



GDS - Vehicle S/W Management

Ver. 04. 06. 2010





ECU Upgrade



Vehicle S/W Management

Module: A-05-001 (p.01)

Auto / Manual Mode and CAUTIONS before ECU Upgrade

ECU upgrade can be divided into two: Auto(automatic) mode and Manual mode. To check ECU Events that are currently supported, click "Event List" Tab.

Auto Mode

"Auto mode" reads ROM ID from the current control module. It automatically compares ROMID with the events and shows only the events that should be updated. Select each events, and upgrade automatically only for the selected events.

Manual Mode

"Manual mode" is used when there is a failure during the Auto upgrade or used in special purpose. It shows all the events for the selected control module. It even forces an upgrade from the current ROM ID to a previous version of ROM ID. The User can select each event for the control module to force update. Password input stage, that is not in Auto mode, is included.

	VCI : USB On 🔍 VMI : On 🔍 Internet : On 🦲	×
GD	Preparation Diagnosis Vehicle SW Management Repair Q	
RIO(JB)/2009	9/G 1.4 DOHC System 🕨 Engine/Unleaded GEN 🔯 🗄	
Vehicle S/W Management	ECU Upgrade	
ECU Upgrade 🛛 🕨	Mode Event List	
	Auto Mode	
	Manual Mode	
	Previous	
	CAUTION CAUTION DO NOT start the engine and DO NOT turn the ignition key to the OFF position during the ECU upgrade. Canifm the target vehicle'system BEFORE performing a manual/error mode ECU upgrade. Review the applicable TSB procedure before performing an ECU upgrade. South the target vehicle'system BEFORE performing an ECU upgrade. Canifm the ray applicable components are replaced BEFORE performing the ECU upgrade. Confirm the new ROM ID after performing an ECU upgrade. Confirm the new ROM ID after performing an ECU upgrade. Bo not remove the USB cable during upgrading the ECU!	
ID Register		
Option Treatment		
Data Treatment		
Inspection / Test		
Setup Manual T	SB Case Analysis DTC Current Data Actuation Test Flight Record DVOM Oscilloscope Simulation Test Internet Update	

Figure 1. ECU Upgrade-Auto/Manual Mode



Figure 2. ECU Upgrade-Event List

After selecting an ECU upgrade event, click "TSB" button to check event details.



The following information should be reviewed prior to performing an ECU upgrade:

- Do not start the engine or turn the ignition key OFF during an ECU upgrade. These actions may damage the ECU.
- The battery should be in a good state of charge prior to beginning an ECU upgrade.
- Confirm the correct selection before performing a manual ECU upgrade.
- Do not perform an ECU upgrade without first reviewing the applicable TSB or Campaign.
- Use the correct vehicle DLC and DLC cable when performing an ECU upgrade.
- If the ECU upgrade is needed for a part change, user should upgrade the ECU after changing that part.
- After finishing the ECU upgrade, user should confirm the new ROM ID.
- ECU upgrades cannot be performed using wireless; connect the USB cable between the PC and VCI prior to selecting the "ECU Upgrade" function.

Auto Mode Upgrade

Following method can run an ECU upgrade by Auto Mode.

ECU Upgrade Mode (Auto Mode) Select

		l : USB On 🛛 🥥 VMI	: On 🥥 Internet : On		- X
GD	Preparation	Diagnosis	Vehicle S/W Management	Repair	0
RIO(JB)/20	09/G 1.4 DOHC		System Engine/Unleaded G	EN	0 🗄
Vehicle S/W Management	ECU Upgrade				
ECU Upgrade 🌗 🕨	- Mode	Event List			
	Auto Mode Manual Mode				
		Previo	Next	_	
ID Pogistor	CAUTION DO NOT start the er Confirm the target ve Review the applicable Make certain that the Ensure that any applicable Confirm the new RO S. Do not remove the U	gine and DO NOT turn y is fully charged BEFOI hicle/system BEFORE p TSB/procedure before proper connector menti able components are re w 1D after performing an SB cable during upgradi	the ignition key to the OFF position d RE beginning ECU upgrade. erforming a manualerror mode ECU performing an ECU upgrade. oned in the related TSB is used. placed BEFORE performing the ECU bCU upgrade. ng the ECU!!	hring the ECU upgrade. upgrade. J upgrade.	•
Option Treatment Data Treatment Inspection / Test					Ŧ
Setup Manual	TSB Case Analysis DT	C Current Data Act	tuation Flight Record DVOM C	Simulation Test	Internet Update

Figure 3. ECU Upgrade-Auto Mode-Mode

Click "Next" button after selecting "Auto Mode" from the Mode section in ECU Upgrade initial page.

ECU upgrade System Select



Figure 4. ECU Upgrade-Auto Mode-Mode

Click "OK" button after selecting the ECU upgrade system.

Start Auto Mode ECU upgrade

GDS automatically communicates with the ECU on the selected vehicle and checks for available event, and prompts a window for checking the battery voltage.

ROM ID will be automatically recognized and if there is no related event for the ECU, following message will be shown as in [Figure x].



Figure 5. ECU Upgrade-Auto Mode-ROM ID Reading

User's Manual

If the battery voltage is sufficient, click "OK" button.







Figure 7. ECU Upgrade-Battery Voltage Check Insufficient!



Figure 8. ECU Upgrade-Auto Mode- No available ECU Event

User's Manual

Automatically triggers the ECU Upgrade process and displays progress.



