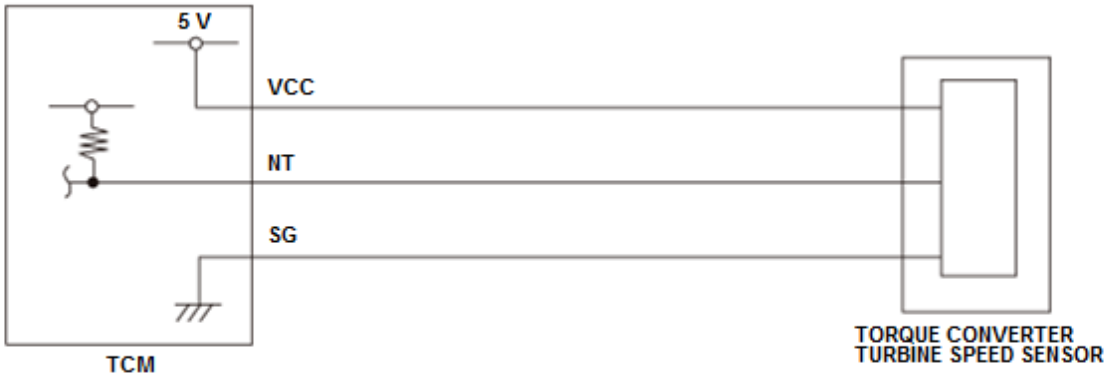


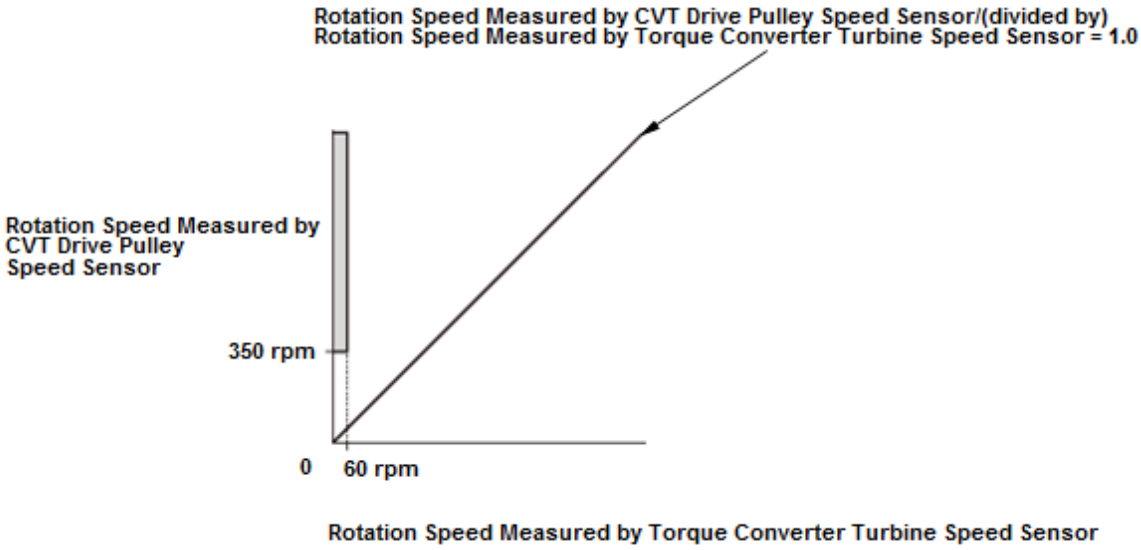


Negative side purge flow	Boost side purge flow	Purge back-flow (P2450)	Condition
Flowing	Flowing	OK	Purge line normal, EVAP canister purge valve normal

DTC P0717: Input/Turbine Speed Sensor "A" Circuit No Signal

General Description





The torque converter turbine speed sensor is attached to the outside of the transmission housing. The torque converter turbine speed sensor detects the number of revolutions of the gear on the input shaft and sends a pulsing signal to the transmission control module (TCM). The TCM converts the pulses to torque converter turbine speed. If no pulses occur with the input shaft rotating, the TCM detects a malfunction that may be caused by an open, an intermittent open, or a short to ground. Based on the correlation between the torque converter turbine speed sensor and the CVT drive pulley speed sensor, the TCM detects a malfunction and stores a DTC.

