ENGINE CONTROL SYSTEM (MR20DE) C

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BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

OVERALL SEQUENCE



*2: Include 1st trip freeze frame data.

DETAILED FLOW

INFOID:000000001307995

ECM-6

JMBIA0078GB

< BASIC INSPECTION >

[MR20DE]

1.GET INFORMATION FOR SYMPTOM	Λ
Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to <u>ECM-8</u> , " <u>Diagnostic Work</u> <u>Sheet</u> ".)	FCM
>> GO TO 2.	
	С
 Check DTC. Perform the following procedure if DTC is displayed. Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.) 	D
 Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>ECM-337, "Symptom Table"</u>.) Check related service bulletins for information. 	E
Is any symptom described and is any DTC detected?	
Symptom is described, DTC is detected>>GO TO 3. Symptom is described, DTC is not detected>>GO TO 4. Symptom is not described, DTC is detected>>GO TO 5.	F
3. CONFIRM THE SYMPTOM	G
Try to confirm the symptom described by the customer (except MI ON). Also study the normal operation and fail safe related to the symptom. Refer to <u>ECM-341, "Description"</u> and <u>ECM-329, "Fail Safe"</u> .	Н
Diagnosis Work Sheet is useful to verify the incident.	
venty relation between the symptom and the condition when the symptom is detected.	
>> GO TO 5.	
4.CONFIRM THE SYMPTOM	
Try to confirm the symptom described by the customer. Also study the normal operation and fail safe related to the symptom. Refer to <u>ECM-341, "Description"</u> and <u>ECM-329, "Fail Safe"</u> .	J
Diagnosis Work Sheet is useful to verify the incident. Verify relation between the symptom and the condition when the symptom is detected.	Κ
>> GO TO 6.	L
5. PERFORM DTC CONFIRMATION PROCEDURE	
Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is	в. 4
detected again. If two or more DTCs are detected, refer to <u>ECM-331, "DTC Inspection Priority Chart"</u> and determine trouble diagnosis order.	IVI
NOTE:	Ν
 Freeze frame data is useful if the DTC is not detected. Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check 	0
If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIR- MATION PROCEDURE.	
Is DTC detected?	Ч
YES >> GO TO 10.	
6 PERFORM BASIC INSPECTION	
Do you have CONSULT-III?	
be you have bendeler in:	

< BASIC INSPECTION >

YES >> GO TO 7. NO >> GO TO 9.

7.PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III

Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL" and "A/F ALPHA-B1" are within the SP value using CON-SULT-III in "SPEC" of "DATA MONITOR" mode. Refer to <u>ECM-96, "Component Function Check"</u>.

Is the measurement value within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

f 8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to ECM-97, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>ECM-337. "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to Circuit Inspection in <u>GI-41, "Circuit Inspection"</u>.

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CON-SULT-III. Refer to <u>ECM-308, "Reference Value"</u>.

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- 2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- 3. Check DTC. If DTC is displayed, erase it. Refer to ECM-74, "Diagnosis Description".

>> GO TO 12.

12.FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

- YES-2 >> Symptom remains: GO TO 6.
- NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to <u>ECM-74, "Diagnosis Description"</u>.) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in <u>ECM-334</u>, <u>"How to Set SRT Code"</u>.

Diagnostic Work Sheet

INFOID:000000001307996

DESCRIPTION

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:

Vehicle ran out of fuel, which caused the engine to misfire.

WORKSHEET SAMPLE

Customer name MR/MS		Model & Year	VIN		
Engine #		Trans.	Mileage		
Incident Date	•	Manuf. Date	In Service Date		
Fuel and fuel	filler cap	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly	y screwed on.		
	☐ Startability	 Impossible to start No combustion affected by the partial combustion affected by the partial combustion NOT affected Possible but hard to start Other 	tion Partial combustion prottle position d by throttle position prs []		
Symptoms	Idling	No fast idle Unstable High idle Low idle Others []			
Symptoms	Driveability	Stumble Surge Knock Lack of power Intake backfire Exhaust backfire Others []			
	Engine stall	At the time of start While idling While accelerating While decelerating Just after stopping While loading			
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime			
Frequency		All the time Under certain conditions Sometimes			
Weather conditions		Not affected			
	Weather	Fine Raining Snowing	Others []		
	Temperature	Hot Warm Cool] Cold 🔲 Humid °F		
		Cold During warm-up	After warm-up		
Engine conditions		Engine speed 0 2,000	4,000 6,000 8,000 rpm		
Road conditions		🗌 In town 🔄 In suburbs 🗌 Hig	nhway 🗌 Off road (up/down)		
Driving conditions		 Not affected At starting While idling At racing While accelerating While cruising While decelerating While turning (RH/LH) 			
		venicie speed <u>1 1 1 1</u> 0 10 20	30 40 50 60 MPH		
Malfunction indicator lamp		☐ Turned on ☐ Not turned on			

MTBL0017

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions, Weather conditions, Symptoms

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< BASIC INSPECTION >

INSPECTION AND ADJUSTMENT BASIC INSPECTION

BASIC INSPECTION : Special Repair Requirement

1.INSPECTION START

- 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
- 2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
- 3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
- 4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.

Ensure engine stays below 1,000 rpm.





- 5. Run engine at about 2,000 rpm for about 2 minutes under no load.
- 6. Make sure that no DTC is displayed with CONSULT-III or GST.

ls any	DTC	dete	cted	1?
YES	>>	GO	то	2

100	· · · · · · · · · · · · · · · · · · ·
NO	>> GO TO 3.



2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3.CHECK TARGET IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

ECM-10

INFOID:000000001307997

< BASIC INSPECTION >

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.

 Check idle speed.
 For procedure, refer to <u>ECM-13, "IDLE SPEED : Special Repair</u> <u>Requirement"</u>.
 For specification, refer to <u>ECM-352, "Idle Speed"</u>.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> GO TO 4.



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING 1. Stop engine. 2. Perform ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement". >> GO TO 5. 5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Perform ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement". >> GO TO 6. **6.**PERFORM IDLE AIR VOLUME LEARNING Perform ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement". Is Idle Air Volume Learning carried out successfully? YES >> GO TO 7. NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4. 7.CHECK TARGET IDLE SPEED AGAIN 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed.

For procedure, refer to <u>ECM-13</u>, "IDLE SPEED : <u>Special Repair Requirement</u>". For specification, refer to <u>ECM-352</u>, "Idle <u>Speed</u>".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 8.

 $\frac{100}{2} >> 00100.$

8.DETECT MALFUNCTIONING PART

Check the Following.

Check camshaft position sensor (PHASE) and circuit. Refer to <u>ECM-183</u>, "<u>DTC Logic</u>".
 Check crankshaft position sensor (POS) and circuit. Refer to <u>ECM-179</u>, "<u>DTC Logic</u>".

Is the inspection result normal?

YES >> GO TO 9.

- NO >> Repair or replace. Then GO TO 4
- **9.**CHECK ECM FUNCTION
- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)

 Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to <u>SEC-10.</u> P <u>"ECM RE-COMMUNICATING FUNCTION : Description"</u>.

>> GO TO 4.

10.CHECK IGNITION TIMING

1. Run engine at idle.

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< BASIC INSPECTION >

- Check ignition timing with a timing light. For procedure, refer to <u>ECM-14</u>, "IGNITION TIMING : <u>Special</u> <u>Repair Requirement"</u> For specification, refer to <u>ECM-352</u>, "Ignition Timing".
 - 1 : Timing indicator
- Is the inspection result normal?
- YES >> INSPECTION END.
- NO >> GO TO 11.



[MR20DE]

11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform <u>ECM-14</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair <u>Requirement"</u>.

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 14.
- NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14.CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.

 Check idle speed. For procedure, refer to <u>ECM-13</u>, "IDLE SPEED : Special Repair Requirement". For specification, refer to <u>ECM-352</u>, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.

 Check ignition timing with a timing light. For procedure, refer to <u>ECM-14</u>, "IGNITION TIMING : <u>Special</u> <u>Repair Requirement"</u>. For specification, refer to <u>ECM-352</u>, "Ignition Timing".

1 : Timing indicator

Is the inspection result normal?

YES >> INSPECTION END.

NO >> GO TO 16.



16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-44, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair the timing chain installation. Then GO TO 4.

< BASIC INSPECTION >

[MR20DE]

17. DETECT MALFUNCTIONING PART	Δ
 Check the following. Check camshaft position sensor (PHASE) and circuit. Refer to <u>ECM-183, "DTC Logic"</u>. Check crankshaft position sensor (POS) and circuit. Refer to <u>ECM-179, "DTC Logic"</u>. 	ECM
Is the inspection result normal?	
YES >> GO TO 18.	
18 CHECK FOM FUNCTION	С
1 Substitute another known good ECM to shock ECM function. (ECM may be the source of an insident, but	-
this is a rare case.)	D
 Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to <u>SEC-10</u> <u>"ECM RE-COMMUNICATING FUNCTION : Description"</u>. 	
	E
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT	_
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description	8
When replacing ECM, this procedure must be performed.	G
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Re-	
quirement	9 📙
1 DEDEODM INITIALIZATION OF MATS SYSTEM AND DECISTRATION OF ALL MATS ICNITION KEY IDS	
PERFORM INITIALIZATION OF NATS STSTEM AND REGISTRATION OF ALL NATS IGNITION RETIDS	,
Refer to <u>SEC-TO, ECM RE-COMMONICATING FUNCTION : Description</u> .	
>> GO TO 2.	
2. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING	J
Refer to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".	K
>> GO TO 3.	
3. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	L
Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".	-
	Б.Л
>> GO TO 4.	IVI
4. PERFORM IDLE AIR VOLUME LEARNING	
Refer to ECM-15. "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	Ν
>> END IDLE SPEED	0
IDLE SPEED : Description	0
This describes how to check the idle speed. For the actual procedure, follow the instructions in "BASIC INSPECTION".	P
IDLE SPEED : Special Repair Requirement	1
	-

ECM-14

INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

Check idle speed in "DATA MONITOR" mode with CONSULT-III. With GST Check idle speed with Service \$01 of GST.

>> INSPECTION END **IGNITION TIMING**

IGNITION TIMING : Description

This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IGNITION TIMING : Special Repair Requirement

1.CHECK IGNITION TIMING

- 1. Attach timing light to the ignition coil No.4 harness.
- 2. Check ignition timing.
 - 1 : Timing indicator

>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description INFOLD CONTROL OF CONTROL OF

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement INFOID:000000001308007

1.START

- 1. Make sure that accelerator pedal is fully released.
- 2. Turn ignition switch ON and wait at least 2 seconds.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- Turn ignition switch ON and wait at least 2 seconds. 4.
- 5. Turn ignition switch OFF and wait at least 10 seconds.

>> END THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement INFOID:000000001308009

1.START



[MR20DE]

INFOID:000000001308003

INFOID:000000001308002

INFOID:000000001308008

< BASIC INSPECTION > [N	R20DE]
 Make sure that accelerator pedal is fully released. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	A
Make sure that throttle valve moves during above 10 seconds by confirming the operating sound	1.
>> END IDLE AIR VOLUME LEARNING	EC
IDLE AIR VOLUME LEARNING : Description	C
 Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine id within the specific range. It must be performed under any of the following conditions: Each time electric throttle control actuator or ECM is replaced. Idle speed or ignition timing is out of specification. 	lle speed D
IDLE AIR VOLUME LEARNING : Special Repair Requirement	D00000001308011
1.PRECONDITIONING	
Make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.	—— F
 Battery voltage: More than 12.9V (At Idle) Engine coolant temperature: 70 - 100°C (158 - 212°F) 	G
 PNP switch: ON Electric load switch: OFF (Air conditioner, headlamp, rear window defogger) On vehicles equipped with daytime running light systems, set lighting switch to the 1st policity small lamps 	sition to
 Steering wheel: Neutral (Straight-ahead position) Vehicle speed: Stopped Transmission: Warmed-up 	I
 CVT models With CONSULT-III: Drive vehicle until "ATF TENP SEN" in "DATA MONITOR" mode of "CVT" systemates less than 0.9V. With put CONSULT THE Drive vehicle for 40 minutes 	stem indi- J
 Without CONSOLT-III: Drive vehicle for 10 minutes. M/T models Drive vehicle for 10 minutes. 	K
Do you have CONSULT-III? YES >> GO TO 2.	
NO $>>$ GO TO 3. 2 IDLE AID VOLUME LEADNING	L
	M
1. Perform Accelerator Pedal Released Position Learning. Refer to <u>ECM-14</u> , "ACCELERATOF <u>RELEASED POSITION LEARNING : Special Repair Requirement"</u> .	<u>PEDAL</u>
 Perform Throttle Valve Closed Position Learning. Refer to <u>ECM-14, "THROTTLE VALVE CLOSE</u> <u>TION LEARNING : Special Repair Requirement"</u>. 	<u>D POSI-</u> N
 Start engine and warm it up to normal operating temperature. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode. Touch "START" and wait 20 seconds. 	0
Is "CMPLT" displayed on CONSULT-III screen?	
NO >> GO TO 5.	Р
3.IDLE AIR VOLUME LEARNING	
🛞 Without CONSULT-III	

NOTE:

- It is better to count the time accurately with a clock.
 It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

< BASIC INSPECTION >

- 1. Perform Accelerator Pedal Released Position Learning. Refer to <u>ECM-14</u>, "ACCELERATOR PEDAL <u>RELEASED POSITION LEARNING : Special Repair Requirement"</u>.
- 2. Perform Throttle Valve Closed Position Learning. Refer to <u>ECM-14</u>, "<u>THROTTLE VALVE CLOSED POSI-</u> <u>TION LEARNING : Special Repair Requirement</u>".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
- 8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
- 9. Start engine and let it idle.
- 10. Wait 20 seconds.



>> GO TO 4

4.CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to <u>ECM-352</u>, "Idle Speed" and <u>ECM-352</u>, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

NO >> Repair or replace malfunctioning part.

6.DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to <u>ECM-96, "Description"</u>. If any of the following conditions occur after the engine has started, eliminate the cause of the incident and

perform Idle Air Volume Learning all over again:

• Engine stalls.

• Erroneous idle.

>> INSPECTION END MIXTURE RATIO SELF-LEARNING VALUE CLEAR

< BASIC INSPECTION >	[MR20DE]
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description	INFOID:000000001308012
This describes how to erase the mixture ratio self-learning value. For the actual procedure, follo tions in "Diagnosis Procedure".	ow the instruc-
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requ	Lirement ECN
1.start	C
 With CONSULT-III Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III. Clear mixture ratio self-learning value by touching "CLEAR". 	D
 With GST Start engine and warm it up to normal operating temperature. Turn ignition switch OFF 	E
 Disconnect mass air flow sensor harness connector. Restart engine and let it idle for at least 5 seconds. Stop engine and reconnect mass air flow sensor harness connector. Select Service \$03 with GST. Make sure DTC P0102 is detected. Select Service \$04 with GST to ergon the DTC P0102. 	F
7. Select Service \$04 with GST to erase the DTC P0102.	G
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FUNCTION DIAGNOSIS ENGINE CONTROL SYSTEM

System Diagram

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< FUNCTION DIAGNOSIS >

System Description

ECM performs various controls such as fuel injection control and ignition timing control.

Component Parts Location



- Ignition coil (with power transistor) 1. and spark plug
- Cooling fan motor-2 4.
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- PCV valve
- 5. Knock sensor
- 8. Cooling fan motor-1
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Refrigerant pressure sensor
- 12. Mass air flow sensor (with intake temperature sensor)



ECM 1.

IPDM E/R 2.

Fuel pump fuse (15A) 3.

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- 1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)
- √ Vehicle front



- 1. EVAP canister purge volume control 2. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)

√ Vehicle front



- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓ Vehicle front

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< FUNCTION DIAGNOSIS >

- 1. Refrigerant pressure sensor
- 2. Cooling fan motor-1
- 3. Cooling fan motor-2

√→ Vehcle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front



- 1. Crankshaft position sensor (POS) 2. Body ground
- √→ Vehcle front



- 1. ASCD clutch switch
- 2. Data link connector



< FUNCTION DIAGNOSIS >

- 1. Stop lamp switch
- 2. ASCD brake switch
- 3. Accelerator pedal position sensor



- ASDC steering switch
 SET/COAST switch
- CANSEL switch
 MAIN SWITCH
- JMBIA0484ZZ
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- √ Vehicle front

Component Description

Component	Reference	
Accelerator pedal position sensor	ECM-268. "Description"	
ASCD brake switch	ECM-252, "Description"	
ASCD steering switch	ECM-249, "Description"	M
ASCD vehicle speed sensor	ECM-259, "Description"	
Camshaft position sensor (PHASE)	ECM-183, "Description"	
Crankshaft position sensor (POS)	ECM-179, "Description"	N
Cooling fan motor	ECM-53, "System Diagram"	
Electric throttle control actuator	ECM-202, "Description"	0
Engine coolant temperature sensor	ECM-122, "Description"	
EVAP canister purge volume control solenoid valve	ECM-192, "Description"	
Fuel injector	ECM-293, "Description"	P
Fuel pump	ECM-296, "Description"	
Heated oxygen sensor 1	ECM-128, "Description"	
Heated oxygen sensor 1 heater	ECM-143, "Description"	
Heated oxygen sensor 2	ECM-146, "Description"	
Heated oxygen sensor 2 heater	ECM-158, "Description"	

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< FUNCTION DIAGNOSIS >

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Component	Reference
Ignition signal	ECM-299, "Description"
Intake air temperature sensor	ECM-119, "Description"
Intake valve timing control solenoid valve	ECM-68. "System Description"
Knock sensor	ECM-177, "Description"
Mass air flow sensor	ECM-114, "Description"
Park/neutral position (PNP) switch	ECM-261, "Description"
PCV valve	ECM-305, "Description"
Refrigerant pressure sensor	ECM-306, "Description"
Stop lamp switch	ECM-265, "Description"
Throttle control motor	ECM-211, "Description"
Throttle control motor relay	ECM-208, "Description"
Throttle position sensor	ECM-243, "Description"
Vehicle speed sensor	ECM-195, "Description"

< FUNCTION DIAGNOSIS >

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

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Crankshaft position sensor (POS)	Engine speed ^{*2} & Piston position]			
Camshaft position sensor (PHASE)		-				ECM
Mass air flow sensor	Amount of intake air	→			-	
	Intake air temperature					
Intake air temperature sensor					С	
Engine coolant temperature sensor	Engine coolant temperature	→				
Heated oxygen sensor 1	Density of oxygen in exhaust gas	→				_
Throttle position sensor	Throttle position	→	Fuel interation 0			D
Accelerator pedal position sensor	Accelerator pedal position	Accelerator pedal position		Fuel Injection & mixture ratio		
Park/neutral position (PNP) switch	Gear position	→ ECM		Fuel injector		Е
Battery	Battery voltage*2	→				
Knock sensor	Engine knocking condition	→				F
Heated oxygen sensor 2 ^{*1}	Density of oxygen in exhaust gas	→				
EPS control unit	Power steering operation	⇒				
ABS actuator and electric unit (control unit)	VDC/TCS operation command	⇒				G
Combination meter	Vehicle speed	⇒				
ВСМ	Air conditioner operation	⇒				Н
*1 : This sensor is not used to control the e	ngine system under normal conditions.					
:	ommunication line.	vonago.		JMBIA0448GB		

System Description

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	K
Crankshaft position sensor (POS)	Engine speed* ³			
Camshaft position sensor (PHASE)	Piston position			
Mass air flow sensor	Amount of intake air			L
Intake air temperature sensor	Intake air temperature			
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection & mixture ratio control	Fuel injector	NЛ
Heated oxygen sensor 1	Density of oxygen in exhaust gas			1 1 1
Throttle position sensor	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position			Ν
Park/neutral position (PNP) switch	Gear position			
Battery	Battery voltage*3			\cap
Knock sensor	Engine knocking condition			0
EPS control unit	Power steering operation			
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas			Ρ
ABS actuator and electric unit (control unit)*2	ABS operation command			
Air conditioner switch*2	Air conditioner operation			
Combination meter*2	Vehicle speed			

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

< FUNCTION DIAGNOSIS >

[MR20DE]

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (CVT models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to <u>ECM-128</u>. "<u>Description</u>". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

< FUNCTION DIAGNOSIS >

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

- Sequential Multiport Fuel Injection System Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM. The four injectors will then receive the signals two times for each engine cycle. This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Н Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Component Parts Location



Ignition coil (with power transistor) 2. PCV valve 3. Fuel injector 1. and spark plug

Knock sensor

ECM-27

- Cooling fan motor-2 4.

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6. Camshaft position sensor (PHASE)

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< FUNCTION DIAGNOSIS >

- 7. Engine coolant temperature sensor
- 10. IPDM E/R

- 8. Cooling fan motor-1
- 11. ECM
 - 14. EVAP canister purge volume control solenoid valve
- 9. Refrigerant pressure sensor
- 12. Mass air flow sensor (with intake temperature sensor)

- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- 1. ECM

2. IPDM E/R

3. Fuel pump fuse (15A)



- 1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)
- ✓ Vehicle front



1. EVAP canister purge volume control 2. solenoid valve

Mass air flow sensor (with intake air temperature sensor)

√ Vehicle front

< FUNCTION DIAGNOSIS >

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1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor

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Heated oxygen sensor 2

Heated oxygen sensor 1

- 1. Heated oxygen sensor 1 harness connector
- 4. Heated oxygen sensor 2 harness connector



< FUNCTION DIAGNOSIS >

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1. PCV valve

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug



- 1. Refrigerant pressure sensor
- 2. Cooling fan motor-1
- 3. Cooling fan motor-2

√ Vehcle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front



- 1. Crankshaft position sensor (POS) 2. Body ground
- √ Vehcle front

< FUNCTION DIAGNOSIS >

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- Stop lamp switch 1.
- 2. ASCD brake switch
- 3. Accelerator pedal position sensor



- 1. ASDC steering switch
- 4. SET/COAST switch
- 2. CANSEL switch 5.
 - MAIN SWITCH
- 3. **RESUME/ACCCELERATE** switch



- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator 1. harness connector
- ✓ Vehicle front

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< FUNCTION DIAGNOSIS >

Component Description

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Component	Reference
Accelerator pedal position sensor	ECM-278, "Description"
Camshaft position sensor (PHASE)	ECM-183, "Description"
Crankshaft position sensor (POS)	ECM-179. "Description"
Engine coolant temperature sensor	ECM-122, "Description"
Fuel injector	ECM-293, "Description"
Heated oxygen sensor 1	ECM-128, "Description"
Heated oxygen sensor 2	ECM-146, "Description"
Intake air temperature sensor	ECM-119, "Description"
Knock sensor	ECM-177, "Description"
Mass air flow sensor	ECM-114, "Description"
Park/neutral position (PNP) switch	ECM-261, "Description"
Throttle position sensor	ECM-125, "Description"
Vehicle speed sensor	ECM-195, "Description"

< FUNCTION DIAGNOSIS >

ELECTRIC IGNITION SYSTEM

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed* ²		ng Ignition coil (with power transis- tor)	
Camshaft position sensor (PHASE)	Piston position			
Mass air flow sensor	Amount of intake air	_		
Engine coolant temperature sensor	Engine coolant temperature			
Throttle position sensor	Throttle position	lanition timina		
Accelerator pedal position sensor	Accelerator pedal position	control		ł
Battery	Battery voltage*2			
Knock sensor	Engine knocking condition			
Park/neutral position (PNP) switch	Gear position			
Combination meter* ¹	Vehicle speed			
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*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

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< FUNCTION DIAGNOSIS >

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operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

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- 1. Ignition coil (with power transistor) and spark plug
- 4. Cooling fan motor-2
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- . PCV valve
- 5. Knock sensor
- 8. Cooling fan motor-1
- 11. ECM

2.

- 14. EVAP canister purge volume control solenoid valve
- 3. Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Refrigerant pressure sensor
- 12. Mass air flow sensor (with intake temperature sensor)



1. ECM

2. IPDM E/R

3. Fuel pump fuse (15A)

< FUNCTION DIAGNOSIS >

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- 1. Electric throttle control actuator 2. (with built-in position sensor, throttle control motor)
- ✓ Vehicle front



Throttle valve

- 1. EVAP canister purge volume control 2. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)

✓ Vehicle front



- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓⊐ Vehicle front

< FUNCTION DIAGNOSIS >





- 1. Heated oxygen sensor 1 harness 2. Heated oxygen sensor 1 3. connector
 - . Heated oxygen sensor 2

4. Heated oxygen sensor 2 harness connector



1. PCV valve

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug


ELECTRIC IGNITION SYSTEM

< FUNCTION DIAGNOSIS >

- 1. Refrigerant pressure sensor
- 2. Cooling fan motor-1
- 3. Cooling fan motor-2

✓ Vehcle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front



- 1. Crankshaft position sensor (POS) 2. Body ground
- √ Vehcle front



- 1. ASCD clutch switch
- 2. Data link connector



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ELECTRIC IGNITION SYSTEM

< FUNCTION DIAGNOSIS >

- 1. Stop lamp switch
- 2. ASCD brake switch
- 3. Accelerator pedal position sensor



- ASDC steering switch 1. SET/COAST switch 4.
- CANSEL switch 2. 5. MAIN SWITCH

RESUME/ACCCELERATE switch 3.



- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- ✓ Vehicle front

Component Description

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Component	Reference
Accelerator pedal position sensor	ECM-278. "Description"
Camshaft position sensor (PHASE)	ECM-183. "Description"
Crankshaft position sensor (POS)	ECM-179, "Description"
Engine coolant temperature sensor	ECM-122, "Description"
Ignition signal	ECM-299, "Description"
Knock sensor	ECM-177, "Description"
Mass air flow sensor	ECM-114, "Description"
Park/neutral position (PNP) switch	ECM-261, "Description"
Throttle position sensor	ECM-125, "Description"
Vehicle speed sensor	ECM-195, "Description"

< FUNCTION DIAGNOSIS >

AIR CONDITIONING CUT CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	K
Air conditioner switch*1	Air conditioner ON signal			
Accelerator pedal position sensor	Accelerator pedal position			
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		IPDM E/R	L
Engine coolant temperature sensor	Engine coolant temperature	Air conditioner	↓ Air conditioner relay	R.
Battery	Battery voltage*2	cut control	↓ Comprossor	IV
Refrigerant pressure sensor	Refrigerant pressure		Compressor	
EPS control unit*1	Power steering operation			N
Combination meter*1	Vehicle speed			

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.

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< FUNCTION DIAGNOSIS >

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• When refrigerant pressure is excessively low or high.

Component Parts Location

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- 1. Ignition coil (with power transistor) and spark plug
- 4. Cooling fan motor-2
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- 2. PCV valve
- 5. Knock sensor
- 8. Cooling fan motor-1
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- 3. Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Refrigerant pressure sensor
- 12. Mass air flow sensor (with intake temperature sensor)



1. ECM

2. IPDM E/R

3. Fuel pump fuse (15A)

< FUNCTION DIAGNOSIS >

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- 1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)
- ✓ Vehicle front



- 1. EVAP canister purge volume control 2. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)

✓ Vehicle front



- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ∠ Vehicle front

< FUNCTION DIAGNOSIS >





- 1. Heated oxygen sensor 1 harness
 2. Heated oxygen sensor 1
 3.

 connector
 3.
 - Heated oxygen sensor 2

4. Heated oxygen sensor 2 harness connector



1. PCV valve

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug



< FUNCTION DIAGNOSIS >

- 1. Refrigerant pressure sensor
- 2. Cooling fan motor-1
- 3. Cooling fan motor-2

✓ Vehcle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front



- 1. Crankshaft position sensor (POS) 2. Body ground
- √ Vehcle front



- 1. ASCD clutch switch
- 2. Data link connector



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< FUNCTION DIAGNOSIS >

- 1. Stop lamp switch
- 2. ASCD brake switch
- 3. Accelerator pedal position sensor

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- ASDC steering switch
 SET/COAST switch
- CANSEL switch
 MAIN SWITCH

3. RESUME/ACCCELERATE switch



- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- √ Vehicle front

Component Description

INFOID:000000001308029

Component	Reference
Accelerator pedal position sensor	ECM-268. "Description"
Camshaft position sensor (PHASE)	ECM-183. "Description"
Crankshaft position sensor (POS)	ECM-179, "Description"
Engine coolant temperature sensor	ECM-122, "Description"
Refrigerant pressure sensor	ECM-306. "Description"
Vehicle speed sensor	ECM-195. "Description"

< FUNCTION DIAGNOSIS >

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	-
ASCD brake switch	Brake podal operation			_
Stop lamp switch	Brake pedar operation			
ASCD clutch switch (M/T models)	Clutch pedal operation			
ASCD steering switch	ASCD steering switch operation	ASCD vehicle speed control	Electric throttle control actuator	
Park/neutral position (PNP) switch	Gear position			
Combination meter*	Vehicle speed			ŀ
TCM* (CVT models)	Powertrain revolution			_

*: This signal is sent to the ECM through CAN communication line

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/ h (25 MPH) and 144 km/h (89 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunc-

NOTE:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.) When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 180 km/h (112 P MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system. And then ASCD will keep the new set speed.

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< FUNCTION DIAGNOSIS >

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P, R position (CVT models)

• Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

• TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

• Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.

• Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 180 km/h (112 MPH)

Component Parts Location

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< FUNCTION DIAGNOSIS >

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- 1. Ignition coil (with power transistor) and spark plug
- Cooling fan motor-2 4.
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- PCV valve

2.

- 5. Knock sensor
- 8. Cooling fan motor-1
- ECM 11.
- 14. EVAP canister purge volume control solenoid valve
- 3. Fuel injector
- Camshaft position sensor (PHASE) 6.
- 9. Refrigerant pressure sensor
- 12. Mass air flow sensor (with intake temperature sensor)



ECM 1.

IPDM E/R 2.







- Electric throttle control actuator 2. Throttle valve 1. (with built-in position sensor, throttle control motor)
- Vehicle front



- EVAP canister purge volume control 2. 1. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)

√ Vehicle front

< FUNCTION DIAGNOSIS >

[MR20DE]



- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓ Vehicle front





- 1. Heated oxygen sensor 1 harness connector
- 2. Heated oxygen sensor 1
- 3. Heated oxygen sensor 2

4. Heated oxygen sensor 2 harness connector



< FUNCTION DIAGNOSIS >

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1. PCV valve

- 2. Ignition coil (with power transistor) 3. Fuel injector and spark plug
- ECM С D 0 T Ε P JMBIA0477ZZ Refrigerant pressure sensor Cooling fan motor-2 1. 2. Cooling fan motor-1 3. ✓ Vehcle front F 0 ➀ 2 G Н
- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front



- 1. Crankshaft position sensor (POS) 2. Body ground
- √ Vehcle front

< FUNCTION DIAGNOSIS >

[MR20DE]



- ASCD clutch switch 1.
- 2. Data link connector



- Stop lamp switch 1.
- 2. ASCD brake switch
- Accelerator pedal position sensor 3.



- 1. ASDC steering switch
- 2. CANSEL switch
- 4. SET/COAST switch
- 5. MAIN SWITCH

3. **RESUME/ACCCELERATE** switch



- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator 1. harness connector
- √ Vehicle front

< FUNCTION DIAGNOSIS >

Component Description

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Component	Reference	
ASCD steering switch	ECM-249, "Description"	ECM
ASCD clutch switch	ECM-252, "Description"	
ASCD brake switch	ECM-252, "Description"	0
ASCD indicator	ECM-286. "Description"	
Stop lamp switch	ECM-265, "Description"	
Electric throttle control actuator	ECM-202, "Description"	D

CAN COMMUNICATION

System Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to LAN-5, "CAN Communication Control Circuit", about CAN communication for detail.

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< FUNCTION DIAGNOSIS >

COOLING FAN CONTROL



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1			
Battery	Battery voltage*1		IPDM E/R	
Combination meter	Vehicle speed* ²	Cooling fan	↓ Cooling fan relay	
Engine coolant temperature sensor	Engine coolant temperature		↓ Cooling fan motor	
BCM	Air conditioner ON signal* ²			
Refrigerant pressure sensor	Refrigerant pressure			

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pres-Μ sure, air conditioner ON signal. Then control system has 4-step control [HIGH/MIDDLE/LOW/OFF].

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< FUNCTION DIAGNOSIS >

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

Cooling fan speed	Cooling fan relay				
	1	2	3	4	5
Stop (OFF)	OFF	OFF	OFF	OFF	OFF
Low (LOW)	ON	OFF	OFF	ON	OFF
Middle (MID)	ON	OFF	OFF	OFF	ON
High (HI)	ON	ON	ON	OFF	ON

< FUNCTION DIAGNOSIS >

Component Parts Location

[MR20DE]





- 1. Ignition coil (with power transistor) and spark plug
 - Cooling fan motor-2
- 7. Engine coolant temperature sensor
- 10. IPDM E/R

4.

- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- PCV valve
- 5. Knock sensor
- 8. Cooling fan motor-1
- 11. ECM

2.

- 14. EVAP canister purge volume control solenoid valve
- 3. Fuel injector
 - Camshaft position sensor (PHASE)
- 6. 9. Refrigerant pressure sensor
- 12. Mass air flow sensor (with intake temperature sensor)
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ECM 1.

IPDM E/R 2.

3. Fuel pump fuse (15A)

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< FUNCTION DIAGNOSIS >



- 1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)
- √ Vehicle front



- 1. EVAP canister purge volume control 2. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)

√ Vehicle front



- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓ Vehicle front

< FUNCTION DIAGNOSIS >

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ECM-57

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< FUNCTION DIAGNOSIS >

- 1. Refrigerant pressure sensor
- 2. Cooling fan motor-1
- 3. Cooling fan motor-2

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√ Vehcle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front



- 1. Crankshaft position sensor (POS) 2. Body ground
- √→ Vehcle front



- 1. ASCD clutch switch
- 2. Data link connector



< FUNCTION DIAGNOSIS >

- 1. Stop lamp switch
- 2. ASCD brake switch
- 3. Accelerator pedal position sensor



- ASDC steering switch
 SET/COAST switch
- CANSEL switch
 MAIN SWITCH
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- ✓ Vehicle front

Component Description

Component	Reference	
Camshaft position sensor (PHASE)	ECM-183, "Description"	
Crankshaft position sensor (POS)	ECM-179, "Description"	
Cooling fan motor	ECM-53, "System Diagram"	Ν
Engine coolant temperature sensor	ECM-122, "Description"	
Refrigerant pressure sensor	ECM-306, "Description"	



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EVAPORATIVE EMISSION SYSTEM

System Diagram



EVAPORATIVE EMISSION LINE DRAWING

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< FUNCTION DIAGNOSIS >

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	ingine speed*1			
Mass air flow sensor	Amount of intake air			
Engine coolant temperature sensor	Engine coolant temperature			
Battery	Battery voltage*1			
Throttle position sensor	Throttle position	EVAP canister	EVAP canister purge vol- ume control solenoid valve	
Accelerator pedal position sensor	Accelerator pedal position			
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)			
Fuel tank temperature sensor	Fuel temperature in fuel tank			
Wheel sensor*2	Vehicle speed			

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

Component Parts Location

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- 1. Ignition coil (with power transistor) and spark plug
- Cooling fan motor-2 4.
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- PCV valve

2.

- 5.
- Knock sensor 8. Cooling fan motor-1
- ECM 11.
- 14. EVAP canister purge volume control solenoid valve
- 3. Fuel injector
- Camshaft position sensor (PHASE) 6.
- 9. Refrigerant pressure sensor
- 12. Mass air flow sensor (with intake temperature sensor)



ECM 1.

IPDM E/R 2.





- Electric throttle control actuator 2. Throttle valve 1. (with built-in position sensor, throttle control motor)
- Vehicle front



- EVAP canister purge volume control 2. 1. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)

√ Vehicle front



< FUNCTION DIAGNOSIS >



- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓ Vehicle front





- 1. Heated oxygen sensor 1 harness connector
- 2. Heated oxygen sensor 1
- 3. Heated oxygen sensor 2

4. Heated oxygen sensor 2 harness connector



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1. PCV valve

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug



√ Vehcle front

< FUNCTION DIAGNOSIS >

[MR20DE]



- ASCD clutch switch 1.
- 2. Data link connector



- Stop lamp switch 1.
- 2. ASCD brake switch
- Accelerator pedal position sensor 3.



- 1. ASDC steering switch
- 2. CANSEL switch
- 4. SET/COAST switch
- 5. MAIN SWITCH

3. **RESUME/ACCCELERATE** switch



- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator 1. harness connector
- √ Vehicle front

< FUNCTION DIAGNOSIS >

Component Description

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Component	Reference	
Accelerator pedal position sensor	ECM-278. "Description"	ECM
Camshaft position sensor (PHASE)	ECM-183, "Description"	
Crankshaft position sensor (POS)	ECM-179. "Description"	0
Engine coolant temperature sensor	ECM-122, "Description"	
EVAP canister purge volume control solenoid valve	ECM-192, "Description"	
Heated oxygen sensor 1	ECM-128, "Description"	D
Mass air flow sensor	ECM-114. "Description"	
Throttle position sensor	ECM-125, "Description"	
Vehicle speed sensor	ECM-195, "Description"	E

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< FUNCTION DIAGNOSIS >

INTAKE VALVE TIMING CONTROL

System Diagram



System Description

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and histon position		
Camshaft position sensor (PHASE)	Engine speed and piston position	Intake valve	Intake valve timing control
Engine coolant temperature sensor	Engine coolant temperature	timing control	solenoid valve
Wheel sensor*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line

SYSTEM DESCRIPTION

This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

< FUNCTION DIAGNOSIS >

Component Parts Location

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- 1. Ignition coil (with power transistor) and spark plug
 - 5.

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- 4. Cooling fan motor-2
- 7. Engine coolant temperature sensor 8.
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- PCV valve
- Knock sensor
- Cooling fan motor-1
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- 3. Fuel injector
 - Camshaft position sensor (PHASE)
- 6. 9. Refrigerant pressure sensor
- 12. Mass air flow sensor (with intake temperature sensor)

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ECM 1.

IPDM E/R 2.

3. Fuel pump fuse (15A)

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- 1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)
- √ Vehicle front



- 1. EVAP canister purge volume control 2. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)

√ Vehicle front



- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓ Vehicle front

< FUNCTION DIAGNOSIS >

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< FUNCTION DIAGNOSIS >

- 1. Refrigerant pressure sensor
- 2. Cooling fan motor-1
- 3. Cooling fan motor-2

√→ Vehcle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front



- 1. Crankshaft position sensor (POS) 2. Body ground
- √→ Vehcle front



- 1. ASCD clutch switch
- 2. Data link connector


INTAKE VALVE TIMING CONTROL

< FUNCTION DIAGNOSIS >

- 1. Stop lamp switch
- 2. ASCD brake switch
- 3. Accelerator pedal position sensor



- ASDC steering switch
 SET/COAST switch
- CANSEL switch
 MAIN SWITCH
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- √ Vehicle front

Component Description

Component	Reference	
Camshaft position sensor (PHASE)	ECM-183, "Description"	
Crankshaft position sensor (POS)	ECM-179, "Description"	
Engine coolant temperature sensor	ECM-122, "Description"	ľ
Intake valve timing control solenoid valve	ECM-68. "System Diagram"	
Vehicle speed sensor	ECM-195, "Description"	

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

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INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service \$03 of ISO 15031-5
Freeze Frame data	Service \$02 of ISO 15031-5
System Readiness Test (SRT) code	Service \$01 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service \$07 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Service \$06 of ISO 15031-5
Calibration ID	Service \$09 of ISO 15031-5

The above information can be checked using procedures listed in the table below.

					X: Applicable	—: Not applicable
	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-III	×	×	×	×	×	—
GST	×	×	×	_	×	×
ECM	×	×*			_	_

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to <u>ECM-329</u>, <u>"Fail Safe"</u>.)

TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MI will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

 \times : Applicable —: Not applicable

		N	11		D.	ТС	1st tri	o DTC			
Items	1st	t trip	2nd	l trip	1et trip	2nd trip	1et trip	2nd trip			
	Blinking	Lighting up	Blinking	Lighting up	displaying	displaying	displaying	displaying	displaying	displaying	display- ing
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	_	_	_	_	_	×	_			
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	_	_	×	_	_	×	_	_			
One trip detection diagnoses (Refer to ECM-332, "DTC Index".)	_	×	_	_	×		_	_			
Except above		_		×		×	×				

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

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The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFOR-MATION ITEMS". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

1st trip DTC is specified in Service \$07 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MI and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to <u>ECM-6, "Work Flow"</u>. Then perform DTC CONFIR-MATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST. Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM has the following priorities to update the data.

Priority		Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172	L
2		Except the above items (Includes CVT related items)	
3	1st trip freeze frame d	ata	N

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

How to Read DTC and 1st Trip DTC

With CONSULT-III

With GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc. These DTCs are prescribed by ISO 15031-5.

< FUNCTION DIAGNOSIS >

(CONSULT-III also displays the malfunctioning component or system.)

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1148, 1706, etc.

These DTCs are controlled by NISSAN.

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.

DTC or 1st trip DTC of a malfunction is displayed in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

(B) With CONSULT-III

The emission related diagnostic information in the ECM can be erased by selecting "All Erase" in the "Description" of "FINAL CHECK" mode with CONSULT-III.

With GST

The emission related diagnostic information in the ECM can be erased by selecting Service \$04 with GST. **NOTE:**

If the DTC is not for CVT related items (see ECM-332, "DTC Index"), skip step 2.

- 1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- 2. Perform TM-392, "Diagnosis Description". (The DTC in TCM will be erased)
- 3. Select Service \$04 with GST (Generic Scan Tool).

🔊 No Tools

NOTE:

If the DTC is not for CVT related items (see ECM-332, "DTC Index"), skip step 2.

- 1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
- Wait at least 10 seconds and then turn it ON (engine stopped) again.
- 2. Perform <u>TM-392. "Diagnosis Description"</u>. (The DTC in the TCM will be erased.)
- 3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.
- If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.