Figure 9. ECU Upgrade-Manual Mode-Upgrade in progress

When ECU Upgrade is completed, following message will be shown as in [Figure x].



Figure 10. ECU Upgrade-Manual Mode-Upgrade completed

Manual mode upgrade

Following method can run an ECU upgrade by Manual Mode.

Select ECU Upgrade Mode (Manual Mode)

Click "Next" button after selecting the "Manual Mode" in ECU Upgrade Mode window.

🕒 VCI : USB On 👋 VMI : On 🥥 Internet : On 📃 🖂							- X			
GD	F	Preparation	n	Diagnos	sis N	/ehicle S/W I	Managemen	t F	Repair	0
RIO(JB)/20	09/G 1	.4 DOHC			System	Engine	e/Unleaded	GEN		0 🗄
Vehicle S/W Management	E	CU Upgrade								
ECU Upgrade 🌗	Au Ma	Mode to Mode inual Mode		Event	List					
				PI	revious		Next			
	1 2 3 4 5 6 7	CAUTION DO NOT stat Ensure that th Confirm the ta Review the ap Make certain Ensure that an Confirm the n	t the engine a e battery is fi arget vehicle/ oplicable TSE that the prop applicable ew ROM ID with USP of	and DO NOT and DO NOT system BEFO. procedure be components a after perform	turn the igniti EFORE begin RE performin fore perform nentioned in t re replaced E ing an ECU u	ion key to the ming ECU up g a manual/err ing an ECU up the related TS BEFORE perfor pgrade.	OFF position grade. ror mode EC pgrade. B is used. orming the EC	during the E U upgrade. CU upgrade.	CU upgrade.	
ID Register	8	Do not remov	e the USB c	able during up	grading the E	CU!!				
Option Treatment										
Data Treatment										
Inspection / Test										Ŧ
Setup Manual	TSB	Case Analysis	DTC	Current Data	Actuation Test	Flight Record	DVOM	Oscilloscope	Simulation Test	Internet Update

Figure 11. ECU Upgrade- Manual Mode-Mode

Select ECU upgrade System

Click "OK" button after selecting the ECU upgrade System.



Figure 12. ECU Upgrade- Manual Mode-Select System

Select ECU uprade event

Select an Event from the list to upgrade an ECU under Event Group. Sub-list will be displayed after selecting an event as shown in [Figure 3].

After setting the ECU event, Click "Next" button.



Figure 13. ECU Upgrade- Manual Mode-Event



Figure 14. ECU Upgrade-Manual Mode- Select Sub-Event



Following instructions should be kept during the upgrade process, or else ECU could be damaged.

- In case running an ECU Upgrade in Manual Mode, select sub-event carefully according to the TSB.
- An ECU may only to be upgraded with correct event subjected to the TSB. Or else the ECU could be damaged.

Entering the correct ECU uprade event Password

Click "OK" button after entering a Password for ECU event. Password for ECU upgrade event can be found in TSB.

Cancel

Figure 15. ECU Upgrade-Manual Mode- Entering Password

Battery Voltage needs to be checked for stable ECU Upgrade process.

Restrain ECU Upgrade process if there are insufficient voltage recognized as shown in [Figure x]. Click "OK" button if there are sufficient voltage left for the process.

Information	Information
BATTERY VOLTAGE:12.12V	BATTERY VOLTAGE:11.93V WARNING!
Voltage Is OK.	Voltage is lower than 12Volts. Please do upgrading after charging the battery.
Press OK to upgrade ECU.	Do not attempt ECU upgrading
to previous screen.	below 12Volts. Do you want upgrading?
OK Cancel	OK Cancel

Battery Voltage OK



User's Manual

Automatically triggers the ECU Upgrade process and displays progress.



Figure 18. ECU Upgrade-Manual Mode- Upgrade in progress

When ECU Upgrade is completed, following message will be shown as in [Figure x].



Figure 19. ECU Upgrade-Manual Mode-Upgrade completed



ID Register





Vehicle S/W Management

Module: A-05-002 (p.01)

Additional functions (ECU specific) are supported under "Vehicle S/W" managemen"t.

	<u> </u>	/CI : USB On 🛛 🔵 VMI :	On 🥥 Internet : On		- X
GD	Preparation	Diagnosis	Vehicle S/W Manag	ement Repai	r O
RIO(JE	3)/2009/G 1.4 DOHC		ystem 🕨 Engine/Unlea	aded GEN	0 2
Vehicle S/W Managem	tent 🔋 Vehicle S/VV Manage	ment			
ECU Upgrade	ID Register				
ID Register	System Ide	entification			
Read VIN Write VIN	Read VIN				
	 Write VIN 				
	Data Treatment	Adaptive Values			
	Inspection / Tes	age Test			
Option Treatment					
Data Treatment					
Inspection / Test					
Setup Manual T	SB DTC Current Data	a Actuation Test Flight Record	DVOM Oscilloscope	Fault Code Searching ECU Upgrade	Simulation Internet Test Update

Figure 1. Initial page of Vehicle S/W Management (Engine)

	<u> </u>	I : USB On 🛛 🔵 VMI	: On 💛 In	ternet : On				
GD	Preparation	Diagnosis	Vehic	e S/W Manag	ement	Repai	r	0
RIO(JB)/20	09/G 1.4 DOHC		System 🕨	Engine/Unlea	aded GEN			o B
Vehicle S/W Management	Vehicle S/W Managem	nent						
ECU Upgrade	ID Register							
ID Register 🛛 🛃	System Ider	tification						
System Identification	- Cystem rate	initiation						_
	Data Tantanad							_
	Data Treatment							
	Resetting A	uto T/A Values						
								_
Option Treatment								
Data Treatment								
Inspection / Test								
Manual TSB	DTC Current Data	Actuation Test Flight Recon	DVOM	Oscilloscope	Fault Code Searching	ECU Upgrade	Simulation Test	Internet Update

Figure 2. Initial page of Vehicle S/W Management (Auto T/M)

System Identification

System Identification shows the ROM ID of the current ECU.



