

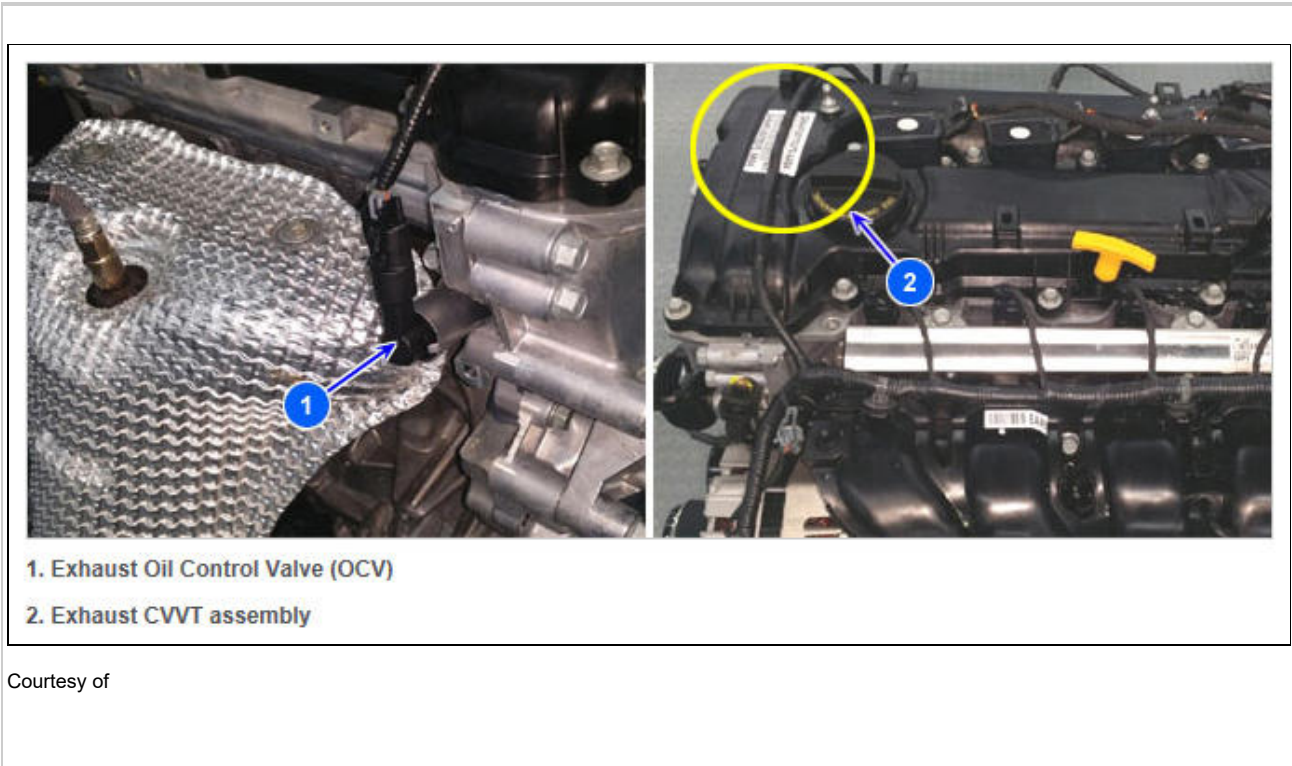
PRODEMAND

YMMS: 2017 Hyundai Elantra SE
Engine: 2.0L Eng
VIN:

Jun 14, 2023
License:
Odometer:

DTC P0014-00: 'B' Camshaft Position - Timing Over-Advanced Or System Performance (Bank 1)

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system is installed to the chain sprocket of the camshafts. This system controls the camshaft to provide optimal valve timing. The PCM controls the Oil Control Valve (OCV), based on the signals output from air flow, throttle position and engine coolant temperature. The CVVT controller regulates the camshaft angle using oil pressure through the OCV. As result, the relative position between the camshaft and the crankshaft becomes optimal, and the engine torque improves, fuel economy improves, exhaust emissions decrease under overall driving conditions.