• The following data are cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service \$01 of ISO 15031-5.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

< FUNCTION DIAGNOSIS >

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If MI is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
HO2S	1	Heated oxygen sensor 1	P1133
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
HO2S HTR	1	Heated oxygen sensor 1 heater	P0135
		Heated oxygen sensor 2 heater	P0141

*: If completion of several SRTs is required, perform driving patterns (DTC CONFIRMATION PROCEDURE), one by one based on the priority for models with CONSULT-III.

SRT Set Timing

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

				Example		
Self-diagn	osis result	Diagnosis	$\leftarrow ON \rightarrow 0$	$\begin{array}{rcl} & \text{Ignitio} \\ \text{OFF} & \leftarrow \text{ON} \rightarrow & \text{O} \end{array}$	n cycle FF \leftarrow ON \rightarrow OF	F $\leftarrow ON \rightarrow$
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
NG exists	Case 3	P0400	OK	ОК	—	_
		P0402	_		—	_
		P1402	NG	_	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MI ON)
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

-: Self-diagnosis is not carried out.

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< FUNCTION DIAGNOSIS >

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". \rightarrow Case 1 above

When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. \rightarrow Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". \rightarrow Case 3 above

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP". NOTE:

SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence on the next page.

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MALFUNCTION INDICATOR (MI)

Description

< FUNCTION DIAGNOSIS >

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The MI is located on the instrument panel.

- The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check. If the MI does not light up, check MI circuit. Refer to <u>MWI-5.</u> <u>"METER SYSTEM : System Diagram"</u>.
- 2. When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running	MALFUNCTION WARNING	 This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. Misfire (Possible three way catalyst damage) One trip detection diagnoses
Mode II	Ignition switch in ON position	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check MI circuit. Refer to <u>MWI-5, "METER SYSTEM : System Diagram"</u>.

Diagnostic Test Mode I — Malfunction Warning

MI	Condition	
ON	When the malfunction is detected.	
OFF	No malfunction.	

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

Diagnostic Test Mode II — Self-diagnostic Results

< FUNCTION DIAGNOSIS >

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The "zero" is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-second OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See <u>ECM-332, "DTC Index"</u>.)

HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to "HOW to ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)".

- If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.
- Be careful not to erase the stored memory before starting trouble diagnoses.

Diagnostic Test Mode II — Heated Oxygen Sensor 1 Monitor

In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition	
ON	Lean	Closed loop system	
OFF	Rich	Closed loop system	
*Remains ON or OFF	Any condition	Open loop system	(

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.

Next run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no load. MI FLASHING WITHOUT DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test (function) modes, and details of the above functions are described later. Refer to "How to Switch Diagnostic Test Mode".

The following emission-related diagnostic information is cleared when the ECM memory is erased.

• Diagnostic trouble codes

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- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

How to Switch Diagnostic Test Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

• Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.

HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

- 1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 2. Repeat the following procedure quickly five times within 5 seconds.
- a. Fully depress the accelerator pedal.
- b. Fully release the accelerator pedal.
- 3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
- Fully release the accelerator pedal. ECM has entered to Diagnostic Test Mode II (Self-diagnostic results). NOTE:

Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW to SET DIAGNOSTIC TEST MODE II (HEATED OXYGEN SENSOR 1 MONITOR)

- 1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results).
- Refer to "HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)".
- 2. Start Engine.

ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

HOW to ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

- Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)".
- 2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
- The emission-related diagnostic information has been erased from the backup memory in the ECM.
- 3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

OBD System Operation Chart

Relationship Between MI, 1st Trip DTC, DTC and Detectable Items

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MI will come on.
- The MI will go off after the vehicle is driven 3 times (pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-III will count the number of times the vehicle is driven.

< FUNCTION DIAGNOSIS >

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• The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

Summary Chart

Items	Fuel Injection System	Misfire	Other	5014
MI (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)	ECM
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)	0
1st Trip DTC (clear)	1 (pattern C), * ¹	1 (pattern C), *1	1 (pattern B)	U
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)	D

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MI, DTC, 1st Trip DTC and Driving Patterns for "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System"

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- *1: When the same malfunction is detected in two consecutive trips, MI will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

- *2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

Explanation for Driving Patterns for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System" <Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

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[MR20DE] < FUNCTION DIAGNOSIS > • The B counter will be cleared when the malfunction is detected once regardless of the driving pattern. The B counter will be counted up when driving pattern B is satisfied without any malfunction. А The MI will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART") <Driving Pattern C> Driving pattern C means the vehicle operation as follows: ECM The following conditions should be satisfied at the same time: Engine speed: (Engine speed in the freeze frame data) ±375 rpm Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%] Engine coolant temperature (T) condition: When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F). When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F). D Example: If the stored freeze frame data is as follows: Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F) Ε To be satisfied with driving pattern C, the vehicle should run under the following conditions: Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F) • The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above. F • The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction. The DTC will not be displayed after C counter reaches 80. The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM. Relationship Between MI, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System" Н

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- *1: When the same malfunction is detected in two consecutive trips, MI will light up.
- *2: MI will go off after vehicle is driven 3 *3: When the same malfunction is detimes (pattern B) without any malfunctions.
- tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

< FUNCTION DIAGNOSIS >

- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

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Explanation for Driving Patterns Except for "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System" <Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) (4).
- The A counter will be counted up when (1) (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.
- <Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

- All components and systems should be monitored at least once by the OBD system.
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MI will go off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

CONSULT-III Function

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the in- dications on the CONSULT-III unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

Diagnostic trouble codes

1st trip diagnostic trouble codes ٠

Freeze frame data

< FUNCTION DIAGNOSIS >

1st trip freeze frame data

• System readiness test (SRT) codes

Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

			DIAGNOSTIC TEST MODE						
				SELF-DI RES	AGNOSTIC SULTS	DATA		DTC 8 CONFIR	SRT MATION
		Item	WORK SUPPORT	DTC* ¹	FREEZE FRAME DATA* ²	MONI- TOR	ACTIVE TEST	SRT STA- TUS	DTC WORK SUP- PORT
		Crankshaft position sensor (POS)		×	×	×			
		Camshaft position sensor (PHASE)		×	×	×			
		Mass air flow sensor		×		×			
		Engine coolant temperature sensor		×	×	×	×		
		Heated oxygen sensor 1		×		×		×	×
လု		Heated oxygen sensor 2		×		×		×	×
ART		Wheel sensor		×	×	×			
Ę		Accelerator pedal position sensor		×		×			
NEN		Throttle position sensor		×		×			
ЛРО		Intake air temperature sensor		×	×	×			
CO	٦UT	Knock sensor		×					
Р	Z	EPS control unit				×			
NTR		Refrigerant pressure sensor				×			
IE COI		Closed throttle position switch (accel- erator pedal position sensor signal)				×			
UD		Air conditioner switch				×			
Ĩ		Park/neutral position (PNP) switch		×		×			
		Stop lamp switch		×		×			
		Battery voltage				×			
		Load signal				×			
		ASCD steering switch		×		×			
		ASCD break switch		×		×			
-		Fuel injector				×	×		
TS		Power transistor (Ignition timing)				×	×		
AR		Throttle control motor relay		×		×			
Ĭ		Throttle control motor		×					
PONE		EVAP canister purge volume control solenoid valve		×		×	×		×
ŇÖ	LU4	Air conditioner relay				×			
CONTROL C	DUT	Fuel pump relay	×			×	×		
	-	Cooling fan relay		×		×	×		
		Heated oxygen sensor 1 heater		×		×		×	
ШZ		Heated oxygen sensor 2 heater		×		×		×	
ENGI		Intake valve timing control solenoid valve		×		×	×		
		Calculated load value			×	×			

< FUNCTION DIAGNOSIS >

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-III screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to ECM-74, "Diagnosis Description".

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	FUEL PUMP WILL STOP BY TOUCHING "START" DUR- ING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEF- FICIENT.	When clearing mixture ratio self- learning value
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition tim- ing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item Regarding items of DTC and 1st trip DTC, refer to ECM-332, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	 The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to <u>ECM-332, "DTC_Index"</u>.)
FUEL SYS-B1	 "Fuel injection system status" at the moment a malfunction is detected is displayed. One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	 "Long-term fuel trim" at the moment a malfunction is detected is displayed. The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	 "Short-term fuel trim" at the moment a malfunction is detected is displayed. The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

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DATA MONITOR MODE

Monitored Item

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		- · ·	×: Applicable
Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	 Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE). 	 Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	 The signal voltage of the mass air flow sensor is displayed. 	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC".
B/FUEL SCHDL	msec	 "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	• When engine is running specification range is indicated in "SPEC".
A/F ALPHA-B1	%	 The mean value of the air-fuel ratio feedback cor- rection factor per cycle is indicated. 	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC". This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1)	V	• The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1		The accelerator pedal position sensor signal volt-	ACCEL SEN 2 signal is converted by
ACCEL SEN 2	V	age is displayed.	ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 1-B1	V	• The throttle position sensor signal voltage is dis-	• TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from
TP SEN 2-B1	v	played.	ECM terminal voltage signal.
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
INJ PULSE-B1	msec	 Indicates the actual fuel injection pulse width compensated by ECM according to the input sig- nals. 	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	 Indicates the ignition timing computed by ECM according to the input signals. 	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW	g-m/s	• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	

< FUNCTION DIAGNOSIS >

Monitored item	Unit	Description	Remarks	
PURG VOL C/V	%	 Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 		A ECM
INT/V TIM (B1)	°CA	 Indicates [°CA] of intake camshaft advance an- gle. 		C
INT/V SOL-B1	%	 The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 		D
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.		E
TRVL AFTER MIL	km/h or mph	Distance traveled while MI is activated.		
02SEN HTR DTY	%	 Indicates the heated oxygen sensor 1 heater con- trol value computed by the ECM according to the input signals. 		F
AC PRESS SEN	V	 The signal voltage from the refrigerant pressure sensor is displayed. 		G
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.		Н
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.		
HO2S1 MNTR (B1)	RICH/LEAN	 Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN: means the mixture became "lean", and control is being affected toward a rich mixture. 	 After turning ON the ignition switch, "RICH" is displayed until air-fuel mix- ture ratio feedback control begins. When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously. 	I
HO2S2 MNTR(B1)	RICH/LEAN	 Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large. 	• When the engine is stopped, a certain value is indicated.	K
START SIGNAL	ON/OFF	 Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage. 	 After starting the engine, [OFF] is dis- played regardless of the starter sig- nal. 	L
CLSD THL POS	ON/OFF	 Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal. 		M
AIR COND SIG	ON/OFF	 Indicates [ON/OFF] condition of the air condition- er switch as determined by the air conditioner sig- nal. 		Ν
P/N POSI SW	ON/OFF	 Indicates [ON/OFF] condition from the park/neu- tral position (PNP) switch signal. 		0
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.		U
LOAD SIGNAL	ON/OFF	 Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and light- ing switch are OFF. 		Ρ
IGNITION SW	ON/OFF	 Indicates [ON/OFF] condition from ignition switch signal. 		

< FUNCTION DIAGNOSIS >

[MR20DE]

Monitored item	Unit	Description	Remarks
HEATER FAN SW	ON/OFF	 Indicates [ON/OFF] condition from the heater fan switch signal. 	
BRAKE SW	ON/OFF	 Indicates [ON/OFF] condition from the stop lamp switch signal. 	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (deter- mined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	 Indicates the fuel pump relay control condition determined by ECM according to the input sig- nals. 	
THRTL RELAY	ON/OFF	 Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. 	
COOLING FAN	HI/LOW/OFF	 Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation MID: Middle speed operation LOW: Low speed operation OFF: Stop 	
HO2S1 HTR (B1)	ON/OFF	 Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM accordining to the input signals. 	
HO2S2 HTR (B1)	ON/OFF	 Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. 	
IDL A/V LEARN	YET/CMPLT	 Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been per- formed yet. CMPLT: Idle air volume learning has already been performed successfully. 	
MAIN SW	ON/OFF	 Indicates [ON/OFF] condition from MAIN switch signal. 	
CANCEL SW	ON/OFF	 Indicates [ON/OFF] condition from CANCEL switch signal. 	
RESUME/ACC SW	ON/OFF	 Indicates [ON/OFF] condition from RESUME/AC- CELERATE switch signal. 	
SET SW	ON/OFF	 Indicates [ON/OFF] condition from SET/COAST switch signal. 	
BRAKE SW1	ON/OFF	 Indicates [ON/OFF] condition from ASCD brake switch signal. 	
BRAKE SW2	ON/OFF	 Indicates [ON/OFF] condition of stop lamp switch signal. 	
VHCL SPD CUT	NON/CUT	 Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off. 	
LO SPEED CUT	NON/CUT	 Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off. 	
AT OD MONITOR	ON/OFF	 Indicates [ON/OFF] condition of CVT O/D ac- cording to the input signal from the TCM. 	 For M/T models, always "OFF" is dis- played.
AT OD CANCEL	ON/OFF	 Indicates [ON/OFF] condition of CVT O/D cancel request signal. 	 For M/T models, always "OFF" is dis- played.



< FUNCTION DIAGNOSIS >

F

Monitored item	Unit	Description	Remarks	^
CRUISE LAMP	ON/OFF	 Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals. 		A
SET LAMP	ON/OFF	 Indicates [ON/OFF] condition of SET lamp deter- mined by the ECM according to the input signals. 		EC
Voltage	V			
Frequency	msec, Hz or %		Only "#" is displayed if item is unable to be measured	С
DUTY-HI		Voltage, frequency, duty cycle or pulse width	 Figures with "#"s are temporary ones. 	
DUTY-LOW		measured by the probe.	They are the same figures as an actu-	D
PLS WIDTH-HI			ously measured.	
PLS WIDTH-LOW			-	
NOTE				E

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	 Engine: Return to the original trouble condition Change the amount of fuel injec- tion using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Fuel injector Heated oxygen sensor 1
IGNITION TIMING	 Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
POWER BALANCE	 Engine: After warming up, idle the engine. A/C switch OFF Shift lever: P or N (CVT), Neutral (M/T) Cut off each fuel injector signal one at a time using CONSULT-III. 	Engine runs rough or dies.	 Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
COOLING FAN*	 Ignition switch: ON Turn the cooling fan "LOW", "MID", "HI" and "OFF" CON- SULT-III. 	Cooling fan moves and stops.	 Harness and connectors IPDM E/R (Cooling fan relay) Cooling fan motor
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant tem- perature using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL PUMP RELAY	 Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT-III and listen to operating sound. 	Fuel pump relay makes the operat- ing sound.	Harness and connectorsFuel pump relay

< FUNCTION DIAGNOSIS >

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	 Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III. 	Engine speed changes according to the opening percent.	Harness and connectorsSolenoid valve
V/T ASSIGN ANGLE	 Engine: Return to the original trouble condition Change intake valve timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Intake valve timing control sole- noid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to ECM-74, "Diagnosis Description".

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

Test mode	Test item	Condition	Reference page
	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	ECM-132
	HO2S1 (B1) P0134		<u>ECM-138</u>
H0231	HO2S1 (B1) P1143		<u>ECM-213</u>
	HO2S1 (B1) P1144		<u>ECM-218</u>
	HO2S2 (B1) P0139		<u>ECM-151</u>
HO2S2	HO2S2 (B1) P1146		<u>ECM-223</u>
	HO2S2 (B1) P1147		<u>ECM-230</u>

Diagnosis Tool Function

INFOID:000000001308049

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-5 Generic S has 8 different functions explained below.

ISO9141 is used as the protocol.

The name "GST" or "Generic Scan Tool" is used in this service manual.



FUNCTION

Diagnostic Service		Function
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including an- alog inputs and outputs, digital inputs and outputs, and system status information.
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to ECM-332, "DTC Index".
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.

< FUNCTION DIAGNOSIS >

[MR20DE]

Diagnostic Service		Function	
Service \$04	CLEAR DIAG INFO	 This diagnostic service can clear all emission-related diagnostic information. This includes: Clear number of diagnostic trouble codes (Service \$01) Clear diagnostic trouble codes (Service \$03) Clear trouble code for freeze frame data (Service \$01) Clear freeze frame data (Service \$02) Reset status of system monitoring test (Service \$01) Clear on board monitoring test results (Service \$06 and \$07) 	A ECN C
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.	
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission- related powertrain components/systems that are continuously monitored during normal driving conditions.	D
Service \$08	—	This diagnostic service is not applicable on this vehicle.	Е
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle infor- mation such as Vehicle Identification Number (VIN) and Calibration IDs.	

INSPECTION PROCEDURE

- 1. Turn ignition switch OFF.
- 2. Connect "GST" to data link connector, which is located under LH dash panel near the hood opener handle.
- 3. Turn ignition switch ON.

dure.

the tool maker.

 4. Enter the program according to instruction on the screen or in the operation manual. (*: Regarding GST screens in this section, sample screens are shown.)

5. Perform each diagnostic mode according to each service proce-

For further information, see the GST Operation Manual of



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< COMPONENT DIAGNOSIS >

COMPONENT DIAGNOSIS TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:000000001308050

INFOID:000000001308051

[MR20DE]

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONI-TOR" mode of CONSULT-III during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MI.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

1.START

Make sure that all of the following conditions are satisfied.

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 104.3 kPa (0.983 1.043 bar, 1.003 1.064 kg/cm², 14.25 15.12 psi)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up
- CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2. PERFORM "SPEC" OF "DATA MONITOR" MODE

With CONSULT-III NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

- 1. Perform ECM-10, "BASIC INSPECTION : Special Repair Requirement".
- 2. Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.
- 3. Make sure that monitor items are within the SP value.
- Is the inspection result normal?
- YES >> END
- NO >> Go to ECM-97, "Diagnosis Procedure".

< COMPONENT DIAGNOSIS >

Diagnosis Procedure





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OVERALL SEQUENCE



< COMPONENT DIAGNOSIS >

[MR20DE]



DETAILED PROCEDURE

1.CHECK "A/F ALPHA-B1"

With CONSULT-III

- 1. Start engine.
- Confirm that the testing conditions are met. Refer to <u>ECM-96, "Component Function Check"</u>.
- 3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

< COMPONENT DIAGNOSIS > [MR20DE]	l
NOTE: Check "A/F ALPHA-B1" for approximately 1 minute because they may fluctuate. It is NG if the indication i out of the SP value even a little.	- S A
Is the measurement value within the SP value? YES >> GO TO 17. NO-1 >> Less than the SP value: GO TO 2. NO-2 >> More than the SP value: GO TO 3.	ECN
Z.CHECK "B/FUEL SCHDL"	С
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.	3
Is the measurement value within the SP value? YES >> GO TO 4. NO >> More than the SP value: GO TO 19. 3 OUTCOL (#D/FUTL OCUDUR)	D
O .CHECK B/FUEL SCHDL	_
Select B/FOEL SCHDL in SPEC of DATA MONITOR mode, and make sure that the indication is within the SP value. <u>Is the measurement value within the SP value?</u> YES >> GO TO 6. NO 1 ->> More than the SP value: GO TO 6.	F
NO-2 $>>$ Less than the SP value: GO TO 25.	G
4. CHECK "A/F ALPHA-B1"	
 Stop the engine. Disconnect PCV hose, and then plug it. Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the Operator. 	ד H
the SP value.	
YES >> GO TO 5. NO >> GO TO 6.	J
5. CHANGE ENGINE OIL	
 Stop the engine. Change engine oil. NOTE: This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is to short during winter). The symptom will not be detected after changing engine oil or changing driving condition. 	- K J L - M
>> INSPECTION END	
6. CHECK FUEL PRESSURE	Ν
Check fuel pressure. (Refer to <u>ECM-349, "Inspection"</u> .) <u>Is the inspection result normal?</u> YES >> GO TO 9. NO 1 ->> Eval pressure is too high: Baplace "fuel filter and fuel pump accombly" and then CO TO 8	0
NO-1 $>>$ Fuel pressure is too high. Replace the filter and their pump assembly and then GO TO 8. NO-2 $>>$ Fuel pressure is too low: GO TO 7.	-
7.DETECT MALFUNCTIONING PART	Р
Check fuel hoses and fuel tubes for clogging	-
<u>Is the inspection result normal?</u> YES >> Replace "fuel filter and fuel pump assembly" and then GO TO 8.	
8. CHECK "A/F ALPHA-B1"	

< COMPONENT DIAGNOSIS >

[MR20DE]

- 1. Start engine.
- Select "Ă/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 9.

9.PERFORM POWER BALANCE TEST

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
- 2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- 1. Ignition coil and its circuit (Refer to ECM-299, "Component Function Check".)
- 2. Fuel injector and its circuit (Refer to ECM-293, "Component Function Check".)
- 3. Intake air leakage
- 4. Low compression pressure (Refer to EM-23, "Inspection".)

Is the inspection result normal?

- YES >> Replace fuel injector and then GO TO 11.
- NO >> Repair or replace malfunctioning part and then GO TO 11.
- 11.CHECK "A/F ALPHA-B1"

1. Start engine.

2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 12.

12. CHECK HEATED OXYGEN SENSOR 1 FUNCTION

- 1. Run engine at about 2,000 rpm for about 2minutes under no load.
- 2. Select "HO2S1 MNTR (B1)", in "DATA MONITOR" mode.
- 3. Running engine at 2,000 rpm under no load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH \rightarrow LEAN \rightarrow RICH

2 times : RICH \rightarrow LEAN \rightarrow RICH \rightarrow LEAN \rightarrow RICH

Is the inspection result more than 5 times during 10 seconds?

YES >> GO TO 15.

NO >> GO TO 13.

13.CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor 1 and its circuit, refer to.

>> GO TO 14.

14.CHECK "A/F ALPHA-B1"

- 1. Start engine.
- 2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 15.

< COMPONENT DIAGNOSIS >	[MR20DE]
15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR	
 Stop the engine. Disconnect ECM harness connector. Check pin terminal and connector for damage, and the 	∩ reconnect it.
>> GO TO 16. 16. CHECK "A/F ALPHA-B1"	-
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indic the SP value. 	ation is within
Is the measurement value within the SP value?	Į
YES >> INSPECTION END NO >> Detect malfunctioning part according to <u>ECM-337, "Symptom Table"</u> . 17. CHECK "B/FUEL SCHDL"	I
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indicatio SP value.	n is within the
Is the measurement value within the SP value?	1
YES >> INSPECTION END NO-1 >> More than the SP value: GO TO 18. NO-2 >> Less than the SP value: GO TO 25.	(
18. DETECT MALFUNCTIONING PART	
 Check for the cause of large engine friction. Refer to the following. Engine oil level is too high Engine oil viscosity Belt tension of alternator, A/C compressor, etc. is excessive Noise from engine 	
 Noise from transmission, etc. Check for the cause of insufficient combustion. Refer to the following. Valve clearance malfunction Intake valve timing control function malfunction Camshaft sprocket installation malfunction, etc. 	
>> Repair or replace malfunctioning part, and then GO TO 30. 19.CHECK INTAKE SYSTEM	
Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.	
 Crushed air ducts Malfunctioning seal of air cleaner element Uneven dirt of air cleaner element Improper specification of intake air system 	
Is the inspection result normal?	
NO >> Repair or replace malfunctioning part, and then GO TO 20.	
20. CHECK "A/F ALPHA-B1", AND "B/FUEL SCHDL"	
Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make each indication is within the SP value.	sure that the
YES >> INSPECTION END	
NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 21.	
21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR	

Stop the engine.
 Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

< COMPONENT DIAGNOSIS >

[MR20DE]

>> GO TO 22.

22.CHECK "A/F ALPHA-B1"

1. Start engine.

 Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>ECM-114, "DTC</u> <u>Logic"</u>. Then GO TO 29.

NO >> GO TO 23.

23.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

1. Replace ECM.

2. Go to ECM-13, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

25.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 27.

NO >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> Less than the SP value: GO TO 27.

27.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.

NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.

28.CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve

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- < COMPONENT DIAGNOSIS >

 Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30. 29. check "A/F Alpha-b1" and "B/Fuel schdl"	ECM
Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.	С
<u>Is the measurement value within the SP value?</u> YES >> INSPECTION END NO >> Detect malfunctioning part according to <u>ECM-337, "Symptom Table"</u> . 30. CHECK "B/FUEL SCHDL"	D
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.	Е
<u>Is the measurement value within the SP value?</u> YES >> INSPECTION END NO >> Detect malfunctioning part according to <u>ECM-337, "Symptom Table"</u> .	F

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POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 8. NO >> GO TO 2.

2

2. CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.

2. Check the voltage between ECM harness connector and terminals as follows.

(+)		(-)		Voltago	
Connector	Terminal	Connector	Terminal	voltage	
		E16	108		
E16	93	E7	10	Battery voltage	
			11		

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

4.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.

2. Check the continuity between ECM harness connector and ground.

E	СМ	Ground	Continuity	
Connector Terminal		Crodina	Continuity	
F7	10		Existed	
	11	Ground		
E16	108			

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 6.

5.DETECT MALFUNCTIONING PART

Check the following.

• 15A fuse (No. 64)

• Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.DETECT MALFUNCTIONING PART

Check the following.

INFOID:000000001308053

< COMPOI	NENT DIA	PU GNOSIS	VVER ; 5 >	SUPPLY AND	J GROUND CIRCUIT	[MR20DE]
Harness	connectors	F121, E	7			
 Harness f 	for open or	short be	etween E	CM and ground		A
>>	Repair op	en circui	t or shor	t to power in harr	ness or connectors.	
7.снеск	ECM POW	/ER SUF	PLY CI	RCUIT-II		EC
1. Recon	nect ECM ł	narness	connecto	ors.		
2. Turn ig	nition swite	h ON.	א וסחא	E/R harness con	pector and ground	С
J. CHECK	the voltage	Delwee				
IP	DM E/R		Ground	Voltage		D
Connector	Termir	nal	Siouna	voltage		
E15	47	(Ground	Battery voltage		-
Is the inspe	ection resul	t normal	<u>?</u>	Dre ee dure "		E
NO >>	• GO TO 8.	<u>VI-299,</u>	Diagnos	<u>is Procedure</u> .		
8. CHECK	ECM POW	/ER SUF	PLY CI	RCUIT-III		F
1. Turn ig	nition swite	h OFF a	nd wait	at least 10 secon	ds.	
2. Turn ig	nition swite	h ON ar	nd then ()FF. parness connecto	r and ground	G
J. Oneck	the voltage	, Dermee				
EC	CM	Cround		Valtaga		Н
Connector	Terminal	Ground		voltage		
E16	105	Ground	After tur	ning ignition switch O	FF, battery volt-	
	100	Ground	proximat	tely 0V.		I
Is the inspe	ection resul	t normal	?			
YES >>	• GO TO 14 Battery vo	4. oltade do	es not e	xist [.] GO TO 9		J
NO-2 >>	Battery vo	oltage ex	ists for n	nore than a few s	econds: GO TO 12.	
9. CHECK	ECM POW	/ER SUF	PLY CI	RCUIT-IV		K
1. Turn ig	nition swite	h OFF a	ind wait	at least 10 secon	ds.	
2. Check	the voltage	e betwee	n ECM r	arness connecto	r and ground.	L
	ECM					
Connector	Termir	nal	Ground	Voltage		D.4
F7	32	(Ground	Battery voltage		IVI
Is the inspe	ection resul	t normal	?			
YES >>	GO TO 10). I				Ν
10.CHEC) WFR S	UPPLY (
1 Discon	nect FCM	harness	connect	or		O
2. Discon	nect IPDM	E/R har	ness_cor	nector.		
3. Check	the continu	ity betw	een ECN	A harness conneo	ctor and IPDM E/R harness connector.	P
	5014					1

E	СМ	IPDN	Continuity	
Connector	Terminal	Connector Terminal		
E16	105	E15	48	Existed

4. Also check harness for short to ground and short to power. Is the inspection result normal?

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >

[MR20DE]

YES >> GO TO 17.

NO >> Repair open circuit or short to ground or short power in harness or connectors.

11.CHECK ECM POWER SUPPLY CIRCUIT-VI

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E11.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

E	СМ	IPDN	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F7	32	E15	51	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

Junction block connectors E7, F121

Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK 20A FUSE

1. Disconnect 20A fuse (No. 62) from IPDM E/R.

2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace 20A fuse.

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.

Check ground connection E21. Refer to Ground Inspection in <u>GI-41, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Repair or replace ground connection.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ground.

E	СМ	Ground	Continuity	
Connector Terminal		Ground	Continuity	
E7	10		Existed	
F7	11	Ground		
E16	108			

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 17.

NO >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

• Harness or connectors F121, E7

• Harness for open or short between ECM and ground

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT	DIAGNOSIS >
-------------	-------------

[MR20DE]

17.CHECK INTERMITTENT INCIDENT		
Is the inspection result normal?		ECM
YES >> Replace IPDM E/R. NO >> Repair open circuit or short to pow	ver in harness or connectors.	С
		D
		E
		F
		G
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U1001 CAN COMM CIRCUIT

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000001308055

INFOID:000000001308056

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001	CAN communication line	When ECM is not transmitting or receiving CAN com- munication signal other than OBD (emission related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 3 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> ECM-108, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-13, "Trouble Diagnosis Flow Chart".

INFOID:000000001308054
U1010 CONTROL UNIT (CAN)

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle mul-ECM tiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000001308058 D

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM
DTC CON	FIRMATION PROCED	URE	
1.PERFO	RM DTC CONFIRMATIO	N PROCEDURE	
1. Turn ig	nition switch ON.		
2. Check	DTC.		
s DTC det	ected?		
YES >> NO >>	 Go to <u>ECM-109, "Diagn</u> INSPECTION END 	osis Procedure".	
Diagnosi	s Procedure		INFOID:00000000130805
1.INSPEC	TION START		
With CO	NSULT-III		
1. Turn ig	nition switch ON.		
2. Select	"SELF-DIAG RESULTS"	mode with CONSULT-III.	
3. IOUCN 1 Perforr	DTC CONFIRMATION	PROCEDURE	
See EC	CM-109, "DTC Logic".		
5. Check	DTC.		
With GS	T		
1. Turnig 2. Soloot	nition switch ON.		
2. Select 3 Perforr	n DTC CONFIRMATION	PROCEDURE	
See EC	<u>CM-109, "DTC Logic"</u> .		
4. Check	DTC.		
s the DTC	U1010 displayed again?		
YES >>	GO TO 2.		
NO >>	INSPECTION END		
2.REPLAC	CE ECM		
1. Replac	e ECM.		
2. Go to	CM-13, "ADDITIONAL S	ERVICE WHEN REPLACING CONTRO	<u> DL UNIT : Special Repair Require</u>
ment"			

>> INSPECTION END

ECM-109

INFOID:000000001308057

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DTC Logic

INFOID:000000001308060

DTC DETECTION LOGIC

NOTE:

If DTC P0011 is displayed with DTC P1111, first perform the trouble diagnosis for <u>ECM-199, "DTC</u> <u>Logic"</u>.

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec (CVT) More than 4.2 msec (M/T)
Shift lever	P or N position (CVT) N position (M/T)

4. Stop vehicle with engine running and let engine idle for 10 seconds.

5. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> Go to ECM-111, "Diagnosis Procedure"

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

1. Maintain the following conditions for at least 20 consecutive seconds.

ECM-110

P0011 IVT CONTROL

ENG SPEED	2,000 - 3,175 rpm (A constant rotation is maintained.)	A
COOLAN TEMP/S	More than 70°C (221°F)	-
Shift lever	1st or 2nd position	EC
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)	
CAUTION:		C
2 Check 1st trip DT	a safe speed.	
With GST	0.	D
Follow the procedure	"With CONSULT-III" above.	
Is 1st trip DTC detected	ed?	F
YES >> Go to <u>EC</u> NO >> INSPECT	M-111, "Diagnosis Procedure" ION END	L
Diagnosis Proced	dure	INFOID:000000001308061
1.CHECK OIL PRES	SURE WARNING LAMP	
 Start engine. Check oil pressu 	re warning lamp and confirm it is not illumi-	G
nated.		
Is oil pressure warning	g lamp illuminated?	
YES >> Go to LU	6, "Inspection".	
10		
		J
		PBIA8559J
	ALVE TIMING CONTROL SOLENOID VALVE	ĸ
Refer to <u>ECM-112, "C</u>	omponent Inspection".	
	<u>t normal?</u>	
NO >> Replace i	ntake valve timing control solenoid valve.	L
3.CHECK CRANKSH	AFT POSITION SENSOR (POS)	
Refer to ECM-182. "C	omponent Inspection".	
Is the inspection resul	t normal?	
YES >> GO TO 4.		
NO >> Replace of	crankshaft position sensor (POS).	N
4.CHECK CAMSHAI	T POSITION SENSOR (PHASE)	
Refer to ECM-185, "C	omponent Inspection"	0
Is the inspection resul	t normal?	-
YES >> GO TO 5.	appropriate and a second (DLLACE)	
	amshall position sensor (PHASE).	P
	- I (INTAKE)	

Check the following.

P0011 IVT CONTROL

< COMPONENT DIAGNOSIS >

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 6.

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



6.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to <u>EM-44, "Removal and Installation"</u>.

NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-58, "Inspection".

Is the inspection result normal?

NO >> Clean lubrication line.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001308062

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]	
1 and 2	6.7 - 7.7 Ω	
1 or 2 and ground	$\propto \Omega$ (Continuity should not exist)	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

- 1. Remove intake valve timing control solenoid valve.
- Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
 CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?



P0011 IVT CONTROL

< COMPONENT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.

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P0102, P0103 MAF SENSOR

Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

DTC DETECTION LOGIC

INFOID:000000001308064

DTC No.	l rouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

P0102 >> GO TO 2. P0103 >> GO TO 3.

P0103 >> G0103.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

- 1. Start engine and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

YES >> Go to ECM-115, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

YES >> Go to ECM-115, "Diagnosis Procedure".

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

- 1. Start engine and wait at least 5 seconds.
- 2. Check DTC.
- Is DTC detected?
- YES >> Go to ECM-115, "Diagnosis Procedure".

P0102, P0103 MAF SENSOR

< COMPONE	NT DIAGNO)SIS >			[MR20DE]	
NO >> IN	SPECTION	END				
Diagnosis I	Procedure	•			INFOID:000000001308065	А
1.INSPECTION	ON START					
Confirm the de	etected DTC.					
<u>Which DTC is</u>	detected?					
P0102 >> G	O TO 2.					С
2.CHECK IN	U TO 3. TAKE SYSTI	ΞM				
Check the follo	owing for cor	nection				D
Air duct	owing for oor					
Vacuum hos	ses	an ala durat	(_
 Intake air pa le the increation 	issage betwe	en air duct	to intake manifol	a		E
YES >> G		<u>Inal :</u>				
NO >> R	econnect the	parts.				F
3.CHECK GR						
1. Turn igniti	ion switch Of	FF.				G
2. Check gro	bund connect	tion E21. Re	efer to Ground In	spection in <u>GI-41, "Circuit Inspection"</u> .		0
Is the inspection	on result nor	mal?				
YES >>G NO >>R	O TO 4. epair or repla	ace around (connection			Н
4. CHECK MA	AF SENSOR	POWER SI				
	ct mass air fl		ensor harness co	onnector		
2. Turn igniti	ion switch Of	N.				
3. Check the	e voltage betv	ween MAF s	sensor harness c	onnector and ground.		
						J
MAF s	Tarminal	Ground	Voltage			
Connector	reminal	Crownd	Dettemuveltere	-		Κ
E lo		Giouna	Ballery vollage	-		
		<u>indi (</u>				1
NO >> G	O TO 6.					L
5.DETECT M	IALFUNCTIO	ONING PAR	т			
Check the follo	owina.					M
 Harness for 	open or shor	t between n	nass air flow sen	sor and IPDM E/R.		
 Harness for 	open or shor	t between n	nass air flow sen	sor and ECM.		
_		, .				Ν
>> R	epair open ci	ircuit or sho	rt to ground or sh	nort to power in harness or connector.		
O .CHECK MA	AF SENSOR	GROUND	CIRCUIT FOR O	PEN AND SHORT		0
1. Turn igniti	ion switch OF	FF.				_
2. Disconner 3. Check the	ct ECM harn	ess connect etween M∆I	ior. E sensor harness	s connector and FCM barness connecto	r	
S. Chook the						Ρ
MAEs	ensor		FCM			

MAF	sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E18	4	F8	52	Existed

4. Also check harness for short to ground and short to power. Is the inspection result normal?

ECM-115

YES >> GO TO 8. NO >> GO TO 7.

7. CHECK MALFUNCTIONING PART

Check the following.

• Harness connectors F123, E6.

• Harness for open or short between mass air flow sensor and ECM.

>> Repair open circuit or short to ground or short to power in harness or connector.

8.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF	sensor	E	Continuity	
Connector Terminal		Connector	Terminal	Continuity
E18	3	F8	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between mass air flow sensor and IPDM E/R.
- Harness for open or short between mass air flow sensor and ECM.

>> Repair open circuit or short to ground or short to power in harness or connector.

10.CHECK MASS AIR FLOW SENSOR

Refer to ECM-116. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace mass air flow sensor.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	MAS A/F SE-B1	
	Ignition switch ON (Engine stopped.)	Approx. 0.4V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

ECM-116

P0102, P0103 MAF SENSOR

< COMPONENT DIAGNOSIS >

[MR20DE]

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector terminals as follows.

						_ ECM	
Connector	(+) Terminal	(-) Torminal	Condition	Voltage		
Connector	Terminal	Connector	Terminal				
				Ignition switch ON (Engine stopped.)	Approx. 0.4V	С	
F8	45 (MAF sensor)	F8	52	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V		
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*	D	
*: Check	for linear voltage	e rise in respo	nse to engir	ne being increased to about 4,000 rpm.			

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

- 1. Turn ignition switch OFF.
- 2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts
- Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check the voltage between ECM harness connector terminals as follows.

	(+)	(-	-)	Condition	Voltago	С
Connector	Terminal	Connector	Terminal	Condition	vollage	
				Ignition switch ON (Engine stopped.)	Approx. 0.4V	Ρ
F8	45 (MAF sensor)	F8	52	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V	
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

ECM-117

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NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

	(+)	(–)	Condition	Voltago	
Connector	Terminal	Connector	Terminal	Condition	vollage	
				Ignition switch ON (Engine stopped.)	Approx. 0.4V	
F8	45 (MAF sensor)	F8	52	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.9 - 1.2V	
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Clean or replace mass air flow sensor.

P0112, P0113 IAT SENSOR

Description

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



Acceptable

0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F)

20

10 6 4

0.2

0.1

-20

Resistance kn 7.0 8.0 7 8.0 7

<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance $k\Omega$
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and 55.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

SEF012P

DTC Logic

INFOID:000000001308068

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	ŀ
P0112	Intake air tempera- ture sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)	L
P0113	Intake air tempera- ture sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Intake air temperature sensor	N

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to ECM-120, "Diagnosis Procedure".
- NO >> INSPECTION END

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P0112, P0113 IAT SENSOR

< COMPONENT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000001308069

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in <u>GI-41. "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.

2. Turn ignition switch ON.

3. Check the voltage between mass air flow sensor harness connector and ground.

MAF	sensor	Ground	Voltage
Connector	Terminal	Oround	vollage
E18	2	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F123, E6

• Harness for open or short between mass air flow sensor (with intake air temperature sensor) and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

${f 4.}$ CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

MAF	sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E18	1	F8	55	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F123, E6

• Harness for open or short between mass air flow sensor (with intake air temperature sensor) and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to ECM-121, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace mass air flow sensor (with intake air temperature sensor).

ECM-120

P0112, P0113 IAT SENSOR

< COMPONENT DIAGNOSIS >

7.CHECH	(INTERMITTENT INC	DENT				Δ
Refer to G	I-39, "Intermittent Inci	dent".				A
>	> INSPECTION END					ECM
Compor	ent Inspection				INFOID:000000001308070	
1. CHECK	K INTAKE AIR TEMPE	RATURE	SENSOR			С
 Turn i Disco Check 	gnition switch OFF. nnect mass air flow se < resistance between r	ensor harne nass air flo	ess connector. w sensor terminals as	follows.		D
Terminals	Condition		Resistance	-		Е
1 and 2	Temperature °C (°F)	25 (77)	1.800 - 2.200 kΩ	-		
Is the insp YES > NO >	ection result normal? > INSPECTION END > Replace mass air flo	ow sensor	(with intake air tempera	ature sensor).		F
						G
						Η
						I
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						K
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P0117, P0118 ECT SENSOR

Description

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance $k\Omega$
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and 44.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:000000001308072

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	
P0117	Engine coolant tem- perature sensor cir- cuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors	
P0118	Engine coolant tem- perature sensor cir- cuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine coolant temperature sensor	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.

2. Check DTC.

Is DTC detected?

- YES >> Go to ECM-123, "Diagnosis Procedure".
- NO >> INSPECTION END

P0117, P0118 ECT SENSOR

< COMPONE	ENT DIAGNO)SIS >	,		[MR20DE]	
Diagnosis	Procedure	!			INFOID:000000001308073	
1.снеск д		INECTION				A
 Turn igni Check gr the inspect 	tion switch OF round connect	FF. tion E21. Ret	fer to Ground Ir	nspection in <u>GI-4</u>	1. "Circuit Inspection".	ECM
YES >> 0 NO >> F	GO TO 2. Repair or repla	ace ground c	onnection.			С
2.CHECK E	CT SENSOR	POWER SU	PPLY CIRCUI	Γ		
 Disconne Turn igni Check th 	ect engine coo tion switch Of le voltage bety	olant tempera N. ween ECT se	ature (ECT) ser ensor harness o	nsor harness con connector and gro	nector. ound.	D
FCT	sensor			_		E
Connector	Terminal	Ground	Voltage			
F28	1	Ground	Approx. 5V	_		F
Is the inspect	tion result nor	mal?		_		
YES >> C NO >> F 3.CHECK F	GO TO 3. Repair open ci CT SENSOR	rcuit or shor	t to ground or s	hort to power in h	narness or connectors.	G
1 Turn igni	tion switch OF	F				Н
2. Disconne	ect ECM harne	ess connecto	or.			
3. Check th	e continuity b	etween ECT	sensor harnes	s connector and	ECM harness connector.	
ECT	sensor		ECM			
Connector	Terminal	Connector	Terminal	Continuity		
F28	2	F8	44	Existed		J
4. Also che	ck harness fo	r short to gro	ound and short	to power.		
Is the inspect	tion result nor	mal?				K
YES >> C NO >> F	30 10 4. Repair open ci	rcuit or shor	t to ground or s	hort to power in h	narness or connectors.	
4.CHECK E	NGINE COOL	ANT TEMP		NSOR		L
Refer to ECM	<u>1-123, "Comp</u>	onent Inspec	<u>tion"</u> .			
Is the inspect	tion result nor	mal?				
YES >> C	GO TO 5.	o ocolont tor	ma aratura agaa			IVI
	керіасе ендіп Ітерміттем		-	JOI.		
		t Incident"				Ν
	<u>a, mermiller</u>	IL IIICIUEIIL.				
>>	NSPECTION	END				0
Componer	nt Inspectio	on			INFOID:000000001308074	
1. СНЕСК Е			ERATURE SEM	ISOR		Ρ
1 Turn igni	tion switch OF	======================================			-	

Turn ignition switch OFF.
 Disconnect engine coolant temperature sensor harness connector.
 Remove engine coolant temperature sensor.