Figure 3. System Identification

Read VIN

The "Read VIN" function will display the VIN for the current ECU. Note that this function is currently supported for Engine ECUs on 2005 and later models.







Figure 5. Read VIN - Processing

Read VIN	[READ VIN FUNCTION] THIS FUNCTION IS USED TO DISPLAY THE VIN
	VIN : VEHICLE IDENTIFICATION NUMBER. IF THE ELECTRONIC ACCESS IS PROVIDED TO THE VIN IT IS RECOMMENDED TO REPORT ALL ELECTRONIC SYSTEM AND PRODUCT NUMBER. VIN (VEHICLE IDENTIFICATION NUMBER) :
	Ok



User's Manual

Write VIN

The "Write VIN" function is used to enter the VIN into a new Engine ECU. This function can only be performed ONCE on an ECU. Incorrect VIN entry and partial VIN entry conditions cannot be changed. This function is not supported on 2004MY or earlier vehicles.



Figure 7. Write VIN - Initial Page



Figure 8. Write VIN - Processing



Figure 9. Write VIN - Input Condition

Write VIN	[WRITE VIN MODE] THIS FUNCTION IS USED TO WIRTE THE VIN INTO THE ECM'S MEMORY. A NEW ECM REQUIRES THAT THIS FUNCTION BE PERFORMED FOLLOWING INSTALLATION. FAILURE TO PERFORM THIS FUNCTION WILL RESULT IN MIL ILLUMINATION WITH DTC P0630.
	[CONDITION] : IG ON(ENGINE OFF) PRESS [OK] BUTTON, AFTER TYPING THE NUMBER. VIN : OK Cancel

Figure 10. Write VIN - Input VIN



Figure 11. Write VIN - Input VIN Complete



The "Option Treatment" function is used to adjust functionality on supported ECUs.

User Option		
7 20 20 20 20 20 20 20 20 3 6 6 1 5 6 6 6	TEM AUTO DOOR LOCK STATUS : ARM/DISARM BY KEY(+RK) : HORN ANSWER BACK(+RK) : [DATA WRITE] 1. SELECT THE ITEM PUT TO USE MOUS 2. SELECT THE VALUE IN COMBO BOX 3. PRESS [OK] BUTTON	VALUE 40 DISABLE ENABLE
	Ok	Cancel

Figure 1. User Option Initial page



The "Resetting Adaptive Values" function is used to reset adaptive learn data on specific ECUs.



Figure 1. Resetting Adaptive Values - Before Reset



Figure 2. Resetting Adaptive Values – Message Box



Figure 3. Resetting Adaptive Values – Test Complete

Version Configuration

The "Version Configuration" function is used on supported engine ECUs to configure for transaxle and ABS ECU options.



Figure 4. Version Configuration - Initial Page



Figure 5. Version Configuration - Message Box



Figure 6. Version Configuration – Test Complete



Readiness Test

The "Readiness Test" function indicates whether or not a specific test is supported, and whether or not that test is completed.



Figure 1. Readiness Test - Supporting List



Figure 2. Readiness Test - Complete

Evap. (Evaporative emission) Leakage Test

The "EVAP Leakage Test" mode is used on supported engine ECUs to force an EVAP leak test to perform. The availability of current data during an EVAP test depends on the ECU. The vehicle conditions must be set as indicated; tests may not run or may provide false results if conditions are incorrect.



Figure 3. Evap Leakage Test - Ready

Evap.Leakage Test	
H 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.6 FUEL T.P. -0.6 100 FUEL VOL. 0 0 FUEL VOL. 0 FUEL VOL. 0 FUEL VOL. 0 FUEL VOL. 0 0 EST STATE : PROCESSING TEST TIME : 16 sec
	Cancel

Figure 4. Evap. Leakage Test – Operation



Figure 5. Evap. Leakage Test – Error



Figure 6. Evap. Leakage Test - Complete

Monitoring Test



Figure 7. Monitoring Test Result

Readiness Test		
Monitoring Test Results Readiness Test HO2S Monitoring Test B- OBD Monitoring Test	[READINESS TEST] THE PURPOSE OF THIS SERVICE IS TO ALLOW TO SYSTEM STATUS INFORMATION. MISFIRE MONITORING FUEL SYSTEM MONITORING CATALYST MONITORING HEATED CATALYST MONITORING EVAP. SYSTEM MONITORING SECONDARY AIR SYSTEM MONITORING A/C SYSTEM REFRIGERANT MONITORING OXYGEN SENSOR HEATER MONITORING EGR SYSTEM MONITORING	ACCESS SUPPORTED SUPPORTED SUPPORTED NOT SUPP. SUPPORTED NOT SUPP. SUPPORTED SUPPORTED SUPPORTED NOT SUPP.
	PRESS [OK]BUTTON,IF YOU READY Ok Cancel	l