DTC Information

DTC Description

The deviation of the camshaft position from the target point is evaluated during stable driving condition. The PCM accumulates this deviation for a certain period and sets DTC P0014-00 when the accumulated deviation is too high. The target camshaft position is predetermined value depending on engine speed and throttle angle in the PCM.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case 1	Deviation check between actual CAM position and CAM setpoint position in case of changing setpoint (slow response of actuator)	1. Oil leak 2. Oil Control Valve 3. CVVT Assembly
	Case 2	Deviation check between actual CAM position and CAM setpoint position (steady deviation)	
Enable Conditions	Case 1	- Time after engine start is longer than 1.5 ~ 2 seconds. - Camshaft set point movement is greater than 12.3° CRK within 0.7 seconds. - Camshaft setpoint is moved more than 0 times since engine start. - Engine speed (RPM) is between 576 to 1504 RPM and 4992 RPM. - Engine oil temperature is between 20°C (68°F) and 120°C (248°F). - Battery voltage is between 11V and 16V.	
	Case 2	- Time after engine start is longer than 1.5 ~ 2 seconds. - Camshaft set point is moved more than 0 times since engine start. - Engine speed (RPM) is between 576 to 1504 RPM and 4992 RPM. - Engine oil temperature is between 20°C (68°F) and 120°C (248°F). - Battery voltage is between 11V and 16V.	
Threshold Value	Case 1	CAM position movement is less than 3.4° CRK within 0.7 second. (with CAM setpoint moving by 12° CRK)	
	Case 2	The difference between Camshaft position actual value and Camshaft position setpoint is greater than 45° CRK/s	
Diagnosis Time		Immediately	
MIL On Condition		2 Driving Cycles	

Specification

Oil Control Valve (OCV)	Normal Parameter At 20°C (68°F)
Coil Resistance (Ω)	$9.9 \pm 0.5\Omega$

Signal Waveform & Data

Fig 1: Screen Display - Reference Waveform At Idle (CH A1; Intake CMPS, CH A2; Exhaust CMPS, CH B1; CKPS)



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Fig 2: Screen Display - Reference Waveform At Idle, Duty 7% (CH A1; Intake CMPS, CH A2; Exhaust CMPS, CH B1; Intake OCV, CH B2; Exhaust OCV)



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Fig 3: Screen Display - Reference Waveform During Stall Test, Duty 37% (CH A1; Intake CMPS, CH A2; Exhaust CMPS, CH B1; Intake OCV, CH B2; Exhaust OCV)