P0117, P0118 ECT SENSOR

< COMPONENT DIAGNOSIS >

4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition			Resistance
			20 (68)	2.1 - 2.9 kΩ
1 and 2	Temperature	°C (°F)	50 (122)	0.68 - 1.00 kΩ
			90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



P0122, P0123 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to ECM-247, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	Harness or connectors (TP sensor 2 circuit is open or shorted.)	H
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	 Electric throttle control actuator (TP sensor 2) 	I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second. M Check DTC. 2. Is DTC detected? YES >> Go to ECM-125, "Diagnosis Procedure". Ν NO >> INSPECTION END Diagnosis Procedure INFOID:000000001308077 1. CHECK GROUND CONNECTION 1. Turn ignition switch OFF. Ρ 2. Check ground connection E21. Refer to Ground Inspection in GI-41. "Circuit Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT Disconnect electric throttle control actuator harness connector. 1

2. Turn ignition switch ON.

ECM-125

INFOID:000000001308075



INFOID:000000001308076

Throttle position sensor

Sensor 1

6.0

4.0

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sensor

Throttle position s output voltage 0.7

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P0122, P0123 TP SENSOR

< COMPONENT DIAGNOSIS >

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	control actuator	Ground	Voltago
Connector	Terminal	Giouna	voltage
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

${f 3.}$ CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	e control actuator	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	control actuator	E	Continuity	
Connector	Terminal	Connector Terminal		
F29	3	F8	34	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to ECM-127, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to ECM-127, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

ECM-126

ECM-127

P0122, P0123 TP SENSOR

< COMPONENT DIAGNOSIS >

Component Inspection

1.CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- ECM 3. Perform ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement". 4. Turn ignition switch ON. Set shift lever to D (CVT) or 1st (M/T) position. 5. С Check the voltage between ECM harness connector terminals as follows. 6. (+) (-) D Condition Voltage Connector Terminal Connector Terminal Fully released More than 0.36V 33 Е (TP sensor 1 signal) Fully depressed Less than 4.75V F8 F8 36 Accelerator pedal Fully released Less than 4.75V 34 (TP sensor 2 signal) Fully depressed More than 0.36V F Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2. 2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace electric throttle control actuator. Н 2. Go to ECM-127, "Special Repair Requirement". >> INSPECTION END Special Repair Requirement INFOID:000000001308079 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement" Κ >> GO TO 2. 2. PERFORM IDLE AIR VOLUME LEARNING L Refer to ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement" >> END Μ Ν
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INFOID:000000001308078

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Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

Rich Ideal ratio Lean Mixture ratio SEF288D

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DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	heated oxygen sensor 1 cir- cuit high voltage	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or short- ed.) Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.







COMPONE	NT DIAGNO	DSIS >			
2.PERFORM	DTC CONF	IRMATION PI	ROCEDURE		
. Start engi . Turn igniti . Restart er . Check 1st <u>s 1st trip DTC</u> YES >> G	ne and warm on switch Ol ngine and let t trip DTC. is detected o to ECM-12	n it up to norm FF and wait at it idle for 2 mi ? 29. "Diagnosis	al operating t t least 10 sec inutes. <u>Procedure"</u> .	temperature. onds.	
)iagnosis I	Procedure				INIEC/ID-202020201120808
					IN-012.50000000 IS0806
.CHECK G					
Check gro	on switch Oi ound connec on result nor	гг. tion E21. Refe <u>mal?</u>	er to Ground	Inspection in	GI-41, "Circuit Inspection".
YES >> G NO >> R RETIGHTE	O TO 2. epair or repla N HEATED	ace ground co OXYGEN SEI	onnection. NSOR 1		
posen and re	tighten heat	ed oxygen ser	nsor 1.		
oosen and re	tighten heat	ed oxygen ser	nsor 1. ka-m. 37 ft-	lb)	
oosen and re Tighte	etighten heat ning torque	ed oxygen ser e: 50 N·m (5.1	nsor 1. kg-m, 37 ft-	lb)	
oosen and re Tighte >> G	etighten heat Ining torque O TO 3.	ed oxygen ser e: 50 N·m (5.1	nsor 1. kg-m, 37 ft- l	lb)	
oosen and re Tighte >> G	etighten heat Ining torque O TO 3.)2S1 GROU	ed oxygen ser e: 50 N·m (5.1 ND CIRCUIT	nsor 1. kg-m, 37 ft- FOR OPEN /	I b) AND SHORT	
oosen and re Tighte >> G CHECK HC . Disconne	etighten heat ning torque O TO 3. D2S1 GROU	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1	nsor 1. kg-m, 37 ft- FOR OPEN A harness cor	Ib) AND SHORT	
oosen and re Tighte >> G .CHECK HC . Disconner Check ba	etighten heat ning torque O TO 3. D2S1 GROU ct heated ox ct ECM harn rpess continu	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between b	nsor 1. kg-m, 37 ft- FOR OPEN harness cor to HO2S1 barne	AND SHORT	and FCM barness connector
oosen and re Tighte >> G CHECK HC Disconnee Disconnee Check ha	etighten heat ning torque O TO 3. D2S1 GROU ct heated ox ct ECM harn rness contine	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between H	nsor 1. kg-m, 37 ft- FOR OPEN <i>J</i> harness cor - HO2S1 harne	Ib) AND SHORT inector. ess connector	and ECM harness connector.
oosen and re Tighte >> G CHECK HO Disconnee Disconnee Check ha	etighten heat ning torque O TO 3. D2S1 GROU of heated oxy of ECM harn rness continu	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between H	nsor 1. kg-m, 37 ft- FOR OPEN harness cor r. HO2S1 harne	AND SHORT Inector. ess connector	and ECM harness connector.
oosen and re Tighte >> G CHECK HC Disconner Disconner Check ha HO2 Connector	etighten heat ning torque O TO 3. D2S1 GROU ct heated oxy ct ECM harn rness continu :S1 Terminal	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between F EC Connector	nsor 1. kg-m, 37 ft- FOR OPEN harness cor to HO2S1 harne CM Terminal	Ib) AND SHORT Inector. ess connector Continuity	and ECM harness connector.
oosen and re Tighte >> G CHECK HC Disconnee Disconnee Check ha HO2 Connector F30	etighten heat ning torque O TO 3. D2S1 GROU It heated oxi It ECM harn rness continu IS1 Terminal	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between H EC Connector F8	nsor 1. kg-m, 37 ft- FOR OPEN A harness cor HO2S1 harne CM Terminal 56	AND SHORT mector. ess connector Continuity existed	and ECM harness connector.
oosen and re Tighte >> G CHECK HC Disconne Disconne Check ha HO2 Connector F30 Also chec	etighten heat ening torque O TO 3. D2S1 GROU ct heated oxy ct ECM harn rness continu S1 Terminal 1 k harness fo	ed oxygen ser 50 N-m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between H EC Connector F8 or short to grou	nsor 1. kg-m, 37 ft- FOR OPEN A harness cor r. HO2S1 harne CM Terminal 56 und and short	AND SHORT Inector. ess connector Continuity existed to power.	and ECM harness connector.
oosen and re Tighte >> G CHECK HC Disconnee Disconnee Check ha HO2 Connector F30 Also chec the inspecti	etighten heat ening torque O TO 3. D2S1 GROU ct heated oxy ct ECM harn rness continu S1 Terminal 1 k harness fo on result nor	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between F EC Connector F8 or short to grou <u>mal?</u>	nsor 1. kg-m, 37 ft- FOR OPEN <i>J</i> harness cor HO2S1 harne CM Terminal 56 und and short	AND SHORT Inector. ess connector Continuity existed t to power.	and ECM harness connector.
oosen and re Tighte >> G CHECK HC Disconnee Disconnee Check ha HO2 Connector F30 Also chect the inspection YES >> G NO	etighten heat ening torque O TO 3. D2S1 GROU ct heated oxy ct ECM harn rness continu 2S1 Terminal 1 k harness fo <u>on result nor</u> O TO 4. enair open c	ed oxygen ser 50 N-m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between H EC Connector F8 or short to grou mal?	nsor 1. kg-m, 37 ft- FOR OPEN harness cor r. HO2S1 harne CM Terminal 56 und and short to ground or	AND SHORT Inector. ess connector Continuity existed to power.	and ECM harness connector.
oosen and re Tighte >> G .CHECK HC . Disconnee . Disconne . Disconnee . Disconnee . Disc	etighten heat ening torque O TO 3. D2S1 GROU ct heated ox ct ECM harn rness continu S1 Terminal 1 k harness fo on result nor O TO 4. epair open c	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between F Connector F8 or short to grou mal? ircuit or short f	nsor 1. kg-m, 37 ft- FOR OPEN harness cor HO2S1 harne CM Terminal 56 und and short to ground or CUIT FOR O	AND SHORT Inector. ess connector Continuity existed to power. short to powe	and ECM harness connector.
oosen and re Tighte >> G CHECK HC Disconnee Disconnee Disconnee Check ha HO2 Connector F30 Also chece the inspection YES >> G NO >> R CHECK HC Check ha	etighten heat ening torque O TO 3. D2S1 GROU ct heated oxy ct ECM harn rness continu 2S1 1 k harness fo on result nor O TO 4. epair open c D2S1 INPUT	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between H EC Connector F8 or short to grou mal? SIGNAL CIRC	nsor 1. kg-m, 37 ft- FOR OPEN harness cor r. HO2S1 harne CM Terminal 56 und and short to ground or CUIT FOR O HO2S1 harne	AND SHORT Inector. ess connector Continuity existed to power. short to power PEN AND Shore connector	and ECM harness connector.
oosen and re Tighte >> G .CHECK HC . Disconnee . D	etighten heat ening torque O TO 3. D2S1 GROU ct heated oxy ct ECM harn rness continu S1 Terminal 1 k harness fo on result nor O TO 4. epair open c D2S1 INPUT rness continu	ed oxygen ser 50 N·m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between H Connector F8 or short to grou <u>mal?</u> ircuit or short to SIGNAL CIRC uity between H	nsor 1. kg-m, 37 ft- FOR OPEN A harness cor HO2S1 harne CM Terminal 56 und and short to ground or CUIT FOR O HO2S1 harne	AND SHORT Inector. ess connector Continuity existed to power. short to powe PEN AND SH ess connector	and ECM harness connector.
oosen and re Tighte >> G CHECK HC Disconnee Disconnee Disconnee Check ha HO2 Connector F30 Also chece the inspection YES >> G NO >> R CHECK HC Check ha	etighten heat ening torque O TO 3. D2S1 GROU ct heated oxy ct ECM harn rness continu 2S1 Terminal 1 k harness fo on result nor O TO 4. epair open c D2S1 INPUT rness continu	ed oxygen ser 50 N-m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between F Connector F8 or short to grou mal? SIGNAL CIRC uity between F	nsor 1. kg-m, 37 ft- FOR OPEN harness cor HO2S1 harne CM Terminal 56 und and short to ground or CUIT FOR O HO2S1 harne CM	AND SHORT mector. ess connector Continuity existed to power. short to powe PEN AND Sheess connector	and ECM harness connector.
oosen and re Tighte >> G .CHECK HC . Disconner . Disconner . Disconner . Check ha HO2 Connector F30 . Also checc : the inspectir YES >> G NO >> R .CHECK HC . Check ha HO2 Connector	etighten heat ening torque O TO 3. D2S1 GROU ct heated oxy ct ECM harn rness continu 2S1 Terminal 1 k harness fo on result nor O TO 4. epair open c D2S1 INPUT rness continu	ed oxygen ser 50 N-m (5.1 ND CIRCUIT ygen sensor 1 ess connector uity between H Connector F8 or short to grou mal? SIGNAL CIRC uity between H EC Connector	nsor 1. kg-m, 37 ft- FOR OPEN A harness cor Anticess c	AND SHORT Inector. ess connector Continuity existed to power. short to powe PEN AND Sheess connector	and ECM harness connector.

HC	02S1	E	CM	Ground	Continuity	
Connector	Terminal	Connector	Terminal	Cround	Continuity	
F30	4	F8	49	Ground	Not existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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< COMPONENT DIAGNOSIS >

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connector for water.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to ECM-130, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set "POST TRIGGER" to 100% in "DATA MONITOR" mode with CONSULT-III.
- 3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
- 4. Hold engine speed at 2,000 rpm under no load during the following steps.
- 5. Touch "RECORD" on CONSULT-III screen.
- 6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
 5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle | 1 | 2 | 3 | 4 | 5 | HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R R means HO2S1 MNTR (B1) indicates RICH

L means HO2S1 MNTR (B1) indicates LEAN

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ECM-130

< COMPONENT DIAGNOSIS >

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-	-)	Condition	Voltago
Connector	Terminal	Connector	Terminal	Condition	voltage
F8	49 (HO2S1 signal)	F8	56	Engine speed held at 2,000 rpm constant un- der no load.	 The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. The maximum voltage is over 0.6V at least 1 time. The minimum voltage is below 0.3V at least 1 time. The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES	>> INSPECTION END
NO	>> GO TO 4

Replace heated oxygen sensor 1.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

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Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



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INFOID:000000001308085

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DTC DETECTION LOGIC

DTC Logic

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Heated oxygen sensor 1 circuit slow response	 The response of the voltage signal from the sensor takes more than the specified time. 	 Harness or connectors (The sensor circuit is open or short- ed.) Heated oxygen sensor 1 Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks PCV valve Mass air flow sensor
DTC CON	FIRMATION PROCED	URE	

D٦	C CONFIRMATION	PROCEDUR
1.	PRECONDITIONING	





< COMPONENT DIAGNOSIS >

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		10010 >			[
If DTC Colleast 10 se TESTING	nfirmation Pro conds before CONDITION:	cedure has conducting	s been pre the next t	eviously conducted, all est.	ways turn ignition switch OFF and wait at	А
Always pe	erform at a ter	nperature	above -10)°C (14°F).	weltage is more than 11V at idle	
Do you boy		ollowing Illi2	procedure	e, confirm that batter	y voltage is more than 11v at idle.	EC
		<u>III (</u>				
NO >	> GO TO 2. > GO TO 3.					
2.PERFO	RM DTC CON	IFIRMATIC		EDURE-I		С
1. Start e	ngine and war	m it up to i	normal ope	erating temperature.		D
2. Stop e	ngine and wai	t at least 1	0 seconds			
3. Turn iq	gnition switch	ON and se	elect "HO2	S1 (B1) P0133" of "H	O2S1" in "DTC WORK SUPPORT" mode	
4 Touch	UNSULT-III. "START"					E
5. Start e	ngine and let i	t idle for at	least 3 mi	inutes.		
NOTE	:					_
Never	raise engine	speed ab	ove 3,600) rpm after this step.	If the engine speed limit is exceeded,	Г
6. When	the following c	onditions a	are met. "T	ESTING" will be displa	aved on the CONSULT-III screen. Maintain	
the co	nditions contin	uously unt	il "TESTIN	IG" changes to "COMI	PLETED". (It will take approximately 40 to	G
50 sec	conds.)					
	ION: ve drive vehicl	la at a caf	cood			
Alway	s anve venici	e al a Sale	e speed.			Н
ENG SPEE	D	CVT 1.3	300 - 3 500 rr	m	-	
		M/T: 1,3	00 - 3,500 rp	m		
VHCL SPEI	ED SE	More that	an 80 km/h (5	50 MPH)	_	I
B/FUEL SC	HDL	CVT: 3 -	15 msec		_	
		M/T: 3 -	15 msec			J
Shift lever		Suitable	position			
If "TE	STING" is not	displayed	l after 5 m	ninutes, retry from st	_ ep 2.	
7. Touch	"SELF-DIAG F	RESULTS"				K
Which disp	layed on COU	ISULT-III s	creen?			
OK >:	> INSPECTIO	N END.				
NG >:	> Go to <u>ECM-1</u>	134, "Diagr	nosis Proc	<u>edure"</u> .		L
J. PERFO	RM COMPON	ENT FUN	CTION CH	IECK		
Without	CONSULT-III					R/
1. Start e	ngine and war	m it up to	normal ope	erating temperature.		IV
2. Set vo	Imeter probes	between E	CM harne	ess connector terminal	s as tollows.	
						Ν
	(+)	1)	Condition	Voltaga	
	(+)	(-) T - modia at	Condition	voitage	
Connector	Ierminal	Connector	Ierminal			С

Connector	Terminal	Connector	Terminal		
F8	49 (HO2S1 signal)	F8	56	Engine speed held at 2,000 rpm constant un- der no load.	 The voltage fluctuates between 0 yo 0.3v and 0.6 to 1.0v more than 5 times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Go to ECM-134, "Diagnosis Procedure".

< COMPONENT DIAGNOSIS >

Diagnosis Procedure

[MR20DE]

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2

NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten the heated oxygen sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 5.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>ECM-17, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>ECM-161. "DTC Logic"</u> or <u>ECM-165.</u> "DTC Logic".

NO >> GO TO 6.

6.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.

- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

ECM-134

< COMPONENT DIAGNOSIS >

HC	02S1		ECM		Orationity	A	
Connector	Terminal	Connecto	r Ter	minal	Continuity		
F30	1	F8		56	existed	FC	
4. Also che	ck harness	s for short to g	round an	d short t	to power.	20	
Is the inspec	<u>tion result r</u>	normal?					
YES >> (GO TO 7.	n oircuit ar ab	ort to are		hart to now ar in hornoop or connectors	С	
				PUT 510	SNAL CIRCUIT FOR OPEN AND SHORT	D	
1. Turn igni 2 Disconne	ition switch ect FCM ha	OFF. arness conne	ctor				
3. Check th	ne continuit	y between HC	02S1 har	ness cor	nnector and ECM harness connector.		
						E	
HO2	S1	ECM		Continu	ity		
Connector	Terminal	Connector	Terminal			F	
F30	1	F8	56	Existe	d		
4. Check th	ne continuit	y between HC	02S1 har	ness cor	nnector or ECM harness connector and ground.		
	04	501				G	
HU2	S1 Torrecipal	ECIV	Torrainal	Ground	Continuity		
E20	Terminal	Connector		Ground	Not ovisted	Н	
F30	4	Fo for chart to n	49	Ground	NOT EXISTEN		
Is the inspec	tion result r	normal?	ower.				
YES >> (<u>GO TO 8.</u>					I	
NO >> F	Repair oper	n circuit or sh	ort to gro	und or sl	hort to power in harness or connectors.		
8.CHECK M	IASS AIR F	LOW SENS	DR			J	
Check mass	air flow ser	nsor.					
Refer to ECN	<u>/I-116, "Cor</u>	mponent Insp	<u>ection"</u> .			K	
Is the inspec	tion result r	normal?				N.	
YES >> (NO >> F	30 TO 9. Replace ma	ass air flow se	ensor.				
9.CHECK P	CV VALVE					L	
	4-305 "Cor	monent Insp	ection"				
Is the inspect	tion result r	normal?				М	
YES >> (<u>GO TO 10.</u>					111	
NO >> F	Repair or re	eplace PCV v	alve.				
10.снеск	HEATED	OXYGEN SE	NSOR 1			Ν	
Perform ECN	/I-136, "Cor	mponent Insp	ection".				
Is the inspec	tion result r	normal?				\cap	
YES >> (GO TO 11.					0	
11 outout	Replace he	ated oxygen	sensor 1.				
II.CHECK	INTERMIT	I ENT INCID	ENT			P	
Refer to GI-3	<u>89, "Intermit</u>	ttent Incident"					

>> INSPECTION END

Component Inspection

INFOID:000000001308087

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 1

- (B) With CONSULT-III
- T. Start engine and warm it up to normal operating temperature.
- 2. Set "POST TRIGGER" to 100% in "DATA MONITOR" mode with CONSULT-III.
- 3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
- 4. Hold engine speed at 2,000 rpm under no load during the following steps.
- 5. Touch "RECORD" on CONSULT-III screen.
- 6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
 5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

```
cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R
```

R means HO2S1 MNTR (B1) indicates RICH L means HO2S1 MNTR (B1) indicates LEAN

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CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES >> INSPECTION END

3.CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Check the voltage between ECM harness connector terminals as follows under the following condition.

< COMPONENT DIAGNOSIS >

[MR20DE]

	(+)	(-)		Condition Voltage		А
Connector	Terminal	Connector	Terminal	Condition	Voltage	_
F8	49 (HO2S1 signal)	F8	56	Engine speed held at 2,000 rpm constant un- der no load.	 The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. The maximum voltage is over 0.6V at least 1 time. The minimum voltage is below 0.3V at least 1 time. The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 	C D
CAUTION:						Е

 Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

 Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 4

4.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- · Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

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P0134 HO2S1

Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



04 0.21 οv

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	Harness or connectors (The sensor circuit is open or shorted.)Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle. Do you have CONSULT-III?

DTC Logic

DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.





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YES >> GO TO 2. NO >> GO TO 3.							
2.PERFORM DTC CONFIRMATION PROCEDURE-I							
 With CONSULT-III Start engine and warm it up to normal operating temperature. Stop engine and wait at least 10 seconds. 	EC						
 Turn ignition switch ON and select "HO2S1 (B1) P0134" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-III. Touch "START". 	C						
 Start engine and let it idle for at least 3 minutes. NOTE: Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, roturn to stop 5 							
 When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.) CAUTION: 	n D E						
Always drive vehicle at a safe speed.	F						
ENG SPEED CVT: 1,300 - 3,500 rpm M/T: 1,300 - 3,500 rpm							
VHCL SPEED SE More than 80 km/h (50 MPH)	0						
B/FUEL SCHDL CVT: 3 - 15 msec M/T: 3 - 15 msec							
Shift lever Suitable position							
If "TESTING" is not displayed after 5 minutes, retry from step 2. 7. Touch "SELF-DIAG RESULTS".	I						
Which displayed on COUSULT-III screen?							
NG >> Go to ECM-139, "Diagnosis Procedure".	J						
3. PERFORM COMPONENT FUNCTION CHECK							
 WITH GST Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM harness connector teaminals as follows. 	K						
(+) (-) Voltage	-						
Connector Terminal Connector Terminal	M						
F849 (HO2S1 signal)F856Engine speed held at 2,000 rpm constant under no load.• The voltage dose not remain in the range of 0.2 to 0.4.	F849 (HO2S1 signal)F856Engine speed held at 2,000 rpm constant under no load.• The voltage dose not remain in the range of 0.2 to 0.4.						
Is the inspection result normal? YES >> INSPECTION END. NO >> Go to ECM-139, "Diagnosis Procedure".	N						
Diagnosis Procedure	0						

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2

NO >> Repair or replace ground connection.

 $2. {\sf CHECK} \ {\sf HO2S1} \ {\sf GROUND} \ {\sf CIRCUIT} \ {\sf FOR} \ {\sf OPEN} \ {\sf AND} \ {\sf SHORT}$

P0134 HO2S1

< COMPONENT DIAGNOSIS >

1. Disconnect heated oxygen sensor 1 harness connector.

2. Disconnect ECM harness connector.

3. Check harness continuity between ECM harness connector and HO2S1 harness connector.

HO	2S1	E	Continuity		
Connector Terminal		Connector Terminal		Continuity	
F30	1	F8	56	Existed	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 ${
m 3.check}$ Ho2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

НО	2S1	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F30	4	F8	49	Existed

2. Check harness continuity between ECM harness connector or HO2S1 harness connector and ground.

HO	2S1	E	CM	Ground	Continuity
Connector	Terminal	Connector	Terminal	Cibulia	Continuity
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HEATED OXYGEN SENSOR 1

Refer to ECM-140, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 1

(I) With CONSULT-III

1. Start engine and warm it up to normal operating temperature.

2. Set "POST TRIGGER" to 100% in "DATA MONITOR" mode with CONSULT-III.

3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".

4. Hold engine speed at 2,000 rpm under no load during the following steps.

ECM-140

P0134 HO2S1

< COMPONENT DIAGNOSIS >



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• Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 4