Figure 8. Readiness Test - 1

Readiness Test		
	[READINESS TEST] THE PURPOSE OF THIS SERVICE IS TO ALLOW TO SYSTEM STATUS INFORMATION.	
	FUEL SYSTEM MONITORING	COMPLETE
	COMPREHENSIVE COMPONENT MONITORING	COMPLETE
Monitoring Test Results	CATALYST MONITORING	NOT CMPLTD
	HEATED CATALYST MONITORING	NOT APPLIC
Readiness lest	EVAP. SYSTEM MONITORING	NOT CMPLTD
-HO2S Monitoring Test	SECONDARY AIR SYSTEM MONITORING	NOT APPLIC
	A/C SYSTEM REFRIGERANT MONITORING	NOT APPLIC
🗄 OBD Monitoring Test	UXYGEN SENSUR MUNITURING	NUT CMPLTD
	ECD SYSTEM MONITORING	
		NOTAFFLIC
	PRESS [OK]BUTTON, IF YOU READY	
	Ok	

Figure 9. Readiness Test - 2





OBD Monitoring Test	
Monitoring Test Results - Readiness Test - HO2S Monitoring Test BDBD Monitoring Test	[OBD-II MONITORING TEST] THE PURPOSE OF THIS SERVICE IS TO ALLOW TO ACCESS TO RESULTS FOR ON-BOARD DIAGNOSTIC MONITORING TESTS OF SPECIFIC COMPONENTS OR SYSTEM THAT ARE NOT CONTINUOUSLY MONITORED. 1.CATALYST MONITORING 2.H02S MONITORING 3.EVAP.EMISSION MONITORING 4.THERMOSTAT MONITORING 5.H02S HEATER(S2) 6.H02S MONITORING(S1) 7.ECT RATIONALITY SOME OF THE MONITORING RESULTS MAY BE INACCURATE. PRESS THE LEFT MENU OF RESULT, IF YOU WANT TO CHECK THE RESULTS.
	Ok Cancel

Figure 11. OBD Monitoring Test

Catalyst Monitoring	
OBD Monitoring Test OBD Monitoring Test OBD Monitoring Test OBD Monitoring Catalyst Monitoring OBD Mon	[CATALYST MONITORING] CID : CATALYST SYSTEM EFFICIENCY(B1) RESULT : PASS DATA : 0.000 LIMIT : 0.074 POSSIBLE MALFUNCTION CAUSES : CATALYST CONVERTER MALFUNCTION CID : CATALYST SYSTEM EFFICIENCY(B2) RESULT : PASS DATA : 0.000 LIMIT : 0.074 POSSIBLE MALFUNCTION CAUSES : CATALYST CONVERTER MALFUNCTION SOME OF THE MONITORING RESULTS MAY BE INACCURATE. PRESS [OK]BUTTON AFTER CHECKING.
	Ok





Figure 13. HO2S Monitoring - 1

HO2S Monitoring	
OBD Monitoring Test OBD Monitoring Test Other Catalyst Monitoring D2S Monitoring Evap.Emission Monito Thermostat Monitorin HO2S Heater(S2) HO2S Heater(S1) ECT Rationality	[HO2S MONITORING] CID : L->R TIME(B1S1) RESULT : PASS DATA : 2560 SEC LIMIT : 2.940 SEC POSSIBLE MALFUNCTION CAUSES : L->R SW TIME MALFUNCTION CID : R->L TIME(B1S1) RESULT : PASS DATA : 638.976 SEC LIMIT : 1276.958 SEC POSSIBLE MALFUNCTION CAUSES : R->L SW TIME MALFUNCTION CID : LEAN FREQUENCY RESP(B2S1) RESULT : PASS DATA : 0.000 SEC LIMIT : 1.248 SEC POSSIBLE MALFUNCTION CAUSES : LEAN FREQUENCY RESPONSE MALFUNCTION
	Prev Next Cancel

Figure 14. HO2S Monitoring - 2



Figure 15. HO2S Monitoring - 3

H02S Monitoring	
OBD Monitoring Test OBD Monitoring Test Other Catalyst Monitoring D2S Monitoring Evap.Emission Monito Thermostat Monitorin H02S Heater(S2) H02S Heater(S1) ECT Rationality	[HO2S MONITORING] CID : R->L TIME(B2S1) RESULT : PASS DATA : 0000 SEC LIMIT : 0.640 SEC POSSIBLE MALFUNCTION CAUSES : R->L SW TIME MALFUNCTION SOME OF THE MONITORING RESULTS MAY BE INACCURATE PRESS [OK]BUTTON AFTER CHECKING.
	Prev Ok





Figure 17. Evap. Emission Monitoring - 1

Evap.Emission Monitoring	
OBD Monitoring Test OBD Monitoring Test Other Catalyst Monitoring HO2S Monitoring HO2S Monitoring Evap Emission Monito Thermostat Monitorin HO2S Heater(S2) HO2S Heater(S1) ECT Rationality	[EVAP.EMISSION MONITORING] CID : CPV STUCK RESULT : PASS DATA : -0.000 hPa LIMIT : -2.000 hPa POSSIBLE MALFUNCTION CAUSES : CANISTER PURGE VALVE MECH.STUCK CID : TANK PS INT RESULT : PASS DATA : -0.000 hPa LIMIT : 0.500 hPa POSSIBLE MALFUNCTION CAUSES : FUEL TANK PRESSURE SENSOR SIGNAL INTERMITTNET CID : TANK PS CONST. RESULT : PASS DATA : 0.019 V LIMIT : 0.015 V POSSIBLE MALFUNCTION CAUSES : FUEL TANK PRESSURE SIGNAL CONSTANT
	Prev Ok





1. Purpose

When engine shaking occurs, this mode can help to determine which cylinder (s) may be the cause. This test does not cut the injector to kill the cylinder. The ECM monitors the speed of the crankshaft while the engine is running to determine the contribution of each cylinder.