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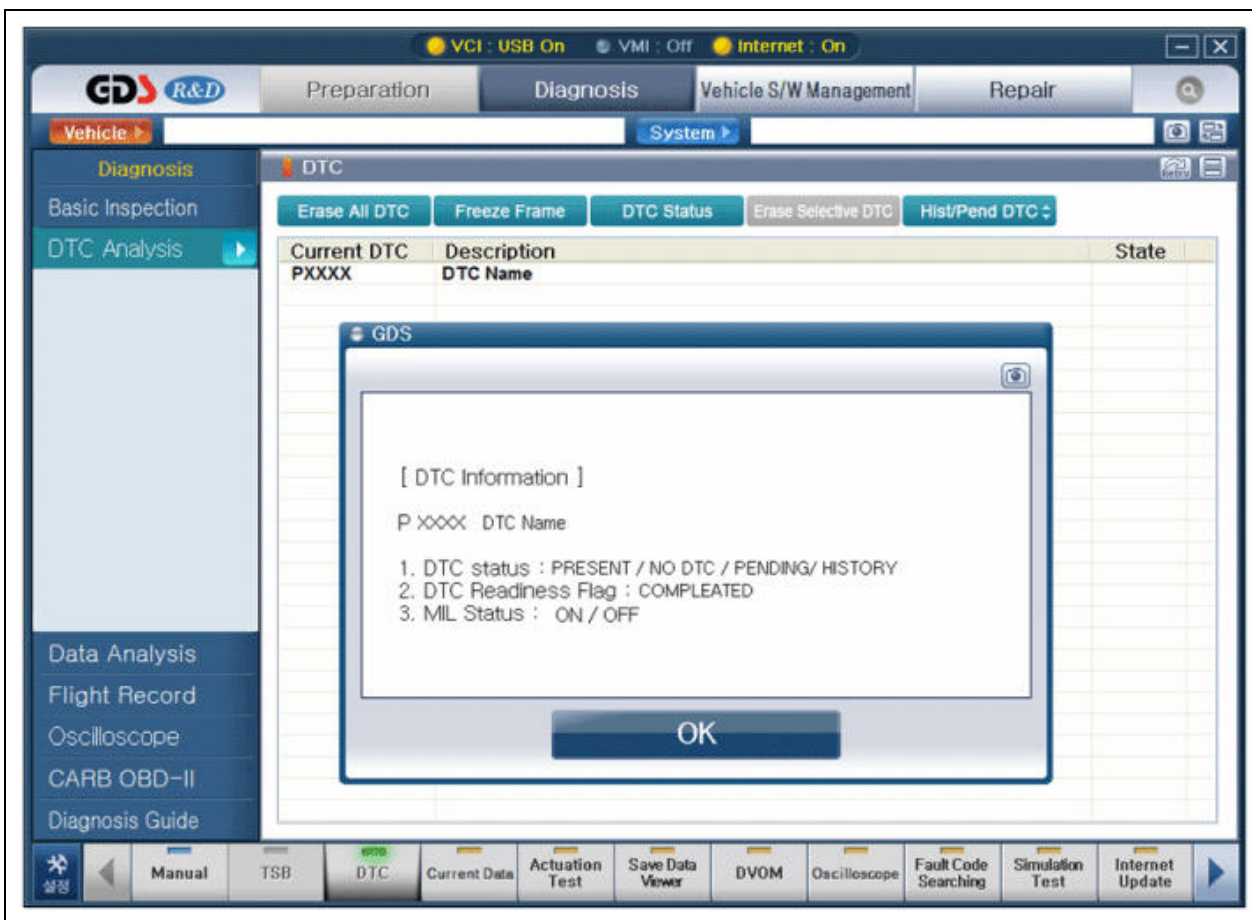
Figs. 1~3) Synchronization between crankshaft position sensor and cam position sensor/oil control valve waveform review

DTC Inspection

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Select **"Diagnostic Trouble Codes (DTC)"** button, Press "DTC Status" to check DTC's information from the DTCs menu.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.

Fig 4: Screen Display - DTC Status Parameter



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5. Record all DTC's, DTC status and freeze frame data. Does DTC Status indicate "Present"?

NOTE:

1. History (Not Present) fault: DTC occurred but has been cleared.
2. Present fault: DTC is occurring at present time.

YES

1. Go to next step below.

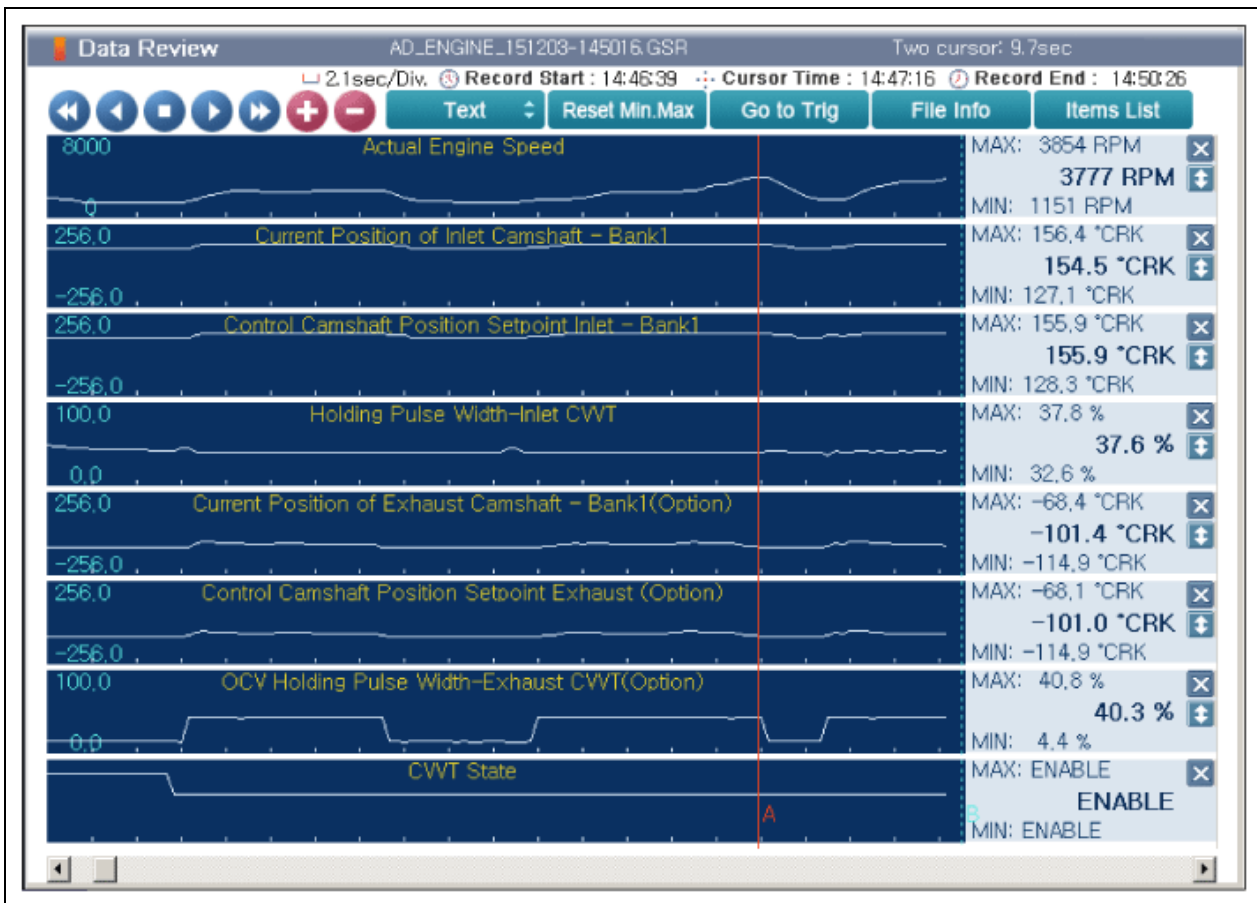
NO

1. Fault is intermittent caused by PCM memory not having been cleared.

GDS Data Analysis

1. Connect GDS and select "DTC Analysis" mode
2. Warm up the engine.
3. Monitor the parameters related to DTC on the "Current Data" menu of the GDS in (Fig 5).

Fig 5: Screen Display - Service Data During Intake CVVT Being In Operation



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Current position of inlet camshaft follows control camshaft position setpoint inlet.

4. Is parameter displayed within specifications?

YES

1. Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "VERIFICATION OF VEHICLE REPAIR" procedure.

NO

1. Go to next step.

Wiring Inspection

Terminal And Connector Inspection

1. Disconnect the OCV and PCM connectors and inspect for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Reconnect the connectors.
2. Connect the GDS and go to "**Current Data**".
3. Monitor camshaft actual position in Current Data, check and wiggle the harness(es), connector(s), and terminal(s).
4. Any change in the values indicates a poor connection. Was a connector problem found?