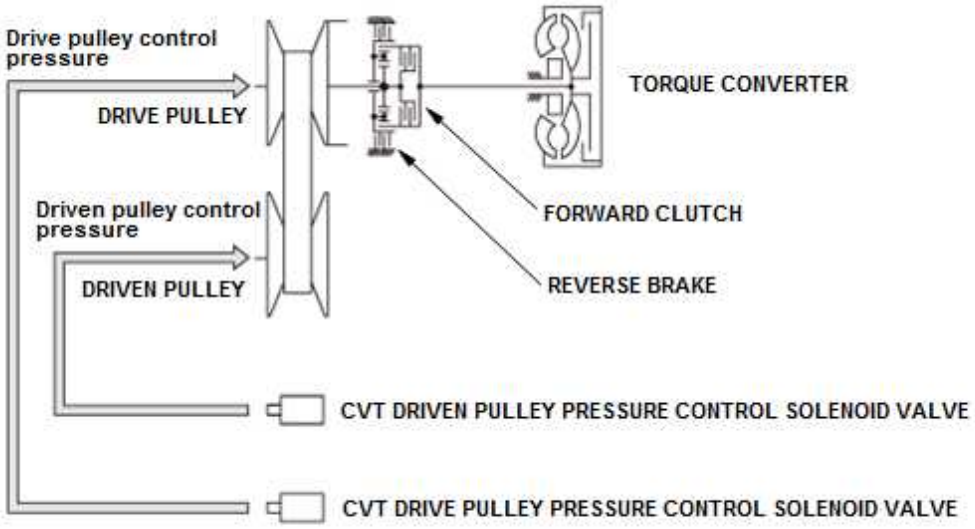
Monitor Execution, Sequence, Duration, DTC Type

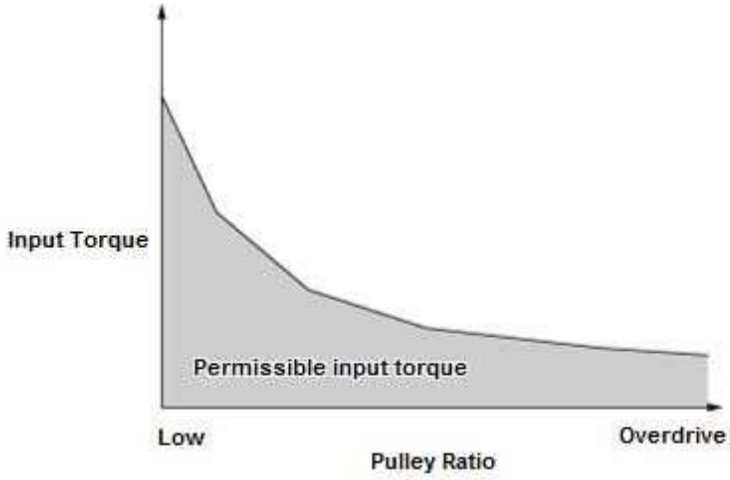
Execution	Continuous
Sequence	None
Duration	10 seconds or more
DTC Type	One drive cycle, MIL on, Shift position indicator blinks

Enable Conditions

DTC P1899:CVT Drive Pulley Pressure Control Valve Stuck OFF or CVT Driven Pulley Pressure Control Valve Stuck ON

General Description





The CVT drive pulley pressure control solenoid valve and the CVT driven pulley pressure control solenoid valve control hydraulic pressure. The CVT drive pulley pressure control solenoid valve and the CVT driven pulley pressure control solenoid valve are controlled by duty cycle output. The spool in the CVT drive pulley pressure control solenoid valve and the CVT driven pulley pressure control solenoid valve moves the valve according to the current, and produces hydraulic pressure in proportion to the current. The transmission control module (TCM) measures the current that passes through the CVT drive pulley pressure control solenoid valve and the CVT driven pulley pressure control solenoid valve and uses feedback control to compensate for the difference between the measured current and the commanded one. To shift the transmission properly, the TCM outputs a drive/driven pulley hydraulic pressure control signal. If the pulley ratio is overdrive while the vehicle is stopped with the forward clutch engaged, and the estimated input torque when starting is a specified value or less and belt slippage does not occur when driving, the TCM detects a CVT drive pulley pressure control solenoid valve stuck OFF failure or a CVT driven pulley pressure control solenoid valve stuck ON and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Condition	Minimum	Maximum
12 volt battery voltage [BATTERY]	9.0 V	–
State of the engine	Running	

[ ]: HDS Parameter

Malfunction Threshold

The VS terminal voltage is 3.7 V or more for at least 38 seconds.