2. Logic

As the runs the crankshaft will speed up and slow down demending on the compression and power strokes of the cylinders Based on the CKP sensor data, ECU will calculate the speed of the crankshaft. The crankshaft will speed up as a cylinder fires which pushes the piston down. As another cylinder starts building compression, the crankshaft will slow until the next cylinder fires which will increase the crankshaft speed.



[Figure 1. Cylinder power balance measuring Logic]

User's Manual

3. Test Method

When Cylinder Power Balance Test Mode is pressed, it automatically collects the speed of the crankshaft for 30 seconds and calculates each cylinder's average speed and displays it in a bar. If a cylinder is reading low, it indicates that the cylinder is not contributing enough. This can be caused by compression, fuel, or spark concerns.



4. How to judge

[Figure 2. Cylinder Power balance test screen]

1) **O** Combustion pressure of cylinder is relatively LOW

This is the case that a cylinder's contribution is low as compared to the other cylinders. It is assumed that the cylinder with the combustion pressure being LOW is the one causing engine shaking. (Refer to the guide provided on the left section of the screen, when needed.)

User's Manual

5. Use example

• Normal



[Figure 3. Cylinder power balance test screen - Normal]

1) **1** There is very little differences in speed data between cylinders

(The most preferred condition is that when all cylinders data are near to the "0" value.)

• Abnormal



[Figure 4. Cylinder power balance test screen -1 cylinder being abnormal]

1) **O** The Notice that cylinder 2 has a negative contribution verses a positive contribution for the other cylinders.

(Speed data value is (- direction) toward to the left)



[Figure 5. Cylinder power balance test screen - two cylinder abnormal]

2) 2 No 2,3 cylinder speed data are toward to the minus direction



[Figure 6. Cylinder power balance test screen - every cylinders being normal]

3) If every cylinders speed data are toward to the positive direction and fairly even, yet the engine is shaking, check for areas that would influence all the cylinders. Check air/fuel and ignition timing.



1. Purpose

This test mode is to diagnose the possibility of poor acceleration occurrence due to the defects of CVVT system that has possible mechanical faults at the Oil Control Valve (OCV) or Camshaft valve.

2. Logic

While driving and observing the Cam position targeted data value through the logic in ECU on-board system, the CVVT control system can determine if the system is faulty or not. By comparing the targeted value and the current data value, this will give the idea as to whether there is a defect or not. If the OCV does not reach the targeted data value within a certain period, it is assumed that it is defective and then will display a CVVT related DTC code.

3. Method

When CVVT test mode button is pressed, it will automatically drive the OCV in two seconds to test if it does reach the targeted value. If it does not reach the targeted values within the two seconds, it will display a CVVT related DTC code.

The test mode conditions on engine is limited to engine RPM of 600rpm~5000rpm below and temperature 20℃~90℃. (68 to 94 degrees F.)

* In the past, CVVT mechanical fault diagnosis mode was only available when driving the vehicle, but this CVVT test mode diagnosis is now possible to perform without driving the vehicle.

4. How to judge

CVVT Test				
• Test Purpose	Current Data			
This test checks whether there is an error in the camshaft valve or in the CVVT oil control valve.	Item Value CAM Objective Position: 129.0 'CRK CAM Current Position: 129.0 'CRK Engine RPM: 736.0 RPM Engine Oil Temperature: 45.0 'C			
Test Conditions Engine RPM : between 600rpm and 5000rpm. Engine oil temperature: between	CVVT Action			
20 °C (68°F) and 90 °C (194°F) • Diagnostic Tips	Item Value CVVT Working State: CVVT Enable CVVT Progress State: POS_END			
 Verify that there are DTC(s) for relating CVVT system or vehicle is in Limp home mode. 	Results			
Test Description	No CVVT DTC has been found.			
Check the function of CV/T by driving the Actuator using communication between control unit and tool. If it does not reach the reference value within the pre -determined time frame, it is assumed that there is an fault in the actuator. Check whether the CAM shaft position can be reached to the standard value within 2 second when CAM shaft moved maximum retarded angle(129'CRK) into advanced angle (15'CRK).	Displayed Test Result			
	Tips Test Start FINISH			

[Figure1. CVVT Test screen]

- Determine if there is a fault by checking for a CVVT related DTC code or by verifying that the CVVT operating value is not in Limp Home mode.