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4.REPLACE HEATED OXYGEN SENSOR 1
```

Replace heated oxygen sensor 1.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

P0135 HO2S1 HEATER

< COMPONENT DIAGNOSIS >

P0135 HO2S1 HEATER

SYSTEM DESCRIPTION

Description

INFOID:000000001308092

[MR20DE]

Input Signal to ECM ECM function Sensor Actuator Camshaft position sensor (PHASE) Engine speed Heated oxygen sensor 1 Heated oxygen sensor 1 Crankshaft position sensor (POS) heater control heater Mass air flow sensor Amount of intake air The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started. DTC Logic INFOID:000000001308093 DTC DETECTION LOGIC DTC No. Trouble diagnosis name DTC detecting condition Possible cause The current amperage in the heated oxygen sensor Harness or connectors 1 heater circuit is out of the normal range. (The heated oxygen sensor 1 heater Heated oxygen sensor 1 P0135 heater control circuit low (An excessively low voltage signal is sent to ECM circuit is open or shorted.) through the heated oxygen sensor 1 heater.) Heated oxygen sensor 1 heater DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than between 11V at Jidle.

>> GO TO 2.		K
2. PERFORM DTC CONFIRMATION PROCEDURE		
 Turn ignition switch ONb and wait at least 5 seconds. Check 1st trip DTC. 		L
Is 1st trip DTC detected?		
YES >> Go to <u>ECM-143, "Diagnosis Procedure"</u> . NO >> INSPECTION END		M
Diagnosis Procedure	INFOID:000000001308094	
1. CHECK GROUND CONNECTION		Ν
 Turn ignition switch OFF. Check ground connection E21. Refer to Ground Inspection in <u>GI-41, "Circuit Inspection"</u>. 		0
Is the inspection result normal?		
YES >> GO TO 2. NO >> Repair or replace ground connection.		Ρ
∠.CHECK HO2S1 POWER SUPPLY CIRCUIT		
1. Disconnect heated oxygen sensor 1 harness connector.		

2. Turn ignition switch ON.

3. Check the voltage between HO2S1 sensor 1 harness connector and ground.

ECM-143

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P0135 HO2S1 HEATER

НО	2S1	Ground	Voltage	
Connector	Terminal	Ground		
F30	2	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F123, E6

• 15A fuse (No. 63)

Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F30	3	F7	3	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to ECM-144, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch OFF.

ECM-144
P0135 HO2S1 HEATER

< COMPONENT DIAGNOSIS >

2. Disconnect HO2S1 harness connector.

Terminals	Resistance [at 25°C (77°F)]	-	
2 and 3	3.4 - 4.4 Ω	-	ECM
1 and 2, 3, 4	$\infty \Omega$	_	
4 and 1, 2, 3	(Continuity should not exist)		С
Is the inspection resu	<u>ult normal?</u>	-	0
YES >> INSPEC NO >> GO TO 2	TION END 2.		D
	ED OXYGEN SENSOR 1		
CAUTION: • Discard any sens	gen sensor 1. or which has been dropped fr	om a height of more than 0.5 m (19.7 in) onto a hard	Е
 Before installing Cleaner tool and a 	concrete floor; use a new one new sensor, clean exhaust sy approved anti-seize lubricant.	e. Arstem threads using Heated Oxygen Sensor Thread	F
>> INSPEC	TION END		G
			Η
			I
			J
			К
			L
			M

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P0138 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic

INFOID:000000001308097

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.

			PBIB184
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 2 minutes.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to ECM-147, "Diagnosis Procedure".
- NO >> INSPECTION END





[MR20DE]

INFOID:000000001308096

P0138 HO2S2

[MR20DE]

Diagnos	is Proc	edure				INFOID:000000001308098
1.CHECK	GROUN	ND CONNE	ECTION			
 Turn ig Check Is the insp 	gnition sv ground (ection re:	vitch OFF. connection sult norma	E21. Ref	er to Gro	ound Inspection in <u>GI-41, "Circuit Inspection"</u> .	
YES >	> GO TO	2.				
NO >	> Repair	or replace	ground co	onnectio		
	HO2S2	GROUND	CIRCUIT		PEN AND SHORT	
 Discor Discor Discor Check 	nnect hea nnect EC the cont	ated oxyge M harness inuity betw	n sensor 2 connecto /een HO23	2 harnes r. S2 harne	ess connector.	
HO2	S2	E	СМ			
Connector	Terminal	Connector	Terminal	- Continu	uity	
E58	1	F8	59	Existe	ed	
4. Also c	heck har	ness for sh	ort to grou	und and	short to power.	
Is the insp	ection re	<u>sult norma</u>	<u> ?</u>			
YES >	> GO TO > GO TO	4.				
				рт		
Chook the						
• Harness	conector	,. 's F121, E7	7			
 Harness 	for open	or short be	etween he	ated oxy	ygen sensor 2 and ECM.	
	Deneir			4.0		
T. Check	the cont	multy betw		52 name	ess connector and ECM harness connector.	
HO2	S2	EC	CM		<u> </u>	
Connector	Terminal	Connector	Terminal	Continu	ity	
E58	4	F8	50	Existe	d	
2. Check	the cont	inuity betw	een HO2	S2 harne	ess connector or ECM harness connector and g	ground.
	_					
HO2	2S2	EC	CM	Ground	Continuity	
Connector	Terminal	Connector	Terminal	0		
E58	4		50	Ground	NOT EXISTED	
J. AISO C	neck nar	ness for Sr	1017 TO DOM	/er.		
YFS >	> GO TO	6	<u>L (</u>			
NO >	> GO TO	5.				
5.DETEC	TED MA	LFUNCTIO	DNING PA	RT		
Check the	following	J.				
• Harness	conector	s F121, E	7			
 Harness 	for open	or short be	etween he	ated oxy	ygen sensor 2 and ECM.	

>> Repair open circuit or short to ground or short to power in harness or connectors.

$6. {\sf CHECK} \hbox{ HO2S2 CONNECTOR FOR WATER}$

< COMPONENT DIAGNOSIS >

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace harness or connectors.

7.CHECK HEATED OXYGEN SENSOR 2

Refer to ECM-148. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



INFOID:000000001308099

[MR20DE]

< COMPONENT DIAGNOSIS >

Is the inspection result normal? А YES >> INSPECTION END NO >> GO TO 6. 3.CHECK HEATED OXYGEN SENSOR 2-I ECM Without CONSULT-III Start engine and warm it up to the normal operating temperature. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 4. Let engine idle for 1 minute. 5. Check the voltage between ECM harness connector terminals as follows under the following condition. D (+) (-) Condition Voltage Connector Terminal Connecor Terminal The voltage should be above 0.68V at least once during this procedure. 50 Revving up to 4,000 rpm under 59 F8 F8 (HO2S2 signal) no load at least 10 times The voltage should be below 0.50V at least once during this procedure. F Is the inspection result normal? >> INSPECTION END YES NO >> GO TO 4. 4.CHECK HEATED OXYGEN SENSOR 2-II Check the voltage between ECM harness connector terminals as follows under the following condition. Н ECM Condition Voltage + Terminal Connector Connecor Terminal The voltage should be above 0.68V at Keeping engine speed at idle 50 least once during this procedure. F8 F8 59 (HO2S2 signal) for 10 minutes The voltage should be below 0.50V at least once during this procedure. Is the inspection result normal? Κ YES >> INSPECTION END NO >> GO TO 5. 5.CHECK HEATED OXYGEN SENSOR 2-III L Check the voltage between ECM harness connector terminals as follows under the following condition. Μ ECM Condition Voltage + Ν Connector Terminal Connecor Terminal The voltage should be above 0.68V at Coasting from 80 km/h (50 least once during this procedure. 50 F8 F8 MPH) in Dposition (CVT), 4th 59 (HO2S2 signal) The voltage should be below 0.50V at least gear position (M/T) once during this procedure. Always drive cehicle at a safe speed. Is the inspection result normal? Ρ >> INSPECTION END YES NO >> GO TO 6. **6.**REPLACE HEATED OXYGEN SENSOR 2 Replace heated oxygen sensor 2. CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

P0139 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond be- tween rich and lean than the specified time.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks 	K

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION

For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

Never stop engine during this procedure. If the engine is stopped, retry this procedure from PERFORM PRO-CEDURE FOR COND1 - II.

ECM-151

, reny mis procedure

Holder

Zirconia tube





Heater pad

INFOID:000000001308100

Μ

Ν

A

ECM

D

F

3.PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5.PERFORM PROCEDURE FOR COND1-III

- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 1.
- 2. Let engine idle 1 minute.
- Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III. 3.
- Touch "START". 4
- 5. Start engine and let it idle for at least 30 seconds.
- Rev engine up to 2,000 rpm two or three times guickly under no load.

Is "CONPLETED" appears on CONSULT-III screen?

YES >> GO TO 9.

NO >> GO TO 6.

6.PERFORM PROCEDURE FOR COND1-IV

When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-III screen. Maintain the condition continuously until "TESTING" changes to "COMPLETED" (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.

COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7. COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until "INCOMPLETED" at "COND2" on CONSULT-III screen has turned to "COMPLETED". (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 8. COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8.PERFORM PROCEDURE FOR COND3-I

Stop vehicle and let it idle until "INCOMPLETED" of "COND3" on CONSULT-III screen has turned to "COM-PLETED". (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9.PERFORM PROCEDURE FOR COND3-II

Touch "SELF DIAGRESULTS".

Which displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to <u>ECM-154</u>, "Diagnosis Procedure". CAN NOT BE DIAGNOSED>>GO TO 10.

< COMPONENT DIAGNOSIS >

[MR20DE]

10.PERFORM PROCEDURE FOR COND3-III А 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle). Turn ignition switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III. 2. 3. Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-III. ECM When "COOLAN TEMP/S" indication reaches to 70°C (158°F). 4. >> GO TO 5. 11.PREFORM COMPONENT FUNCTION CHECK Perform component function check. Refer to ECM-153, "Component Function Check". NOTE: D Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed. Is the inspection result normal? Е YES >> INSPECTION END NO >> Go to ECM-154, "Diagnosis Procedure". Component Function Check INFOID:000000001308102 1.PERFORM COMPONENT FUNCTION CHECK-I Without CONSULT-III Start engine and warm it up to the normal operating temperature. 1. 2. Turn ignition switch OFF and wait at least 10 seconds. Н Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3. Let engine idle for 1 minute. 4 Check the voltage between ECM harness connector terminals as follows under the following condition. 5. (+) (-) Condition Voltage Connector Terminal Connector Terminal 50 Revving up to 4,000 rpm un-A change of voltage should be more than F8 F8 59 (HO2S2 signal) der no load at least 10 times 0.12 V for 1 second during this procedure. Is the inspection result normal? Κ YES >> INSPECTION END NO >> GO TO 2. 2. PERFORM COMPONENT FUNCTION CHECK-II Check the voltage between ECM harness connector terminals as follows under the following condition. M (+) (-) Voltage Condition Terminal Connector Connector Terminal 50 A change of voltage should be more than Keeping engine speed at idle F8 F8 59 Ν (HO2S2 signal) for 10 minutes 0.12 V for 1 second during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 3. 3. PERFORM COMPONENT FUNCTION CHECK-III Ρ Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltago
Connector	Terminal	Connector	Terminal	Condition	voltage
F8	50 (HO2S2 signal)	F8	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 3rd gear position (M/T)	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Always drive vehicle at a safe speed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECM-154, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>ECM-17</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR : Special Repair Requirement"</u>.
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>ECM-161, "DTC Logic"</u> or <u>ECM-165,</u> "DTC Logic".
- NO >> GO TO 3.

 $\mathbf{3}$.check H02S2 ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E58	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Check the following..

Harness connectors F121, E7

Harness for open or short between heated oxygen sensor 2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

ECM-154

INFOID:000000001308103

< COMPONENT DIAGNOSIS >

HO2	2S2	EC	M	0	Constinution it	
Connector	Terminal	Connector	Terminal	Ground	Continuity	
E58	4	F8	50	Ground	Not existed	
3. Also c	heck hari	ness for sh	ort to pov	ver.	L	
Is the insp	ection res	sult normal	?			
YES >	> GO TO	7.				
NO >	> GO TO	6.				
b. REPLA	CE HEAT	FED OXYG	EN SENS	SOR 2		
Check the	following	l				
Harness	connecto	ors F121, E	7 twoon ho	atod ox		2 and ECM
• 110111655	ioi open			aleu ux	ygen sense	
>	> Renair	open circu	it or short	to arou	nd or short	o power in harness or connectors
				R 2		
				tion"		
	<u>011-100,</u>	Compone sult normal	nt inspec 2	<u>uun</u> .		
YES >			<u>:</u>			
NO >	> GO TO > GO TO	8.				
8.REPLA	CE HEAT		EN SENS	SOR 2		
Banlaga h		<u></u>				
 Béfore i Cleaner 	nstalling tool and	new oxy approved	gen sens I anti-seiz	sor, clea ze lubrio	an exhaust cant.	system threads using Oxygen Sensor Thread
>	> INSPE	CTION EN	D			
9.CHECK	INTERN	AITTENT II	NCIDENT			
Refer to G	I-39, "Inte	ermittent In	cident".			
>	> INSPE	CTION EN	D			
Compon	ent Ins	pection				INFOID:000000001308104
1.INSPEC		TART				
Do you ha	ve CONS	SULT-III?				
Do you ha	ve CONS	SULT-III?				
YES >	> GO TO	2.				
NO >	> GO TO	3.				
2.CHECK	HEATE		N SENSO	R 2		
(B)With CO	ONSULT-					
1. Turn iq	gnition sw	vitch ON ar	nd select '	"Data N	IONITOR"	node with CONSULT-III.
2. Start e	ngine an	d warm it u	up to the r	normal o	perating te	perature.
4. Start e	ingine an	d keep the	engine st	beed be	tween 3.50	and 4.000 rpm for at least 1 minute under no load.
			5			

- Let engine idle for 1 minute.
 Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

< COMPONENT DIAGNOSIS >





"HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.50V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltago	
Connector	Terminal	Connector	Terminal	Condition	Voltage	
F8	50 (HO2S2 signal)	F8	59	Revving up to 4,000 rpm un- der no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltago
Connector	Terminal	Connector	Terminal	Condition	volage
F8	50 (HO2S2 signal)	F8	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

< COMPONENT DIAGNOSIS >

[MR20DE]

Connector Terminal Connector Terminal Consumption Consumption F8 50 F8 59 Consumption Consumption The voltage should be above 0.68V at least once during this procedure. The voltage should be above 0.50V at least once during this procedure. Always drive at a safe speed. Is the inspection result normal? The voltage should be above 0.50V at least once during this procedure. State inspection result normal? VSS > NOPECTION END NO >> GO TO 6. CAUTION: O >> GO TO 6. Constant of the proper during this procedure. The voltage should be above 0.50V at least once during this procedure. Periods have beated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. The solid beated oxygen Sensor Thread cleaner tool and approved anti-seize lubricant. >> INSPECTION END >> INSPECTION END >> INSPECTION END		(+)	(-	_)	Condition	Voltage
F8 60 (HO2S2 signal) F8 59 Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear posi- tion (MT) The voltage should be above 0.80V at least once during this procedure. Always drive at a safe speed. Is the inspection result normal? The voltage should be above 0.80V at least once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> 60 To 6. SC.REPLACE HEATED OXYGEN SENSOR 2 Explace heated oxygen sensor 2. CAUTION: O biscard any heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END >> INSPECTION END >> >> INSPECTION END >>	Connector	Terminal	Connector	Terminal		voltage
Always drive at a safe speed. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 6. 6. REPLACE HEATED OXYGEN SENSOR 2 Replace heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. • Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END >> INSPECTION END	F8	50 (HO2S2 signal)	F8	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear posi- tion (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.
Is the inspection result normal? YES → INSPECTION END N → SGTO 6. 6. REPLACE HEATED OXYGEN SENSOR 2 Replace heated oxygen sensor vhich has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. 9 Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END	Always dri	ve at a safe sp	eed.			
YES >> INSPECTION END NO >> GO TO 6. 6. REPLACE HEATED OXYGEN SENSOR 2 Replace heated oxygen sensor 2. CAUTON: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. • Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END	Is the insp	ection result ne	ormal?			
6.REPLACE HEATED OXYGEN SENSOR 2 Replace heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. • Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END >> INSPECTION END	YES > NO >	> INSPECTIO > GO TO 6.	N END			
Replace heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. • Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END	6.REPLA	CE HEATED C	DXYGEN S	ENSOR 2		
CAUTONE • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. • Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread cleaner tool and approved anti-seize lubricant. >> INSPECTION END	Replace h	eated oxygen	sensor 2.			
 bison and surface such as a concrete floor; use a new one. Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END 		: any heated a		oor which	has been drepped from a	hoight of more than $0.5 m / 40.7$
 Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END 	in) onto	a hard surfac	e such as	a concret	e floor; use a new one.	
> INSPECTION END	Before	installing new	voygen s	sensor, cle	ean exhaust system threads	s using Oxygen Sensor Thread
>> INSPECTION END	Cleaner		oven anti-	-30120 IUDI	ivant.	
	>	> INSPECTIO	N END			

Ρ

P0141 HO2S2 HEATER

Description

[MR20DE]

INFOID:000000001308105

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator	
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2	Heated oxygen sensor 2 heater	
Engine coolant temperature sensor	Engine coolant temperature	heater control		
Mass air flow sensor	Amount of intake air			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
 Below 3,600 rpm after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	ON

DTC Logic

INFOID:000000001308106

INFOID:000000001308107

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0141	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- Turn ignition switch ON and wait at least 5 seconds.
- 2. Check 1st trip DTC.

(a) With GST

Follow the procedure "With CONSULT-III" above.

Is 1st tip DTC detected?

- YES >> Go to ECM-158. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

P0141 HO2S2 HEATER

< COMPONENT DIAGNO	SIS >			[MR20DE]
 Turn ignition switch OF Check ground connect 	F. ion E21. Re	fer to Ground I	nspection in <u>GI-41, "Circuit Inspection"</u> .	A
Is the inspection result norr	mal?			
YES >> GO TO 2. NO >> Repair or repla	ice ground c	connection.		ECM
2.CHECK HO2S2 POWE	R SUPPLY (CIRCUIT		
1. Disconnect heated oxy	gen sensor	2 harness coni	nector.	
 Turn ignition switch ON Check the voltage betw 	N. veen HO2S2	2 harness conn	ector and ground.	C
10262			_	D
Connector Terminal	Ground	Voltage		
E58 2	Ground	Battery voltage	—	F
Is the inspection result norr	mal?		-	_
YES >> GO TO 4.				
NO >> GO TO 3.				F
3. DETECT MALFUNCTIC	NING PAR	Г		
Check the following.				G
 15A fuse (No. 63) Harness for open or shore 	t hetween h	eated oxygen s	sensor 2 and fuse	_
>> Repair open ci	rcuit or shor	t to ground or s	short to power in harness or connectors.	Н
4. CHECK HO2S2 OUTPL	JT SIGNAL (OPEN AND SHORT	
1 Turn ignition switch OF	F			
2. Disconnect ECM harne	ess connecto	or.		
3. Check the continuity be	etween HO2	S2 harness co	nnector and ECM harness connector.	
				J
HU2S2	Connector	ECM	Continuity	
E58 3	F7	Terminai	Evisted	K
4 Also check harness for	short to are	und and short	to power	
Is the inspection result nor	mal?		to power.	
YES $>>$ GO TO 6.				L
NO >> GO TO 5.				
5. DETECT MALFUNCTIC	NING PART	г		Μ
Check the following.				
Harness connectors F122	2, E8			
 Harness for open or shor 	t between h	eated oxygen s	sensor 2 and ECM	N
>> Renair open ci	rcuit or shor	t to around or s	short to power in barness or connectors	
6.CHECK HEATED OXYC	GEN SENSC	DR 2 HEATER		0
Refer to ECM-160, "Compo	onent Inspec	<u>ction"</u> .		
Is the inspection result nor	mal?			Р
YES >> GO TO 8.				
NU >> GU TU 7.				
I.REPLACE HEATED OX	YGEN SEN	SOR 2		

Replace heated oxygen sensor 2. CAUTION:

P0141 HO2S2 HEATER

< COMPONENT DIAGNOSIS >

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001308108

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- 3. Check resistance between HO2S2 terminals as follows.

Terminals	Resistance [at 25°C (77°F)
2 and 3	3.3 - 4.4 Ω
1 and 2, 3, 4	$\Omega \propto$
4 and 1, 2, 3	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

< COMPONENT DIAGNOSIS >

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000001308109

[MR20DE]

ECM

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	- F
P0171	Fuel injection system too lean	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Intake air leaks Heated oxygen sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to <u>ECM-17, "MIXTURE RATIO SELF-LEARNING VALUE</u> CLEAR : Special Repair Requirement"	
2. Start engine.	L
Is it difficult to start engine?	
YES >> GO TO 3. NO >> GO TO 4.	M
3.RESTART ENGINE	
If it is difficult to start engine, the fuel injection system has a malfunction, too. Crank engine while depressing accelerator pedal.	Ν
Does engine start?	
YES >> Go to <u>ECM-162, "Diagnosis Procedure"</u> . NO >> Check exhaust and intake air leak visually.	0
4. PERFORM DTC CONFIRMATION PROCEDURE-II	
 Start engine and let it idle for at least 10 minutes. Check 1st trip DTC. 	Ρ
Is 1st trip DTC detected?	
YES >> Go to <u>ECM-162, "Diagnosis Procedure"</u> . NO >> GO TO 5.	
5. PERFORM DTC CONFIRMATION PROCEDURE-III	
1. Turn ignition switch OFF and wait at least 10 seconds.	

Turn ignition switch OFF and wait at least 10 seconds.

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< COMPONENT DIAGNOSIS >

INFOID:000000001308110

 Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed in the freeze frame data ± 400 rpm		
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)	
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).	
	When the freeze frame data shows higher than or equal to 70 $^{\circ}$ C (158 $^{\circ}$ F), T should be higher than or equal to 70 $^{\circ}$ C (158 $^{\circ}$ F).	

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECM-162, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 2.

2. CHECK FOR INTAKE AIR LEAK

- 1. Listen for an intake air leak after the mass air flow sensor.
- 2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace.

3.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between heated oxygen sensor 1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F30	4	F8	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

< COMPONENT DIAGNOSIS >

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Connector	Terminal	Connector	Terminal	Ground	Continuity	
F30	4	F8	49	Ground	Not existed	
6. Also c	heck harn	ess for sho	ort to powe	er.		EC
Is the insp	ection resu	ult normal?				
YES >	> GO TO 4	4.				С
NO >	> Repair o	pen circuit	or short t	o grouno	d or short to power in harness or connectors.	
4.CHEC	K FUEL PR	RESSURE				
1. Relea	se fuel pre	ssure to ze	ero. Refer	to <u>ECM</u>	-349, "Inspection".	D
2. Install	fuel press	ure gauge	and chec	k fuel pr	essure. Refer to <u>ECM-349, "Inspection"</u> .	
٨+	idling: An	provimate	aly 350 kg	Da (3 57	ka/cm^2 51 nci)	Е
In the iner	ontion room	ult normal?	iy 550 ki	a (5.57		
		an normal? S				
NO >	> GO TO 5	5. 5.				F
5. DETEC	CT MALFU	INCTIONIN	IG PART			
Check fue	I hoses an	d fuel tube	s for cloa	aina.		G
Is the insp	ection resu	ult normal?		0 0		
YES >	> Replace	"fuel filter	and fuel p	oump as	sembly".	Ц
NO >	> Repair o	r replace				
D .CHEC	K MASS AI	R FLOW S	SENSOR			
With Co	ONSULT-II	I j				
1. Install 2 Check	all remove MASS A	ed parts.	in "DATA	MONIT	OR" mode with CONSULT-III	
For sp	ecification	, refer to <u>E</u>	<u>CM-352.</u>	<u>"Mass A</u>	<u>sir Flow Sensor"</u> .	.
With G	ST					0
1. Install 2 Check	all remove	ed parts. flow senso	r signal in	Service	s \$01 with GST	
For sp	ecification	, refer to <u>E</u>	<u>CM-352,</u>	"Mass A	<u>ir Flow Sensor"</u> .	K
Is the mea	surement	value withi	n the spe	cificatior	<u>?</u>	
YES >	> GO TO 7	7.	for runted	l to recipio	le or lease connections in the mass sir flow concer sirewit or	L
NU >	arounds.	. Refer to E	CM-114.	i termina DTC L	als or loose connections in the mass air now sensor circuit or odic".	
7.CHECK			EL INJEC	TOR	<u></u> -	
						N
1. Start e	engine.	•				
2. Perfor	m "POWE	R BALANC	CE" in "AC		EST" mode with CONSULT-III.	Ν
3. Make	sure that e	each circuit	produces	s a mom	ientary engine speed drop.	
Withou		.T-III				
1. Let er	igine idle.					С

< COMPONENT DIAGNOSIS >

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>ECM-293, "Component Function Check"</u>.



8. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- Remove fuel tube assembly. Refer to <u>EM-36, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

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< COMPONENT DIAGNOSIS >

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

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DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	F	
P0172	Fuel injection system too rich	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	 Heated oxygen sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor 	G	
DTC CO	NFIRMATION PROC	EDURE		Ц	
1.PREC	ONDITIONING				
If DTC Colleast 10 s	onfirmation Procedure seconds before conduct	has been previously conducted, always tur ing the next test.	n ignition switch OFF and wait at		
2.perf	>> GO TO 2. ORM DTC CONFIRMA ⁻	TION PROCEDURE-I		J	
1. Clear <u>CLEA</u> 2. Start	r the mixture ratio self-le AR : Special Repair Rec engine.	arning value. Refer to <u>ECM-17, "MIXTURE</u> juirement".	RATIO SELF-LEARNING VALUE	K	
YES : NO :	>> GO TO 3. >> GO TO 4. ART ENGINE			L	
If it is diffi	cult to start engine, the	fuel injection system has a malfunction, too).	M	
Crank en	gine while depressing a	ccelerator pedal.			
YES : NO :	>> Go to <u>ECM-166, "Di</u> >> Remove spark plugs	agnosis Procedure". and check for fouling, etc.		Ν	
4.PERF	ORM DTC CONFIRMA	TION PROCEDURE-II		0	
1. Start	engine and let it idle for	at least 10 minutes.		0	
Is 1st trip YES : NO :	<u>s 1st trip DTC detected?</u> YES >> Go to <u>ECM-166, "Diagnosis Procedure"</u> . NO >> GO TO 5.				
5.PERF	ORM DTC CONFIRMA	TION PROCEDURE-III			
1. Turn	ignition switch OFF and	l wait at least 10 seconds.			

Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
 Held the accelerator pedal as steady as possible.

Hold the accelerator pedal as steady as possible.

ECM-165

[MR20DE]

< COMPONENT DIAGNOSIS >

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The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ±400 rpm
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)
Engine coolent temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 $^{\circ}$ C (158 $^{\circ}$ F), T should be higher than or equal to 70 $^{\circ}$ C (158 $^{\circ}$ F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECM-166, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000001308112

1.CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace. NO >> GO TO 2.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect heated oxygen sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between heated oxygen sensor 1 harness connector and ECM harness connector.

HO2S1 sensor 1		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F30	4	F8	49	Existed

 Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

HO2S1 sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector Terminal		Ground	Continuity
F30	4	F8	49	Ground	Not existed

P0172 FUEL INJECTION SYSTEM FUNCTION	
< COMPONENT DIAGNOSIS >	[MR20DE]
6. Also check harness for short to power.	
Is the inspection result normal?	A
YES >> GO TO 4.	
NO >> Repair open circuit or short to ground or short to power in harness or connectors.	ECM
 Release fuel pressure to zero. Refer to <u>ECM-349, "Inspection"</u>. Install fuel pressure gauge and check fuel pressure. Refer to <u>ECM-349, "Inspection"</u>. 	С
At idling: Approximately 350 kPa (3.57 kg/cm ² , 51 psi)	
Is the inspection result normal?	D
YES >> GO TO 6.	
NO $>>$ GO 10 5. 5 DEFENTING FUNCTIONING FURT	
J. DETECT MALFUNCTIONING PART	
Check fuel hoses and fuel tubes for clogging.	
Is the inspection result normal?	F
YES >> Replace "fuel filter and fuel pump assembly".	
6 CHECK MASS AIR FLOW SENSOR	
	G
 With CONSULT-III Install all removed parts. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. For specification, refer to <u>ECM-352</u>, "Mass Air Flow Sensor". 	Н
 Install all removed parts. Check mass air flow sensor signal in "Service \$01" with GST. For specification, refer to <u>ECM-352</u>, "<u>Mass Air Flow Sensor</u>". 	I
Is the measurement value within the specification?	I
 YES >> GO TO 7. NO >> Check connectors for rusted terminals or loose connections in the mass air flow sense grounds. Refer to <u>ECM-114, "DTC Logic"</u>. 	sor circuit or
7. CHECK FUNCTION OF FUEL INJECTOR	K
With CONSULT-III	
1. Start engine.	L
 Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III. Make sure that each circuit produces a momentary engine speed drop. 	
5. Make sure that each chould produces a momentary engine speed drop.	Ν. //
Without CONSULT-III	IVI
Let engine idle. Listen to each fuel injector operating sound	
	Ν
Clicking noise should be heard.	

Is the inspection result normal?

- YES >> GO TO 8.
- >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>ECM-293, "Component Function Check"</u>. NO

Suitable Ο Э tool Click Click Ρ Click Click PBIB3332E

$8. {\sf CHECK FUELINJECTOR}$

Remove fuel injector assembly. Refer to <u>EM-36, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube. 1.

< COMPONENT DIAGNOSIS >

- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injectors.
- Crank engine for about 3 seconds. Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39. "Intermittent Incident".

>> INSPECTION END

P0222, P0223 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to <u>ECM-247, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	 Harness or connectors (TP sensor 1 circuit is open or shorted.)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	Electric throttle control actuator (TP sensor 1)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Start engine and let it idle for 1 second. Check DTC. <u>Is DTC detected?</u> YES >> Go to <u>ECM-169, "Diagnosis Procedure"</u>. NO >> INSPECTION END Diagnosis Procedure <u>1.CHECK GROUND CONNECTION</u> Turn ignition switch OFF. Check ground connection E21. Refer to Ground Inspection in <u>GI-41, "Circuit Inspection"</u>. Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.

2. Turn ignition switch ON.

ECM-169

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INFOID:000000001308115



P0222, P0223 TP SENSOR

< COMPONENT DIAGNOSIS >

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle c	Ground	Voltago	
Connector	Terminal	Giouna	vollage
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 ${f 3.}$ CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle of	control actuator	ECM		Continuity
Connector Terminal		Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 ${f 4.}$ CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle of	control actuator	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	2	F8	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to ECM-171, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

Go to <u>ECM-171, "Special Repair Requirement"</u>.

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

ECM-171

P0222, P0223 TP SENSOR

< COMPONENT DIAGNOSIS > **Component Inspection**

1.CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- ECM 3. Perform ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement". 4. Turn ignition switch ON. Set shift lever to D (CVT) or 1st (M/T) position. 5. С Check the voltage between ECM harness connector terminals as follows. 6. (+) (-) D Condition Voltage Connector Terminal Connector Terminal Fully released More than 0.36V 33 Е (TP sensor 1 signal) Fully depressed Less than 4.75V F8 F8 36 Accelerator pedal Fully released Less than 4.75V 34 (TP sensor 2 signal) Fully depressed More than 0.36V F Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2. 2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace electric throttle control actuator. Н 2. Go to ECM-171, "Special Repair Requirement". >> INSPECTION END Special Repair Requirement INFOID:000000001308117 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement" Κ >> GO TO 2. 2. PERFORM IDLE AIR VOLUME LEARNING Refer to ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement" L >> END Μ

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< COMPONENT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:000000001308118

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DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)

On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MI will blink.

When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.

When the misfire condition decreases to a level that will not damage the TWC, the MI will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink. When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on. If another misfire condition occurs that can damage the TWC, the MI will begin to blink again.

 Two Trip Detection Logic (Exhaust quality deterioration) For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MI will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	Improper spark plug
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	Insufficient compression Incorrect fuel pressure
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	The fuel injector circuit is open or shorted
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	Fuel injector Intake air leak
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	 The ignition signal circuit is open or shorted Lack of fuel Signal plate Heated oxygen sensor 1 Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Restart engine and let it idle for about 15 minutes.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECM-173, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.

< COMPONENT DIAGNOSIS >

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

			С
Engine speed	Engine speed in the freeze frame data ±400 rpm		
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)		D
Engine coolant temperature (T)	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).		D
condition	When the freeze frame data shows higher than or equal to 70 $^\circ C$ (158 $^\circ F), T$ should be higher than or equal to 70 $^\circ C$ (158 $^\circ F).$		Е
The time to driving vari	es according to the engine speed in the freeze frame data.		
			F
Engine speed	Time		
Around 1,000 rpm	Approximately 10 minutes		
Around 2,000 rpm	Approximately 5 minutes		G
More than 3,000 rpm	Approximately 3.5 minutes		
3. Check 1st trip DTC.			Н
Is 1st trip DTC detected?			
YES >> Go to <u>ECM-173</u> NO >> INSPECTION I	<u>3, "Diagnosis Procedure"</u> . END		
Diagnosis Procedure		INFOID:000000001308119	1
1. CHECK FOR INTAKE A	IR LEAK AND PCV HOSE		J
1. Start engine and run it	at idle speed.		
2. Listen for the sound of	the intake air leak.		k
Is intake air leak detected?			I.
YES >> Discover air lea	ak location and repair		
NO >> GO TO 2.			L
2.CHECK FOR EXHAUST	SYSTEM CLOGGING		
Stop engine and visually ch	neck exhaust tube, three way catalyst and muffler for dents.		М
Is the inspection result norr	nal?		
YES-1 >> With CONSUL	T-III: GO TO 3.		
NO >> Repair or repla	ULI-III: GO TO 4. ce it		Ν
3 PERFORM POWER BA			
			0
1 Start engine			0
2. Perform "POWER BAL	ANCE" in "ACTIVE TEST" mode with CONSULT-III.		
3. Make sure that each ci	rcuit produces a momentary engine speed drop.		Ρ
Is the inspection result norr	nal?		
YES >> GO TO 9. NO >> GO TO 4.			

4. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.

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< COMPONENT DIAGNOSIS >

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>ECM-294, "Component Inspection"</u>.



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse in IPDM E/R to release fuel pressure. **NOTE:**

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Check ignition coil, power transistor and their circuits. Refer to <u>ECM-299, "Component Function</u> <u>Check"</u>.



< COMPONENT DIAGNOSIS >

[MR20DE]

7. CHECK SPARK PLUG А Check the initial spark plug for fouling, etc. Is the inspection result normal? YES >> Replace spark plug(s) with standard type one(s). For ECM spark plug type, refer to EM-18, "Removal and Installation". NO >> Repair or clean spark plug. Then GO TO 8. D SEF156 8. CHECK FUNCTION OF IGNITION COIL-III Е 1. Reconnect the initial spark plugs. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and 2. the grounded portion. F Spark should be generated. Is the inspection result normal? YES >> INSPECTION END NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-18, "Removal and Installation". Н 9. CHECK COMPRESSION PRESSURE Check compression pressure. Refer to EM-23, "Inspection". Is the inspection result normal? YES >> GO TO 10. NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets. **10.**CHECK FUEL PRESSURE 1. Install all removed parts. Release fuel pressure to zero. Refer to ECM-349, "Inspection". 2. Install fuel pressure gauge and check fuel pressure. Refer to ECM-349. "Inspection". Κ 3. At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi) Is the inspection result normal? YES >> GO TO 12. NO >> GO TO 11. Μ 11. DETECT MALFUNCTIONING PART Check fuel hoses and fuel tubes for clogging. Ν Is the inspection result normal? YES >> Replace "fuel filter and fuel pump assembly". NO >> Repair or replace. 12. CHECK IGNITION TIMING For procedure, refer to ECM-10, "BASIC INSPECTION : Special Repair Requirement". For specification, refer to ECM-352, "Idle Speed" and ECM-352, "Ignition Timing". Ρ Is the inspection result normal? YES >> GO TO 13. NO >> Follow the ECM-14, "IGNITION TIMING : Special Repair Requirement". 13.CHECK HEATED OXYGEN SENSOR 1 HEATER Refer to ECM-144, "Component Inspection". Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace heated oxygen sensor 1.

14.CHECK MASS AIR FLOW SENSOR

With CONSULT-III

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.

For specification, refer to ECM-352, "Mass Air Flow Sensor".

With GST

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to ECM-352, "Mass Air Flow Sensor".

Is the measurement value within the specification?

- YES >> GO TO 15.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>ECM-114, "DTC Logic"</u>.

15. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in ECM-337, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace.

16.ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>ECM-74</u>, "<u>Diagnosis</u> <u>Description</u>".

>> GO TO 17.

17. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:000000001308121

DTC DETECTION LOGIC

				D
DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause	-
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)	E
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Knock sensor	– F

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.	1
2. PERFORM DTC CONFIRMATION PROCEDURE	1
 Start engine and run it for at least 5 seconds at idle speed. Check 1st trip DTC. 	J
Is 1st trip DTC detected?	
YES >> Go to <u>ECM-177, "Diagnosis Procedure"</u> . NO >> INSPECTION END	K
Diagnosis Procedure	
1. CHECK GROUND CONNECTION	L
 Turn ignition switch OFF. Check ground connection E21. Refer to Ground Inspection in <u>GI-41, "Circuit Inspection"</u>. Is the inspection result normal? 	M
YES >> GO TO 2. NO >> Repair or replace ground connection.	Ν
Z.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
 Disconnect knock sensor harness connector and disconnect ECM harness connector. Check the continuity between knock sensor harness connector and ECM harness connector. 	0
Knock sensor ECM	
Connector Terminal Connector Terminal	Ρ

Also check harness for short to ground and short to powe
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F8

Is the inspection result normal?

2

YES >> GO TO 3.

F12

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Existed

ECM-177

INFOID:000000001308120

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P0327, P0328 KS

< COMPONENT DIAGNOSIS >

INFOID:000000001308123

$\mathbf{3}$.check knock sensor input signal circuit for open and short

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock s	sensor	EC	Continuity	
Connector Terminal		Connector		
F12	1	F8	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK KNOCK SENSOR

Refer to ECM-178, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace knock sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK KNOCK SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect knock sensor harness connector.
- Check resistance between knock sensor terminals as follows. NOTE:

It is necessary to use an ohmmeter which can measure more than 10 M Ω .

Terminals	Resistance [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones. <u>Is the inspection result normal?</u>

YES >> INSPECTION END

NO >> Replace knock sensor.

P0335 CKP SENSOR (POS)

< COMPONENT DIAGNOSIS >

P0335 CKP SENSOR (POS)

Description

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.



DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0335	Crankshaft position sen- sor (POS) circuit	 The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine run- ning. 	 Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) Crankshaft position sensor (POS) Refrigerant pressure sensor Accelerator pedal position sensor Signal plate 	K L M

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.

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P0335 CKP SENSOR (POS)

< COMPONENT DIAGNOSIS >

Is 1st trip DTC detected?

- YES >> Go to ECM-180, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000001308126

[MR20DE]

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.

2. Turn ignition switch ON.

3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sen	sor (POS)	Ground	Voltago	
Connector Terminal		Giouna	voltage	
F20	1	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sens	sor (POS)	ECM		Continuity	
Connector Terminal		Connector	Terminal	Continuity	
F20	1	F8	75	Existed	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F8	74	Refrigerant pressure sensor	E49	3		
	75	CKP sensor (POS)	F20	1		
E16 102 APP sensor		APP sensor	E110	5		

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.

Refrigerant pressure sensor (Refer to <u>ECM-306, "Diagnosis Procedure"</u>.)

Is the inspection result normal?
P0335 CKP SENSOR (POS)

YES >> GO TO 6. A NO >> Replace malfunctioning components. A 6.CHECK APP SENSOR Refer to ECM-273. "Component Inspection". ECM Is the inspection result normal? YES >> GO TO 12. C NO >> GO TO 7. C C 7.REPLACE ACCELERATOR PEDAL ASSEMBLY C C 1. Replace accelerator pedal assembly. 2. Go to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement". D >> INSPECTION END E 8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT E 1. Turn ignition switch OFE. E
6. CHECK APP SENSOR Refer to ECM-273. "Component Inspection". Is the inspection result normal? YES >> GO TO 12. NO >> GO TO 7. 7. REPLACE ACCELERATOR PEDAL ASSEMBLY 1. Replace accelerator pedal assembly. 2. Go to ECM-14. "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement". >> INSPECTION END 8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFE.
Refer to ECM-273. "Component Inspection". ECM Is the inspection result normal? YES >> GO TO 12. NO >> GO TO 7. C 7.REPLACE ACCELERATOR PEDAL ASSEMBLY C 1. Replace accelerator pedal assembly. C 2. Go to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement". D >> INSPECTION END E 8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT E
Is the inspection result normal? Is the inspection result normal? YES >> GO TO 12. NO >> GO TO 7. 7.REPLACE ACCELERATOR PEDAL ASSEMBLY C 1. Replace accelerator pedal assembly. C 2. Go to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement". D >> INSPECTION END E 8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT E
YES >> GO TO 12. NO >> GO TO 7. 7.REPLACE ACCELERATOR PEDAL ASSEMBLY 1. Replace accelerator pedal assembly. 2. Go to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Require- ment". > INSPECTION END 8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFE.
NO >> GO TO 7. C 7.REPLACE ACCELERATOR PEDAL ASSEMBLY 1. Replace accelerator pedal assembly. D 2. Go to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement". D >> INSPECTION END E 8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT E 1. Turn ignition switch OFE. E
1. Replace accelerator pedal assembly. 2. Go to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement". D >> INSPECTION END E 8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF.
 2. Go to <u>ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".</u> > INSPECTION END E 8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. Image: Comparison of the system o
>> INSPECTION END B.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF.
8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF.
1. Turn ignition switch OFF.
 Disconnect ECM harness connector. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.
CKP sensor (POS) ECM Continuity
Connector Terminal Connector Terminal
F202F862ExistedH
4. Also check harness for short to ground and short to power.
Is the inspection result normal?
YES >> GO TO 9. NO >> Repair open circuit or short to ground or short to power in harness or connectors
9. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.
CKP sensor (POS) ECM Continuity
Connector Terminal Connector Terminal
F20 3 F8 61 Existed
2. Also check harness for short to ground and short to power.
Is the inspection result normal?
NO >> Repair open circuit or short to ground or short to power in harpess or connectors
10. CHECK CRANKSHAFT POSITION SENSOR (POS)
1U. CHECK CRANKSHAFT POSITION SENSOR (POS) Refer to ECM-182, "Component Inspection".
1U. CHECK CRANKSHAFT POSITION SENSOR (POS) Refer to ECM-182, "Component Inspection". Is the inspection result normal?
1U. CHECK CRANKSHAFT POSITION SENSOR (POS) Refer to ECM-182, "Component Inspection". Is the inspection result normal? YES YES
10.CHECK CRANKSHAFT POSITION SENSOR (POS) Refer to ECM-182, "Component Inspection". Is the inspection result normal? YES >> GO TO 11. NO >> Replace crankshaft position sensor (POS). 11 ourself of the sensor of the sensor (POS).
10.CHECK CRANKSHAFT POSITION SENSOR (POS) N Refer to ECM-182, "Component Inspection". N Is the inspection result normal? YES >> GO TO 11. NO >> Replace crankshaft position sensor (POS). O 11.CHECK GEAR TOOTH O