Possible Cause

NOTE: The causes shown may not be a complete list of all potential problems, and it is possible that there may be other causes.

- A/F sensor (sensor 1) failure
- A/F sensor (sensor 1) VS line open
- PCM internal circuit failure

Confirmation Procedure

Operating Condition

1. Start the engine. Hold the engine speed [ENGINE SPEED] at 3,000 rpm without load (CVT in P or N, M/T in neutral) until the radiator fan comes on.
2. Let the engine idle for at least 2 minutes.

With the HDS

None.

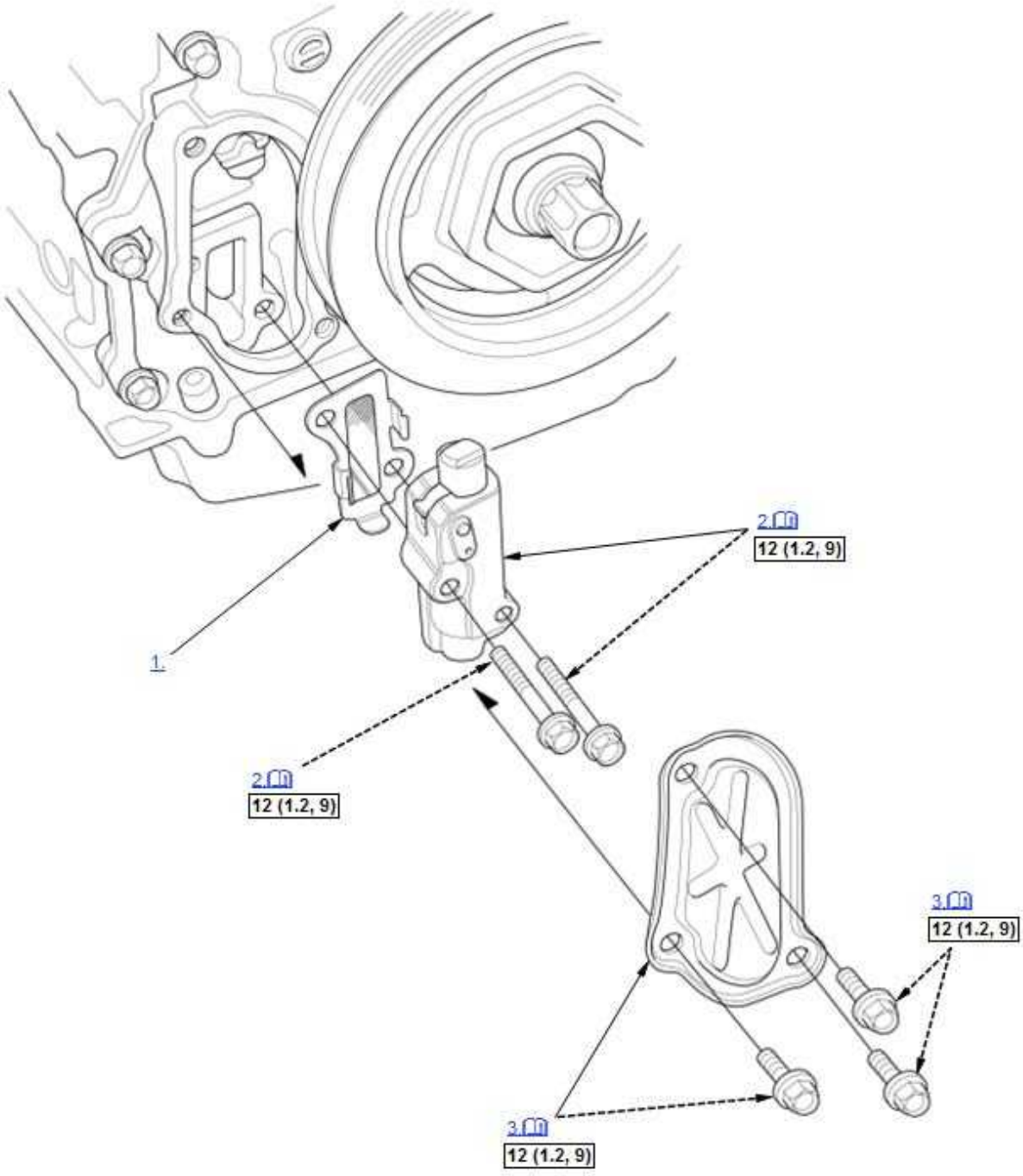
Diagnosis Details

Conditions for setting the DTC