User's Manual

5. Use example

• Normal

₩T Test		10
N		
• Test Purpose	Current Data	
This test checks whether there is an error in the camshaft valve or in the CVVT oil control valve. • Test Conditions	Item CAM Objective Position: CAM Current Position: Engine RPM: Engine Oil Temperature:	Value 129.0 'CRK 129.0 'CRK 736.0 RPM 45.0 'C
- Engine RPM : between 600rpm and 5000rpm. - Engine oil temperature: between 20 % (68%) and 90 % (194%)	CVVT Action	
Diagnostic Tips	Item CVVT Working State: CVVT Progress State:	Value CVVT Enable POS_END
 Verify that there are DTC(s) for relating CVVT system or vehicle is in Limp home mode. 	 Results 	
• Test Description Check the function of CVVT by driving the Actuator using communication between control unit and tool. If it does not reach the reference value within the pre- determined time frame, it is assumed that there is an fault in the actuator. Check whether the CAM shaft position can be reached to the standard value within 2 second when CAM shaft moved maximum retarded angle(129'CRK) into advanced angle (15'CRK).	No CVVT DTC has been	found. Displayed Test Result
	Tips	Test Start FINISH

[Figure2. CVVT Test result - Normal]

• Abnormal

CVVT Test				
Test Purpose	٢	• Current Data		
This test checks whether there is an error in the camshaft valve or in the CVVT oil control valve. • Test Conditions	l	Item CAM Objective Position: CAM Current Position: Engine RPM: Engine Oil Temperature:	Value 129.0 'CRK 129.0 'CRK 640.0 RPM 77.0 'C	
- Engine RPM : between 600rpm and 5000rpm. - Engine oil temperature: between 20 °C (68°F) and 90 °C (194°F)	Ç₹	CVVT Action Item	Value	
• Diagnostic Tips		CVVT Working State: CVVT Progress State:	CVVT Enab POS_END	ble
 Verify that there are DTC(s) for relating CVVT system or vehicle is in Limp home mode. • Test Description Check the function of CVVT by driving the Actuator using communication between control unit and tool. If it does not reach the reference value within the pre- determined time frame, it is assumed that there is an fault in the actuator. Check whether the CAM shaft position can be reached to the standard value within 2 second when CAM shaft moved maximum retarded angle(129'CRK) into advanced angle (15'CRK). 		• Results DTC related to the CVVT	has been foun	d. Check the DTC and diagnose the system.
		Tips		Test Start FINISH

[Figure3. CVVT Test result- abnormal]

🚳 ++ GDS ++ - Microsoft Inte	ernet Explorer
	Preparation Diagnosis Vehicle S/W Manas ment Report 음사용자 반경 및 중류
북미기아 (valuse or	n YMI : OH OPTIMA(MG) / 2006 / G 2 4L CW/T(SIE Search JobShe
Diagnosis 📼	
Basic Inspection	Erase All DTC Freeze Frame DTC Status Erase Selective DTC
DTC Analysis	Description State
()) DTC Match	P0011 "A" Camshaft Position-Timing Over-Advanced or System Performance[Bank 1]
[Freeze Frame
	Freeze Frame is NOT supported in this system.
◇ DTC List ☑ 정비통신 / 한영진환	
Data Analysis	
Case Analysis	
Symptom Analysis	
Flight Record	
Oscilloscope	
장비통신 부품 정비 기탈로그 지침서	전경 로드법 고장코드 센서 강제구동 주행기록 알티에터 오실로 사용 ECU 뿐였다는 지식공신 2년년에 전감적이는 지식공신 인터넷 감독이다. 전 전감적이는 지속공신 것같아이는 것 것 같이 다. 전 전감적이는 전감적이는 것 같아. 전 전감적이는 것 같아. 전 전감적이는 것 같아. 전 전감적이는 것 같아. 한 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

[Figure4. DTC code shown]

User's Manual



1. Purpose

This test mode is used to diagnose the symptoms like engine stalling or intermittent engine shaking possibly caused by the MAF (Mass Air Flow) sensor, which could have an intermittent wiring problem.

2. Logic

It retrieves the error bit from Shadow failure memory and displays the output data in graph form.

3. Method

Press the MAF/TPS/ECT Circuit Test button to enter the Circuit Test mode and then monitor the data continuously. Analyze the graph data to find out possible wrong conditions. A possible problem can be found by monitoring the output signal while shaking the sensor wire or vehicle driving.



[Figure 1. MAF sensor wiring poor connection test]

4. Use example

• Normal



Abnormal

[Figure 2. MAF sensor wiring disconnection test -Normal]



* TPS(Throttle Position Sensor) / ECT(Engine Coolant Temperature) sensor can be tested by Circuit Test Mode as well.



[Figure 4. TPS sensor wiring disconnection test -abnormal]



[Figure 5. ECT sensor wiring disconnection test -abnormal]

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1. Purpose

This test mode is used to check the function of evaporative system on vehicles with OBD-II, and to make diagnose easier by displaying the test result in a graph form. This Mode is helpful when checking the operation and checking for leakage of EVAP system.

2. Test Logic

The EVAP Test mode is built into the ECU and can be activated by using the GDS. The system monitors the tank pressure sensor while activating the PCSV valve, and Canister close valve.

3. Test Method

When the "Start" button is pressed, the engine ECU automatically checks the readiness of evaporative system leakage test. If the leakage test is ready, the ECU activates the Canister purge solenoid valve and close valve to make suitable vacuum condition in the fuel tank system at an appropriate time. The ECM monitors the changes in vacuum/ pressure in the fuel tank system within a given time.

The test results will be displayed on the screen and the ECM will generate a DTC if the measured value excess the limit value.



[Figure1. EVAP Monitoring logic]

4. How to judge



[Figure 2. Screen of testing the EVAP leakage]

- After running the test mode, if there is a leakage, ECU will show the relevant DTC. For more detailed diagnosing, refer to the graph shown in Figure 1.