10.CHECK CRANKSHAFT POSITION SENSOR (POS) N Refer to ECM-182, "Component Inspection". N Is the inspection result normal? YES >> GO TO 11. NO >> Replace crankshaft position sensor (POS). O 11.CHECK GEAR TOOTH Visually check for chipping signal plate gear tooth. P
10.CHECK CRANKSHAFT POSITION SENSOR (POS) Refer to ECM-182, "Component Inspection". Is the inspection result normal? YES >> GO TO 11. NO >> Replace crankshaft position sensor (POS). 11.CHECK GEAR TOOTH Visually check for chipping signal plate gear tooth. Is the inspection result normal? YES YES >> CO TO 12
10.CHECK CRANKSHAFT POSITION SENSOR (POS) Refer to ECM-182, "Component Inspection". Is the inspection result normal? YES >> GO TO 11. NO >> Replace crankshaft position sensor (POS). 11.CHECK GEAR TOOTH Visually check for chipping signal plate gear tooth. Is the inspection result normal? YES >> GO TO 12. NO >> Replace the signal plate.

Refer to GI-39, "Intermittent Incident".

< COMPONENT DIAGNOSIS >

>> INSPECTION END

Component Inspection

1.CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace crankshaft position sensor (POS).



2.CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or $\infty \Omega$
2 (+) - 3 (-)	

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace crankshaft position sensor (POS).

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< COMPONENT DIAGNOSIS >

P0340 CMP SENSOR (PHASE)

Description

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes. ECM receives the signals as shown in the figure.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0340 is displayed with DTC P1129, first perform the trouble diagnosis for DTC P1129. Refer to <u>ECM-247, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0340	Camshaft position sen- sor (PHASE) circuit	 The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	 Harness or connectors (The sensor circuit is open or shorted) Camshaft position sensor (PHASE) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery 	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.

ECM-183

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< COMPONENT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to ECM-184, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECM-184, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.

NO >> Check starting system.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21 Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

 $\mathbf{3.}$ CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.

2. Turn ignition switch ON.

3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP senso	r (PHASE)	Ground	Voltage	
Connector	Terminal	Cround	vollage	
F26	1	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP senso	r (PHASE)	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F26	2	F8	63	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 ${f 5.}$ CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

ECM-184

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< COMPONENT DIAGNOSIS >

[MR20DE]

CMP sensor (PHASE) ECM Connector Terminal						
Connector Terminal Connector Terminal Existed 2 3 F8 65 Existed 2. Also check harness for short to ground and short to power. Is intermination of a short to ground and short to power in harness or connectors. 5. CHECK CAMSHAFT POSITION SENSOR (PHASE) Refer to ECM-195. "Component Inspection." Is the inspection result normal? YES > GO TO 7. NO >> Replate camshaft position sensor (PHASE). 7.CHECK CAMSHAFT (INT) Check the following. • Accumulation of debris to the signal plate of camshaft (1) rear end Is the inspection result normal? YES > GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end Is the inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. So >> Remove debris and clean the signal plate of camshaft position sensor (PHASE). 8.CHECK INTERMITTENT INCIDENT Refer to GL-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1. Turn ignition switch OFF. 2. Usoson the fixing bolt of	CMP senso	r (PHASE)	E	СМ		
F28 3 F8 65 Existed 2. Also check hamess for short to ground and short to power. Is the inspection result normal? YES >> G0 TO 6. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 6.CHECK CAMSHAFT POSITION SENSOR (PHASE) Refer to ECM-185. "Component Inspection". Is the inspection result normal? YES >> GO TO 7. NO >> Replace camshaft position sensor (PHASE). 7.CHECK CAMSHAFT (INT) Check the following. • Accumulation of debris to the signal plate of camshaft (1) rear end • Chipping signal plate of camshaft rear end Is the inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft NO >> Remove debris and clean the signal plate of camshaft NO >> Remove debris and clean the signal plate of camshaft Scheck INTERMITTENT INCIDENT Refer to GL-33. "Intermittent Incident". >> INSPECTION END Component Inspection 1. Tur	Connector	Terminal	Connector	Terminal		
2. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> 60 T0 6. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 6. CHECK CAMSHAFT POSITION SENSOR (PHASE) Refer to ECM-185. "Component Inspection". Is the inspection result normal? YES >> 60 T0 7. NO >> Replace camshaft position sensor (PHASE). 7. CHECK CAMSHAFT (INT) Check the following. • Accumulation of debris to the signal plate of camshaft (1) rear end • Chipping signal plate of camshaft rear end Is the inspection result normal? YES >> 60 T0 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. 8. CHECK INTERMITTENT INCIDENT Refer to GL:39. "Intermittent Incident". >> INSPECTION END Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-1 1. Turn ignition switch OFF. 2. Locosen the fixing both of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. Is the inspection result normal? YES >> GO T0 2. NO >> Replace camshaft position sensor (PHASE). 1. Turn ignition switch OFF. 2. Locosen the fixing both of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. Is the inspection result normal? YES >> GO T0 2. NO >> Replace camshaft position sensor (PHASE). 1. Turn ignition switch OFF. 2. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO T0 2. NO >> Replace camshaft position sensor (PHASE).	F26	3	F8	65	Existed	
Is the inspection result normal? YES >> GO TO 6. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 6. CHECK CAMSHAFT POSITION SENSOR (PHASE) Refer to ECM-185. "Component Inspection". Is the inspection result normal? YES >> GO TO 7. NO >> Replace camshaft position sensor (PHASE). 7. CHECK CAMSHAFT (INT) Check the following. Accumulation of debris to the signal plate of camshaft (1) rear end 6. Chipping signal plate of camshaft rear end 18. the inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. 8. CHECK INTERMITTENT INCIDENT Refer to GI-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-1 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 1. Use the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor. 7. Visually check the sensor. 7. Visually check the sensor for chipping. 1. Strein inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).	2. Also c	heck harr	ness for sh	ort to grou	und and short to power.	
YES >> GOTO 6. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 6.CHECK CAMSHAFT POSITION SENSOR (PHASE) Refer to ECM-185. "Component Inspection". Is the inspection result normal? YES >> GOTO 7. NO >> Replace camshaft position sensor (PHASE). 7.CHECK CAMSHAFT (INT) Check the following. • Accumulation of debris to the signal plate of camshaft (1) rear end • Chipping signal plate of camshaft rear end Is the inspection result normal? YES >> GOTO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. 8.CHECK INTERMITTENT INCIDENT Refer to G1-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-1 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. Is the inspection result normal? YES >> GOTO 2. NO >> Replace camshaft position sensor (PHASE). 2. Loosen the fixing bolt of the sensor (PHASE). 3. Visually check the sensor for chipping. Is the inspection result normal? YES >> GOTO 2. NO >> Replace camshaft position sensor (PHASE). 3. Visually check the sensor for chipping. 3. Visually check the sensor for ch	Is the inspe	ection res	sult normal	<u>?</u>		
Refer to <u>GI-39</u> , <u>"Intermittent Incident"</u> . SCHECK CAMSHAFT POSITION SENSOR (PHASE). 7.CHECK CAMSHAFT (INT) Check the following. Accumulation of debris to the signal plate of camshaft (1) rear end Is the inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. 8.CHECK INTERMITTENT INCIDENT Refer to <u>GI-39</u> , <u>"Intermittent Incident"</u> . >> INSPECTION END Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-1 1. Turn ignition switch OFF. 2. Loosent the fixing bold of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. Is the inspection result normal? YES >> GO TO 8. NO >> Replace camshaft position sensor (PHASE). 2. Loosent the fixing bold of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 2. Loosent for the sensor for chipping. 2. Loosent for the sensor for chipping. 2. Is beinspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 2. Loosent the sensor for chipping. 2. Box Previous Previous PHASE). 2. Dosent the sensor for chipping. 2. Box Phase the sensor for chipping. 3. Disconnect camshaft position sensor (PHASE). 3. Disconnect camshaft position sensor (PHASE). 3	YES >:	> GO TO	6. opon circui	it or chort t	to ground or short to now in harposs or connectors	
Bit Check CAMSHAFT POSITION SENSOR (PHASE) Refer to CLM-185. "Component Inspection". Is the inspection result normal? YES YO YES Check the following. Accumulation of debris to the signal plate of camshaft (1) rear end Is the inspection result normal? YES YES YES Scheck INTERMITTENT INCIDENT Refer to GI-39. "Intermittent Incident". >> INSPECTION END Component Inspection Scheck CAMSHAFT POSITION SENSOR (PHASE)-I 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bold of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. Is the inspection result normal? YES > G0 TO 2. NO >> Replace camshaft position sensor (PHASE).						
Refer to GI-39, "Intermittent Incident". Solution sensor (PHASE). Accumulation of debris to the signal plate of camshaft (1) rear end Check the following. Accumulation of debris to the signal plate of camshaft (1) rear end State inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. BCHECK INTERMITTENT INCIDENT Refer to GI-39, "Intermittent Incident". >> INSPECTION END Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 2. Mode the sensor (PHASE). 2. Mode the sensor (PHASE) harness connector. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. 1. State inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).						
Is the implectation result normal? YES >> GOTO 7. NO >> Replace camshaft position sensor (PHASE). 7.CHECK CAMSHAFT (INT) Check the following. Accumulation of debris to the signal plate of camshaft (1) rear end (Chipping signal plate of camshaft rear end Is the inspection result normal? YES >> GOTO 8. NO >> Remove debris and clean the signal plate of camshaft NO >> Remove debris and clean the signal plate of camshaft Refer to GI-39. "Intermittent INCIDENT Refer to GI-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GOTO 2. NO >> Replace camshaft position sensor (PHASE). NO >> Replace camshaft position sensor (PHASE).	Refer to E	<u>-IVI-185, 1</u>	<u>"Compone</u>	nt Inspecti	<u>ion"</u> .	
NO →> Replace camshaft position sensor (PHASE). 7.CHECK CAMSHAFT (INT) Check the following. Accumulation of debris to the signal plate of camshaft (1) rear end (Sthe inspection result normal? YES →> GO TO 8. NO →> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. 8.CHECK INTERMITTENT INCIDENT Refer to GI-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-1 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor of chipping. Is the inspection result normal? YES →> GO TO 2. NO →> Replace camshaft position sensor (PHASE).			7	<u>r</u>		
7.CHECK CAMSHAFT (INT) Check the following: Accumulation of debris to the signal plate of camshaft (1) rear end Is the inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft NO >> Remove debris and clean the signal plate of camshaft PES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. 8.CHECK INTERMITTENT INCIDENT Refer to GI-39, "Intermittent Incident". >> INSPECTION END Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing boil of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor of chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).	NO >:	> Replace	, . e camshaft	t position s	sensor (PHASE).	
Check the following. Accumulation of debris to the signal plate of camshaft (1) rear end Is the inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. BCCHECK INTERMITTENT INCIDENT Refer to GI-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing boil of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 0. Sensor (PHASE). 0. Sensor 2. NO >> Replace camshaft position sensor (PHASE).	7. СНЕСК		AFT (INT)			
 Accumulation of debris to the signal plate of camshaft (1) rear end Chipping signal plate of camshaft rear end Is the inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. 8. CHECK INTERMITTENT INCIDENT Refer to GI-39, "Intermittent Incident". >> INSPECTION END 0. Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). Wo >> Replace camshaft position sensor (PHASE). 0. Used to result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 0. Used to result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).	Check the	followina	. ,			
 Chipping signal plate of camshaft rear end Is the inspection result normal? YES >> GO TO 8. NO >> Renove debris and clean the signal plate of camshaft rear end or replace camshaft. 8.CHECK INTERMITTENT INCIDENT Refer to GI-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 	Accumul	ation of d	lebris to the	e signal pla	ate of camshaft (1) rear end	
The the inspection result normal? YES >> GO TO 8. NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. B.CHECK INTERMITTENT INCIDENT Refer to G1-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).	Chipping	signal pl	ate of cam	snatt rear	ena	
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. 8.CHECK INTERMITTENT INCIDENT Refer to GI-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor for chipping. Is the inspection result normal? YES >> GOTO 2. NO >> Replace camshaft position sensor (PHASE).			<u>suit normai</u>	<u> </u>		
rear end or replace camshaft.	NO >:	> Remov	e debris a	nd clean t	the signal plate of camshaft	
8.CHECK INTERMITTENT INCIDENT Refer to GI-39, "Intermittent Incident". >> INSPECTION END Component Inspection vocasion (PHASE)-1 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-1 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).		rear en	d or replac	e camshaf	ft.	
8.CHECK INTERMITTENT INCIDENT Refer to GI-39, "Intermittent Incident". >> INSPECTION END Component Inspection versus 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-1 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).						
8.CHECK INTERMITTENT INCIDENT Refer to GI-39. "Intermittent Incident". >> INSPECTION END Component Inspection 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing boli of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).						
8.CHECK INTERMITTENT INCIDENT Refer to GI-39, "Intermittent Incident". >> INSPECTION END Component Inspection 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).						
Refer to GI-39, "Intermittent Incident". >> INSPECTION END Component Inspection Component Inspection 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).					- PBIA95	57J
 >> INSPECTION END Component Inspection A.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Isthe inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 						
>> INSPECTION END Component Inspection December 2012 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Isthe inspection result normal? YES >> GOTO 2. NO >> Replace camshaft position sensor (PHASE).		<u>1-39, IIIte</u>		<u>icident</u> .		
Component Inspection 1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. <u>Is the inspection result normal?</u> YES > GO TO 2. NO >> Replace camshaft position sensor (PHASE).	>:	> INSPE	CTION EN	D		
1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).	Compon	ont Inc	nection	-		
 1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I 1. Turn ignition switch OFF. 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. 1. Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 			pection		INFOID:000000001	1308131
 Turn ignition switch OFF. Loosen the fixing bolt of the sensor. Disconnect camshaft position sensor (PHASE) harness connector. Remove the sensor. Visually check the sensor for chipping. <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 	1.снеск	CAMSH	AFT POSI	TION SEN	NSOR (PHASE)-I	
 2. Loosen the fixing bolt of the sensor. 3. Disconnect camshaft position sensor (PHASE) harness connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 	1. Turn ig	gnition sw	itch OFF.			
 3. Disconnect canishalt position sensor (PHASE) namess connector. 4. Remove the sensor. 5. Visually check the sensor for chipping. <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 	2. Loose	n the fixir	ng bolt of th	ne sensor.	(DLASE) hornood connector	
 5. Visually check the sensor for chipping. <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE). 	4. Remov	ve the se	nsor.	tion senso	or (PHASE) harness connector.	
Is the inspection result normal? YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).	5. Visual	ly check t	he sensor	for chippir	ng.	
YES >> GO TO 2. NO >> Replace camshaft position sensor (PHASE).	Is the inspe	ection res	sult normal	?		
NO >> Replace camshaft position sensor (PHASE).	YES >:	> GO TO	2.			
PBIA9876J	NU >:	> Replace	e camsnaft	position s	sensor (PHASE).	
PBIA9876J						
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РВІА9876Ј						
РВІА9876Ј						
	0				PBIA98	76J

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

< COMPONENT DIAGNOSIS >

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or $\infty \Omega$
2 (+) - 3 (-)	*

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE).

< COMPONENT DIAGNOSIS >

P0420 THREE WAY CATALYST FUNCTION

DTC Logic

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of heated oxygen sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficien- cy below threshold	 Three way catalyst (manifold) does not oper- ate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity. 	 Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F). 7. Open engine hood.
- 8. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
- 9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
- 10. Check the indication of "CATALYST".

Which is displayed on CONSULT-III screen?

ECM-187

INFOID:000000001308132

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ad.

< COMPONENT DIAGNOSIS >

CMPLT>> GO TO 6. INCMP>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.

 Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 6.

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Stop engine and cool it down to less than 70°C (158°F).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6.PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECM-189. "Diagnosis Procedure".

NO >> INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>ECM-188, "Component Function Check"</u>.

NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to ECM-189, "Diagnosis Procedure".

Component Function Check

INFOID:000000001308133

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

4. Let engine idle for 1 minute.

5. Check the voltage between ECM harness connector terminals as follows under the following condition.

	(+)	(-)		Condition		
Connector	Terminal	Connector	Terminal	Condition	Opecification	
F8	49 (HO2S1 signal)	F8	56	Keeping engine speed at 2,000 rpm constant under no load	The voltage switch periodically more than 5 times within 10 seconds.	

Is the inspection result normal?

YES >> GO TO 2

NO >> Go to <u>ECM-132</u>, "DTC Logic".

2. PERFORM COMPONENT FUNCTION CHECK-II

Without CONSULT-III

- 1. Set voltmeter probes between ECM terminals as follows.
- 2. Make sure that the voltage switching frequency (high&low) HO2S2 voltage is very less than that of HO2S1 voltage under the following condition.

< COMPONENT DIAGNOSIS >

[MR20DE]

	(+)	(-	-)	a		А
Connector	Terminal	Connector	Terminal	Condition	Specification	
	49 (HO2S1 signal)		56	Kapping anging speed at 2 000	Switching freqency ratio (A/B) : Less than 0.75	EC№
F8	50 (HO2S2 signal)	F8	59	rpm constant under no load	ing frequency B : Heated oxygen sensor 1 voltage switch- ing frequency	
Is the insp YES NO >	 > INSPECTIO > If the ratio is to <u>ECM-189</u> 	ormal? N END greater tha , "Diagnosis	in above (<u>s Procedu</u>	0.75), it means three way ca <u>re"</u> .	atalyst does not operate properly. Go	D
Diagnos	sis Procedui	re			INFOID:000000001308134	Е
1.CHEC	K EXHAUST S	YSTEM				
Visually c	heck exhaust tu	ubes and m	uffler for a	dent.		F
Is the insp	pection result n	ormal?				
YES > NO >	>> GO TO 2. >> Repair or rep K EXHAUST G	DIACE.				G
						Ц
2. Lister	n for an exhaus	t gas leak b	efore the	three way catalyst (manifold	d).	П
	To exhaust ma	HO2S1		Three way catalyst Three way Manifold) HO2S2 (Under flo	or) Muffler	l J
	➡ : Exhaust gas				SEC502D	Κ
ls exhaus	t gas leak dete	cted?				
YES >	 > Repair or rep > GO TO 3. 	olace.				L
3.CHEC	K INTAKE AIR	LEAK				
Listen for	an intake air le	ak after the	mass air	flow sensor.		M
Is intake a	air leak detected	<u>d?</u>				
YES >	>> Repair or rep >> GO TO 4.	place.				Ν
4.CHEC	K IGNITION TII	MING AND	IDLE SPE	ED		
Check the For specif	e following item fication, refer to	s. Refer to ECM-352,	ECM-10, ' "Ignition	"BASIC INSPECTION : Spe Timing", ECM-352, "Idle Spe	cial Repair Requirement" eed".	0
Is the insp	pection result n	ormal?				
YES > NO >	> GO TO 5. > Follow the <u>E</u> Special Repr	<u>CM-14, "IO</u> air Require	NITION 1 ment".	IMING : Special Repair Rec	quirement",ECM-13, "IDLE SPEED :	Ρ
5. CHEC	K FUEL INJEC	TOR	<u> </u>			
4 044	متعملاتهم متعما فاحج		م م م م الم			

Stop engine and then turn ignition switch ON.
 Check the voltage between ECM harness connector terminals as follows.

< COMPONENT DIAGNOSIS >

(-	+)	(-)		Voltago
Connector	Terminal	Connector	Terminal	vollage
	25			
F 7	29	E16	108	Battery voltage
17	30			
	31			

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>ECM-293, "Diagnosis Procedure"</u>.

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure. NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.



< COMPONENT DIAGNOSIS >

[MR20DE]

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P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE < COMPONENT DIAGNOSIS > [MR20DE]

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

DTC DETECTION LOGIC

 DTC No.
 Trouble diagnosis name
 DTC detecting condition
 Possible cause

 P0444
 EVAP canister purge volume control solenoid valve circuit open
 An excessively low voltage signal is sent to ECM through the valve
 • Harness or connectors (The solenoid valve circuit is open or shorted.)

 • EVAP canister purge volume control solenoid valve circuit
 • ECM through the valve
 • EVAP canister purge volume control solenoid valve circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 13 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to ECM-192. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000001308137

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister control sole	⁻ purge volume enoid valve	Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

ECM-192

INFOID:000000001308135

INFOID:000000001308136

			URGE VC	IUME CONTROL SOLENOID VALVE
YES >> G	O TO 3.	< 010 >		
NO >> G	60 TO 2.			
2.DETECT N	ALFUNCTIC	NING PART		
Check the foll	owing.	F121		
Harness for	open or shor	t between EV	AP canister p	ourge volume control solenoid valve and IPDM E/R
 Harness for 	open or shor	t between EV	AP canister p	ourge volume control solenoid valve and ECM
>> R	enair open ci	rcuit or short f	to around or s	short to power in barness or connectors
3.CHECK EV	VAP CANIST	ER PURGE V		NTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT
FOR OPEN A	ND SHORT			
1. Turn ignit	ion switch OF	F.		
2. Disconne 3. Check the	ct ECM harne e continuity b	etween EVAP	. canister pur	ge volume control solenoid valve barness connector and
ECM harr	ness connect	or.		
	_			+
EVAP canister control sole	purge volume enoid valve	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed
4. Also chec	k harness for	r short to grou	nd and short	to power.
Is the inspecti	ion result nor	<u>mal?</u>		
YES-1 >> W	/ith CONSUL /ithout CONS	T-III: GO TO 4	i. O 5	
NO >> R	epair open ci	rcuit or short t	o ground or ៖	short to power in harness or connectors.
4.CHECK EV	VAP CANISTI	ER PURGE V	OLUME CON	ITROL SOLENOID VALVE OPERATION
With CONS	SULT-III			
1. Reconner	ct all harness	connectors di	isconnected.	
3. Perform "	PURG VOL (CONT/V" in "A	CTIVE TEST	" mode with CONSULT-III. Check that engine speed var-
ies accore	ding to the va	lve opening.		
Does engine s	speed vary ad	cording to the	<u>e value openi</u>	ng?
NO >> G	60 TO 5.			
5.CHECK EV	VAP CANISTI	ER PURGE V	OLUME CON	NTROL SOLENOID VALVE
Refer to ECM	-193, "Compo	onent Inspecti	<u>on"</u> .	
Is the inspecti	ion result nor	mal?		
YES >> G	O TO 6.			
	epiace EVAP		le volume cor	ntroi solenoid valve.
Refer to GI-39	<u>a, "Intermitter</u>	<u>it Incident"</u> .		
>>	SPECTION	END		
Componen	t Inspectio	 n		N/C0/D-0000000000000000000000000000000000
1				
	VAP CANISTI	ER PURGE V		NTROL SOLENOID VALVE
(P)With CONS	SULT-III			

Turn ignition switch OFF.
 Reconnect all harness connectors disconnected.
 Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[MR20DE]

- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve

< COMPONENT DIAGNOSIS >

P0500 VSS

Description

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

DTC DETECTION LOGIC **NOTE:**

- If DTC P0500 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001.Refer to ECM-108, "DTC Logic".
- If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to <u>ECM-109, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	F
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	 Harness or connectors (The CAN communication line is open or short- ed) Harness or connectors (The vehicle speed signal circuit is open or shorted) Wheel sensor Combination meter ABS actuator and electric unit (control unit) 	G

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES	>> GO TO 2.
NO	>> GO TO 5.
2. pre	CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK VEHICLE SPEED SENSOR FUNCTION

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine.

 Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III. The vehicle speed on CON-SULT-III should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

NO >> Go to <u>ECM-196, "Diagnosis Procedure"</u>.

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode with CONSULT-III.
- 2. Warm engine up to normal operating temperature.

 Maintain the following conditions for at least 50 consecutive seconds. CAUTION:

ECM-195

INFOID:000000001308139

INFOID:000000001308140

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Always drive vehicle at a safe speed.

ENG SPEED	CVT: 1,600 - 6,000 rpm M/T: 1,600 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7.2 - 31.8 msec
Shift lever	Except P or N position (CVT) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECM-196, "Diagnosis Procedure".

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECM-196, "Component Function Check".

Use component function check to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to ECM-196, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK

With GST

- 1. Lift up drive wheels.
- 2. Start engine.
- Read vehicle speed sensor signal in Service \$01 with GST. The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECM-196, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000001308142

INFOID:000000001308141

1.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-17, "CONSULT-III Function (ABS)", BRC-104, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK COMBINATION METER

Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

< COMPONENT DIAGNOSIS >

P0605 ECM

Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause	G
		A)	ECM calculation function is malfunctioning.		0
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM	
		C)	ECM self shut-off function is malfunctioning.		Н
DTC CON	FIRMATION PROC	EDU	RE		

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.	
2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A	K
 Turn ignition switch ON. Check 1st trip DTC. 	
Is 1st trip DTC detected?	L
YES >> Go to <u>ECM-198, "Diagnosis Procedure"</u> . NO >> GO TO 3.	
3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	M
 Wait at least 1 second. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON. Check 1st trip DTC. 	N
Is 1st trip DTC detected?	
YES >> Go to <u>ECM-198, "Diagnosis Procedure"</u> . NO >> GO TO 4.	0
4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C	
 Wait at least 1 second. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON. Repeat step 2 for 32 times. Check 1st trip DTC. 	Ρ
Is 1st trip DTC detected?	

YES >> Go to ECM-198, "Diagnosis Procedure".

NO >> INSPECTION END

ECM-197

INFOID:000000001308143



INFOID:000000001308144

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< COMPONENT DIAGNOSIS >

Diagnosis Procedure

[MR20DE] INFOID:000000001308145

1.INSPECTION START

()With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "SELF-DIAG RESULTS" mode with CONSULT-III.
- Touch "ERASE". 3.
- 4. Perform DTC CONFIRMATION PROCEDURE. See ECM-197, "DTC Logic".

With GST

- 1. Turn ignition switch ON.
- 2. Select Service \$04 with GST.
- Perform DTC CONFIRMATION PROCEDURE. 3. See ECM-197, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END

2.REPLACE ECM

- Replace ECM. 1.
- 2. Go to ECM-13, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P1111 IVT CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

P1111 IVT CONTROL SOLENOID VALVE

Description

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

Trouble diagnosis name

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.

DTC Logic

DTC No.

DTC DETECTION LOGIC

PBIB1842E

INFOID:000000001308147

P1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	 Harness of connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve
DTC CO	NFIRMATION PROC	EDURE	
1.PREC	ONDITIONING		
If DTC Colleast 10 s	onfirmation Procedure seconds before conduct	has been previously conducted, alway ing the next test.	rs turn ignition switch OFF and wait at
າ ;	>> GO 102.		
Z.PERF	ORM DTC CONFIRMA	TION PROCEDURE	
 Start Check 	engine and let it idle for k 1st trip DTC.	r 5 seconds.	
<u>Is 1st trip</u> YES NO	<u>DTC detected?</u> >> Go to <u>ECM-199, "Dia</u> >> INSPECTION END	agnosis Procedure".	L

DTC detecting condition

Diagnosis Procedure

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect intake valve timing control solenoid valve harness connector. 2.
- Turn ignition switch ON. 3.
- Check the voltage between intake valve timing control solenoid valve harness connector and ground. 4.

IVT control s	olenoid valve	Ground	Voltago	
Connector Terminal		Ciouna	Voltage	
F41	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTION PART

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INFOID:000000001308148

Plunger D Coil Е

Possible cause

· Harness or connectors

P1111 IVT CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

Check the following.

- Harness connectors E7, F121
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace harness or connectors.

 $\mathbf{3}.$ Check intake value timing control solenoid value output signal circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

IVT control	solenoid valve	E	Continuity	
Connector Terminal		Connector	Terminal	Continuity
F41	2	F8	73	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to ECM-200, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001308149

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	$\propto \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

P1111 IVT CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[MR20DE]

 Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
 CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace intake valve timing control solenoid valve.



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P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

< COMPONENT DIAGNOSIS >

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:000000001308150

[MR20DE]

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:000000001308151

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
	Electric throttle control	A)	Electric throttle control actuator does not func- tion properly due to the return spring malfunc- tion.	
P1121	actuator	B)	Throttle valve opening angle in fail-safe mode is not in specified range.	Electric throttle control actuator
	-	C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 3. Set shift lever to P (CVT) or Neutral (M/T) position.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and wait at least 1 second.
- 6. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 7. Set shift lever to P (CVT) or Neutral (M/T) position.
- 8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 9. Check DTC.

Is DTC detected?

- YES >> Go to ECM-202, "Diagnosis Procedure".
- NO >> GO TO 3.

$\mathbf{3}$. Perform dtc confirmation procedure for malfunction c

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 3. Set shift lever to N, P (CVT) or Neutral (M/T) position.
- 4. Start engine and let it idle for 3 seconds.
- 5. Check DTC.

Is DTC detected?

- YES >> Go to ECM-202, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

ECM-202

INFOID:000000001308152

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

< COMPONENT DIAGNOSIS >

[MR20DE]



< COMPONENT DIAGNOSIS >

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:000000001308154

[MR20DE]

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:000000001308155

DTC DETECTION LOGIC

NOTE: If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to <u>ECM-208, "DTC Logic"</u> or <u>ECM-202, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	Electric throttle control performance	Electric throttle control function does not oper- ate properly.	 Harness or connectors (Throttle control motor circuit is open or shorted) Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

YES >> Go to <u>ECM-204</u>, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000001308156

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector terminals as follows.

< COMPONENT DIAGNOSIS >

[MR20DE]

(+)	(—)					А
Connector	Terminal	Connector	Terminal	Co	ndition	Voltage	_	
E7	2	E16	109	Ignition	switch OFF	Approx. 0V		
F/	2	EIO	108	Ignition	switch ON	Battery voltage		
Is the inspe	ction resul	t normal?						
YES >>	GO TO 10	Э.						С
							T 1	
				RELAI	INPUT SIC	JNAL CIRCUI	1-1	D
 1. Turn Igr 2. Check f 	he voltage	ch OFF. 9 between E	CM harnes	ss conne	ector termir	als as follows		
								_
	(+)		(-)) /alta na			E
Connector	Termina	al Conr	ector Terr	minal	voltage			
F7	15	E	16 1	08 E	Battery voltag	je		F
Is the inspe	ction resul	t normal?						
YES >>	GO TO 7.							\sim
								G
				RELAI	POWERS			
 Disconr Disconr 	nect ECM	F/R harnes	nnector. ss connecto	or F13				Н
3. Check t	he continu	lity betweer	n ECM harn	iess con	nector and	I IPDM E/R ha	rness connector.	
								I
IPDM	E/R	EC	М	Continuity	v			
Connector	Terminal	Connector	Terminal	Continuity	, 			
E13	32	F7	15	Existed	_			J
4. Also ch	eck harne	ss for short	to ground a	and shor	t to power.			
Is the inspe	ction resul	t normal?						K
YES >> NO >>	GO TO 6. GO TO 5.							
5.DETECT	MALFUN	CTIONING	PART					
Check the f								L
Harness c	connectors	E7, F121						
 Harness female 	or open or	short betwo	een ECM a	nd IPDN	1 E/R			M
	_ .	,						
>>	Repair op	en circuit o	r short to gr	ound or	short to po	ower in harnes	s connectors.	
O .CHECK	FUSE							Ν
1. Disconr	nect 15A fu	use (No. 61) from IPDN	/I E/R.				
Is the inspe	ction resul	t normal?						0
YES >>	GO TO 9.							
NO >>	Replace 1	I5A fuse.						P
7.снеск	THROTTL	E CONTRO	DL MOTOR	RELAY	INPUT SIG	GNAL CIRCUI	T-II	٢
1. Disconr	nect ECM	harness co	nnector.					

2. disconnect IPDM E/R harness conector E15.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

< COMPONENT DIAGNOSIS >

[MR20DE]

IPDM	E/R	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E14	52	F7	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors E7, F121

• Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F29	5	F7 -	1	Not existed
	5		4	Existed
	0		1	Existed
	0		4	Not existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace.

11.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.

- 2. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - 2. Electric throttle control actuator

Is the inspection result normal?

- YES >> GO TO 12.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



12. CHECK THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS > [MR20DE]	
Refer to ECM-207, "Component Inspection".	•
Is the inspection result normal?	А
YES >> GO TO 13.	
13 CHECK INTERMITTENT INCIDENT	ECM
	_
Refer to <u>GI-39, Intermittent Incident</u> .	
YES $>>$ GO TO 14.	C
NO >> Repair or replace harness or connectors.	
14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	D
 Replace malfunction electric throttle control actuator. Go to <u>ECM-207, "Special Repair Requirement"</u>. 	E
>> INSPECTION END	
Component Inspection INFOLD:000000001308152	F
1. CHECK THROTTLE CONTROL MOTOR	
 Disconnect electric throttle control actuator harness connector. Check resistance between electric throttle control actuator terminals as follows. 	G
Terminals Resistance	Н
5 and 6 Approx. 1 - 15 Ω [at 25 °C (77°F)]	
Is the inspection result normal?	I.
YES >> INSPECTION END	I
NO $>>$ GO IO 2. 2 DEDIAGE ELECTRIC TUDOTTUE CONTROL ACTUATOR	
	J
Replace electric throttle control actuator. Go to ECM-207 "Special Repair Requirement"	
	K
>> INSPECTION END	
Special Repair Requirement	³ ∟
1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"	M
2 PERFORM IDLE AIR VOLUME LEARNING	Ν
	-
	~
>> END	0

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P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:000000001308159

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:000000001308160

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	 Harness or connectors (Throttle control motor relay circuit is open) Throttle control motor relay
P1126	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	 Harness or connectors (Throttle control motor relay circuit is shorted) Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.

Witch DTC is detected?

P1126 >> GO TO 2.

P1124 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.

- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

YES >> Go to ECM-208, "Diagnosis Procedure".

NO >> INSPECTION END

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1124

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to ECM-208, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000001308161

1. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.

2. Check the voltage between ECM harness connector terminals as follows.

ECM-208

[MR20DE]

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

[MR20DE]

(+)		(-)) (alta aa		/
Connector	Terminal	Connector	Term	inal		_
F7	15	E16	10	8 Battery voltag	e	E
<u>Is the inspec</u> YES >> (NO >> (2. CHECK T	t <u>ion result n</u> GO TO 5. GO TO 2. HROTTLE (ormal? CONTROL M	10TOR R	ELAY POWER SUF		(
 Disconne Disconne Disconne Check th 	ect ECM hai ect IPDM E/ ie continuity	rness connec R harness co between EC	ctor. onnector l M harnes	E13. ss connector and IP	DM E/R harness connect	or.
IPDM	E/R	ECN	Л			F
Connector	Terminal	Connector	Terminal	- Continuity		
E13	32	F7	15	Existed		1
4. Also che	ck harness	for short to g	round an	d short to power.		
Is the inspec YES >> (NO >> (<u>tion result n</u> GO TO 4. GO TO 3.	ormal?				(
3.DETECT	MALFUNCT	IONING PAP	RT			
Check the fo • Harness cc • Harness fo >> F	llowing. onnectors E7 r open or sh Repair open	7, F121 ort between circuit or sho	ECM and	I IPDM E/R und or short to powe	r in harness connectors.	
4.CHECK F	USE					
1. Disconne 2. Check 1	ect 15A fuse	e (No. 61) fro Nown	m IPDM I	Ξ/R.		
Is the inspec	tion result n	ormal?				
YES >> (GO TO 8.					
NO >> F	Replace 15A	A fuse.				
D. CHECK T	HROTTLE		IOTOR R	ELAY INPUT SIGN	AL CIRCUIT-I	
1. Check th	e voltage be	etween ECM	harness	connector terminals	as follows.	
(+	+)	(-)		Que d'itie e		ľ
Connector	Terminal	Connector	Terminal	Condition	voltage	
F7	2	E16	108	Ignition switch OFF	Approx. 0V	I
.,	2	210		Ignition switch ON	Battery voltage	
Is the inspec YES >> (NO >> (CHECK T >> (tion result n GO TO 8. GO TO 6.	ormal?				
				ELAT INPUT SIGN		
 1. Turn igni 2. Disconne 3. Disconne 	tion switch (ect ECM hai ect IPDM E/	JFF. mess connec R harness co	ctor. onnector l	E15.		

4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

[MR20DE]

IPDM	E/R	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	52	F7	2	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors E7, F121

• Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R.
- NO >> Repair or replace harness or connectors.

< COMPONENT DIAGNOSIS >

P1128 THROTTLE CONTROL MOTOR

Description

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:000000001308163

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	 Harness or connectors (Throttle control motor circuit is shorted.) Electric throttle control actuator (Throttle control motor) 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 2 seconds. 1. 2. Start engine and let it idle for 5 seconds. Check DTC. 3 Is DTC detected? YES >> Go to ECM-211, "Diagnosis Procedure". NO >> INSPECTION END Κ Diagnosis Procedure INFOID:000000001308164 1.CHECK GROUND CONNECTION L
- 1. Turn ignition switch OFF.
- Check ground connection E21. Refer to Ground Inspection in <u>GI-41, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.

- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle of	EC	Continuity		
Connector	Terminal	Connector	Terminal	Continuity
	5		1	Not existed
F29	5	E7	4	Existed
	6	17	1	Existed
	0		4	Not existed

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P1128 THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS >

[MR20DE]

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

 ${\it 3.}$ CHECK THROTTLE CONTROL MOTOR

Refer to ECM-212, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

Go to ECM-212, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

2. Check resistance between electric throttle control actuator terminals as follows.

Terminals Resistance

5 and 6 Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

Go to ECM-212, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000001308166

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

ECM-212

INFOID:000000001308165

P1143 HO2S1

Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the "rich" output is sufficiently high and whether the "lean" output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

 DTC No.
 Trouble diagnosis name
 DTC detecting condition
 Possible cause

 P1143
 Heated oxygen sensor 1 lean shift monitoring
 The maximum and minimum voltage from the sensor are not reached to the specified voltages.
 • Heated oxygen sensor 1 • Heated oxygen sensor 1 • Fuel pressure • Fuel injector • Intake air leaks
 • O

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test. **TESTING CONDITION:**

Always perform at a temperature above -10°C (14°F)







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< COMPONENT DIAGNOSIS >

INFOID:000000001308169

Before performing the following procedure, confirm that battery voltage is more than 11V at idle. Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

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2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.

- 2. Stop engine and wait at least 10 seconds.
- 3. Turn ignition switch ON and select "HO2S1 (B1) P1143" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START".
- 5. Start engine and let it idle for at least 3 minutes. NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

 When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	CVT: 1,375 - 2,600 rpm M/T: 1,375 - 2,600 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	CVT: 3.7 - 10.0 msec M/T: 3.7 - 10.0 msec
Shift lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

7. Touch "SELF-DIAG RESULT"

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to ECM-214, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes between EM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltage	
Connector	Terminal	Connector	Terminal	Condition	voltage	
F8	49 (HO2S1 signal)	F8	56	Engine speed held at 2,000 rpm constant under no load	 The maximum voltage is over 0.6 at least 1 time. The minimum voltage is over 0.1 at least 1 time. 	

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to ECM-214, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

P1143 HO2S1

< COMPONENT DIAGNOSIS >	[MR20DE]
Is the inspection result normal?	
YES >> GO TO 2.	
NO >> Repair or replace ground connection.	
2.RETIGHTEN HEATED OXYGEN SENSOR 1	-
Loosen and retighten heated oxygen sensor 1.	
Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)	
>> GO TO 3.	
3.CLEAR THE SELF-LEARNING DATA	
1. Clear mixture ratio self-learning value, refer to ECM-17, "MIXTURE RATIO SELF-LEA	ARNING VALUE
CLEAR : Special Repair Requirement".	
2. Run engine for at least 10 minutes at lule speed.	
Is the 1st trip DTC P0171 detected or difficult to start engine?	
Yes >> Perform trouble diagnosis for DTC P0171. Refer to <u>ECM-161, "DTC Logic"</u> .	
No >> GO TO 4.	
4.CHECK HEATED OXYGEN SENSOR 1 HEATER	
Refer to ECM-144, "Component Inspection".	
Is inspection result normal?	
YES >> GO TO 5. NO >> Replace heated oxygen sensor 1	
5 CHECK INTERMITTENT INCIDENT	
Perform GL 20. "Intermittent Incident"	
Is the inspection result normal?	
YES >> GO TO 6.	
NO >> Repair or replace.	
6. REPLACE HEATED OXYGEN SENSOR 1	
Replace heated oxygen sensor 1.	
>> INSPECTION END	
Component Inspection	INFOID:000000001308170
1.INSPECTION START	
Do vou have CONSULT-III?	
Do you have CONSULT-III?	
YES >> GO TO 2.	
NO >> GO TO 3.	
2.CHECK HEATED OXYGEN SENSOR 1	
With CONSULT-III	
1. Start engine and warm it up to normal operating temperature.	
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".	
4 Hold engine speed at 2 000 rpm under no load during the following steps	

Hold engine speed at 2,000 rpm under no load during the following steps.
 Touch "RECORD" on CONSULT-III screen.

P1143 HO2S1

< COMPONENT DIAGNOSIS >

[MR20DE]

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CAUTION:

• Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

, Minimum

• Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 1

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Without CONSULT-III

T. Start engine and warm it up to normal operating temperature.

2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltago
Connector	Terminal	Connector	Terminal	Condition	Voltage