When a malfunction is detected during the first drive cycle, a Pending DTC is stored in the PCM memory. If the malfunction returns in the next (second) drive cycle, the MIL comes on and a Confirmed DTC and the freeze data are stored.

Conditions for clearing the DTC

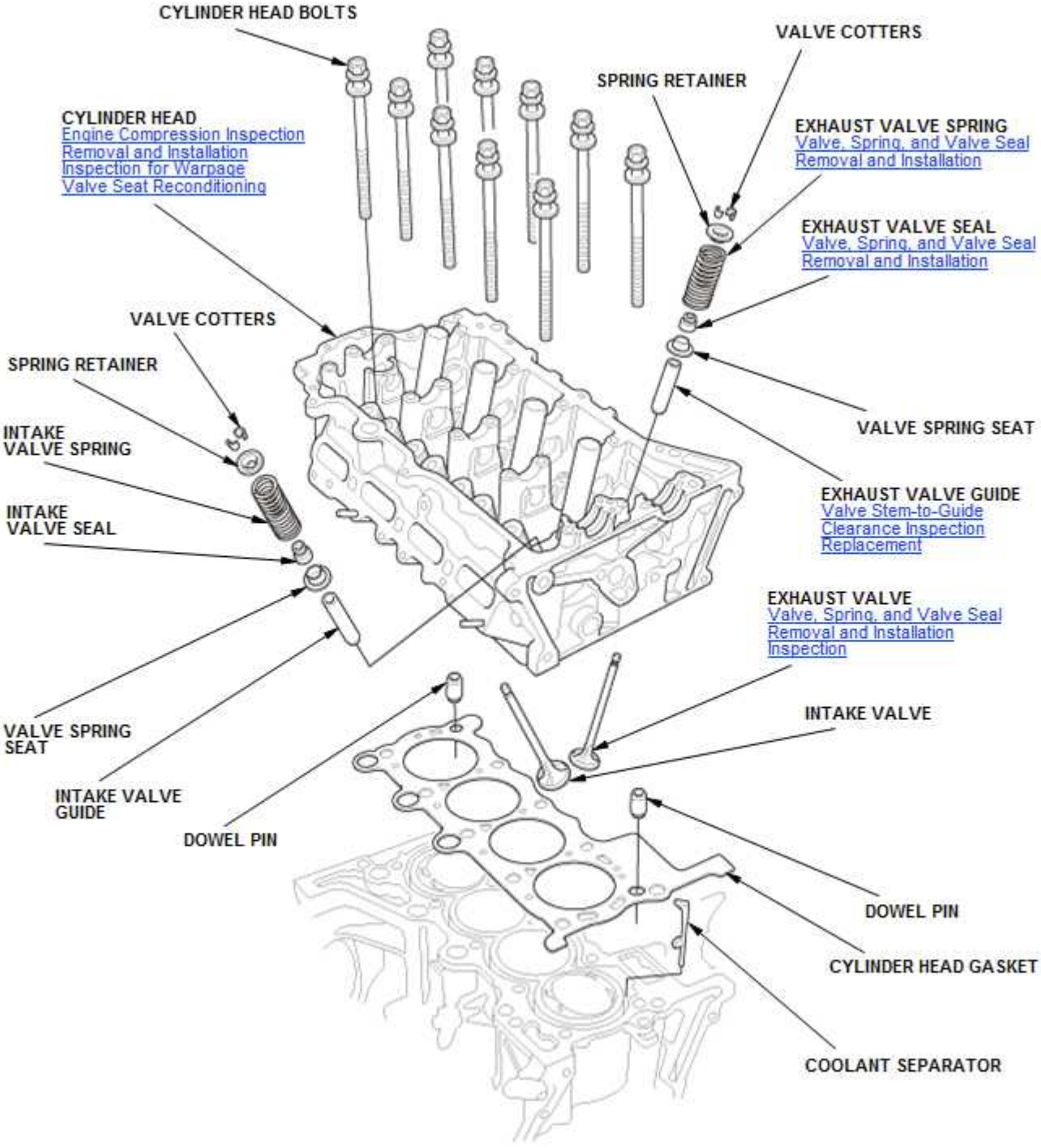
The MIL is cleared if the malfunction does not return in three consecutive trips in which the diagnostic runs. The MIL, the Pending DTC, the Confirmed DTC, and the freeze data can be cleared with the scan tool Clear command or by disconnecting the 12 volt battery.