YES

1. Repair the connector. Go to "VERIFICATION OF VEHICLE REPAIR" procedure.

NO

1. Go to "SYSTEM INSPECTION" procedure.

System Inspection**■ Visual Inspection**

1. Check oil level is O.K.
2. Check for oil leakage around OCV
3. Has a problem been found?

YES

1. Repair or replace as necessary. Go to "VERIFICATION OF VEHICLE REPAIR" procedure.

NO

1. Go to "COMPONENT INSPECTION" procedure.

Component Inspection**■ Check OCV and Filter**

1. Check resistance of OCV
 1. IG "OFF". Disconnect OCV connector.
 2. Measure resistance between power and signal terminals of OCV. (Component Side)
Specification : Approx. $9.9 \pm 0.5 \Omega$ at 20°C (68°F)
 3. Is the measured resistance within specification?

YES

1. Go to next step below.

NO

1. Substitute with a known - good OCV and check for proper operation. If the problem is corrected, replace OCV and go to "VERIFICATION OF VEHICLE REPAIR" procedure.

2. Check operation of OCV

1. Start the engine and let it idle.
2. With OCV connector still disconnected, connect 12V and a ground to 2 and 1 terminals of the OCV (Component side).

Specification:

Test Condition	Disconnect OCV connector	Apply battery voltage
Normal Value	Normal engine speed	Rough idle or engine stall