F8	49 (HO2S1 signal)	F8	56	Engine speed held at 2,000 rpm con- stant under no load.	 The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. The maximum voltage is over 0.6V at least 1 time. The minimum voltage is below 0.3V at least 1 time. The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4

4.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1. CAUTION:
P1143 HO2S1

- < COMPONENT DIAGNOSIS > • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. • Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant. >> INSPECTION END

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[MR20DE]

P1144 HO2S1

Description

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



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INFOID:000000001308172



DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

shifting to the rich side, the malfunction will be detected.

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.





INFOID:000000001308171

				P1144 HO2S1		
< COMPO	NENT DIAGN	IOSIS >			[MR20DE]	
Do you ha	ve CONSULT-	?				
YES >	> GO TO 2.					A
2 PERFO	RM DTC CON			EDURE		
						ECM
2. Stop e	ingine and wai	t at least 10) seconds	S.		
3. Turn ig	gnition switch	ON and se	lect "HO	2S1 (B1) P1144" of "HO2S1	" in "DTC WORK SUPPORT" mode	С
4. Touch	"START".					0
5. Start e	ngine and let i	t idle for at	least 3 m	ninutes.		_
NOTE	: raise engine	speed ab	ove 3,60	0 rpm after this step. If the	e engine speed limit is exceeded,	D
return	to step 5.	-				
6. When the co	the following c inditions contir	ionditions a nuously uni	re met, " til "TEST	IESTING will be displayed of ING will be displayed of ING (ING)	TED". (It will take approximately 50	Е
secon	ds or more.)	,,,,,				
CAUT Alway	ION: s drive vehicl	le at a safe	speed.			F
,			opeen			I
ENG SPEE	D	CVT: 1,3	75 - 2,600 r	pm		
		M/T: 1,37	M/1: 1,375 - 2,600 rpm			G
B/EUEL SC						
D/FUEL SC	ΠDL	M/T: 3.7	M/T: 3.7 - 10.0 msec			Н
Shift lever		Suitable	position			
If "TE	STING" is not	displayed	after 5 r	ninutes, retry from step 2.		1
7. Touch	"SELF-DIAG F	RESULT"	ooroop?			I
		<u> </u>	<u>screen?</u>			
NG >	> Go to <u>ECM-2</u>	219, "Diagn	osis Proc	<u>edure"</u> .		J
3.PERFO	RM COMPON	IENT FUNC	CTION CI	HECK		
With GS	ST				· · · · · · · · · · · · · · · · · · ·	K
1. Start e	engine and war	m it up to r	ormal op	erating temperature.	Harris and a the faller day and differen	
2. Set vo	ltmeter probes	between E	M harne	ss connector terminals as fo	llows under the following condition.	
	(+)	(-)			L
Connector	Terminal	Connector	, Terminal	Condition	Voltage	
					• The maximum voltage is over 0.8 at least	\mathbb{M}
F8	49	F8	56	Engine speed held at 2,000 rpm	1 time.	

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

constant under no load

• The minimum voltage is over 0.35 at

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INFOID:000000001308173

least 1 time.

Is the inspection result normal?

(HO2S1 signal)

- YES >> INSPECTION END
- NO >> Go to ECM-219, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CLEAR THE SELF-LEARNING DATA

- 1. Clear the mixture ratio self-learning value, refer to <u>ECM-17, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected or difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0172. Refer to ECM-161, "DTC Logic".

No >> GO TO 4

4.CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch OFF.

2. Disconnect heated oxygen sensor 1 harness connector.

3. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to ECM-144, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated oxygen sensor 1.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to ECM-130, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III? YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

ECM-220

INFOID:000000001308174

P1144 HO2S1

< COMPONENT DIAGNOSIS >

- Start engine and warm it up to normal operating temperature. 1.
- Set "POST TRIGGER" to 100% in "DATA MONITOR" mode with CONSULT-III. 2.
- Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)". 3.
- Hold engine speed at 2,000 rpm under no load during the following steps. 4.
- Touch "RECORD" on CONSULT-III screen. 5.
- 6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds. 5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

ECM 1 2 3 4 5 cvcle HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R R means HO2S1 MNTR (B1) indicates RICH D L means HO2S1 MNTR (B1) indicates LEAN Ε SEF217YA



CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

3.CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Check the voltage between ECM harness connector terminals as follows under the following condition. 2.

(+)		(-)		Condition	Voltage	N
Connector	Terminal	Connector	Terminal	Condition	volage	
F8	49 (HO2S1 signal)	F8	56	Engine speed held at 2,000 rpm constant under no load	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: $0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V$ 2 times: $0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V$	N 0
O A LITION						P

CAUTION:

 Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

 Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Is the inspection result normal?

YES >> INSPECTION END

ECM-221

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NO >> GO TO 4. **4.**REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

P1146 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuelcut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1146	Heated oxygen sensor 2 circuit minimum voltage	The minimum voltage from the sensor is not	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 	ŀ
monitoring	reached to the specified voltage.	Fuel pressureFuel injectorIntake air leaks	L	

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

• For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

• Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in Procedure for COND1.

ECM-223

CAUTION:

Always drive at safe speed.

[MR20DE]

Heater pad

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INFOID:000000001308176

INFOID:000000001308175

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>> GO TO 3.

3.PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-IV

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

- 2. Let engine idle 1 minute.
- 3. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START".
- 5. Start engine and let it idle for at least 30 seconds.
- 6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is "CONPLETED" appears on CONSULT-III screen?

YES >> GO TO 9.

NO >> GO TO 6.

6.PERFORM PROCEDURE FOR COND1-I

When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-III screen. Maintain the condition continuously until "TESTING" changes to "COMPLETED" (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.

COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.

COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7.PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until "INCOMPLETED" at "COND2" on CONSULT-III screen has turned to "COMPLETED". (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 8. COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8.PERFORM PROCEDURE FOR COND3

Stop vehicle and let it idle until "INCOMPLETED" of "COND3" on CONSULT-III screen has turned to "COM-PLETED". (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9.PERFORM PROCEDURE FOR COND3-I

Touch "SELF DIAGRESULTS".

Which displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to <u>ECM-226</u>, "Diagnosis Procedure".

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INFOID:000000001308177

CAN NOT BE DIAGNOSED>>GO TO 10.

< COMPONENT DIAGNOSIS >

10.PERFORM PROCEDURE FOR COND3-II

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Turn ignition switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III. 2.
- 3. Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-III.
- When "COOLAN TEMP/S" indication reaches to 70°C (158°F). 4.

>> GO TO 5.

11.PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECM-225, "Component Function Check". NOTE:

Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES	>> INSPECTION END	
NO	>> Go to ECM-226 "Diagnosis Procedure"	

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

(I) With GST

- 1. Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltage	
Connector	Terminal	Connector	Terminal	Condition	Voltage	J
F8	50 (HO2S2 signal)	F8	59	Revving up to 4,000 rpm un- der no load at least 10 times	The voltage should be above 0.68V at least once during this procedure.	
		10				' K

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–	(-) Condition		Veltage	
Connector	Terminal	Connector	Terminal	Condition	volage	NI
F8	50 (HO2S2 signal)	F8	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.	N
Is the insp	ection result no	ormal?				\cap
YES > NO >	> INSPECTIOI > GO TO 3.	N END				0
3.PERFC	RM COMPON	ENT FUN	CTION C	HECK-III		Ρ
Check the	voltage betwe	en FCM ha	iness co	nnector terminals as follow	s under the following condition	

< COMPONENT DIAGNOSIS >

[MR20DE]

	(+)	(–)	Condition	Voltage			
Connector	Terminal	Connector	Terminal	Condition	voltage			
F8	50 (HO2S2 signal)	F8	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear po- sition (M/T)	The voltage should be above 0.68V at least once during this procedure.			
Is the insp	ection result n	ormal?						
YES > NO >	> INSPECTIO > Go to <u>ECM-</u>	N END 226, "Diagr	nosis Prod	cedure".				
Diagnos	is Procedu	re			INFOID:000000001308178			
1. CHECK		ONNECTIO	N					
1. Turn ig 2. Check	gnition switch	OFF. ection E21.	Refer to	Ground Inspection in <u>GI-41,</u>	"Circuit Inspection".			
Is the insp	<u>ection result n</u>	ormal?						
YES >	YES >> GO TO 2.							
NO >	> Repair or re	place grour	nd conneo	ction.				
Z .CLEAR	THE SELF-L	EARNING	DATA					
1. Clear <u>CLEA</u> 2 Rup e	mixture ratio <u>R : Special Re</u> ngine for at le	self-learnin pair Requir	g value, <u>ement"</u> .	refer to <u>ECM-17, "MIXTUR</u>	E RATIO SELF-LEARNING VALUE			
Le the 1et t		2 dotootod		e speed.				
YES >	> Perform trou	ible diagno	sis for DT	C P0172. Refer to <u>ECM-165</u>	5. "DTC Logic".			
2								
J.CHECK	CHO2S2 GRC			COPEN AND SHORT				
1. Turn iç 2. Discor	gnition switch nect heated c	OFF. oxygen sen	sor 2 harı	ness connector.				
4. Check	the continuity	between H	lO2S2 ha	arness connector and ECM h	arness connector.			
HO	2S2	ECM	Co	ntinuity				
Connector	Terminal Co	nnector Tei	minal	internet y				
E58	1	F8	59 E	ixisted				
5. Also c	heck harness	for short to	ground a	and short to power.				
<u>Is the insp</u>	<u>ection resul</u> t n	ormal?	-	·				
YES >	> GO TO 5.							

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E7, F121

• Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

$5. {\sf CHECK} \ {\sf HO2S2} \ {\sf INPUT} \ {\sf SIGNAL} \ {\sf CIRCUIT} \ {\sf FOR} \ {\sf OPEN} \ {\sf AND} \ {\sf SHORT}$

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO	2S2	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E58	4	F8	50	Existed

< COMPONENT DIAGNOSIS >

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INFOID:000000001308179

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO	2S2	E	СМ	Ground	Continuity	
Connector	Terminal	Connector Terminal		Giouna	Continuity	
E58	4	F8	50	Ground	Not existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E7, F121
- Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

1	CHECK HEATED OXYGEN SENSOR 2
---	------------------------------

Refer to ECM-227, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 9.

8.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END
9.CHECK INTERMITTENT INCIDENT
Refer to GI-39, "Intermittent Incident".
>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III? YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

< COMPONENT DIAGNOSIS >





"HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.50V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltago
Connector	Terminal	Connector	Terminal	Condition	voltage
F8	50 (HO2S2 signal)	F8	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltago
Connector	Terminal	Connector	Terminal	Condition	voltage
F8	50 (HO2S2 signal)	F8	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

< COMPONENT DIAGNOSIS >

[MR20DE]

	(+)	(-	-)	Condition	\/oltage
Connector	Terminal	Connector	Terminal	Condition	voitage
F8	50 (HO2S2 signal)	F8	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear posi- tion (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.
s the insp	ection result n	ormal?			
YES > NO >	> INSPECTIO > GO TO 6.	N END			
5. REPLA	CE HEATED C	OXYGEN S	SENSOR	2	
Replace h CAUTION Discard in) onto	eated oxygen s : any heated o a hard surfac	sensor 2. xygen sei se such as	nsor whi	ch has been dropped from ete floor; use a new one.	a height of more than 0.5 m (19.7
Before i Cleaner	nstalling new tool and appr	oxygen s roved anti	sensor, o -seize lui	clean exhaust system threa bricant.	ds using Oxygen Sensor Thread
>	> INSPECTIO	N END			

P1147 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuelcut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

• For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

• Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in Procedure for COND1.

CAUTION:

Always drive at safe speed.

Heater pad Holder Lirconia tube



[MR20DE]

INFOID:000000001308181

SEF259V

>> GO TO 3.		А
3. PERFORM PROCEDURE F	FOR COND1-I	
Start engine and warm it up to	normal operating temperature.	ECM
>> GO TO 4.		
4.PERFORM PROCEDURE	FOR COND1-II	С
Turn ignition switch OFF and w	/ait at least 10 seconds.	
		D
5 PERFORM PROCEDURE I		
1. Start engine and keep the	engine speed between 3.500 and 4.000 rpm for at least 1 minute under no load.	Е
 Let engine idle 1 minute. 		
 Select "HO2S2 (B1) P114, Touch "START". 	* of "HO2S2" In "DTC WORK SUPPORT" mode with CONSULT-III.	F
5. Start engine and let it idle f	for at least 30 seconds.	
Is "CONPLETED" appears on (CONSULT-III screen?	G
YES >> GO TO 9.		9
NO $>>$ GO TO 6.		
When the following conditions	-UK CUND1-I	Η
Maintain the condition continue seconds.)	busly until "TESTING" changes to "COMPLETED" (It will take approximately 60	Ι
ENG SPEED	More than 1,000 rpm	. [
B/FUEL SCHDL	More than 1.0 msec	0
COOLAN TEMP/S	More than 70°C (158°F)	
		K
COND1: OUT OF CONDITIO COND1: COMPLETED CONI COND1: COMPLETED CONI COND1: COMPLETED CONI	N>>GO TO 4. D2: INCOMPLETED>>GO TO 7. D2: COMPLETED>>GO TO 8.	L
7.PERFORM PROCEDURE	FOR COND2	
While driving, release accele "COND2" on CONSULT-III scre	rator pedal completely from the above condition until "INCOMPLETED" at een has turned to "COMPLETED". (It will take approximately 4 seconds.)	Μ
Which displayed on CONSULT	<u>-III screen?</u>	NI
COND2: COMPLETED CONI COND2: COMPLETED CONI)3: INCOMPLETED>>GO TO 8.)3: COMPLETED>>GO TO 9.	IN
8.PERFORM PROCEDURE	FOR COND3	\bigcirc
Stop vehicle and let it idle unti PLETED". (It will take a maxim	I "INCOMPLETED" of "COND3" on CONSULT-III screen has turned to "COM- um of approximately 6 minutes.)	
>> GO TO 9.		Ρ
9. PERFORM PROCEDURE	FOR COND3-I	
Touch "SELF DIAGRESULTS".		
Which displayed on CONSULT	-III screen?	
OK >> INSPECTION END NG >> Go to <u>ECM-233, "I</u>) <u>Diagnosis Procedure"</u> .	

< COMPONENT DIAGNOSIS >

CAN NOT BE DIAGNOSED>>GO TO 10.

10.PERFORM PROCEDURE FOR COND3-II

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Turn ignition switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- 3. Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-III.
- 4. When "COOLAN TEMP/S" indication reaches to 70°C (158°F).

>> GO TO 5.

11.PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECM-225, "Component Function Check".

NOTE:

Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END NO >> Go to ECM-233, "Diagnosis Procedure".

Component Function Check

INFOID:000000001308182

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

- T. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltage	
Connector	Terminal	Connector	Terminal	Condition	voltage	
F8	50 (HO2S2 signal)	F8	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

Connector Terminal Connector Terminal Connector Terminal F8 50 (HO2S2 signal) F8 59 Keeping engine speed at idle for 10 minutes The voltage should be above 0.68V at lead once during this procedure.	(+)		(-)		Condition	Voltago	
F8 50 (HO2S2 signal) F8 59 Keeping engine speed at idle for 10 minutes The voltage should be above 0.68V at lead once during this procedure.	Connector	Terminal	Connector	Terminal	Condition	Voltage	
	F8	50 (HO2S2 signal)	F8	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

 $\mathbf{3.}$ PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

< COMPONENT DIAGNOSIS >

[MR20DE]

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	(+)	(-	-)	Condition	Voltozo	А
Connector	Terminal	Connector	Terminal	Condition	voitage	
F8	50 (HO2S2 signal)	F8	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear po- sition (M/T)	The voltage should be above 0.68V at least once during this procedure.	EC
Is the insp	ection result r	ormal?	L			
YES >	> INSPECTIC	N END				С
NO >	So to ECM-	<u>233, "Diag</u> i	<u>nosis Pro</u>	<u>cedure"</u> .		
Diagnos	sis Procedu	re			INFO/D:000000001308183	D
1. CHECK	K GROUND C	ONNECTIO	DN			
1 Turn i	anition switch	OFF				F
2. Check	k ground conn	ection E21.	Refer to	Ground Inspection in GI-41,	"Circuit Inspection".	
Is the insp	ection result n	ormal?			· · · · · ·	
YES >	> GO TO 2.					F
NO >	> Repair or re	place groui	nd conne	ction.		
2.CLEAR	R THE SELF-L	EARNING	DATA			
1 Clear	mixture ratio	self-learnir	na value	refer to ECM-17 "MIXTUR	E RATIO SELE-LEARNING VALUE	G
	R : Special Re	epair Requi	rement".			
2. Run e	engine for at le	ast 10 minu	utes at idl	e speed.		
Is the 1st t	trip DTC P017	2 detected	? Is it diffi	cult to start engine?		Н
YES >	> Perform trou	uble diagno	sis for D	C P0172. Refer to <u>ECM-165</u>	<u>, "DTC Logic"</u> .	
NO >	> GO TO 3.					
3.CHECK	KHO2S2 GRC	OUND CIRC	CUIT FOF	R OPEN AND SHORT		
1. Turn i	gnition switch	OFF.				
2. Disco	nnect heated	oxygen sen	sor 2 har	ness connector.		J
3. Disco	nnect ECM ha	rness conn	ector.	rnana connector and ECM b	ornoon connoctor	
4. Check	c the continuity	/ Detween r	10252 na	amess connector and ECM h		
нс	1252	ECM				K
Connector	Torminal Co		Co	ontinuity		
Connector	ierminai CC					
E58	1	F8	59 E	zisted		L
5. Also c	check harness	for short to	ground a	and short to power.		
Is the insp	ection result n	ormal?				M
YES >	> GO TO 5.					1 0 1
NO >	> GO 10 4.					
4.DETEC	CT MALFUNC	TIONING P	ART			Ν
Check the	following.					
 Harness 	connectors E	7, F121				
 Harness 	tor open or sl	nort betwee	en heated	oxygen sensor 2 and ECM.		0
	_ .			1 1 <i>4 4</i> 4 4 4		
- >	Repair oper	n circuit or s	short to gi	ound or short to power in har	ness or connectors.	
D. CHEC	K HO2S2 INPL	JT SIGNAL	CIRCUI	FOR OPEN AND SHORT		Ρ
1. Check	k the continuity	/ between l	HO2S2 ha	arness connector and ECM h	arness connector.	

HO	2S2	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E58	4	F8	50	Existed

< COMPONENT DIAGNOSIS >

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO	2S2	E	СМ	Ground	Continuity
Connector	Terminal	Connector	Terminal	Cround	Continuity
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E7, F121
- Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK HEATED OXYGEN SENSOR 2

Refer to ECM-227, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 8.

8.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

- T. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

ECM-234

INFOID:000000001308184

< COMPONENT DIAGNOSIS >



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- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. G
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltago	
Connector	Terminal	Connector	Terminal	Condition	voltage	
F8	50 (HO2S2 signal)	F8	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(-)		Condition	Voltago	
Connector	Terminal	Connector	Terminal	Condition	voltage	N
F8	50 (HO2S2 signal)	F8	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.	Ν

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltaga	
Connector	Terminal	Connector	Terminal	Condition	voltage	
F8	50 (HO2S2 signal)	F8	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

>> INSPECTION END

< COMPONENT DIAGNOSIS > P1211 TCS CONTROL UNIT

Description

DTC Logic

The malfunction information related to TCS is transferred through the CAN communication line from "ABS actuator and electric unit (control unit)" to ECM.

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

DTC DETECTION LOGIC

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211	TCS control unit	ECM receives a malfunction information from "ABS actuator and electric unit (control unit)".	 ABS actuator and electric unit (control unit) TCS related parts
DTC CON	FIRMATION PROCI	EDURE	
1.PRECO	NDITIONING		
TESTING (Before per	CONDITION: forming the followin	g procedure, confirm that battery vol	tage is more than 10.5V at idle.
>:	• GO TO 2.		
2.perfo	RM DTC CONFIRMAT	TION PROCEDURE	
 Start e Check 	ngine and let it idle for 1st trip DTC.	at least 60 seconds.	
Is 1st trip D	TC detected?		
YES >> NO >>	» <u>ECM-237, "Diagnosi</u> » INSPECTION END	<u>s Procedure"</u>	
Diagnosi	s Procedure		INFOID:000000001308187
Go to BRC	-74, "Work Flow".		

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P1212 TCS COMMUNICATION LINE

Description

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and "ABS actuator and electric unit (control unit)".

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

DTC Logic

INFOID:000000001308189

DTC DETECTION LOGIC

NOTE:

- If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>ECM-108, "DTC Logic"</u>.
- If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to <u>ECM-109, "DTC Logic"</u>.

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212	TCS communication line	ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.	 Harness or connectors (The CAN communication line is open or short- ed.) ABS actuator and electric unit (control unit) Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>ECM-238, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

Go to BRC-74, "Work Flow".

ECM-238

INFOID:000000001308190

INFOID:000000001308188

< COMPONENT DIAGNOSIS >

P1217 ENGINE OVER TEMPERATURE

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1217 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>ECM-108, "DTC Logic"</u>.
- If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to <u>ECM-109, "DTC Logic"</u>.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1217	Engine over tempera- ture (Overheat)	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	 Harness or connectors (The cooling fan circuit is open or short- ed.) IPDM E/R (Cooling fan relays -1,-2 and - 3) Cooling fan relays -4 and -5 Cooling fan motor -1 and -2 Radiator hose Radiator or and the second state of the second	F

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to <u>CO-10, "Inspection"</u>. Also, replace the engine oil. Refer to <u>LU-7, "Draining"</u>.

- 1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to <u>MA-23</u>, <u>"SAE Viscosity Number"</u>.
- 2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>ECM-239, "Component Function Check"</u>. **NOTE:**

Use component function check to check the overall function of the cooling fan. During this check, a DTC might M not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END NO >> Go to ECM-240, "Diagnosis Procedure".

Component Function Check

INFOID:000000001308192

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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Check the coolant level in the reservoir tank and radiator. Allow engine to cool before checking coolant level. Is the coolant level in the reservoir tank and/or radiator below the proper range? YES >> Go to ECM-240, "Diagnosis Procedure". NO >> GO TO 2. 2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to ECM-240, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan motor operate at each speed (LOW/MID/HI).

Without CONSULT-III

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-8, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECM-240, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000001308193

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

2. CHECK COOLING FAN OPERATION

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III on the CONSULT-III screen.
- 3. Make sure that cooling fans-1 and -2 operates at each speed (LOW/MID/HI).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Check cooling fan control circuit. Refer to ECM-287, "Diagnosis Procedure".

3. CHECK COOLING FAN OPERATION

Without CONSULT-III

- 1. Perform IPDM E/R auto active test and check cooling fan motor operation.
- 2. Make sure that cooling fans-1 and -2 operates at each speed (LOW/MID/HI).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Check cooling fan control circuit. Refer to <u>ECM-287, "Diagnosis Procedure"</u>.

4.CHECK COOLING SYSTEM FOR LEAK

Check cooling system for leak. Refer to CO-10, "Inspection".

< COMPONENT DIAGNOSIS >	[MR20DE]	
Is leakage detected?		
YES >> GO TO 6. NO >> GO TO 5.		А
5. DETECT MALFUNCTIONING PART		
Check the following for leak. Refer to <u>CO-10, "Inspection"</u> .		ECM
Hose Radiator		
Water pump		С
Reservoir tank		
>> Repair or replace.		D
6.CHECK RESERVOIR CAP		
Check radiator cap. Refer to CO-14, "RADIATOR CAP : Inspection".		Е
Is the inspection result normal?		
YES >> GO TO 7.		
NO >> Replace radiator cap.		F
/ .CHECK THERMOSTAT		
Check thermostat.		G
Is the inspection result normal?		0
YES >> GO TO 8.		
NO >> Replace thermostat.		Н
Ö. CHECK ENGINE COOLANT TEMPERATURE SENSOR		
Check engine coolant temperature sensor. Refer to ECM-123, "Component Inspection".		
Is the inspection result normal?		
OK >> GO TO 9.		
NG >> Replace engine coolant temperature sensor.		.1
9. CHECK MAIN 13 CAUSES		0
If the cause cannot be isolated, check the following.		

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	 Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	• Visual	No blocking	_
	2	Coolant mixture	Coolant tester	50 - 50% coolant mixture	MA-23, "SAE Viscosity Number"
	3	Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-10. "Inspection"
	4	Reservoir tank cap	Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/ cm ² , 9 - 14 psi) (Limit)	CO-18, "Removal and In- stallation"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-10, "Inspection"
ON* ²	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-27, "Removal and In- stallation"
ON* ¹	7	Cooling fan motor	CONSULT-III	Operating	ECM-290, "Component Inspection (Cooling Fan Motor)"
OFF	8	Combustion gas leak	Color checker chemical tester 4 Gas analyzer	Negative	_

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Engine	Step	Inspection item	Equipment	Standard	Reference page
ON* ³	9	 Coolant temperature gauge 	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to res- ervoir tank	Visual	No overflow during driving and idling	CO-10, "Inspection"
OFF* ⁴	10	Coolant return from res- ervoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-10, "Inspection"
OFF	11	Water control valve	Remove and inspect the valve	Within the specified value	CO-30, "Removal and In- stallation"
OFF	12	Cylinder head	 Straight gauge feeler gauge 	0.1 mm (0.004 in) Maxi- mum distortion (warping)	EM-67. "Removal and In- stallation"
	13	Cylinder block and pis- tons	Visual	No scuffing on cylinder walls or piston	EM-72, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-6, "Troubleshooting Chart".

>> INSPECTION END

P1225 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

DTC No.

DTC DETECTION LOGIC

Trouble diagnosis name



P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)
DTC CON	IFIRMATION PROC	EDURE	
1.PRECC	NDITIONING		
If DTC Colleast 10 se TESTING Before pe	nfirmation Procedure conds before conduct CONDITION: rforming the followir	has been previously conducted, always ing the next test. Ing procedure, confirm that battery vol	turn ignition switch OFF and wait at tage is more than 10V at idle.
>: 2.perfo	> GO TO 2. RM DTC CONFIRMA	TION PROCEDURE	
 Turn ig Turn ig Turn ig Turn ig Check 	gnition switch ON. gnition switch OFF and gnition switch ON. 1st trip DTC.	l wait at least 10 seconds.	
Is 1st trip [YES >: NO >:	<u>DTC detected?</u> > Go to <u>ECM-243, "Dia</u> > INSPECTION END	agnosis Procedure".	
Diagnos	is Procedure		INF0ID:000000001308196

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.

2. Remove the intake air duct.

INFOID:000000001308194 ECM Throttle position sensor 6.0 Throttle position sensor output voltage 0 0 0 0 0 0 0 Sensor 1

Seńsor 2

Possible cause

90

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Throttle valve opening angle (deg)

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P1225 TP SENSOR

< COMPONENT DIAGNOSIS >

- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - 2. Electric throttle control actuator

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



 $2. {\tt Replace electric throttle control actuator}$

- 1. Replace electric throttle control actuator.
- 2. Go to ECM-244, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000001308197

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1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P1226 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

DTC No.

P1226

DTC DETECTION LOGIC



DTC CONFIRMATION PROCEDURE

Trouble diagnosis name

Closed throttle position

learning performance

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test. **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.		
2. Turn ignition switch OFF, wait at least 10 seconds.		
3. Turn ignition switch ON.		
4. Repeat steps 2 and 3 for 32 times.		
5. Check 1st trip DTC.		
Is 1st trip DTC detected?		М
YES >> Go to ECM-245, "Diagnosis Procedure".		
NO >> INSPECTION END		
Diagnosis Procedure	INFOID:000000001308200	Ν
1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY		
1. Turn ignition switch OFF.		0
2. Remove the intake air duct.		
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INFOID:000000001308199



Possible cause

· Electric throttle control actuator

(TP sensor 1 and 2)

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P1226 TP SENSOR

< COMPONENT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

2. Electric throttle control actuator

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



 $2. {\tt Replace electric throttle control actuator}$

- 1. Replace electric throttle control actuator.
- 2. Go to ECM-244, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000001308201

[MR20DE]

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P1229 SENSOR POWER SUPPLY

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P1229 SENSOR POWER SUPPLY

DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	D	TC detecting conditio	'n	Possible cause
P1229	Sensor power supply circuit short	ECM detec sensor is e;	ts a voltage of power xcessively low or high	source for 1.	 Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] Accelerator pedal position sensor Throttle position sensor Camshaft position sensor (PHASE)
DTC CON	FIRMATION PRO	CEDURE			
1.PRECO	NDITIONING				
If DTC Cor least 10 sec TESTING (Before per	nfirmation Procedure conds before condu CONDITION: forming the follow	e has been cting the ne r ing procec	previously conde ext test. Iure, confirm th a	ucted, alw at battery	vays turn ignition switch OFF and wait at voltage is more than 10V at idle.
>>	• GO TO 2.				
2.PERFO	RM DTC CONFIRM	ATION PRO	OCEDURE		
1. Start er	ngine and let it idle	for 1 second	d.		
 Check DTC determinant 	DTC. ected?				
YES >> NO >>	→ Go to <u>ECM-247, "I</u> → INSPECTION ENI	<u>Diagnosis P</u> D	rocedure".		
Diagnosi	s Procedure				INFOID:000000001308203
1. снеск	GROUND CONNE	CTION			
1. Turn ig 2. Check	nition switch OFF. ground connection	E21. Refer	to Ground Inspec	tion in <u>GI</u>	-41, "Circuit Inspection".
Is the inspe	ection result normal	<u>?</u>			
YES >> NO >>	SO TO 2. Repair or replace (around coni	nection.		
2.снеск	ACCELERATOR P	, EDAL POS	ITION SENSOR	1 POWER	SUPPLY CIRCUIT
1. Discon 2. Turn ig 3. Check	nect accelerator pe nition switch ON. the voltage betwee	dal position n APP sens	(APP) sensor ha	rness con ector and	ground.
A	APP sensor	a .			
Connecto	or Terminal	Ground	Voltage		
E110	4	Ground	Approx. 5V		

Is the inspection result normal?

>> GO TO 7. >> GO TO 3. YES

NO

3.CHECK SENSOR POWER SUPPLY CIRCUITS

P1229 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

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E	CM	Sensor			
Connector Terminal		Item	Connector	Terminal	
F8	72	Electric throttle control actuator	F29	1	
10	78	CMP sensor (PHASE)	F26	1	
E16 106		APP sensor	E110	4	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK CAMSHAFT PSITION SENSOR (PHASE)

Refer to ECM-185, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace malfunctioning component.

5.CHECK TP SENSOR

Refer to ECM-277, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> GO TO 6.

6.Replace electric throttle control actuator

- 1. Replace electric throttle control actuator.
- 2. Go to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to ECM-270, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.Replace accelerator pedal assembly

1. Replace accelerator pedal assembly.

 Go to <u>ECM-14</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P1564 ASCD STEERING SWITCH

Description

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated. Refer to <u>ECM-45</u>, "System Description" for the ASCD function.

DTC Logic

DTC DETECTION LOGIC **NOTE**:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>ECM-197, "DTC Logic"</u>.

Trouble diagnosis name	DTC detecting condition	Possible cause				
ASCD steering switch	 An excessively high voltage signal from the ASCD steering switch is sent to ECM. ECM detects that input signal from the ASCD steering switch is out of the specified range. ECM detects that the ASCD steering switch is stuck ON. 	 Harness or connectors (The switch circuit is open or shorted.) ASCD steering switch ECM 				
NFIRMATION PRO	DCEDURE	Н				
ONDITIONING						
nfirmation Procedu econds before cond	re has been previously conducted, alw ucting the next test.	ays turn ignition switch OFF and wait at				
> GO TO 2.		J				
ORM DTC CONFIRI	MATION PROCEDURE					
gnition switch ON. at least 10 seconds. MAIN switch for at CANCEL switch fo	least 10 seconds, then release it and w	ait at least 10 seconds. d wait at least 10 seconds				
RESUME/ACCELE	ERATE switch for at least 10 seconds,	then release it and wait at least 10 sec-				
SET/COAST switch	n for at least 10 seconds, then release i	t and wait at least 10 seconds.				
CDTC.		D.A.				
$\frac{100000}{100000000000000000000000000000$	'Diagnosis Procedure"	IVI				
> INSPECTION EN	Diagnosis i rocedure .					
sis Procedure		N INFOID:000000001308206				
K GROUND CONNI	ECTION	0				
gnition switch OFF.	E21. Refer to Ground Inspection in GI	-41, "Circuit Inspection".				
Is the inspection result normal?						
YS >> GO TO 2.						
NO >> Repair or replace ground connection.						
KASCD STEERING	SWITCH CIRCUIT					
	Trouble diagnosis name ASCD steering switch NFIRMATION PRO ONDITIONING onfirmation Procedu econds before cond > GO TO 2. DRM DTC CONFIRM gnition switch ON. at least 10 seconds. MAIN switch for at CANCEL switch for at least 10 seconds. MAIN switch for at CANCEL switch for a RESUME/ACCELE SET/COAST switch (CANCEL switch for a RESUME/ACCELE SET/COAST switch (CANCEL switch for a RESUME/ACCELE SET/COAST switch (CANCEL switch for a RESUME/ACCELE (COAST switch for a RESUME/ACCELE (COAST switch for a RESUME/ACCELE (COAST switch for a RESUME/ACCELE (COAST switch for (COAST	Trouble diagnosis name DTC detecting condition ASCD steering switch • An excessively high voltage signal from the ASCD steering switch is sent to ECM. ASCD steering switch • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON. NFIRMATION PROCEDURE ONDITIONING onfirmation Procedure has been previously conducted, alw econds before conducting the next test. >> GO TO 2. DRM DTC CONFIRMATION PROCEDURE gnition switch ON. at least 10 seconds. MAIN switch for at least 10 seconds, then release it and w CANCEL switch for at least 10 seconds, then release it and RESUME/ACCELERATE switch for at least 10 seconds, then release it an RESUME/ACCELERATE switch for at least 10 seconds, then release it < DTC.				

1. Turn ignition switch ON.

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- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check each item indication under the following conditions.

Monitor item	Condition	Indication	
MAIN SW	MAIN switch	Pressed	ON
MAIN SW	MAIN SWICH	Released	OFF
		Pressed	ON
CANCEL SW	CANCEL SWICH	Released	OFF
RESUME/ACC SW		Pressed	ON
	RESOME/ACCELERATE SWICH	Released	OFF
SET SW		Pressed	ON
		Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as follows.

(+)		(-)		Condition	Voltage	
Connector	Terminal	Connector	Terminal			
E16	94 (ASCD steering switch signal)	E16	95	MAIN switch: Pressed	Approx. 0V	
				CANSEL switch: Pressed	Approx. 1V	
				SET/COAST switch: Pressed	Approx. 2V	
				RESUME/ACCELERATE switch: Pressed	Approx. 3V	
				All ASCD steering switches: Released	Approx. 4V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

 $\mathbf{3.}$ check ascd steering switch ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect combination switch harness connector M352.
- 4. Check the continuity between ASCD steering switch and ECM harness connector.

ASCD steering switch	ECM		Continuity	
Terminal	Connector	Terminal	Continuity	
15	E16	95	Existed	

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M77, E105

Combination switch (spiral cable)

Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

P1564 ASCD STEERING SWITCH

< COMPONENT DIAGNOSIS >

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5. Check ascd steering switch input signal circuit for open and short

1. Check the continuity between ECM harness connector and ASCD steering switch.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	Continuity
14	E16	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M77, E105

• Combination switch (spiral cable)

· Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD STEERING SWITCH

Refer to ECM-251, "Component Inspection".	
Is the inspection result normal?	Н
YES >> GO TO 8.	
NO >> Replace ASCD steering switch.	
8. CHECK INTERMITTENT INCIDENT	I
Refer to GI-39, "Intermittent Incident".	
>> INSPECTION END	J
Component Inspection	INEQID:000000001308207

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.

2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Posistanco
Connector	Terminals	Condition	Resistance
M352 14 and 15	MAIN switch: Pressed	Approx. 0 Ω	
	CANCEL switch: Pressed	Approx. 250 Ω	
	SET/COAST switch: Pressed	Approx. 660 Ω	
	RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω	
		All ASCD steering switches: Released	Approx. 4,000 Ω
the increastion requilt normal?			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch

P1572 ASCD BRAKE SWITCH

Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to <u>ECM-45</u>, "System Description" for the ASCD function.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>ECM-197, "DTC Logic"</u>.
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause	
		A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	 Harness or connectors (The stop lamp switch circuit is shorted.) Harness or connectors (The ASCD brake switch circuit is shorted.) Harness or connectors 	
P1572	ASCD brake switch	B)	ASCD brake switch signal is not sent to ECM for extremely long time while the ve- hicle is driving.	 Hames of connectors (The ASCD clutch switch circuit is shorted.) (M/T) Stop lamp switch ASCD brake switch ASCD clutch switch (M/T) Incorrect stop lamp switch installation Incorrect ASCD brake switch installation Incorrect ASCD clutch switch installation (M/T) ECM 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT-III

- 1. Start engine.
- 2. Select "DATA MONITOR" mode with CONSULT-III.
- 3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
- 4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.
- CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

INFOID:000000001308208

INFOID-000000001308209

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[MR20DE]

Connector	Terminal	Connector	Terminal			Condition		Voltage	Г
Withou I. Turn ig 2. Check	tt CONSULT-III gnition switch ON. the voltage between E(CM harnes	s connecto	or ter	minal as fo	ollows.			0
🕅 \\/:+h ~·			⊢ully releasec	1	ON				
BRAKE SV	/1 Brake pedal		Slightly depre	ssed	OFF				Ν
Monitor ite	m Co	ondition			Indication				
 With C Turn ig Select Check 	ONSULT-III gnition switch ON. : "BRAKE SW1" in "DAT. : "BRAKE SW1" indicatio	A MONITC)R" mode v ne following	vith C g con	CONSULT- ditions.	-111.			L
1. CHECK	OVERALL FUNCTION	-1							Κ
Diagnos	is Procedure						"	IFOID:0000000001308210	
<u>Is 1st trip I</u> YES > NO >	<u>DTC detected?</u> > Go to <u>ECM-253, "Diac</u> > INSPECTION END	<u>inosis Pro</u>	<u>cedure"</u> .						J
2. Check (a) With G: Follow the	t 1st trip DTC. ST procedure "With CONS	ULT-III" ab	oove.						I
Driving loca	ation	Depress th five second the above-	e brake pedal ds so as not to mentioned ve	l for m come hicle s	ore than e off from speed.				Н
Selector lev	/er	Suitable po	sition	.,					G
VHCL SPE	ED SE	More than	30 km/h (19 n	nph)					
1. Drive CAUT Alway NOTE This p If a ro	the vehicle for at least 5 TON: vs drive vehicle at a sa : procedure may be conc ad test is expected to	consecuti fe speed. lucted wit be easier,	ve seconds h the drive it is unnee	e whe cess	er the folle eels lifted ary to lift	owing condit in the shop the vehicle	ions. 9 or by driving	the vehicle.	E
J.PERFC		ON PROC	EDURE FO	OR M	IALFUNC	TION B		_	D
YES > NO >	> Go to <u>ECM-253, "Diac</u> > GO TO 3.	inosis Pro	<u>cedure"</u> .						С
Follow the	procedure "With CONS	ULT-III" ab	ove.						
5. Check	t 1st trip DTC. ST								ECN
Shift lever		Suitable po	sition						
VHCL SPE	ED SE	More than	30 km/h (19 n	nph)					A

< COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO-1 >> CVT models: GO TO 3.

NO-1 >> M/T models: GO TO 7.

2. CHECK OVERALL FUNCTION-II

(P) With CONSULT-III

Select "BRAKE SW2" and check indication in "DATA MONITOR" mode.

Monitor item	Condition	Indication	
BDAKE SW/2	Brake pedal (CVT)	Slightly depressed	ON
DIVARE 3002	Brake pedal and clutch pedal (M/T)	Fully released	OFF

Without CONSULT-III

Check the voltage between ECM harness connector terminal as follows.

(+)		(-)		Condition	Voltage		
Connector	Terminal	Connector	Terminal	Condition		voitage	
E16	99	E108	108	Brake pedal (CVT)	Slightly de- pressed	Approx. 0V	
210	(Stop lamp switch signal)	2100	108	(M/T)	Fully released	Battery volt- age	

Is the inspection result normal?

YES >> GO TO 19.

>> GO TO 14. NO

 ${\it 3.}$ check ascd brake switch power supply circuit

1. Turn ignition switch OFF.

- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD b	rake switch	Ground	Voltage	
Connector Terminal		Cround	Vollage	
E112	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5. >> GO TO 4.

NO

4.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E105, M77

• 10A fuse (No.1)

· Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. Check ascd brake switch input signal circuit for open and short

1. Turn ignition switch OFF.

- Disconnect ECM ASCD harness connector. 2.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ake switch	E	Continuity	
Connector	Terminal Connecto		Terminal	Continuity
E112	2	E16	100	Existed

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4. Also d	heck harr	ness for	short to gro	und and short to	power.	
Is the insp	ection res	sult norm	nal?			
YES >	> GO TO	6. open cir	cuit or short	to around or sho	or to power in harness or connectors	_
6.CHECK	ASCD B	RAKE S	SWITCH			E
Refer to E	CM-257, '	"Compo	nent Inspec	tion (ASCD Brake	e Switch)".	
Is the insp	ection res	sult norm	nal?			
YES >	> GO TO	19.	handler avvita	L.		
				CON		
2. Disco	nnect AS	CD cluch	 n switch har	ness connector.		
3. Turn i	gnition sw	itch ON		aluah awitah hara	and connector and ground	
4. Checi	c the volta	ge betw	een ASCD	ciuch switch ham	less connector and ground.	
ASCD Clu	tch switch	0				
Connector	Terminal	Ground	(Condition	Voltage (V)	
E111	E111 1 Ground Brake pedal Slightly depressed Approx. 0					
				Fully released	Battery voltage	
Is the insp	ection res	sult norm	nal?			
NO >	> GO TO > GO TO	12. 8.				
8.CHECK	K ASCD B	RAKE S	WITCH PO	WER SUPPLY C	IRCUIT	
1. Turn i	gnition sw	vitch OFI	.			
2. Disco	nnect AS	CD brake	e switch har	ness connector.		
4. Check	k the volta	ge betw	een ASCD	brake switch harr	ness connector and ground.	
		-			-	
ASCD br	ake switch	Ground	d Voltage			
Connector	Terminal					
E112		Ground	Battery volt	age		
		10	<u>nal?</u>			
NO >	> GO TO	9.				
9.DETEC	T MALFU	INCTIO	NING PART			
Check the	following					
 Junction 10A fuse 	block cor (No 1)	nnector I	E105, M77			
 Harness 	for open	or short	between As	SCD brake switch	n and fuse	
10	> Repair (open cir	cuit or short	to ground or sho	ort to power in harness or connectors.	
		BRAKE	- SWITCHT	NPUT SIGNAL C	IKCUIT FOR OPEN AND SHORT	
1. Turn i 2. Checl	gnition sw	utch OFI	 etween ASC	D brake switch	harness connector and ASCD clutch s	witch harness
conne	ector.					

ASCD b	rake switch	ASCD clu	Continuity		
Connector Terminal		Connector	Terminal	Continuity	
E112	2	E111	1	Existed	

< COMPONENT DIAGNOSIS >

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11.CHECK ASCD CLUTCH SWITCH

Refer to ECM-258, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 19.

NO >> Replace ASCD clutch switch.

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ECM harness connector and ASCD cluch switch harness connector.

E	CM	ASCD clu	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E16	100	E111	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK ASCD BRAKE SWITCH

Refer to ECM-257, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.

NO >> Replace ASCD brake switch.

14. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect stop lamp switch harness connector.
- 3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp	o switch	Ground	Voltage	
Connector	Terminal	Giouna		
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage	

Is the inspection result normal?

15. DETECT MALFUNCTIONING PART

Check the following.

• 10A fuse (No.11)

• Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

< COMPONENT DIAGNOSIS >

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E	СМ	Stop lamp sv	witch			А
Connector	Terminal	Connector	Terminal	Continuity		
E10	99	E114 (M/T) E115 (CVT)	2	Existed		ECI
3. Also ch	neck harnes	s for short to gro	ound and	short to pov	ver.	
Is the inspe	ection result	normal?				С
YES >>	• GO TO 18 • GO TO 17					
17.DETE	CT MALFU	NCTIONING PA	RT			D
Check the	following.					
Harness	for open or s	short between E	CM and	stop lamp sv	vitch	_
	_ .	· ·, ·				E
18 0000	Repair ope	en circuit or shor	t to grou	nd or short to	power in harness or connectors.	
				an Loren Out		F
Is the inspe	oction result	normal?	<u>xion (Sto</u>	<u>op Lamp Swi</u>	<u>(cn)</u> .	
YES >>	• GO TO 19					G
NO >>	Replace st	op lamp switch.				