	Detailed information, notes, and precautions
	Torque: N·m (kgf·m, lbf·ft)

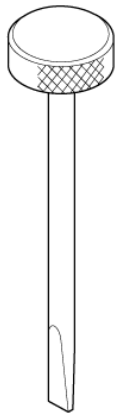
1. Cam Chain Auto-Tensioner Filter - Install

2. Cam Chain Auto-Tensioner - Install



Valve Clearance Adjustment

Special Tool Required

Image	Description/Tool Number
	Adjuster 07MAA-PR70110
	Locknut Wrench 07MAA-PR70120

Adjustment

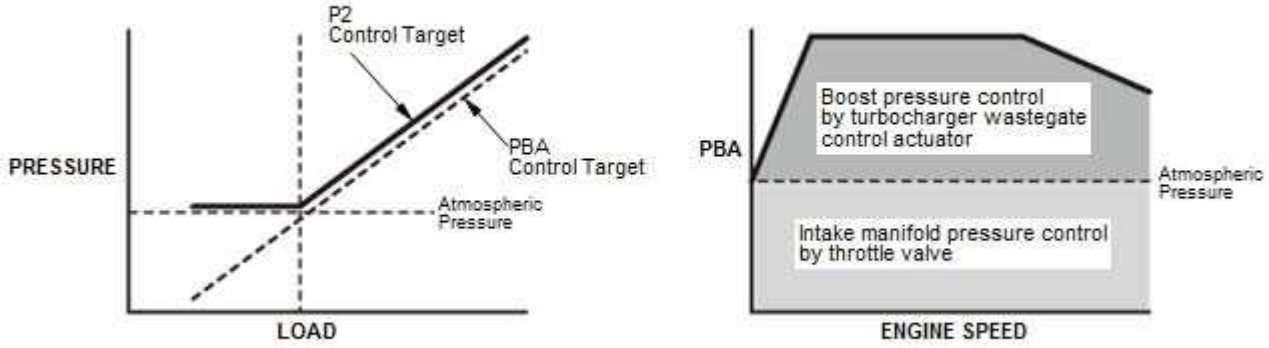
NOTE: Connect the HDS to the DLC and monitor ECT SENSOR 1 with the HDS. Adjust the valve clearance only when the engine coolant temperature is less than 100 °F (38 °C).