3. Has a problem been found?

YES

1. Go to "Check OCV and Filter" procedure below.

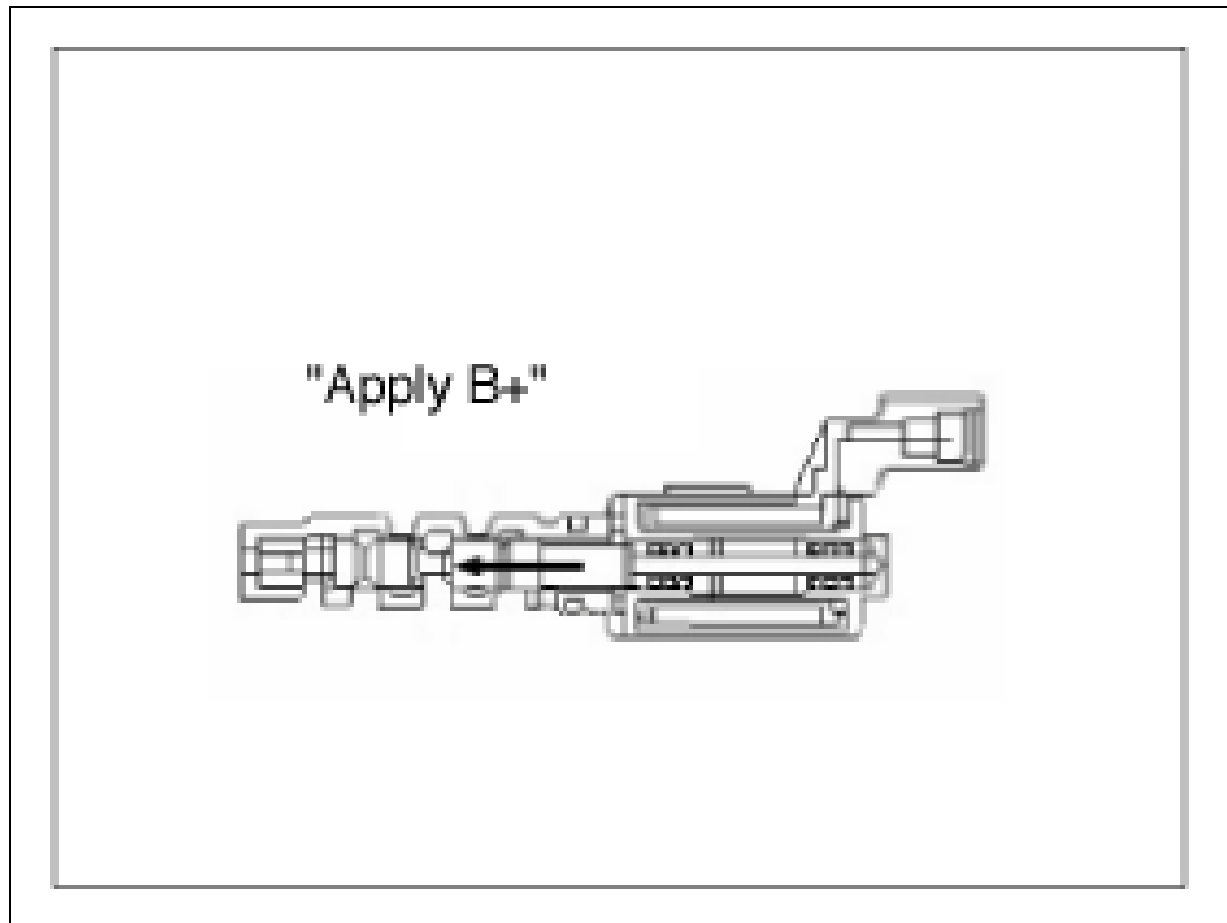
NO

1. Go to "Check CVVT (Continuously Variable Valve Timing) Assembly" procedure below.

3. Check OCV and Filter

1. IG "OFF".
2. Check OCV filter for sticking or contamination.
3. Remove the OCV and visually check the spool column of OCV for contamination.
4. Has a problem been found?
YES
 1. Clean or replace as necessary. Go to "VERIFICATION OF VEHICLE REPAIR" procedure.**NO**
 1. Go to next step below.
5. Apply 12V and a ground to 2 and 1 terminals of the OCV (Component side).
6. Verify that a "clicking" sound is heard when applying the battery voltage.
7. Repeat this procedure 4 or 5 times to ensure intake OCV reliability.