6. Use example

• Normal



[Figure3. Screen of testing EVAP leakage - Normal]



• Abnormal

[Figure4. Screen of testing EVAP leakage - Abnormal]



This test mode is to inspect the position and condition of the timing belt. If the engine has hard starting, engine stall, or engine shaking it can be due to a jumped timing belt, poorly positioned belt or an excessively loosen belt. This test mode can analyze the belt position and condition by comparing signals between CKP sensor and CMP sensor.

2. Test Logic

By inspecting the teeth position signal of CKP sensor where the CMP signal is ascending and descending, the assembled timing belt condition can be checked indirectly. (Timing mark for both the camshaft and crankshaft gear should be marked at same location all the time.)

3. Method

If a technician needs to check the belt timing after assembling the engine or replacement of the timing belt, it is possible to check the timing of the belt without disassembling the timing belt cover. It is also possible to find out the correct timing position of belt just by cranking the engine when the engine can not be started.

* This test mode is only applicable when the signals of CKP/CMP sensor is normal.

4. How To judge



[Figure1. Screen of testing the Timing Belt]

- By inspecting the teeth position signal of CKP sensor where the CMP signal is ascending and descending, the timing belt position and condition can be checked automatically. (Please refer to the described guide if needed.)



This mode will test the secondary ignition system including ignition coils, spark plugs, and checks for high-voltage leakage causing engine shaking or poor acceleration.

2. Logic

As you know, the energy produced by the ignition coil is dispensed as voltage over time. The higher the voltage demand, the lower the duration of the spark, and visa versa. By monitoring the spark duration we get an indication of the voltage demand of the ignition system. The ignition coils, ignition wires, spark plugs, compression and fuel ratio will all effect the voltage and time of the spark.

3. Method

When the "Ignition Test" mode button is pressed, the spark duration is monitored for each cylinder then displayed both in graph form and text form.

4. How to judge



[Figure 1. Ignition channels Test mode screen]

- Duration of all the cylinder's spark can be compared to determine if one or more cylinders are out of the normal. (Refer to the guide on the left side of the main screen for guidance.)

* Conditions that can be checked with the spark duration (ms)

- ignition coil condition
- High-voltage cable leakage
- Spark plug condition
- Combustion pressure status
- air/fuel mixture status

5. Use example

• Normal



[Figure 2. Ignition channels(6cylinders) test mode-normal]

1) **1** duration for each cylinder shows equal data values. Assumed as normal.

• Abnormal



[Figure 3. Ignition channels(6cylinders) test mode -abnormal]

1) **1** No. 1 and 4 Cylinders have different data values. Assumed as abnormal.



[Figure 4. Ignition channels(4 cylinders) test mode]



This mode will test the performance of the O2 sensor(s) by monitoring the reactions of O2 sensor while varying the air/fuel ratio

2. Logic

By using the Short Term Fuel Trim function, the ECM will move the fuel mixture rich to lean for 3 seconds while monitoring the O2 sensor signal. The system will display the O2 sensor signal as it reacts to the changes in fuel mixture.

3. Method

When O2 sensor Short-trip test mode is pressed, the reaction of O2 sensor is displayed while the air/fuel amount is varied. The display will show the command to the fuel system to move the mixture rich and lean. Also displayed is the response from the O2 sensor(s) to the changes in the fuel mixture.

4. How to judge



[Figure 1. O2 sensor Short trip]

- 1) \bullet Section where the fuel was deliberately reduced or increased.
- 2) **2** fuel amount deliberately decreased (Air/fuel ratio lean)
- 3) **3** fuel amount deliberately increased (Air/fuel ratio rich)
 - Check the voltage of the O2 sensor(s) to see that it follows the command of the ECM as the Air/Fuel mixture is changed.
 - Reaction in O2 sensor.
 - Air/Fuel ratio (rich): O2 sensor higher voltage signal
 - Air/Fuel ratio (lean): O2 sensor lower voltage signal

5. Use example

• Normal



[Figure 2. O2 sensor Short trip Test screen - normal]

- The O2 sensor signals follow the lean/rich command of the ECM as the fuel mixture changes.

• Abnormal



[Figure 3. O2 sensor Short trip Test screen - abnormal]

- The one O2 sensor signal does not follow the lean/rich command of the ECM as the fuel mixture changes.



This test mode will check the mechanical condition of Idle Speed Actuator (ISA) valve. A malfunctioning Idle Speed Actuator Valve may cause engine shaking, poor idle, or engine stalling.

2. Logic

With the engine idling, the GDS performs the ISA Duty control (Short Term Adjustment) function test while monitoring the value changes of engine RPM, ISA duty change, and ISA adaptation at short trip time to check the function of the ISA value.

3. Method

When ISA Short-trip test mode "Start" button is pressed, GDS automatically varies the duty cycle of the ISA valve and then, displays the changes in data (ISA valve duty change, Engine RPM, ISA adaptation values) in graph form. Users can use the graph data to analyze the functionality of the ISA valve.

4. How to judge



[Figure 1. ISA Short-trip Test]

- 1) **1** Range of ISA valve Duty cycle increased
- 2) 2 Range of ISA valve Duty cycle decreased
- 3) ③ ISA valve commands the Duty to increase or to decrease (Approximately by 10%)
 - Check the waveform for engine RPM, which follows the ISA valve duty variation.
 - When ISA valve duty increases: engine RPM increases / ISA adaptation value decreases
 - When ISA valve duty decreases: engine RPM decreases / ISA adaptation value Increases

If the air intake increases, ISA adaptation value is decreased and if the air intake increases, ISA adaptation value is decreased.

The ECU uses the ISA adaptation value to control the basic ISA valve duty values to maintain the engine idling RPM.