1. **Cylinder Head Cover - Remove**

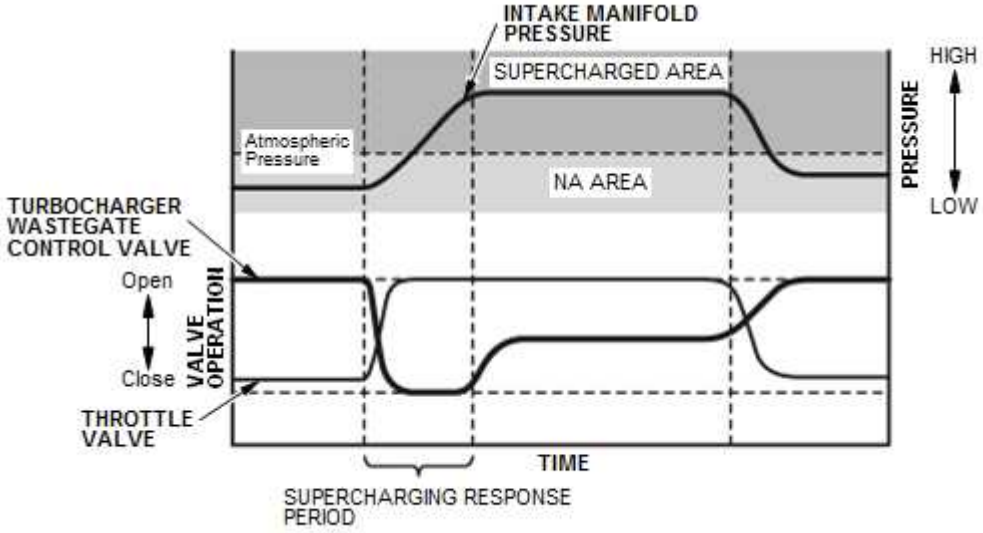
2. **Right Front Wheel - Remove**

3. **Engine Undercover - Remove**

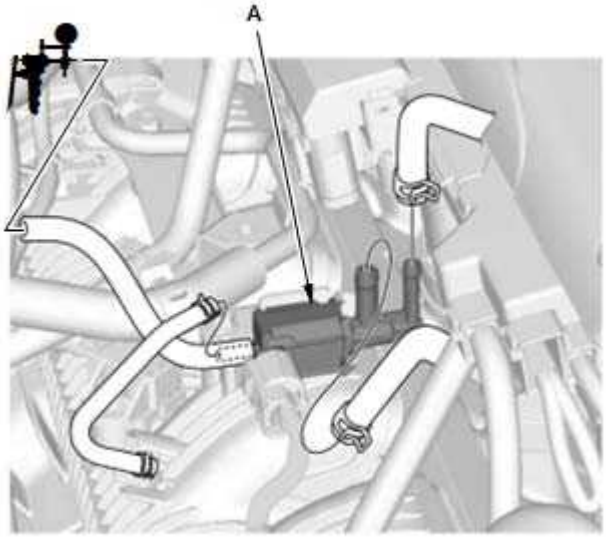
In the area where the intake manifold absolute pressure (PBA) is below the atmospheric pressure (NA area), the engine output is controlled by changing the throttle valve open ratio. In the NA area, the turbocharger wastegate control valve is opened to keep the pressure in the upstream of the throttle valve (P2) to almost the atmospheric pressure, which prevents the exhaust pressure increasing by the turbine operation and reduces exhaust loss.
In the area where the PBA is at or above the atmospheric pressure (supercharged area), the engine output is controlled by changing the turbocharger wastegate control valve open ratio to control the boost pressure.



In the supercharging response period, where the target PBA increases with the required torque to the engine and the internal pressure of the intake manifold increases from the NA area into the supercharged area, the throttle valve open ratio increases, the PBA increases, and the turbocharger wastegate control valve starts to close to ensure sufficient responsiveness.
When the PBA reaches around the atmospheric pressure, the throttle valve is fixed in the fully-open position to minimize the air flow drag at the throttle valve. In the supercharged area, the turbocharger wastegate control valve open ratio is controlled so that the target PBA is achieved. After that, when the required torque to the engine decreases, the throttle valve closes and the turbocharger wastegate control valve opens to reduce the exhaust loss.



Type B



6. Turbocharger Bypass Control Solenoid Valve - Vacuum Line Open Stuck Check

1. Turn the vehicle to the ON mode.
2. Select TURBOCHARGER BYPASS CONTROL SOLENOID VALVE ON in the INSPECTION MENU with the HDS.
3. Reapply vacuum to the port.
   - If it does not hold vacuum, replace the turbocharger bypass control solenoid valve.
   - If it holds vacuum, the turbocharger bypass control solenoid valve is OK. Check the vacuum hose between the turbocharger bypass control solenoid valve, the intake manifold, turbocharger bypass valve, and the turbocharger outlet pipe.