Fig 6: Applying Battery Voltage



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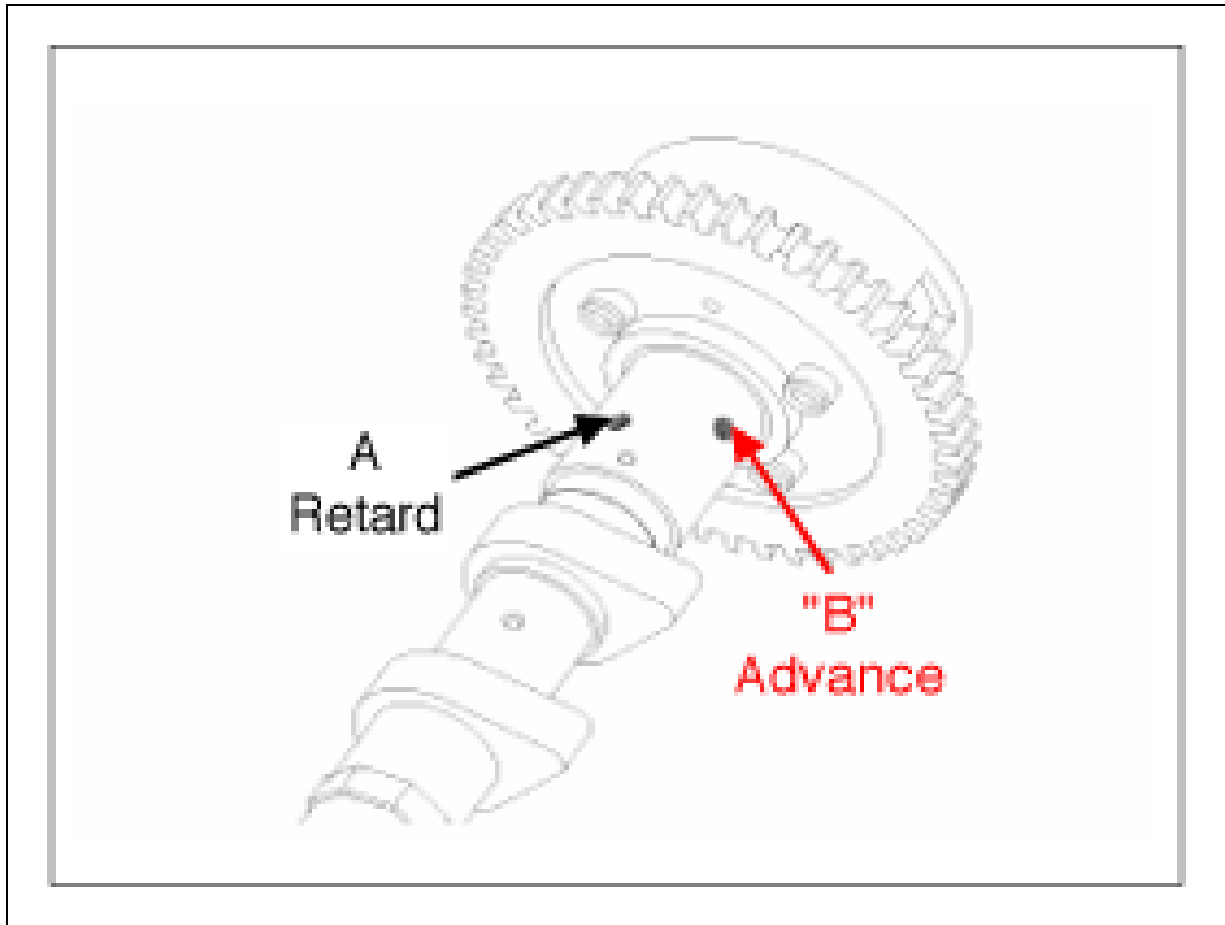
8. Is OCV working properly?
YES
 1. Go to "Check CVVT Assembly" procedure below.**NO**
 1. Check OCV for contamination, deterioration, or damage. Substitute with a known-good OCV and check for proper operation. If the problem is corrected, replace OCV and then go to

"VERIFICATION OF VEHICLE REPAIR" procedure.

4. Check CVVT (Continuously Variable Valve Timing) Assembly

1. Remove the CVVT assembly. (Refer to - " CVVT & Camshaft ")
2. Check that the CVVT assembly is locked.
3. One of the 2 holes on the cam journal is for advances (upper) and the rest is for retards (lower). Apply masking tape to all oil path holes except the one advance hole ("B") indicated by the arrow as shown in (Fig 7).

Fig 7: Locating Cam Journal Holes (Advance And Retard)