19. CHEC	K INTERMI	TTENT INCIDE	NT			н
Refer to GI	<u>-39, "Interm</u>	<u>ittent Incident"</u> .				
Compon	ont Incho	ction (ASCD	Broko	Switch)		1
Compon	спі пізре		Diake	Switch		INFOID:000000001308211
1.снеск	ASCD BRA	KE SWITCH-I				J
1. Turn ig	nition switch	n OFF. broko owitab ba	rnoog og	nnactor		
3. Check	the continui	ty between ASC	D brake	switch termi	nals under the following conditions	. K
	1					
Terminals	C	Condition	Contin	uity		L
1 and 2	Brake pedal	Fully released	Exist			
Is the inspe	oction result	normal?	INOL EXI	sieu		Γ.Δ.
YES >>	INSPECTI	ON END				IVI
NO >>	• GO TO 2.					
2.CHECK	ASCD BRA	KE SWITCH-II				N
1. Adjust	ASCD brak	e switch installa	tion. Ref	fer to <u>BR-8, '</u>	Inspection and Adjustment" (LHD	models) or <u>BR-</u>
2. Check	the continui	ty between ASC	D brake	switch termi	nals under the following conditions	. 0
	1					
Terminals	C		Contin	uity		Р
1 and 2	Brake pedal	Fully released	Exist	ed 		
ls the inerc	action result	normal?	INULEXI	SIEU		
is the mape	Jouon 163ull	norman				

YES >> INSPECTION END

NO >> Replace ASCD brake switch.

< COMPONENT DIAGNOSIS >

Component Inspection (ASCD Clutch Switch)

1.CHECK ASCD CLUTCH SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- 3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Clutch podal	Fully released	Existed
T anu z	Clutch pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

- 1. Adjust ASCD clutch switch installation. Refer to <u>CL-5, "Inspection and Adjustment"</u>.
- 2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Clutch nedal	Fully released	Existed
Tanu 2	Clutch pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:000000001308213

1.CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to <u>BR-8</u>, "Inspection and Adjustment" (LHD models) or <u>BR-58</u>, "Inspection and Adjustment" (RHD models).

2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
	Diake pedal	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

P1574 ASCD VEHICLE SPEED SENSOR

< COMPONENT DIAGNOSIS >

P1574 ASCD VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to <u>ECM-45</u>, "System Description" for ASCD functions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>ECM-108, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to <u>ECM-109, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>ECM-195, "DTC Logic"</u>
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer F
 to ECM-197, "DTC Logic"

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	 Harness or connectors (The CAN communication line is open or shorted.) (Combination meter circuit is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM (CVT models) ECM 	H

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

L >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE Start engine. 1. Μ Drive the vehicle at more than 40 km/h (25 MPH). 2. **CAUTION:** Always drive vehicle at a safe speed. Ν NOTE: This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle. 3. Check DTC. Is DTC detected? YES >> Go to ECM-259, "Diagnosis Procedure". NO >> INSPECTION END Ρ **Diagnosis** Procedure INFOID:000000001308216 CHECK DTC WITH TCM Check DTC with TCM. Refer to TM-392, "Diagnosis Description". Is the inspection result normal?

YES >> GO TO 2.

ECM-259

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P1574 ASCD VEHICLE SPEED SENSOR

< COMPONENT DIAGNOSIS >

[MR20DE]

NO >> Perform trouble shooting relevant to DTC indicated.

 $2. {\sf CHECK} \ {\sf DTC} \ {\sf with} \ {\sf "ABS} \ {\sf actuator} \ {\sf and} \ {\sf electric} \ {\sf unit} \ ({\sf control} \ {\sf unit})"$

Refer to BRC-17, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK COMBINATION METER

Check combination meter function. Refer to <u>MWI-24. "CONSULT-III Function (METER/M&A)"</u>.

>> INSPECTION END

< COMPONENT DIAGNOSIS >

P1706 PNP SWITCH

Description

When the shift lever position is P or N (CVT), Neutral position (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:000000001308218

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	 Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] Park/neutral position (PNP) switch
DTC CON 1.INSPEC	FIRMATION PROC	EDURE	
Do you hav <u>Do you hav</u> YES	/e CONSULT-III? /e CONSULT-III? > GO TO 2		
NO >	> GO TO 5. NDITIONING		

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

(P)With CONSULT-III

- Turn ignition switch ON. 1.
- Κ Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-III. Then check the "P/N POSI SW" sig-2. nal under the following conditions.

Position (Shift lever)	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF
Is the inspection result normal?	
YES >> GO TO 4.	
4 PERFORM DTC CONFIRMATION	
 Select DATA MONITOR mod Start engine and warm it up to 	normal operating temperature.
 Maintain the following condition 	ns for at least 50 consecutive se
CAUTION:	fe enced

Always drive vehicle at a safe speed.

ENG SPEED	CVT: 1,500 - 6,375 rpm M/T: 1,500 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)

[MR20DE]

INFOID:000000001308217

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ECM

P1706 PNP SWITCH

< COMPONENT DIAGNOSIS >

B/FUEL SCHDL	CVT: 2.4 - 31.8 msec M/T: 3.5 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECM-262, "Diagnosis Procedure".

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECM-262, "Component Function Check".

NOTE:

Use component function check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to ECM-262, "Diagnosis Procedure".

Component Function Check

INFOID:000000001308219

1.PERFORM COMPONENT FUNCTION CHECK

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as follows.

ECM		Ground		Condition		Voltago
Connector	Terminal	Connector	Terminal	Condition		voltage
F8	69 (PNP switch signal)	E16	108	Shift lever	P or N (CVT) Neutral (M/T)	Approx. 0V
	(PNP switch signal)				Except above	BATTERY VOLTAGE

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to ECM-262, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000001308220

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect Park/neutral position (PNP) switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between PNP switch harness connector and ground.

PNP swi	tch	Ground	Voltago	
Connector	Terminal	Giouna	voltage	
F21 (CVT)	7			
F46 (2WD with M/T)	2	Ground	Battery voltage	
F48 (4WD with M/T)	2	*		

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DTECTED MALFUNCTIONING PART

P1706 PNP SWITCH

[MR20DE] < COMPONENT DIAGNOSIS > Check the following. Harness connectors E6, F123 А • 10A fuse (No. 58) Harness for open or short between PNP switch and IPDM E/R ECM >> Repair open circuit or short to ground or short to power in harness or connectors. ${f 3.}$ CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT С 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between PNP switch harness connector and ECM harness connector. D PNP switch ECM Continuity Connector Terminal Connector Terminal Е F21 6 (CVT) F46 F 3 E10 102 Existed (2WD with M/T) F48 1 (4WD with M/T) 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. Н NO >> Repair open circuit or short to ground or short to power in harness or connectors. **4.**CHECK PNP SWITCH Refer to TM-404, "Component Inspection" (CVT) or TM-12, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection" (M/T). Is the inspection result normal? YES >> GO TO 5. NO >> Replace PNP switch. **5.**CHECK INTERMITTENT INCIDENT Κ Refer to GI-39, "Intermittent Incident". >> INSPECTION END L Μ Ν

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P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

< COMPONENT DIAGNOSIS >

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Description

ECM receives primary speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:000000001308222

INFOID:000000001308221

[MR20DE]

DTC DETECTION LOGIC

NOTE:

- If DTC P1715 is displayed with DTC U1001 first perform the trouble diagnosis for DTC U1001. Refer to <u>ECM-108, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to <u>ECM-109, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to <u>ECM-179, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>ECM-183, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>ECM-197, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (Primary speed sensor) (TCM output)	Primary speed sensor signal is different from the theoretical value calculated by ECM from secondary speed sensor signal and engine rpm signal.	 Harness or connectors (The CAN communication line is open or short- ed) Harness or connectors (Primary speed sensor circuit is open or short- ed) TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECM-264, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000001308223

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-392, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM.

>> INSPECTION END

P1805 BRAKE SWITCH

Description

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

DTC Logic

INFOID:000000001308225

DTC DETECTION LOGIC

DTC No.	Trouble diagno	sis name	DTC	detecting condition	Possible cause
P1805	Brake switch		A brake switch s tremely long time	ignal is not sent to ECM for ex- e while the vehicle is driving.	 Harness or connectors (Stop lamp switch circuit is open or short- ed.) Stop lamp switch
DTC CON	FIRMATION	PROC	EDURE		
1.PERFOR	RM DTC CON	IFIRMA	TION PROCED	URE	
 Turn ig Fully de Erase t Check 	nition switch (epress the bra he DTC with 1st trip DTC.	ON. ake peda CONSU	al for at least 5 LT-III.	seconds.	
<u>Is 1st trip D</u> YES >> NO >>	TC detected? Go to ECM-2 INSPECTIO	2 <u>65, "Dia</u> N END	agnosis Procec	<u>lure"</u> .	
Diagnosi	s Procedui	re			INFOID:000000001308226
1. снеск	STOP LAMP	SWITC	H CIRCUIT		
1. Turn ig 2. Check	nition switch (the stop lamp	OFF. when d	epressing and	releasing the brake peda	 I.
Brake pe	dal Stop I	amp			
Fully relea	sed Not illum	ninated			
Slightly depr	essed Illumir	nated			
Is the inspe	ction result n	ormal?			
YES >> NO >>	GO TO 4 GO TO 2				
2.снеск	STOP LAMP	SWITC	H POWER SU	PPLY CIRCUIT	
1. Discon 2. Check	nect stop lam the voltage be	p switch etween s	harness conne stop lamp switc	ector. h harness connector and	ground.
Stop la	mp switch	a .			
Connector	Terminal	Ground	Voltage		
E114 (M/T)	1	Ground	Battery voltage		
Is the inspe	ction result n	ormal?			
YES >>	GO TO 4.	onnur:			
NO >>	GO TO 3.				
3.DETECT	MALFUNCT		FART		

ECM-265

[MR20DE]

INFOID:000000001308224

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P1805 BRAKE SWITCH

< COMPONENT DIAGNOSIS >

Harness connectors M77, E105

Harness for open or short between ECM and stop lamp switch

• 10A fuse (No.11)

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1 Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

EC	М	Stop lam	Continuity	
Connector	Terminal	Connector Terminal		
E16	00	E114 (M/T)	2	Existed
L10	39	E115 (CVT)	Z	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Refer to ECM-266, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

1.CHECK STOP LAMP SWITCH-I

- Turn ignition switch OFF. 1.
- Disconnect stop lamp switch harness connector. 2.
- 3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Condition C		Continuity
1 and 2	Brako podal	Fully released	Not existed		
	Diake pedal	Slightly depressed	Existed		

Is the inspection result normal?

YES >> INSPECTION END NO

>> GO TO 2.

2. CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to ECM-266, "Component Inspection (Stop Lamp Switch)".

Check the continuity between stop lamp switch terminals under the following conditions. 2.

Terminals	Condition		Continuity
1 and 2	Brako podal	Fully released	Not existed
	Diake peual	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

P1805 BRAKE SWITCH

< COMPONENT DIAGNOSIS >

NO >> Replace stop lamp switch.



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< COMPONENT DIAGNOSIS >

P2122, P2123 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to ECM-247, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal posi- tion sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	Harness or connectors (APP sensor 1 circuit is open or shorted.)
P2123	Accelerator pedal posi- tion sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	 Accelerator pedal position sensor (APP sensor 1)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

- >> Go to ECM-268, "Diagnosis Procedure". YES
- >> INSPECTION END NO

Diagnosis Procedure

1.CHECK GROUND CONNECTION

Turn ignition switch OFF. 1.

Check ground connection E21. Refer to Ground Inspection in GI-41. "Circuit Inspection". 2.

Is the inspection result normal?

YES >> GO TO 2.

INFOID:000000001308228

INFOID-000000001308229

INFOID:000000001308230

P2122, P2123 APP SENSOR

	I DIAGNOS	SIS >	[M]	R20DE]
NO >> Rep	air or replac	e ground co	onnection.	
2.CHECK APP	SENSOR 1	POWER S	UPPLY CIRCUIT	
 Disconnect Turn ignition Check the v 	accelerator switch ON. oltage betwe	pedal positio een APP se	on (APP) sensor harness connector. nsor harness connector and ground.	E
APP sensor	Ground	Voltage		
Connector Term	inal	voltage		
E110 4	Ground	Approx. 5V		
s the inspection	result norm	<u>al?</u>		
YES >> GO NO >> Rep 3. CHECK APP	TO 3. pair open circ SENSOR 1	cuit or short GROUND (to ground or short to power in harness or connectors. CIRCUIT FOR OPEN AND SHORT	
 Turn ignition Disconnect Check the c 	n switch OFF ECM harnes continuity bef	s connector ween APP	r. sensor harness connector and ECM harness connector.	
APP sensor		ECM	Continuity	
Connector Term	inal Connect	or Terminal		
E110 2	E16	111	Existed	
e the increation	result norm	-10		
YES >> GO NO >> Rep 1. CHECK APP	TO 4. pair open circ SENSOR II	uit or short NPUT SIGN	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT	
YES >> GO NO >> Rep 1. CHECK APP	TO 4. pair open circ SENSOR II	uit or short NPUT SIGN ween APP :	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector.	
YES >> GO NO >> Rep 1.CHECK APP 1. Check the c	TO 4. pair open circ SENSOR IN continuity bet	uit or short NPUT SIGN ween APP	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector.	
YES >> GO NO >> Rep 1. CHECK APP 1. Check the c APP sensor Connector Term	TO 4. pair open circ SENSOR IN continuity bef	cuit or short NPUT SIGN ween APP = ECM or Terminal	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector.	
YES >> GO NO >> Rep 1. CHECK APP 1. Check the c APP sensor Connector Term E110 3	TO 4. pair open circ SENSOR IN continuity bet inal Connect E16	cuit or short NPUT SIGN ween APP s ECM or Terminal 110	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector.	
YES >> GO NO >> Rep LCHECK APP 1. Check the c APP sensor Connector Term E110 3 2. Also check	TO 4. pair open circ SENSOR IN continuity bet inal Connect E16 harness for s	cuit or short NPUT SIGN ween APP ECM or Terminal 110 short to grou	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector.	
YES $>>$ GO NO $>>$ Rep 1. CHECK APP 1. Check the c APP sensor Connector Term E110 3 2. Also check s the inspection YES $>>$ GO NO $>>$ Rep	TO 4. pair open circ SENSOR IN continuity beform inal Connect E16 harness for so result norm TO 5. pair open circ	cuit or short NPUT SIGN ween APP ECM or Terminal 110 short to grou al? cuit or short	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed und and short to power. to ground or short to power in harness or connectors.	
State inspectionYES>> GONO>> Rep1. CHECK APP1. Check the cAPP sensorConnectorTermE11032. Also checks the inspectionYES>> GONO>> RepD.CHECK APP	TO 4. pair open circ SENSOR IN continuity bet inal Connect E16 harness for s result norm TO 5. pair open circ SENSOR	cuit or short NPUT SIGN ween APP = ECM or Terminal 110 short to grou al? cuit or short	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed und and short to power. to ground or short to power in harness or connectors.	
Stille inspectionYES>> GONO>> Rep1. CHECK APP1. Check the cAPP sensorConnectorTermE11032. Also checks the inspectionYES>> GONO>> RepD.CHECK APPRefer to ECM-2s the inspection	TO 4. pair open circ SENSOR IN continuity bet inal Connect E16 harness for s result norm TO 5. pair open circ SENSOR 70, "Compor	cuit or short NPUT SIGN ween APP = ECM or Terminal 110 short to grou al? cuit or short	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed Und and short to power. to ground or short to power in harness or connectors.	
YES $>>$ GO NO $>>$ Rep 1. CHECK APP 1. Check the c APP sensor Connector Term E110 3 2. Also check s the inspection YES $>>$ GO NO $>>$ Rep D.CHECK APP Refer to ECM-2 s the inspection YES $>>$ GO	TO 4. pair open circ SENSOR IN continuity before inal Connect E16 harness for so result norm TO 5. pair open circ SENSOR 70, "Compor result norm TO 7.	air cuit or short NPUT SIGN ween APP ECM or Terminal 110 short to grou al? cuit or short nent Inspect al?	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed und and short to power. to ground or short to power in harness or connectors.	
Stille inspectionYES>> GONO>> Rep1. CHECK APP1. Check the constructionAPP sensorConnectorTermE11032. Also checks the inspectionYES>> GONO>> RepD.CHECK APPRefer to ECM-2s the inspectionYES>> GONO>> GONO>> GONO>> GOO.CHECK APP	TO 4. pair open circ SENSOR IN continuity bet inal Connect E16 harness for s result norm TO 5. pair open circ SENSOR 70, "Compor result norm TO 7. TO 6. CCELERATO	air cuit or short NPUT SIGN ween APP s ECM or Terminal 110 short to grou al? cuit or short <u>nent Inspect</u> al?	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed und and short to power. to ground or short to power in harness or connectors. ion".	
Stille inspectionYES>> GONO>> Rep1. CHECK APP1. Check the cAPP sensorConnectorTermE11032. Also checks the inspectionYES>> GONO>> RepD.CHECK APPRefer to ECM-2s the inspectionYES>> GONO>> GONO>> GOO.CHECK APPRefer to ECM-2s the inspectionYES>> GONO>> GOD.REPLACE AI. Replace action	TO 4. pair open circ SENSOR IN continuity bet inal Connect E16 harness for s result norm TO 5. pair open circ SENSOR 70, "Compor result norm TO 7. TO 6. CCELERATO	air cuit or short NPUT SIGN ween APP s ECM or Terminal 110 short to grou al? cuit or short <u>nent Inspect</u> al? DR PEDAL	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed Ind and short to power. to ground or short to power in harness or connectors. ion".	
State inspectionYES>> GONO>> Rep1. CHECK APP1. Check the cAPP sensorConnectorTermE11032. Also checks the inspectionYES>> GONO>> RepD.CHECK APPRefer to ECM-2s the inspectionYES>> GONO>> GOD.REPLACE A1. Replace acc2. Go to ECM-	TO 4. pair open circ SENSOR IN continuity before inal Connect E16 harness for so result norm TO 5. pair open circ SENSOR 70, "Compor result norm TO 7. TO 6. CCELERATO celerator peo 270, "Specia	air cuit or short NPUT SIGN ween APP ECM or Terminal 110 short to grou al? cuit or short hent Inspect al? DR PEDAL al assembly al Repair Re	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed und and short to power. to ground or short to power in harness or connectors. ion". ASSEMBLY y. equirement".	
Stille inspectionYES>> GONO>> Rep1. CHECK APP1. Check the cAPP sensorConnectorTermE11032. Also checks the inspectionYES>> GONO>> RepD.CHECK APPRefer to ECM-2s the inspectionYES>> GONO>> GOD.REPLACE A1. Replace acc2. Go to ECM-	TO 4. pair open circ SENSOR IN continuity bet inal Connect E16 harness for s result norm TO 5. pair open circ SENSOR 70, "Compor result norm TO 7. TO 6. CCELERATO celerator peo 270, "Specia BECTION E	air cuit or short NPUT SIGN ween APP ECM or Terminal 110 short to groual? cuit or short cuit or short nent Inspect al? DR PEDAL al assembly al Repair Re	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed und and short to power. to ground or short to power in harness or connectors. ion". ASSEMBLY y. equirement".	
YES $>>$ GO NO $>>$ Rep 1. CHECK APP 1. Check the c APP sensor Connector Term E110 3 2. Also check s the inspection YES $>>$ GO NO $>>$ Rep D.CHECK APP Refer to ECM-2 s the inspection YES $>>$ GO NO $>>$ Rep D.CHECK APP Refer to ECM-2 S the inspection YES $>>$ GO NO $>>$ GO D.CHECK APP Refer to ECM-2 S the inspection YES $>>$ GO NO $>>$ GO D.REPLACE A 1. Replace act 2. Go to ECM- >> INS	TO 4. pair open circ SENSOR IN continuity before inal Connect E16 harness for so result norm TO 5. pair open circ SENSOR 70, "Compor result norm TO 7. TO 6. CCELERATO celerator peo 270, "Specia PECTION E	air cuit or short NPUT SIGN ween APP = ECM or Terminal 110 short to grou al? cuit or short nent Inspect al Repair Re ND	to ground or short to power in harness or connectors. AL CIRCUIT FOR OPEN AND SHORT sensor harness connector and ECM harness connector. Continuity Existed und and short to power. to ground or short to power in harness or connectors. ion". ASSEMBLY y. equirement".	

Refer to GI-39, "Intermittent Incident".

P2122, P2123 APP SENSOR

< COMPONENT DIAGNOSIS >

Component Inspection

INFOID:000000001308231

[MR20DE]

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECM harness connector terminals as follows.

(+)		(-)		Condition		Voltage
Connector	Terminal	Connector Terminal		Condition		voltage
	110		111		Fully released	0.6 - 0.9V
E16	(APP sensor 1 signal)	E16	111	Accelerator podal	Fully depressed	3.9 - 4.7V
	103		104	Accelerator pedar	Fully released	0.3 - 0.6V
	(APP sensor 2 signal)		104		Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Go to ECM-270, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000001308232

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3. Perform idle air volume learning

Refer to ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

< COMPONENT DIAGNOSIS >

P2127, P2128 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID-000000001308234

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal posi- tion sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit
P2128	Accelerator pedal posi- tion sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	 is shorted.] (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 2) Crankshaft position sensor (POS) Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 1 second. 1.
- Check DTC. 2.

Is DTC detected?

YES >> Go to ECM-271, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection". 2.

Is the inspection result normal?

YES >> GO TO 2.

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P2127, P2128 APP SENSOR

< COMPONENT DIAGNOSIS >

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP	sensor	Ground	Voltage	
Connector Terminal		Ciouna	voltage	
E110	5	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP	sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

EC	ECM Sensor			
Connector	Terminal	Item	Connector	Terminal
F8 74 75		Refrigerant pressure sensor	E49	3
		CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to ECM-182, "Component Inspection".)
- Refrigerant pressure sensor (Refer to ECM-306, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between APP sensor harness connector and ECM harness connector.

P2127, P2128 APP SENSOR

< COMPONENT DIAGNOSIS >

APP s	ensor	ECM		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity		
E110	1	E16	104	Existed		

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

I.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E110	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to ECM-273, "Component Inspection".

Is the inspection result normal?

YES	>>	GC) TO	10.
-			-	

NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Go to ECM-274, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.

3. Check the voltage between ECM harness connector terminals as follows.

(+) (-)		-) 		ition	Voltago	
Connector	Terminal	Connector	Terminal	Condition		Voltage
	110		111		Fully released	0.6 - 0.9V
E16	(APP sensor 1 signal)	E16	111	Accelerator padal	Fully depressed	3.9 - 4.7V
	103	EIO	101		Fully released	0.3 - 0.6V
	(APP sensor 2 signal)		104		Fully depressed	1.95 - 2.4V

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P2127, P2128 APP SENSOR

< COMPONENT DIAGNOSIS >

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Go to ECM-274, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000001308237

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECM-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECM-14, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

< COMPONENT DIAGNOSIS >

P2135 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC DETECTION LOGIC

NOTE:

If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to ECM-247, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/perfor- mance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	 Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test. **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2	L
2. PERFORM DTC CONFIRMATION PROCEDURE	
 Start engine and let it idle for 1 second. Check DTC. 	Ν
Is DTC detected?	
YES >> Go to <u>ECM-275, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Ν
Diagnosis Procedure	INFOID:000000001308240
1. CHECK GROUND CONNECTION	
 Turn ignition switch OFF. Check ground connection E21. Refer to Ground Inspection in <u>GI-41, "Circuit Inspection"</u>. 	F
Is the inspection result normal?	
YES >> GO TO 2.	
NO >> Repair or replace ground connection.	
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I	
1. Disconnect electric throttle control actuator harness connector.	

ECM-275



INFOID:000000001308239



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P2135 TP SENSOR

< COMPONENT DIAGNOSIS >

- 2. Turn ignition switch ON.
- 3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle c	Ground	Voltage	
Connector Terminal		Clound	voltage
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

 \sim >> GO 10 3

3.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle of	control actuator	EC	CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
F29	1	F8	72	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

${f 4.}$ CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle c	control actuator	EC	CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle c	control actuator	E	Continuity	
Connector	Connector Terminal		Terminal	Continuity
F20	2	F8	33	Existed
123	3	10	34	LAISteu

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK THROTTLE POSITION SENSOR

Refer to ECM-277, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

P2135 TP SENSOR

 7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace electric throttle control actuator. 2. ECM-277, "Special Repair Requirement"
 Replace electric throttle control actuator. ECM-277, "Special Repair Requirement"
2. ECM-277, "Special Repair Reguirement"
>> INSPECTION END
8. CHECK INTERMITTENT INCIDENT
Refer to GI-39, "Intermittent Incident".
>> INSPECTION END
Component Inspection
1. Turn ignition switch OEE
 Reconnect all harness connectors disconnected.
 Perform <u>ECM-277, "Special Repair Requirement"</u>. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
0. Check the voltage between LCM namess connector terminals as follows.
(+) (-) Condition Voltage
Connector Terminal Connector Terminal
33 Fully released More than 0.36V
F8 F8 F8 Accelerator pedal Fully depressed Less than 4.75V
(TP sensor 2 signal) Fully depressed More than 0.36V
Is the inspection result normal?
YES >> INSPECTION END
2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR
1. Replace electric throttle control actuator.
2. Go to ECM-277, "Special Repair Requirement".
>> INSPECTION END
Special Repair Requirement
1 PERFORM THROTTLE VALVE CLOSED POSITION LEARNING
Refer to ECM-14. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"
>> GO TO 2.
2.PERFORM IDLE AIR VOLUME LEARNING
Refer to ECM-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to ECM-247, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal posi- tion sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	 Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 1 and 2) Crankshaft position sensor (POS) Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 1 second. 1
- Check DTC. 2.

Is DTC detected?

- YES >> Go to ECM-278, "Diagnosis Procedure".
- >> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF. 1.

INFOID:000000001308243

INFOID:000000001308244



< COMPO	NENT D	IAGNOSI	IS >				[MR20)DE]
2. Check	ground c	onnection	n E21. Refer	to Ground	Inspection	in <u>GI-41.</u>	"Circuit Inspection".	
Is the insp	ection res	ult norma	<u>ul?</u>					А
YES >	> GO TO	2.						
NO >:	> Repair o	or replace	e ground con	nection.				EC
Z.CHECK	APP SE	NSOR 1 I	POWER SUI	PPLY CIRC	UIT			ECI
1. Discor	nnect acco	elerator p	edal position	(APP) sen	isor harnes	s connec	tor.	
2. Turn ig 3. Check	the volta	itch ON. de betwei	en APP sens	sor harness	connector	and arou	Ind	С
0. 011001		go botho				and grot		
APP s	sensor							D
Connector	Terminal	Ground	Voltage					D
E110	4	Ground	Approx. 5V					
Is the insp	ection res	ult norma	12					E
YES >	> GO TO	3.						
NO >:	> Repair o	open circu	uit or short to	ground or	shot to pov	ver in hai	mess or connectors.	_
3. CHECK	APP SE	NSOR 2 I	POWER SUI	PPLY CIRC	UIT-I			1
1. Turn iç	gnition sw	itch ON.						
2. Check	the volta	ge betwe	en APP sens	sor narness	connector	and grou	Jnd.	G
	sonsor							
Connector	Terminal	- Ground	Voltage					Н
F110	5	Ground	Approx 5V					11
Is the insp	ection res							
YES >	> GO TO	7.	<u>u.</u>					I
NO >	> GO TO	4.						
4.CHECK	APP SE	NSOR 2 I	POWER SUI	PPLY CIRC	UIT-II			1
1. Turn iç	gnition sw	itch OFF.						
2. Discor	nect ECN	A harness	s connector.					
3. Check	the conti	nuity betv	veen APP se	ensor harne	ess connect	or and E	CM harness connector.	K
	sensor		ECM					
Connector	Terminal	Connect		Continuity				1
E110	5	F16	102	Existed				
Is the insp	ection res		102	Existed				
YES >	> GO TO	5.	<u>u.</u>					M
NO >	> Repair of	open circu	uit or short to	ground or	shot to pov	ver in hai	rness or connectors.	
5.CHECK	APP SE	NSOR 2 I	POWER SU	PLY CIRC	UIT-III			N
Check har	ness for s	hort to po	ower and sho	ort to aroun	d, between	the follow	wing terminals.	IN
				J	-,		9	
EC	M			Sensor				0
Connector	Terminal		Item		Connector	Terminal		
	74	Refrigerar	nt pressure sen	sor	E49	3		P
ГŎ	75	CKP sens	or (POS)		F20	1		P

102 Is the inspection result normal?

APP sensor

YES

E16

>> GO TO 6. >> Repair short to ground or short to power in harness or connectors. NO

6.CHECK COMPONENTS

E110

5

< COMPONENT DIAGNOSIS >

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>ECM-182, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to <u>ECM-306, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning component.

7. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP	sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E110	2	E16	111	Existed
ETTU	1	L10	104	LAISIGU

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

 ${f 8}.$ CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP	sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E110	3	E16	110	Evictod
EIIU	6	L 10	103	EXISIED

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.CHECK APP SENSOR

Refer to ECM-280. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Go to ECM-281, "Special Repair Requirement".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.

ECM-280

< COMPONENT DIAGNOSIS >

2.

Turn ignition switch ON. Check the voltage between ECM harness connector terminals as follows. 3.

	(+)	(-	-)				
Connector	Terminal	Connector	Terminal	- Conc	dition	Voltage	EC
	110		111		Fully released	0.6 - 0.9V	
E110	(APP sensor 1 signal)	E16	111	Accelerator padal	Fully depressed	3.9 - 4.7V	С
EIIU	103	E10	104	Accelerator pedal	Fully released	0.3 - 0.6V	0
	(APP sensor 2 signal)		104		Fully depressed	1.95 - 2.4V	
Is the insp	ection result normal?	-					D
YES >: NO >:	> INSPECTION ENE > GO TO 2.)					
2.REPLA	CE ACCELERATOR	PEDAL AS	SSEMBLY				E
1. Replac	ce accelerator pedal	assembly.					
2. Go to	ECM-281, "Special F	Repair Requ	<u>uirement"</u> .				F
~		'n					
Special I	Papair Paguiran	, nont					G
Special I	Repair Requirem	ient				INFOID:000000001308247	0
1.PERFO	RM ACCELERATOR	R PEDAL R	ELEASED	POSITION LEA	RNING		
Refer to E	CM-14, "ACCELER	ATOR PED	DAL RELE	ASED POSITIO	N LEARNING :	Special Repair Require-	Н
<u>ment"</u> .							
							I
2 DEDEO	90102. MATHOATTLE VAL						
						poir Doguiromont"	.1
Refer to E	JM-14, THRUITLE	VALVE CL	<u>USED PC</u>	JSITION LEARNI	ING : Special Re	epair Requirement.	0
>	> GO TO 3.						
3.PERFO	RM IDLE AIR VOLU		NING				Κ
Refer to E	CM-15, "IDLE AIR V		ARNING	Special Repair F	Requirement".		
							L
>:	> END						
							IVI
							Ν
							0
							0

[MR20DE]

А

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Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to <u>ECM-45</u>, "System Description" for the ASCD function.

Component Function Check

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
	Brake pedal (CVT)	Slightly depressed	OFF
BILARE SWI	Brake pedal and clutch pedal (M/T)	Fully released	ON

Without CONSULT-III

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as follows.

(+)		(-)		Condition	Voltago	
Connector	Terminal	Connector	Terminal	Condition		vollage
E16	100	100 E16 108 Brake pedal (CVT)		Brake pedal (CVT)	Slightly de- pressed	Approx. 0V
LIU	E16 (ASCD brake switch signal)	LIU	100	(M/T)	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Go to ECM-282, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK OVERALL FUNCTION-I

Check which type of transmission the vehicle is equipped with.

Is the inspection result normal?

CVT >> GO TO 2.

M/T >> GO TO 6.

2. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ake switch	Ground	Voltage	
Connector	onnector Terminal		vollage	
E112	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

INFOID:000000001308248

INFOID:000000001308249

< COMPC	NENT DI	AGNOSI	IS >			[MR20DE]
3.DETEC			ING PART			Δ
Check the • Harness	following.	s M77, E	105			^
 Harness 	for open o	r short b	etween ASC	D brake switch a	nd fuse	ECM
	> Renair o	nen circu	uit or short to	around or short t	o power in harness or connectors	
4.CHECK	ASCD BF	RAKE SV		T SIGNAL CIRCU	JIT FOR OPEN AND SHORT	С
 Turn i Disco Check 	gnition swit nnect ECM < the contin	tch OFF. harness uity betv	s connector. veen ASCD	brake switch harn	ess connector and ECM harness co	D nnector.
ASCD bra	ake switch		ECM	Continuity		E
Connector	Terminal	Connecto	or Terminal	Continuity		
E112	2	E16	100	Existed		F
4. Also c	heck harne	ess for sl	hort to groun	id and short to pov	wer.	1
Is the insp YES > NO >	ection resu > GO TO 5 > Repair o	<u>ilt norma</u> 5. pen circu 24KE SV	<u>ll?</u> uit or short to VITCH	o ground or short t	o power in harness or connectors.	G
	CM-285 "(n (ASCD Brake S	witch)"	———— Н
Is the insp	ection resu	ult norma	ll?	III (ASCD BIAKE S	<u>witch)</u> .	
YES >	> GO TO 1	3.	<u>u.</u>			
NO >	> Replace	ASCD b	rake switch.			I
6. CHECK	(ASCD CL	UCH SV	VITCH CIRC	UIT		
 Turn i Disco Turn i 	gnition swit nnect ASC anition swit	tch OFF. D cluch s tch ON.	switch harne	ess connector.		J
4. Check	the contin	uity betv	veen ASCD	cluch switch harne	ess connector and ground.	K
ASCD cl	uch switch					
Connector	Terminal	Ground	C	Condition	Voltage (V)	L
		<u> </u>		Slightly depressed	Approx. 0	
E111	1	Ground	Brake pedal	Fully released	Battery voltage	
5. Also c	heck harne	ess for sl	hort to groun	nd and short to pov	wer.	M
Is the insp	ection resu	<u>ilt norma</u>	<u>ll?</u>			
YES >	> GO TO 1	1.				Ν
	<pre>< GO TO 7</pre>	RAKE SV	VITCH POW	ER SUPPLY CIR	CUIT	
1. Turn i	gnition swit	tch OFF.				0
2. Disco	nnect ASC	D brake	switch harne	ess connector.		
4. Check	the voltag	e betwe	en ASCD bra	ake switch harnes	s connector and ground.	Р
		1		_		
ASCD br	ake switch	Ground	Voltage			
Connector	Terminal		-			

E112 1 Ground Battery voltage

Is the inspection result normal?

YES >> GO TO 9.

< COMPONENT DIAGNOSIS >

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Junction block connector M77,E105
- 10A fuse (No. 1)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD bra	ake switch	ASCD clu	Continuity		
Connector Terminal		Connector Terminal		Continuity	
E112	2	E111	1	Existed	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK ASCD BRAKE SWITCH

Refer to ECM-257, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace ASCD brake switch.

11. CHECK ASCD CLUCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector
- 3. Check the continuity between ASCD cluch switch harness connector and ECM harness connector.

ASCD clu	ich switch	E	Continuity		
Connector Terminal		Connector	Terminal	Continuity	
E112	2	E16	100	Existed	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ASCD CLUTCH SWITCH

Refer to ECM-258, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace ASCD clutch switch.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

< COMPO	ONENT DIA	GNOSIS >		[MR20DE]	
Compor	nent Inspe	ection (ASCD	Brake S	witch) INFOID:000000001308251	-
1. CHEC	K ASCD BR	AKE SWITCH-I			ŀ
1. Turn i	ignition swite	ch OFF.			
 Disco Chec 	nnect ASCE) brake switch ha uity between AS0	arness conn CD brake sv	ector. vitch terminals under the following conditions.	
Terminals	С	ondition	Continuity		(
1 and 2	Brake pedal	Fully released	Existed		
	- · · · · · · · · · · · · · · · · · · ·	Slightly depressed	Not existed		I
Is the insp	bection resul	t normal?			
YES >	>> INSPECT >> GO TO 2	ION END			
	K ASCD BR	AKE SWITCH-II			
1. Adjus	t ASCD brai	ke switch installand Adjustment" (I	tion. Refer RHD models	to <u>BR-8, "Inspection and Adjustment"</u> (LHD miodels) or <u>BR-</u> s).	ļ
2. Chec	k the continu	uity between ASC	CD brake sv	vitch terminals under the following conditions.	
Tanataala	0		Orationity		(
Terminals	C	Fully released	Eviated		
1 and 2	Brake pedal	Slightly doprosed	Not ovisted		
e tha iner	action resul	t normal?	NUL EXISTED		
YES >	>> INSPECT	ION END			
NO >	>> Replace /	ASCD brake swit	ch.		
Compoi	nent Inspe	ection (ASCD	Clutch S	Switch) INFOID:000000001308252	
1. CHEC	K ASCD CLI	UTCH SWITCH-			
1. Turni	ignition swite	ch OFF.			
2. Disco	onnect ASCE) clutch switch ha	arness conr	ector.	I
3. Chec	K the continu	lity between ASC	D Clutch SV	witch terminals under the following conditions.	
Terminals	C	Condition	Continuity		
	0 1	Fully released	Existed	-	
1 and 2	Clutch pedal	Slightly depressed	Not existed	-	
Is the insp	pection resul	t normal?		-	I
YES >	>> INSPECT	ION END			
NU >	>> GO 10 2.				1
 Adjus Chec 	t ASCD clut k the continu	ch switch installa uity between ASC	ition. Refer CD clutch sv	to <u>CL-5, "Inspection and Adjustment"</u> . witch terminals under the following conditions.	(
Terminals	C	Condition	Continuitv		
		Fully released	Existed	-	I
1 and 2	Clutch pedal	Slightly depressed	Not existed	-	ſ
		- 3 .,			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch.

ASCD INDICATOR

< COMPONENT DIAGNOSIS >

ASCD INDICATOR

Description

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.

SET lamp illuminates when following conditions are met.

- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.

Refer to <u>ECM-45, "System Description"</u> for the ASCD function.

Component Function Check

INFOID:000000001308254

INFOID:000000001308255

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR CONDITION			SPECIFICATION
CRUISE LAMP	Ignition switch: ON	 MAIN switch: Pressed at the 1st time →at the 2nd time 	$ON\toOFF$
	MAIN switch: ON	ASCD: Operating	ON
SET LAMP	 When vehicle speed: Be- tween 40 km/h (25 MPH) and 144 km/h (89 MPH) 	ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECM-286, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC U1001. Refer to <u>ECM-108, "DTC Logic"</u>.

2.CHECK COMBINATION METER OPERATION

Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check combination meter circuit. Refer to <u>MWI-5</u>, "<u>METER SYSTEM</u> : <u>System Diagram</u>".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39. "Intermittent Incident".

>> INSPECTION END

ECM-286

COOLING FAN

< COMPONENT	DIAGNOSI	S >			[MR20DE]			
COOLING F	AN					Δ		
Description INFOID:000000001308256								
Cooling fan opera Refer to <u>ECM-53.</u>	Cooling fan operates at each speed when the current flows in the cooling fan motor as follows. Refer to <u>ECM-53. "System Diagram"</u> for cooling fan operation.							
Component F	unction C	heck			INFOID:000000001308257	_		
1.CHECK COOL	ING FAN LO	OW SPEE	D FUNC	TION		С		
 With CONSULT-III Turn ignition switch ON. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III. Make sure that cooling fans operates. 								
 Without CONS 1. Perform IPDN 2. Make sure that 	SULT-III 1 E/R auto a at cooling fa	active test	and che	ck cooling fan motors operation.		E		
Is the inspection r YES >> INSP	<u>esult norma</u> ECTION EN	' ID.	_			F		
Diagnosis Pro	<u>ECM-287, '</u> cedure	<u>"Diagnosis</u>	<u>Proced</u>	l <u>ure"</u> .	INFOID:000000001308258	G		
1. CHECK COOL 1. Turn ignition s	ING FAN RI	ELAY POV	VER SU	IPPLY CIRCUIT		Н		
 2. Disconnect co 3. Turn ignitions 4. Check the vol 	oling fan re witch ON. tage betwee	lays-4, -5. en cooling	fan rela	ys-4 or -5 harness connector and ground.		I		
Cooling fan relay-4	Cooling	fan relay-5				J		
Connector Termin	al Connec- tor	Terminal	Ground	Voltage				
E57 2	E59	2	Ground	Battery voltage		K		
Is the inspection result normal? YES >> GO TO 3. NO >> GO TO 2.						L		
Z.DETECT MAL		NG PART						
 • 15A fuse (No. 63) • Harness for open or short between cooling fan relays-4 or -5 and fuse 						Μ		
>> Popair or roplace malfunctioning part						Ν		
3. CHECK COOLING FAN MOTORS POWER SUPPLY CIRCUIT								
 Turn ignition switch OFF. Disconnect cooling fan motor-2 harness connector. Check voltage between cooling fan motor-2 and ground. 								
Cooling fan motor-	2 Ground	Volta	ne			Ρ		

Ground		Cooling is	Ground	Voltage	
Cround	Connector Terminal		rminal	voltage	
Ground	1	E54	1 Ground B	Battery voltage	
Ground	2	LJ4	2		

4. Check the continuity between cooling fan relay-3 harness connector and IPDM E/R harness connector.

COOLING FAN

Cooling f	an relay-3	IPDI	Continuity	
Connector	Terminal	Connector	Connector Terminal	
E59	4	E13	48	Existed

5. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

6. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

• 40A fusible link (letter M)

Harness for open or short between cooling fan motor-2 and battery

>> Repair or replace malfunctioning part.

5. Check cooling fan motors circuit for open and short

- 1. Disconnect IPDM E/R harness connectors.
- 2. Disconnect cooling fan motor-1 harness connector.
- 3. Check the continuty between cooling fan relay-4 and IPDM E/R.

Cooling fan relay-4		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E57	1	E15	31	Existed
	3	E10	7	LAISIEU

4. Check the continuty between cooling fan relay-5 and IPDM E/R.

Cooling fan relay-5		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E59	1	E10	59	Existed

5. Check the continuty between cooling fan relay-5 and gound.

Cooling fa	n relay-5	Ground	Continuity	
Connector	Terminal	Ground		
E59	5	Ground	Existed	

6. Check the continuty between cooling fan relay-4 and cooling fan motor-1.

Cooling fan relay-4		cooling fan motor-1		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E57	5	E53	2	Existed

7. Check the continuty between cooling fan motor-1 and IPDM E/R.

Cooling fan motor-1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E53	1	E10	4	Evisted
	2		8	LAISteu

8. Check the continuty between cooling fan motor-1 and ground.
COOLING FAN

O a allia a fa						Δ
	Torminal	Ground	Continuity			
Connector	3					
E53	4	Ground	Existed			ECM
9. Check t	he continu	ity between	IPDM E/R a	and ground.		
						С
IPDM	E/R	Ground	Continuity			
Connector	Terminal					D
E11 	25	Ground	Existed			
10 Check t	he continu	itv hetween	cooling fan	relav-4 and	cooling fan motor-2	E
		ity between	cooling lan	Tolay + and		
Cooling fa	in relay-4	cooling f	an motor-2			
Connector	Terminal	Connector	Terminal	Continuity		F
E57	3	E54	3	Existed		
11. Check t	he continu	ity between	cooling fan	relay-5 and	cooling fan motor-2.	G
				1		
Cooling fa	in relay-5	cooling f	an motor-2	Continuity		
Connector	Terminal	Connector	Terminal	Evicted		H
			4	Existed		
6.DETECT Check the for	MALFUN	Short betwe	PART	fan relav-4	and IPDM F/R	J
 Harness for Harness for Harness for 	or open or or open or or open or or open or	short betwee short betwee short betwee	een cooling een cooling een cooling	fan relay-5 fan relay-4 fan relay-4	and IPDM E/R and IPDM E/R and cooling fan motor-1 and cooling fan motor-2	K
 Harness for Harness for Harness for Harness for 	or open or or open or or open or or open or	short betwee short betwee short betwee short betwee	een cooling een cooling een cooling een cooling	fan relay-5 fan relay-5 fan motor-1 fan motor-1	and ground and cooling fan motor-2 and IPDM E/R and ground	L
Harness for	or open or	short betwe	een IPDM E	/R and grou	nd	M
>>	Repair op	en circuit o	r short to arc	ound ro sho	rt to power in harness or connectors.	
7.снеск	COOLING	FAN RELA	YS-4 AND -	5		Ν
Refer to EC	M-290, "C	omponent I	nspection (C	Cooling Fan	Relay)".	
Is the inspec	ction result	t normal?				0
YES >> NO >>	GO TO 8. Replace n	nalfunctioni	na coolina fa	an relav.		-
8.CHECK	COOLING	FAN MOTO	DRS-1 AND	-2		Р
Refer to EC	M-290, "C	omponent I	nspection (C	Cooling Fan	Motor)".	
Is the inspec	ction result	t normal?		-		
YES >>	GO TO 9.	olfunation	na ocolina f	on motor		
	керіасе п Імтерміт			an motor.		
	<u>ວອ, mem</u>	ment inclu				

Is the inspection result normal?

- YES >> Replace IPDM E/R.
- NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

1. CHECK COOLING FAN MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan motor harness connector.

3. Supply cooling fan motor terminals with battery voltage and check operation.

Spood	Term	ninals	Operation
Speed	(+)	(—)	Operation
	1	3 and 4	
Middle (MID)	2	3 and 4	Cooling fans operators at middle speed
	1 and 2	3	Cooling fails operates at middle speed.
	1 and 2	4	
High (HI)	1 and 2	3 and 4	Cooling fans operates at high speed.
		s and 4	Cooling lans operates at high speed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace cooling fan motor.

Component Inspection (Cooling Fan Relay)

- 1. CHECK COOLING FAN RELAY
- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay-4, -5.
- 3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
2 and 5	12V direct current supply between terminals 1 and 2	Existed
5 and 5	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay.



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[MR20DE]

ELECTRICAL LOAD SIGNAL

< COMPONENT DIAGNOSIS >

ELECTRICAL LOAD SIGNAL

Description

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

Component Function Check

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Connect CONSULT-III and select "DATA MONITOR" mode.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition	Indication				
	Rear window defogger switch	ON	ON			
LOAD SIGNAL	Real window delogger switch	OFF	OFF			
Is the inspection result normal?						

YES >> GO TO 2.

120	00 N	52.		
NO	>> Go to	ECM-291,	"Diagnosis	Procedure".
-				

2.CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Co	Indication	
	Lighting switch	ON at 2nd position	ON
LOAD SIGNAL	Lighting Switch	OFF	OFF

Is the inspection result normal?

YES	>> GO TO 3.

NO >> Go to ECM-291, "Diagnosis Procedure".

${\it 3.}$ check heater fan control switch function

Select "HEATER FAN SW" and check indication under the following conditions.

Monitor item	Condition	Indication	