5. Use example

• Normal



[Figure 2. ISA Short-trip Test screen - Normal]

- Engine RPM varies according to ISA valve variation

(Check the ISA Actual Duty, RPM and ISA Adaption as compared to the ISA Command Duty.)

• Abnormal



[Figure 3. ISA Short-trip Test screen - abnormal]

- There is no change in engine RPM in 0 and 0 sections.

(Check for air leakage or ISA valve malfunction at specific operating range)



This test mode is to test the MAF (Mass Air Flow) sensor fault. A faulty MAF may cause engine shaking, poor idle, or engine stalling.

2. Logic

At Engine idling condition, the user monitors the MAF sensor data while varying ISA Duty values by GDS. Users can analyze the MAF sensor data values to determine whether the MAF sensor is malfunctioning.

3. Method

When test button is pressed, GDS automatically varies the ISA duty valve amount and displays the relative data such as ISA duty order, Engine RPM, Air flow (Kg/h), Air flow (mg/st) in graph form. User can analyze the displayed data to check MAF sensor functionality.

- Air flow (Kg/h): MAF (Air intake) intake air measured from the sensor.
- Air flow (mg/st): Maximum intake air for one cylinder per one stroke.

4. How to judge



[Figure 1. MAF Short-trip test]

- 1) **1** Range of ISA Duty valve increase
- 2) 2 Range of ISA Duty valve decrease
 - Check whether there is change in engine RPM when ISA valve duty changes.
 - ISA duty valve increases: engine RPM increases / Air flow increases
 - ISA duty valve decreases: engine RPM decreases / Air flow decreases
- * This test can only be performed when ISA valve functionality is normal.

5. Use example

• Normal



[Figure 2. MAF Short-trip test screen -normal]

- MAF sensor data values are changing when ISA valve data values vary.

• Abnormal



[Figure 3. MAF Short-trip test screen - abnormal]

- MAF sensor data values are fixed when ISA valve data values vary.



This test mode is to check the function of the Purge Control Solenoid Valve (PCSV). A faulty PCSV may cause engine vibration or idle concerns.

2. Logic

The PCSV duty control (Short Term Adjustment) function operates the PCSV valve to 35% for 5 seconds and then reads the variation in air/fuel ratio correction to diagnose the PCSV valve indirectly in a short period of time.

3. Method

When the PCSV test mode "Start" button is pressed, it automatically operates the PCSV valve then displays the data such as MAF sensor, ISA valve duty, PCSV valve duty, air/fuel ratio correction in graph form. Users can check the functionality of the PCSV valve by analyzing the air/fuel ratio correction (B1/B2).

4. How to judge



[Figure 1. PCSV Test screen]

- 1) **1** PCSV valve operating range (approximately 35% duty)
- 2) 2 Air/fuel ratio correction (B1/B2) change

- In the middle of operating PCSV valve, $\pm 20\%$ of air/fuel ratio correction could be shown depending on the evaporation gas stored in the canister. In other words, there will always be a difference in air/fuel ratio correction when using the Charcoal Canister with evaporative gas. If there is no difference in the air/fuel ratio correction value, the PCSV valve mechanism could be faulty.

5. Use example

• Normal



[Figure 2. PCSV Test screen -Normal]

1) • Air/fuel ratio correction (B1/B2) is not in a fixed pattern in PCSV valve operating region.

• Abnormal



[Figure 3. PCSV Test screen -Abnormal]

1) • Air/fuel ratio correction (B1/B2) is fixed in PCSV valve operating region. (PCSV faulty)



During the diagnosis process, the user can set the vehicle engine RPM to a certain RPM for testing. This mode enables the user to set the engine RPM at a certain rate. [However, a maximum of 950 RPM (±50) is allowed.]

2 Logic

For certain specific diagnosis, users are able to set the engine RPM at a certain rate.

3. Method

Test Purpose	Sensor output value
hs test mode provides technican change the engine RPM blocately at tile and checks the shicle's reaction. set) To check the service data, turn to the may page and select rivice data mode.	Engine IRM 767 rpm
Test Condition	
ble after warm up the engine bove 80 °C(176°F))	
Test Description	Devilorpm) Down(sourpm) Devilorpm) Down(surpm)
 Test suborditudes Test suborditudes The changed engine RDM for desired value will be martaned after subort prio test mode. Engine RDM will be initialed after tim engine and wave? Seconds. depending on the Engine tope and is can be set up to maximum 950604. 	1
	Engine RPM control button (10 rpm or 100rpm)

[Figure1. Idle RPM Control Test]

- Depending on the user's purpose, set the engine RPM to a certain rate and then press the "Finish" button.

Use this test mode to perform diagnosis on Actuation test, Sensor data and DTC code with Scan tool or to retrieve some

specific vehicle symptoms (such as engine vibration, load compensation). If the user turns the ignition off for 7 seconds after finishing the diagnosis, the engine RPM is automatically reset to its initial RPM.



This test mode retrieves the DTC originally erased by the GDS when it is necessary to know the history of the erased DTC.

2. Test Logic

History DTCs can be retrieved from the ECU Back up Memory for up to a maximum of 10 DTCs. Only the last 10 DTCs are memorized by ECU and the others are permanently erased by ECU.



[Figure 1. DTC Back-Up Mode]

- Adding up time is applied only when the" IG ON" is on for more than 5 minutes.

If the "IG ON" is less than 5 minutes, time is not counted.