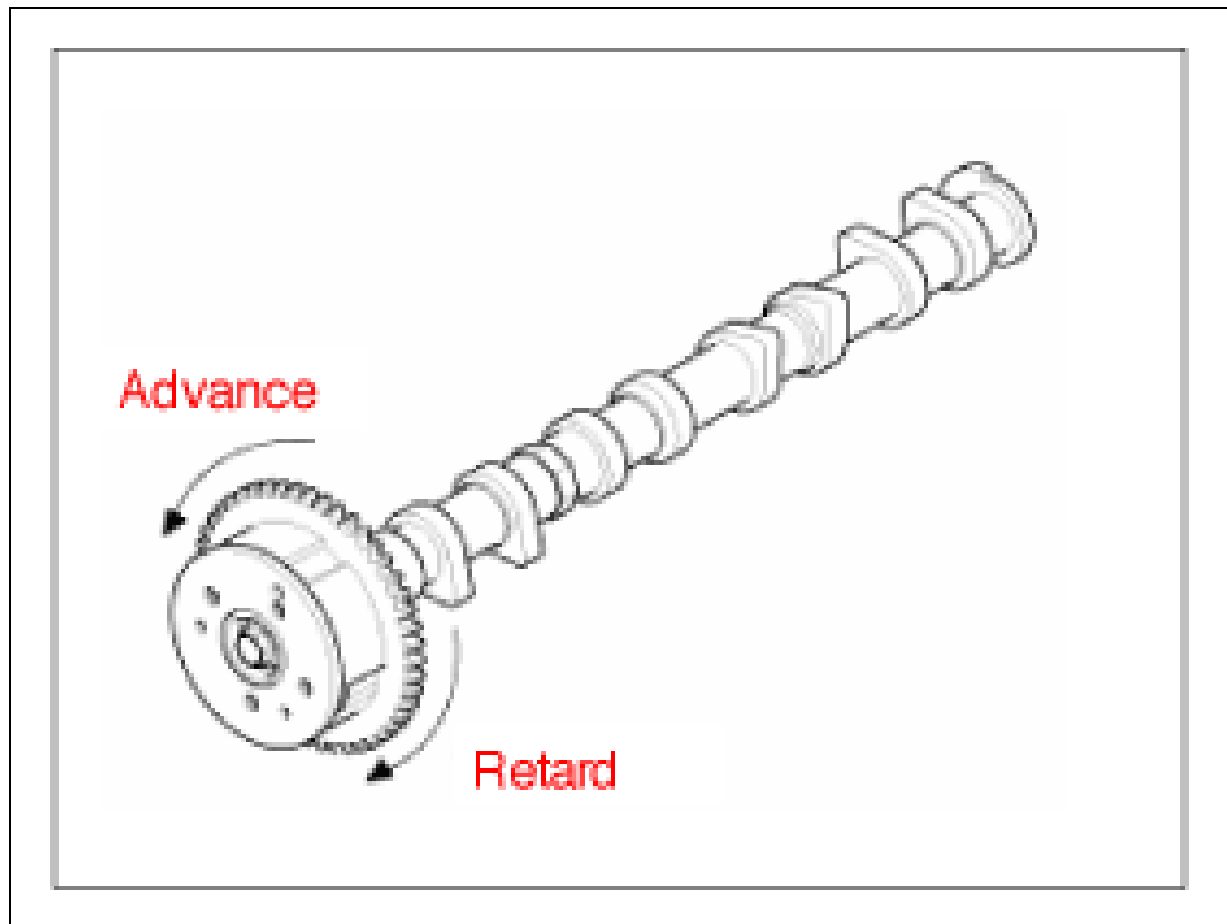
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4. To release the CVVT lock pin, wrap some tape around the tip of an air pressure adapter and apply low air pressure of approx. 150 kPa (1.5 kg/cm² , 21 psi) to the exposed camshaft port. Wrap a shop towel or rag around the CVVT because residual oil may leak out of the unit when applying air pressure.
5. With low air pressure applied, turn the CVVT to the ADVANCE direction as indicated in (Fig 8).

NOTE: *If too much air leaks when applying the low air pressure, the CVVT lock pin may not release and the CVVT*

may not turn.

Fig 8: Turning CVVT To Advance Direction



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6. Allow the CVVT assembly to move in the ADVANCE and DELAY directions to ensure there is no binding and that it moves freely. (Movable smoothly in the range about 20°)
7. Turn the CVVT by hand and make sure it locks in the maximum delay angle position.
8. Is CVVT assembly working properly?
 - YES**
 1. Operate engine to check for DTC resetting. If okay, go to "VERIFICATION OF VEHICLE REPAIR" procedure.
 - NO**
 1. Replace the CVVT assembly and go to "VERIFICATION OF VEHICLE REPAIR" procedure.

Verification Of Repair

Verification Of Vehicle Repair

After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC" button.

2. Press "DTC Status" button and confirm that "DTC Readiness Flag" indicates "Completed". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History (Not Present)" displayed?
YES
 1. System performing to specification at this time. Clear the DTC.**NO**
 1. Go to the applicable troubleshooting procedure.

ETM

For wiring diagram information, refer to appropriate SYSTEM WIRING DIAGRAMS article.