HEATER FAN SW	Heater fan control switch	ON	ON
HEATER FAIL OW	Theater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECM-291, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>ECM-291, "Com-ponent Function Check"</u>.

Which circuit is related to the incident?

Rear window defogger>>GO TO 2 Headlamp>>GO TO 3.

Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-4, "System Diagram".

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ELECTRICAL LOAD SIGNAL

< COMPONENT DIAGNOSIS >

3.CHECK HEADLAMP SYSTEM

Refer to EXL-13, "System Diagram" (XENON TYPE) or EXL-237, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

FUEL INJECTOR

Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Go to ECM-293, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- Make sure that each circuit produces a momentary engine speed drop. 3.
- Without CONSULT-III
- 1. Let engine idle.
- Listen to each fuel injector operating sound. 2.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECM-293, "Diagnosis Procedure".



Diagnosis Procedure

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1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

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FUEL INJECTOR

	Fuel injecto	Ground	Voltage		
Cylinder	nder Connector Terminal				Ciouna
1	F37	1			
2	F38	1	Ground	Battery voltage	
3	F39	1	Ciouna		
4	F40	1			

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F123, E6

• 15A fuse (No. 64)

· Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between fuel injector harness connector and ECM harness connector.

	Fuel injecto	or	EC	Continuity	
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F37	2		31	
2	F38	2	57	30	Evictod
3	F39	2		29	EXISIEU
4	F40	2		25	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to ECM-294, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- 3. Check resistance between fuel injector terminals as follows.

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FUEL INJECTOR

< COMPONENT DIAGNOSIS >

Termina	Is Resistance [at 10 - 60°C (50 - 140°F)]
1 and 2	2 11.1 - 14.5Ω
<u>Is the in</u> YES NO	spection result normal? >> INSPECTION END >> Replace malfunctioning fuel inj

FUEL PUMP

[MR20DE]

Sensor	Input signal to ECM	ECM Function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓	
Battery	Battery voltage*		Fuel pump	

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

Component Function Check

1.CHECK FUEL PUMP FUNCTION

- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> <u>ECM-296</u>, "Diagnosis Procedure".



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1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

Diagnosis Procedure

- 2. Disconnect ECM harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ECM harness connector and ground.

EC	СМ	Ground	Voltage	
Connector Terminal		Ciouna	voltage	
F7	23	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

FUEL PUMP

< COMPONENT DIAGNOSIS >

- Turn ignition switch OFF.
 Disconnect IDPDM E/R harness connector.
- 3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

EC	CM	IPDI	M E/R	Continuity	6	ECM
Connector	Terminal	Connector	Terminal	Continuity	•	
F7	23	E13	33	Existed		0
Is the insp	ection res	ult normal?				C
YES >	> GO TO	10.				
NO >	> GO TO :	3.				D
3. DETEC	T MALFU	NCTIONIN	G PART			
Check the	following.					_
 Harness Harness 	for open of	tors E6, F	123. pround and	l short nower		E
- 110111633	tor open c		ground and	short power.		
>	> Repair h	arness or o	connectors			F
4.CHECK			R SUPPI	Y CIRCUIT-III		
 Reconnect all harness connectors disconnected. 						G
3. Discor	nnect "fuel	level sens	or unit and	fuel pump" hari	ness connector.	
4. Turn ignition switch ON.					Ц	
5. Check	voltage b	etween tu	ei ievei ser	isor unit and fue	i pump namess connector and ground.	11
Fuel level	sensor unit				-	
and fue	el pump	Ground		Voltage		1
Connector	Terminal			-		
			Battery vol	tage should exist 1	-	
B40	5	Ground	second after	er ignition switch is		J
le the inen	action res	ult normal?	,		-	
VES >	$\sim GOTO$	2				K
NO >	> GO TO :	5. 5.				
5.CHECK	(15A FUS	E				
1 Turn i	nition swi	tch OFF				L
2. Discor	nnect 15A	fuse (No. 5	57) from IP	DM E/R.		
3. Check	15A fuse					М
Is the insp	ection resu	ult normal?	-			
YES >	> GO TO (ð.				
		iuse.				Ν
U.CHECK	K FUEL PL	IMP POWE	ER SUPPL	Y CIRCUIT-IV		
1. Discor	nnect IPD	ME/Rharn		ctor.	proctor and "fuel lovel concer unit and fuel nump"	\bigcirc
harnes	ss connect	tor.			inector and identever sensor unit and iden pullip	0

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
F13	46	B40	5	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

ECM-297

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>> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

NO

• Harness connectors E105, M77, M11, B1, B66, B67

• Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump"

>> Repair open circuit or short to power in harness or connectors.

8.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between "fuel level sensor unit and fuel pump" and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity	
Connector	Terminal			
B40 3		Ground	Existed	
2 Also book borness for short to power				

Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to ECM-298. "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace fuel pump.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:000000001308271

1.CHECK FUEL PUMP

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Check resistance between "fuel level sensor unit and fuel pump" terminals as follows.

Terminals	R	esistance)
3 and 5	0.2 - 5.00	2 [at 25°C	C (77°F)]
		14	

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace "fuel level sensor unit and fuel pump".

IGNITION SIGNAL

Description

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check	INFOID:000000001308273	С
1.INSPECTION START		
Turn ignition switch OFF, and restart engine.		D
Does the engine start?		
YES-1 >> With CONSULT-III: GO TO 2. YES-2 >> Without CONSULT-III: GO TO 3. NO >> Go to <u>ECM-299, "Diagnosis Procedure"</u> .		E
		F
With CONSULT-III Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.		
 Make sure that each circuit produces a momentary engine speed drop. <u>Is the inspection result normal?</u> 		G
YES >> INSPECTION END NO >> Go to <u>ECM-299, "Diagnosis Procedure"</u> .		Н
J. IGNITION SIGNAL FUNCTION		

Without CONSULT-III

Let engine idle. 1.

2. Read the voltage signal between ECM harness connector terminals as follows.



Diagnosis Procedure

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF, wait at least 10 seconds and then turn ON. 1.
- Check the voltage between ECM harness connector and ground. 2.

E	СМ	Ground	Voltage	
Connector Terminal		Cround	voltage	
E16	105	Ground	Battery voltage	

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Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to ECM-104, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect condenser harness connector.

3. Turn ignition switch ON.

4. Check the voltage between condenser harness connector and ground.

Con	denser	Ground	Voltage
Connector Terminal		Cround	Voltage
F13 1		Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.

2. Disconnect IPDM E/R harness connector F10.

3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector Terminal		Continuity
E13	47	F13	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to ECM-104, "Diagnosis Procedure".

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E7, F121

>> Repair open circuit or short to ground or short to power in harness connectors.

${f 5.}$ CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between condenser harness connector and ground.

Cond	denser	Ground	Continuity
Connector Terminal		Ciouna	Continuity
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CONDENSER

Refer to ECM-303, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 7.

NG >> Replace condenser.

IGNITION SIGNAL

COMPONENT DIAGNOSIS >

[MR20DE]

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7. CHEC	CK IGNITIC	ON COIL F	POWER S	SUPPLY CI	CIRCUIT-V	Δ
1. Reco 2. Disc	onnect all I connect ign	harness co ition coil h	onnectors arness c	s disconnec onnector.	ected.	A
4. Che	ck the volta	age betwe	en ignitio	on coil harne	ness connector and ground.	ECN
	Ignition coi	1				
Cylinder	Connector	Terminal	Ground	Voltage		C
1	F33	3				
2	F34	3	Ground	Battery volta	tage	D
3	F35	3	Ground	Dattery voltag	lage	
4	F36	3				F
Is the ins	spection re	sult norma	<u>al?</u>			
YES	>> GO TC)9.)8				
				т		F
 Harnes 	ss connect]. ors E7. F1	21			G
		,				
	>> Repair	open circ	uit or sho	rt to ground	nd or short to power in harness connectors.	
9. CHEC	CK IGNITIC		GROUND	CIRCUIT	T FOR OPEN AND SHORT	Н
1. Turn	ignition sv	witch OFF				
2. Che	ck the cont	tinuity bet	ween igni	tion coil ha	arness connector and ground.	
	Invition oni	1				
Culinder	Ignition col	Torrainal	Ground	Continuity		
Cylinder	Connector	reminal				J
	F33	2	-			
	F35	2	Ground	Existed		Κ
	F36	2	-			
	check har	ness for s	hort to po)WAr		I
Is the ins	spection re	sult norma	al?	Jwei.		
YES	>> GO TC) 10.	<u></u>			
NO	>> Repair	open circ	uit or sho	rt to ground	nd or short to power in harness or connectors.	M
10.сн	ECK IGNI		L OUTPU	IT SIGNAL	L CIRCUIT FOR OPEN AND SHORT	
1. Disc	onnect EC	M harnes	s connect	tor.		N
2. Che	ck the cont	tinuity bet	ween ECI	M harness	s connector and ignition coil harness connector.	IN
<u> </u>	Ignition coi	I 	E	=CM	Continuity	0
Cylinder	Connector	Ierminal	Connecto	or Terminal		
1	F33	1	1	17	_	Þ
2	F34	1	F7	18	— Existed	٣
3	F35	1	1	22	_	
4		1		21		

3. Also check harness for short to ground and short to power. Is the inspection result normal?

YES >> GO TO 11.

>> Repair open circuit or short to ground or short to power in harness or connectors. NO

IGNITION SIGNAL

< COMPONENT DIAGNOSIS >

11.CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to ECM-302, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

- YES >> GO TO 12.
- NO >> Replace malfunctioning ignition coil with power transistor.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:000000001308275

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ignition coil harness connector.
- 3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
Terriniais	
1 and 2	Except 0 or $\infty\Omega$
1 and 3	Excopt 0.0
2 and 3	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor.

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Remove fuel pump fuse in IPDM E/R to release fuel pressure. **NOTE:**

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 4. Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm 0.66 in) is taken.

AT T
13 - 17 mm
(0.52-0.66 in)
Grounded metal portion
(Cylinder head, cylinder block, etc.)
JMBIA0066GB

IGNITION SIGNAL

IGNITION SIGNAL	
< COMPONENT DIAGNOSIS > [MR20DE]	
NOTE: When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal- functioning.	А
<u>Is the inspection result normal?</u> YES >> INSPECTION END NO >> Replace malfunctioning ignition coil with power transistor	ECM
Component Inspection (Condenser)	0
1.CHECK CONDENSER	С
 Turn ignition switch OFF. Disconnect condenser harness connector. Check resistance between condenser terminals as follows. 	D
Terminals Resistance	Е
1 and 2 Above 1 MΩ [at 25°C (77°F)]	
Is the inspection result normal? YES >> INSPECTION END NO >> Replace condenser.	F
	G
	Η
	I
	J
	K
	L
	M
	Ν
	0
	Ρ

MALFUNCTION INDICATOR

Description

The Malfunction Indicator (MI) is located on the combination meter. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to ECM-304, "Diagnosis Procedure".

Component Function Check

1.CHECK MI FUNCTION

1. Turn ignition switch ON.

2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECM-304, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC U1001. Refer to ECM-108, "Diagnosis Procedure".

2. CHECK DTC WITH COMBINATION METER

Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair or replace.

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INFOID:000000001308278

INFOID:000000001308277

POSITIVE CRANKCASE VENTILATION

Normal condition

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Description





High-load condition

This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) value is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection

➡ Fresh air
➡ Blow-by gas

1.CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace PCV valve.



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[MR20DE]

INFOID:000000001308280

REFRIGERANT PRESSURE SENSOR

Description

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The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:000000001308283

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn A/C switch and blower fan switch ON.
- 3. Check the voltage between ECM harness connector and ground.

	ECM	Ground	Voltage
Connector	Terminal	Cround	voltage
F8	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECM-306, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Stop engine.
- 3. Turn ignition switch OFF.
- 4. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pre	essure sensor	Ground	Voltage	
Connector	Terminal	Ciouna	vonago	
E49	3	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

ECM-306

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REFRIGERANT PRESSURE SENSOR

< COMPON	ENT DIAGN	VOSIS >			[MR20DE]	
3.DETECT	MALFUNCT	IONING P	ART			Δ
Check the fol • Harness co	llowing. onnectors E	6, F123				A
 Harness to 	r open or sh	ort betwee	en ECM ar	nd refrigera	ant pressure sensor	EC
>> [Repair open	circuit or s	short to are	ound or sh	ort to power in harness or connectors.	
4.CHECK R		NT PRES	SURE SEI	NSOR GR	OUND CIRCUIT FOR OPEN AND SHORT	С
1. Turn iani	ition switch	OFF.				0
 Disconne Check th tor. 	ect ECM ha	rness conn v between	ector. refrigerant	t pressure	sensor harness connector and ECM harness connec-	D
Refrigerant pre	essure sensor	EC	CM			E
Connector	Terminal	Connector	Terminal	Continuity		
E49	1	F8	48	Existed	-	E
4. Also che	ck harness	for short to	ground a	nd short to	power.	Г
Is the inspect	<u>tion result n</u>	ormal?				
YES >> (NO >> (GO TO 6. GO TO 5.					G
5.DETECT	MALFUNCT		ART			
Check the fo	llowing					Н
Harness co	onnectors E	6, F123				
 Harness fo 	r open or sh	ort betwee	en ECM ar	nd refrigera	ant pressure sensor	1
~~ [2enair onen	circuit or s	short to are	ound or sh	ort to nower in harness or connectors	
6 CHECK B						
			ECM harn		of or order and refrigerant pressure sensor barness connec-	J
tor.	le continuity	Detween			solor and reingerant pressure sensor namess connec-	
					_	K
Refrigerant pre	essure sensor	E	СМ	Continuity	-	
Connector	Terminal	Connector	Terminal		_	
E49	2	F8	41	Existed	-	
2. Also che	ck harness	for short to	ground a	nd short to	power.	
Is the inspec	tion result n	ormal?				N
NO >> (GO TO 8. GO TO 7.					
7.DETECT	MALFUNCT		ART			N
Check the fo	llowing					P
Harness co	onnectors E	6, F123				
 Harness fo 	r open or sh	ort betwee	en ECM ar	nd refrigera	ant pressure sensor	C
г	Donoir on or	oircuit or -	bort to an		ort to power in herpose or connectors	
1 <<	теран ореп отсомитти		ENIT		on to power in namess of connectors.	F
Refer to GI-3	<u>9, "Intermitt</u>	ent Incider	<u>nt"</u> .			

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. NO >> Repair or replace.

ECU DIAGNOSIS ECM

Reference Value

INFOID:000000001308285

VALUES ON THE DIAGNOSIS TOOL

Remarks:

• Specification data are reference values.

• Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

Le. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	C	Values/Status					
ENG SPEED	Run engine and compare CONSU	Almost the same speed as the tachometer indication.					
MAS A/F SE-B1	See ECM-97, "Diagnosis Procedure	See ECM-97, "Diagnosis Procedure".					
B/FUEL SCHDL	See ECM-97, "Diagnosis Procedure	<u>_</u> .					
A/F ALPHA-B1	See ECM-97, "Diagnosis Procedure	<u>_</u> .					
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158°F)				
HO2S1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V				
HO2S2 (B1)	 Revving engine from idle up to 3,00 are met. Engine: After warming up After keeping engine speed betwe idle for 1 minute under no load 	0 - 0.3V ←→ Approx. 0.6 - 1.0V					
HO2S2 MNTR (B1)	Engine: After warming up	LEAN $\leftarrow \rightarrow \rightarrow$ RICH Change more than 5 times during 10 seconds.					
HO2S2 MNTR (B1)	 Revving engine from idle up to 3,00 are met. Engine: After warming up After keeping engine speed betwe idle for 1 minute under no load 	$LEAN \leftarrow \rightarrow RICH$					
VHCL SPEED SE	Turn drive wheels and compare C dication.	Almost the same speed as speedometer indication					
BATTERY VOLT	Ignition switch: ON (Engine stopp)	ed)	11 - 14V				
ACCEL SEN 1	Ignition switch: ON	Accelerator pedal: Fully released	0.6 - 0.9V				
ACCEL SENT	(Engine stopped)	Accelerator pedal: Fully depressed	4.0 - 4.8V				
ACCEL SEN 2*	Ignition switch: ON	Accelerator pedal: Fully released	0.3 - 4.7V				
ACCEL CEN 2	(Engine stopped)	Accelerator pedal: Fully depressed	1.95 - 2.4V				
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36V				
THRL SEN 1-B1	 Engine stopped) Shift lever: D (CVT), 1st (M/T) 	Accelerator pedal: Fully depressed	Less than 4.75V				
	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V				
	 Shift lever: D (CVT), 1st (M/T) 	Accelerator pedal: Fully depressed	Less than 4.75V				
INT/A TEMP SE	Ignition switch: ON	Indicates intake air tempera- ture					
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow O$	$OFF\toON\toOFF$					
CLSD THUPOS	Ignition switch: ON	Accelerator pedal: Fully released	ON				
	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF				

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Monitor Item	Condition		Values/Status	
	— • • • • • • • • • • • • • • • • • • •	Air conditioner switch: OFF	OFF	Α
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates.)	ON	
		Shift lever: P or N (CVT), Neutral (M/T)	ON	
P/IN POSI 5W	• Ignition switch: ON	Selector lever: Except above	OFF	
	• Engine: After warming up, idle the	Steering wheel: Not being turned	OFF	С
PW/ST SIGNAL	engine	Steering wheel: Being turned	ON	
		Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON	D
LUAD SIGNAL	• Ignition switch. ON	Rear window defogger switch and lighting switch: OFF	OFF	
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON\toOFF\toON$	E
	• Engine: After warming up, idle the	Heater fan switch: ON	ON	
HEATER FAN SW	engine	Heater fan switch: OFF	OFF	
		Brake pedal: Fully released	OFF	F
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	ON	
	Engine: After warming up	Idle	2.0 - 3.0 msec	G
INJ PULSE-B1	 Shift lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec	Н
	Engine: After warming up	Idle	10° - 20° BTDC	
IGN TIMING	 Shift lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	25° - 45° BTDC	
PURG VOL C/V	 Engine: After warming up Shift lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%	J
	No load	2,000 rpm	20% - 90%	K
	Engine: After warming up	Idle	–5° - 5°CA	
INT/V TIM (B1)	 Shift lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0° - 20°CA	L
	Engine: After warming up	Idle	0%	К.Л
INT/V SOL (B1)	 Shift lever: P or N (CV1), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0% - 60%	IVI
		Air conditioner switch: OFF	OFF	
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates)	ON	0
FUEL PUMP RLY	For 1 seconds after turning ignitionEngine running or cranking	n switch: ON	ON	
	Except above	OFF	Р	
THRTL RELAY	Ignition switch: ON		ON	

Monitor Item	C	ondition	Values/Status
	Engine: After warming up, idle the engine Air conditioner switch: OEE	Engine coolant temperature is 94 °C (201°F) or less.	OFF
COOLING FAN		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F)	LOW*2
		Engine coolant temperature is 100°C (212°F) or more	HIGH* ²
HO2S1 HTR (B1)	Engine: After warming upEngine speed: Above 3,600 rpm		ON
	Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	 Engine speed: Below 3,600 rpm a Engine: After warming up Keeping the engine speed betwee idle for 1 minute under no load 	fter the following conditions are met. n 3,500 and 4,000 rpm for 1 minute and at	ON
	• Engine speed: Above 3,600 rpm		OFF
VEHICLE SPEED	• Turn drive wheels and compare Codication.	ONSULT-III value with the speedometer in-	Almost the same speed as the speedometer indication
		Idle air volume learning has not been per- formed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
O2SEN HTR DTY	Engine coolant temperature whenEngine speed: below 3,600 rpm	Approx. 30%	
AC PRESS SEN	Engine: IdleBoth A/C switch and blower fan sv	1.0 - 4.0V	
VHCL SPEED SE	Turn drive wheels and compare Co dication.	Almost the same speed as the speedometer indication	
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
MAIN SW	• Ignition Switch. ON	MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
CANCEL SW	· Ignition switch. ON	CANCEL switch: Released	OFF
	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
RESONE/ACC SW		RESUME/ACCELERATE switch: Re- leased	OFF
	• Ignition switch: ON	SET/COAST switch: Pressed	ON
3L1 3W	• Ignition switch. ON	SET/COAST switch: Released	OFF
BRAKE SW1	a lenition quitch. ON	 Brake pedal: Fully released (CVT) Brake pedal and clutch pedal: Fully released (M/T) 	ON
(ASCD brake switch)	• Ignition switch. ON	 Brake pedal: Slightly depressed (CVT) Brake pedal and/or clutch pedal: Slightly depressed (M/T) 	OFF
BRAKE SW2	• Ignition quitab: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	• Ignition switch: ON	Brake pedal: Slightly depressed	ON
VHCL SPD CUT	Ignition switch: ON	NON	
LO SPEED CUT	Ignition switch: ON	NON	
AT OD MONITOR	Ignition switch: ON	OFF	
AT OD CANCEL	Ignition switch: ON	OFF	



Monitor Item	C	Values/Status	0		
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \rightarrow OFF$	— A	
	MAIN switch: ON	ASCD: Operating	ON	EC	
SET LAMP	When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF		

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- ECM is located in the engine room left side near battery.
- When disconnecting ECM harness connector (A), loosen (C) it with levers as far as they will go as shown in the figure.
 - 1 : ECM
 - B : Fasten
- Connect a break-out box (EG17550000) and harness adapter (EG17550400) between the ECM and ECM harness connector.
- Use extreme care not to 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

Terminal No.		Description			Value	
+		Signal name	Input/ Output	Condition	(Approx.)	N
1 (GR)	108 (B)	Throttle control motor (Open)	Output	 [Ignition switch: ON] Engine stopped Shift lever: D (CVT), 1st (M/T) Accelerator pedal: Fully depressed 	3.2V★ 1mSec/div 5V/div JMBIA0324GB	O
2 (P)	108 (B)	Throttle control motor re- lay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	



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Tern	ninal No.	Description			Volue
+		Signal name	Input/ Output	Condition	(Approx.)
3 (R)	56 (G)	Heated oxygen sensor 1 heater	Output	[Engine is running] • Warm-up condition • Engine speed: Below 3,600 rpm	2.9 - 8.8V★ 50mSec/div 50mSec/div 10V/div JMBIA0325GB
				 [Ignition switch: ON] Engine stopped [Engine is running] Engine speed: below 3,600 rpm 	BATTERY VOLTAGE (11-14V)
4 (L)	108 (В)	Throttle control motor (Close)	Output	 [Ignition switch: ON] Engine stopped Shift lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released 	1.8V★ 5mSec/div 5V/div JMBIA0326GB
5 (G)	59 (BR)	Heated oxygen sensor 2 heater	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10V★ 50mSec/div 50mSe
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
9	108 (B)	EVAP canister purge vol- ume control solenoid	Output	 [Engine is running] Idle speed Accelerator pedal: Not depressed even slightly, after engine starting 	BATTERY VOLTAGE (11 - 14V)★ 50mSec/div € 10V/div JMBIA0327GB
(')		valve		 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after start- ing engine.) 	10V★ 50mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
10 (B) 11 (B)	_	ECM ground	_	_	_

ing ignition switch OFF

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Terr	ninal No.	Description			No.	
+		Signal name	Input/ Output	Condition	Value (Approx.)	A
15 (LG)	108 (B)	Throttle control motor re-	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)	ECM
(LO)	(0)	lay		[Ignition switch: ON]	0 - 1.0V	
17 (SB) 18		Ignition signal No. 1		[Engine is running]Warm-up conditionIdle speed NOTE:	0 - 0.3V★ 50mSec/div	C
(W)	108 (B)	Ignition signal No. 2	Output	The pulse cycle changes depending on rpm at idle	2V/div JMBIA0329GB	Е
21	(В)	Ignition signal No. 4			0.2 - 0.5∨★	
(G) 22 (P)		Ignition signal No. 3		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	50mSec/div	F
(K)					2V/div JMBIA0330GB	G
23 (L)	108 (B)	Fuel pump relay	Output	 [Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running] 	0 - 1.0V	Η
25		Fuel injector No. 4			BATTERY VOLTAGE	
(P) 29 (LG)	108 (B)	Fuel injector No. 3	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	(11 - 14V)★ 50mSec/div € 10V/div JMBIA0331GB	J
30 (BR)	(D)	Fuel injector No. 2			BATTERY VOLTAGE (11 - 14V)★	L
31 (GR)		Fuel injector No. 1		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	50mSec/div 50mSec/div 10V/div JMBIA0332GB	M
32 (G)	108 (B)	ECM relay (Self shut-off)	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.0V	0
				[Ignition switch: OFF] • More than a few seconds after turn- ing ignition switch OFF	BATTERY VOLTAGE (11 - 14V)	Р

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Tern	ninal No.	Description)/alua
+		Signal name	Input/ Output	Condition	Value (Approx.)
33	36	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
(LG)	(BR)		input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	36	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
(O)	(BR)			 [Ignition switch: ON] Engine stopped Shift lever: D (CVT), 1st (M/T) Accelerator pedal: Fully depressed 	More than 0.36V
36 (BR)	_	Sensor ground (Throttle position sensor)	_	_	_
37 (W)	40 (B)	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
38 (P)	44 (O)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
40 (B)	108 (B)	Sensor ground (Knock sensor)	_	_	_
41 (SB)	48 (V)	Refrigerant pressure sen- sor	Input	 [Engine is running] Warm-up condition Both A/C switch and blower fan motor switch: ON (Compressor operates) 	1.0 - 4.0V
44 (O)	_	Sensor ground (Engine coolant tempera- ture sensor)	_	_	_
				[Ignition switch: ON] • Engine stopped	0.4V
45 (G)	52 (SB)	Mass air flow sensor	Input	[Engine is running]Warm-up conditionIdle speed	0.9 - 1.2V
				[Engine is running]Warm-up conditionEngine is revving from idle to about 4,000 rpm	0.9 - 1.2 to 2.4V (Check for linear voltage rise in response to en- gine being increased to about 4,000 rpm.)
46 (W)	55 (B)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
48 (V)	_	Sensor ground (Refrigerant pressure sensor)		_	_
49 (GR)	56 (G)	Heated oxygen sensor 1	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	0 - 1.0V

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Tern	ninal No.	Description			Value	
+		Signal name	Input/ Output	Condition	(Approx.)	A
50 (L)	59 (BR)	Heated oxygen sensor 2	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 1.0V	EC C D
52 (SB)	_	Sensor ground (Mass air flow sensor)	_	_	_	
55 (B)	_	Sensor ground (Intake air temperature sensor)	_	_	_	E
56 (G)	_	Sensor ground (Heated oxygen sensor 1)	_	-	_	F
59 (BR)	_	Sensor ground (Heated oxygen sensor 2)	_	_	_	C
61	62	Crankshaft position sen-		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0V★ 5mSec/div f f f f f f f f f f f f f f f f f f f	H
(W)	(R)	sor (POS)	Input	[Engine is running] • Engine speed: 2,000 rpm	4.0V★ 5mSec/div € 2V/div	J K
62 (R)	_	Sensor ground [Crankshaft position sen- sor (POS)]	_	_	_	L
63 (L)	_	Sensor ground [Camshaft position sen- sor (PHASE)]	_	_	_	Μ

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< ECU DIAGNOSIS >

[MR20DE]

Term	ninal No.	Description			Value
+		Signal name	Input/ Output	Condition	(Approx.)
65	63	Camshaft position sensor	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0 - 2.0★ 10mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
(Y)	(L)	(PHASE)	input	[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
69 (LG)	108 (B)	PNP switch	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/ T)	BATTERY VOLTAGE (11 - 14V)
()				[Ignition switch: ON] • Shift lever: Except above	0V
72 (P)	36 (BR)	Sensor power supply (Throttle position sensor)		[Ignition switch: ON]	5V
				[Engine is running]Warm-up conditionIdle speed	0V
73 (V)	108 (В)	Intake valve timing control solenoid valve	Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000rpm Quickly	7 - 10V★
74 (L)	108 (B)	Sensor power supply (Refrigerant pressure sensor)	Input	[Ignition switch: ON]	5V
75 (G)	62 (R)	Sensor power supply [Crankshaft position sen- sor (POS)]		[Ignition switch: ON]	5V
78 (P)	63 (L)	Sensor power supply [Camshaft position sen- sor (PHASE)]	_	[Ignition switch: ON]	5V
83 (P)	108 (B)	CAN communication line	Input/ Output	_	-
84 (L)	108 (B)	CAN communication line	Input/ Output	_	
88 (Y)	108 (B)	Data link connector	Input/ Output	[Ignition switch: ON] CONSULT-III or GST: Disconnected	10.5V
93	108			[Ignition switch: OFF]	0V
(O)	(B)	Ignition switch	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

< ECU DIAGNOSIS >

[MR20DE]

Term	ninal No.	Description			Value	0
+		Signal name	Input/ Output	Condition	(Approx.)	A
				[Ignition switch: ON] • ASCD steering switch: OFF	4V	ECM
				[Ignition switch: ON] • MAIN switch: Pressed	٥V	
94 (V)	95 (B)	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1V	С
(-)	(-)			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V	D
				[Ignition switch: ON] • SET/COAST switch: Pressed	2V	E
95 (R)	_	Sensor ground (ASCD steering switch)	—	_	_	
99	108	Stop Jamp switch	Input	[Ignition switch: OFF]Brake pedal: Fully released	0V	F
(R)	(B)	Stop lamp switch	mput	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)	G
100 (CB)	108 (B)	ASCD brake switch	Input	 [Ignition switch: ON] Brake pedal: Slightly depressed (CVT) Brake pedal and clutch pedal: Slightly depressed (M/T) 	0V	H
(GR)	(D)			 [Ignition switch: ON] Brake pedal: Fully released (CVT) Brake pedal and/or clutch pedal: Fully released (M/T) 	BATTERY VOLTAGE (11 - 14V)	
102 (L)	108 (B)	Sensor power supply (Accelerator pedal posi- tion sensor 2)	_	[Ignition switch: ON]	5V	J
103	104	Accelerator pedal posi-	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.3 - 0.6V	K
(G)	(Y)	tion sensor 2	input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	1.95 - 2.4V	L
104 (Y)	_	Sensor ground (Accelerator pedal posi- tion sensor 2)	_	_	_	Μ
105 (R)	108 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	N
106 (LG)	111 (W)	Sensor power supply (Accelerator pedal posi- tion sensor 1)		[Ignition switch: ON]	5V	0
108 (B)	—	ECM ground	_	-	_	0
110	111	Accelerator pedal posi-	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.6 - 0.9V	Ρ
(SB)	(W)	tion sensor 1	mpor	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	3.9 - 4.7V	_
111 (W)	_	Sensor ground (Accelerator pedal posi- tion sensor 1)	—	_	—	_

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)





< ECU DIAGNOSIS >



JCBWA0221GE



minal Color Signal Name [Specification] Terminal Col Vo. of Wire No. of Wire	0 840 ence FUEL LEVEL SENSOR UNIT AND FUEL pro EQRTOY RS pro EQRTOY RS fill 51 information 51 information 51	ometer No. B66 onnector Name WIRE TO WIRE onnector Type NISO4FW-CS MAS Control Color Signal Name (Specification)	Ownector No. B67 Corrector Name WRE TO WRE Connector Type NRO4MW-CS Connector Type Image: Connector Type Connector Type Image: Connector Type Connector Type Image: Connector Type Mine Color No. of Wire
3 - - 3 B 5 - - - - 6 - - - - 6 - - - - 6 - - - - 6 - - - - 6 - - - - 6 - - - - 7 14 15 10 11 13 14 15 16 10	- 2 δ μ 	1 R	1 R 2 B Connector Nu. EB Connector Name UNE TO WIE Connector Type MCXWV-LC
Signal Name [Specification] Signal Name [Specification] - [With MR engine] - [With Reagine] - [With MR engine] - [With Reagine] - [With Reagine] - [With MR engine] - [With MR engine] - [With MR engine] - [With MR engine]	<u>[*1_1_1_1_1_1</u>]	minulation Color Signal Name (Specification) No. of Wire Signal Name (Specification) 5 L — — 6 N — — 8 W — — 9 R — — 10 B — — 11 R — — 12 R — — 13 B — — 14 P — —	Terminal No. Color of Wire Signal Name [Specification] 2 V

Connector No. E14 Connector Name IPIM E-R. (INTELLOENT POWER DISTRIBUTION MODULE ENGINE ROOM) Connector Type NSI2FER-CS	Terminal Color Signal Name [Specification] No. of Wire Signal Name [Specification] 40 V - 41 LG - 46 W -	Connector Nume E18 Connector Name MASS AR FLOW SENSOR Connector Type HADSE Marcel Type HOBFE Marcel Type Marcel Type Marcel Type Signal Name [Saecification] Marcel Type - (Wth MR engine] Signal Name [Saecification] - (Wth MR engine]		A ECM C D
No. E13 Vamin IPPM K. R. KINTELLIGENT POWER Vamin IDPM K. KINTELLIGENT Vamin IDPM K. KINTELIGENT	Color Signal Name [Specification] B	R VBR LG AVCC-APS1 B GND SB GND-APS1 W GND-APS1		E F G
Connector N Connector N Connector 1,	Terminal (No. or 25 26 27 31 31 33			Н
eter No. E11 PDM E.R. UNTELLIGENT POWER eter Name DISTRIBUTTON MODILE ENGINE ROOM) eter Type MODEF-L.C 11109 141312	inal Color of Wire Signal Name [Specification] of Wire	eter No. E16 eter Name ECM eter Type MAX-4FB-MEAB-LH eter Type MAX-4FB-MEAB-LH MAX24FB-		I J K
				L
FROL SYSTEM (MR ER INTELLIGENT POWER BBUTTON MODULE ENGINE ROOM) A-LG 5 4 3 8 7 6	Signal Name (Specification)	E.R. (MTELLIGENT POWER BBUTTON MODULE ENGINE ROOM) EW-CS 11 50 - 49 48 47 30 59 58 57 56 55 54 - 1000 - 100		M
ENGINE CONT Connector Name Connector Name Distriction Connector Type MOBPY	Terminal Color No. of Wire 4 W 7 P 8 G	Connector No. E15 Connector Name PDM Connector Name Distric Connector Type NS16 H.S. H.S. H.S. H.S. H.S. H.S. H.S. H.S	JCBWA0224GE	0
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Corrrector No. E57 Connector Name COOLING FAN RELAY-4 Connector Name NSDR1-M2 Connector Type NSDR1-M2 2211	Terminal No. Color Signal Name [Specification] 1 V 2 O 3 P 5 G	Connector No. E10 Connector Nume ACCELERATOR PEDAL POSITION SENSOR Connector Type RMDFE Connector Type RMDFE	
Connector No. E54 Connector Name COOLING FAN MOTOR-2 Connector Type RSO4FGY-PR	Terminal Color Signal Name [Specification] No. of Wire - 2 O - 3 P - 4 GR -	Connector No. E105 Connector Name WRE. TO WRE. Connector Name WRE. TO WRE. Connector Type TH0FW-CS16-TM4 Connector Type Tennal Connector Name Signal Name (Specification) In V In V In Signal Name (Specification) In V In V	
IGINE) Connector Name Connector Name Connector Type RSMFGY-PR RSMFGY-PR	Terminal Color Signal Name (Specification) No. of Wire Signal Name (Specification) 1 W - 2 G - 3 B - 4 B -	Connector Name E9 Connector Name 2001NG FAN RELAY-5 Connector Type 3001NG FAN RELAY-5 Connector Type 2001NG FAN RELAY-5 Connector Type Signal Name (Specification) 1 0 2 0 3 0 6 -	
ENGINE CONTROL SYSTEM (MR EN Connector Num Connector Num Connector Type Connector Type Co	Terminal Color Signal Name [Specification] No. of Wine Signal Name [Specification] 1 V - 2 SB -[Without OR engine] 3 L -	Opmeter No. E8 Corrector Nume HEATED OX/GEN SENSOR 2 Corrector Type HEATED OX/GEN SENSOR 2 Opmeter Type AFZOHE Terminal Color 1 No. 2 W 2 W 2 W	JCBWA0225GE

[MR20DE]
			А
	Name (Specification)	025F 025R 040A-174 640A-174 640A-175 640A-175 040A-025F P0A-005 P1A5E P1	ECM
HILE ETIS	2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2		С
Connector No. Connector Type Connector Type	Terminal Col. No of Wurden 3 2 P P 4 L0 0 L0 L0	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	D
	feation]	(astition)	Е
AMP SWITCH	Signal Name (Speci	BR-MEA8-LH BR-MEA8-LH BR-MEA8-LH DISE 596 506 507 17 1 1555 506 506 507 17 1 1555 507 17 17 17 17 17 17 17 17 17 17 17 17 17	F
ar No. E114 510P LJ M027E9 L	of Wire P < Color	P No. F8 P Nome ECM MAA0F 3332414454 3334144456 3334144456 3334144456 3334144456 535444435 S3544445 S3544445 S3544445 S3544445 S354445 S354445 S354445 S35445 S35445 S35445 S35445 S35445 S35445 S35445 S35455 S35455 S35455 S35455 S354555 S354555 S354555 S3545555 S3545555 S3545555 S35455555 S35455555 S354555555 S3545555555555 S35455555555555555555555555555555555555	G
Connect Connect	Terminal No. 2	Commetci Commetci Commetci Commetci 1 1 33 33 33 33 33 33 33 33 34 41 45 48	Н
	s (Specification)	SNH4 CNH3 NH4 NH4 NH42 SOFF SOFF	I
112 SCD BRAKE SWITC OTTBR-LC OTTBR-LC	Signal Nam [Wit		J
NE) Connector No. E Connector Name At Connector Type M	Terminal Color No. of Wire 2 2 9 9	23 23 23 23 23 23 23 23 23 23 23 23 23 2	K
			L
DL SYSTEM (M	gnal Name [Specification]	MEAB-FH MEAB-FH MEAB-FH Manuel (Space) Manuel (Space) Manu	Μ
		Image: Simple state	Ν
Connector Name Connector Name Connector Type HS	Terminal Colo No. of War 1 - 2 - 3 -	JCBWA0226GE	0

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Ormetor No. F21 Connector Name PARK / NEUTRAL POSTION SWTCH Connector Type RK08FG Connector Type RK08FG	Connector No. F30 Connector Name HEATED OXYGEN SENSOR I Connector Tapa AFZOFE Connector Tapa AFZOFE
Connector No. F20 Connector Name CRANKSHAFT POSITION SENSOR (POS) Connector Type RHUGFB Connector Type RHUMF Total Type RHUMF Total Type RHUMF	Connector No. F29 Connector No. FLECITIAC THROTTLE CONTROL Connector Name ActUATOR Connector Name Span Name Connector Name Span Name Connector Name Connector Connector Name Connector
AGINE) Connector Name Connector Name Connector Type Connector Type MOZPW-LC Connector Type Connector Ty	Commettor No. F23 Commettor Name ENGINE COOLANT TEMPERATURE SENSOR Commettor Type EOGFGY-RS Commettor Type EOGFGY-RS
ENGINE CONTROL SYSTEM (MR EN Connector Name for Name fo	Connector No. F26 Connector Name CAMEHAFT POSITION SENSOR (PHASE) Connector Type RHLOFE Connector Type RHLOFE

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Connector No. F35 Connector Name EXISTICN COLL No.3 (WITH POWER TRANSISTICN. Connector Name EXISTICN COLL No.3 (WITH POWER Connector Type EXISTICN COLL No.3 (MITH POWER	Terminal No. Color Mire Signal Name [Specification] 1 R - 2 B - 3 BR -	Gometer No. 739 Connector Name FUEL INJECTOR No.3 Connector Type HSDFGY	Terminal No. Color of Wres Signal Name [Specification] 1 0 - 2 LG -(Wth MR engine)	A ECM C D
Connector No. F14 Connector Name TEAMSISTOR) Connector Type EUSFGY-RS	Terminal No. Color Signal Name [Specification] 1 Wr - 2 B - 3 BR -	Connector No. F38 Connector Name FUEL INJECTOR No.2 Connector Type HSI02FGY	Terminal No. Calor Signal Name [Speoffication] 1 0 - 2 BR -	E F G H
INE) Gometer No. 73 Connector Name IRANTION COLL No.1 WITH POWER Connector Type EGRGY-RS	Terninal Color Signal Name (Secrification) 1 of Wire - 2 B - 3 BR -	Connector Nu. F37 Connector Name FUEL INJECTOR No.1 Connector Type HS02FGY Connector Type HS02FGY	Terrninal Color Signal Name [Specification] No. of Wire Specification] 1 O - 2 GR -	I J K
ENGINE CONTROL SYSTEM (MR ENG Connector Name Connector Name Connector Name CONTROL SOLINGIO Connector Name CONTROL SOLINGIO CONTROL SOLINIO CONTROL SOLINIO CONTROL SOLINO CONTROL SOLINO CONTROL SOLIN	Terrinial Mo. Color of Wire Signal Name [Specification] 1 A -[Without GR engine] 2 Y -	Connector No. F36 Connector Name Connector Name Connector Type Connector Type Con	Terminal No. Color 3 9 9 -	L M N O
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ECM-328



ECM

Fail Safe

NON DTC RELATED ITEM

ECM-329

JCBWA0230GE

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Engine operating condi- tion in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator circuit	When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MI circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.	<u>ECM-304</u>

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode					
P0011	Intake valve timing control	The signal is not energized to the introduction control does not function.	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.				
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more that	n 2,400 rpm due to the fuel cut.				
P0117 P0118	Engine coolant tempera- ture sensor circuit	Engine coolant temperature will be condition. CONSULT-III displays the engine co	determined by ECM based on the time after following polant temperature decided by ECM.				
		Condition	Engine coolant temperature decided (CONSULT-III display)				
		Just as ignition switch is turned ON or START	40°C (104°F)				
		Approx. 4 minutes after engine starting	80°C (176°F)				
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)				
		When the fail-safe system for engine coolant temperature sensor is activated, the co fan operates while engine is running.					
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.					
P0500	Vehicle speed sensor	When the fail-safe system for vehicl (Highest) while engine is running.	e speed sensor is activated, the cooling fan operates				
P0605	ECM	(When ECM calculation function is ECM stops the electric throttle contributed opening (approx. 5 degrees) be ECM deactivates ASCD operation.	malfunctioning:) rol actuator control, throttle valve is maintained at a by the return spring.				
P1121	Electric throttle control ac- tuator	(When electric throttle control actual malfunction:) ECM controls the electric throttle ac idle position. The engine speed will	tor does not function properly due to the return spring ctuator by regulating the throttle opening around the not rise more than 2,000 rpm.				
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.					
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle st engine stalls. The engine can restart in N or P (CVT), Neutral (M/T) position, and engine speed exceed 1,000 rpm or more.					
P1122	Electric throttle control function	ECM stops the electric throttle contr fixed opening (approx. 5 degrees) b	rol actuator control, throttle valve is maintained at a by the return spring.				

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DTC No.	Detected items	Engine opera	Engine operating condition in fail-safe mode				
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle cont fixed opening (approx. 5 degrees)	CM stops the electric throttle control actuator control, throttle valve is maintained at a xed opening (approx. 5 degrees) by the return spring.				
P1128	Throttle control motor	ECM stops the electric throttle cont fixed opening (approx. 5 degrees)	rol actuator control, throttle valve is maintained at a by the return spring.	ECI			
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.					
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.					
		Vehicle condition	Driving condition	D			
		When engine is idling	Normal				
		When accelerating	Poor acceleration	F			
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.					

DTC Inspection Priority Chart

INFOID:000000001308288

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[MR20DE]

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)	
1	U1001 CAN communication line	
	U1010 CAN communication	1
	P0102 P0103 Mass air flow sensor	1
	P0112 P0113 P0127 Intake air temperature sensor	
	P0117 P0118 P0125 Engine coolant temperature sensor	
	 P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor 	J
	P0327 P0328 Knock sensor	
	P0335 Crankshaft position sensor (POS)	
	P0340 Camshaft position sensor (PHASE)	
	P0500 Vehicle speed sensor	k
	• P0605 ECM	
	P0705 P0850 Park/neutral position (PNP) switch	
	P1229 sensor power supply	
	• P1610 P1611 P1612 P1615 NATS	L
	P1706 Park/Neutral position (PNP) switch	
	P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor	
	1	N
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Priority	Detected items (DTC)
2	 P0132 P0133 P0134 P1143 P1144 Heated oxygen P0135 Heated oxygen sensor 1 heater P0138 P0139 P1146 P1147 Heated oxygen sensor 2 P0141 Heated oxygen sensor 2 heater P0444 EVAP canister purge volume control solenoid valve P0710 P0715 P0720 P0740 P0744 P0776 P0778 P0840 P0845 P1740 P1777 P1778 CVT related sensors, solenoid valves and switches P1111 Intake valve timing control solenoid valve P1122 Electric throttle control function P1124 P1126 Throttle control motor relay P1217 Engine over temperature (OVERHEAT) P1805 Brake switch
3	 P0011 Intake valve timing control P0171 P0172 Fuel injection system function P0300 - P0304 Misfire P0420 Three way catalyst function P1121 Electric throttle motor actuator P1211 TCS control unit P1212 TCS communication line P1564 ASCD steering switch P1572 ASCD brake switch P1574 ASCD vehicle speed sensor P1715 Primary speed sensor

DTC Index

INFOID:000000001308289

×:Applicable —: Not applicable

DTC	;* ¹	Items		Test value/			Poforonco
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Test limit (GST only)	Trip	MI	page
U1001	1001* ⁴	CAN COMM CIRCUIT	—	—	2	—	<u>ECM-108</u>
U1010	1010	CONTROL UNIT(CAN)	_	—	1 (CVT) 2 (M/T)	× (CVT) — (M/T)	ECM-109
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	_	Flashing ^{*6}	_
P0011	0011	INT/V TIM CONT-B1	—	—	2	—	ECM-110
P0102	0102	MAF SEN/CIRCUIT-B1	—	—	1	×	<u>ECM-114</u>
P0103	0103	MAF SEN/CIRCUIT-B1	—	—	1	×	<u>ECM-114</u>
P0112	0112	IAT SEN/CIRCUIT-B1	—	—	2	×	ECM-119
P0113	0113	IAT SEN/CIRCUIT-B1	—	—	2	×	<u>ECM-119</u>
P0117	0117	ECT SEN/CIRC	—	—	1	×	ECM-122
P0118	0118	ECT SEN/CIRC	—	—	1	×	ECM-122
P0122	0122	TP SEN 2/CIRC-B1	—	—	1	×	ECM-125
P0123	0123	TP SEN 2/CIRC-B1	—	—	1	×	ECM-125
P0132	0132	HO2S1 (B1)	—	×	2	×	ECM-128
P0133	0133	HO2S1 (B1)	×	×	2	×	ECM-132
P0134	0134	HO2S1 (B1)	—	×	2	×	ECM-138
P0135	0135	HO2S1 HTR (B1)	×	×	2	×	ECM-143
P0138	0138	HO2S2 (B1)	×	×	2	×	ECM-146
P0139	0139	HO2S2 (B1)	×	×	2	×	ECM-151
P0141	0141	HO2S2 HTR (B1)	×	×	2	×	ECM-158

ECM-332

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[MR20DE]

DTC	C* ¹	Items		Test value/			Poforonco	Δ
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Test limit (GST only)	Trip	MI	page	~
P0171	0171	FUEL SYS-LEAN-B1	_	—	2	×	ECM-161	ECM
P0172	0172	FUEL SYS-RICH-B1		—	2	×	ECM-165	
P0222	0222	TP SEN 1/CIRC-B1		_	1	×	ECM-169	
P0223	0223	TP SEN 1/CIRC-B1		—	1	×	ECM-169	С
P0300	0300	MULTICYL MISFIRE		—	2	×	ECM-172	
P0301	0301	CYL 1 MISFIRE	_	—	2	×	ECM-172	D
P0302	0302	CYL 2 MISFIRE	_	—	2	×	ECM-172	D
P0303	0303	CYL 3 MISFIRE	_	—	2	×	ECM-172	
P0304	0304	CYL 4 MISFIRE	_	—	2	×	ECM-172	Е
P0327	0327	KNOCK SEN/CIRC-B1	_	—	2	—	ECM-177	
P0328	0328	KNOCK SEN/CIRC-B1	_	—	2	—	ECM-177	F
P0335	0335	CKP SEN/CIRCUIT	_	—	2	×	ECM-179	Г
P0340	0340	CMP SEN/CIRC-B1	_	—	2	×	ECM-183	
P0420	0420	TW CATALYST SYS-B1	×	×	2	×	ECM-187	G
P0444	0444	PURG VOLUME CONT/V	_	—	2	×	ECM-192	
P0500	0500	VEH SPEED SEN/CIRC*5		_	2	×	ECM-195	Ц
P0605	0605	ECM		_	1 or 2	× or —	ECM-197	П
P0705	0705	PNP SW/CIRC		_	2	×	<u>TM-403</u>	
P0710	0710	ATF TEMP SEN/CIRC	_	—	1	×	<u>TM-406</u>	
P0715	0715	INPUT SPD SEN/CIRC		_	2	×	<u>TM-408</u>	
P0720	0720	VEH SPD SEN/CIR AT*5		—	2	×	<u>TM-411</u>	
P0740	0740	TCC SOLENOID/CIRC	_	_	2	×	<u>TM-417</u>	J
P0744	0744	A/T TCC S/V FNCTN	_	_	2	×	<u>TM-419</u>	
P0746	0746	PRS CNT SOL/A FCTN		_	1	×	<u>TM-423</u>	Κ
P0776	0776	PRS CNT SOL/B FCTN		_	2	×	<u>TM-425</u>	
P0778	0778	PRS CNT SOL/B CIRC		—	2	×	<u>TM-427</u>	1
P0840	0840	TR PRS SENS/A CIRC		—	2	×	<u>TM-432</u>	L
P0845	0845	TR PRS SENS/B CIRC	_	—	2	×	<u>TM-437</u>	
P1111	1111	INT/V TIM C/CIRC	_	—	1	×	ECM-199	M
P1121	1121	ETC ACTR - B1	_	—	1	×	ECM-202	
P1122	1122	ETC FUNCTION/CIRC - B1	_	—	1	×	ECM-204	
P1124	1124	ETC MOT PWP	—	—	1	×	ECM-208	Ν
P1126	1126	ETC MOT PWP - B1	—	—	1	×	ECM-208	
P1128	1128	ETC MOT - B1	—	—	1	×	ECM-211	0
P1143	1143	HO2S1 (B1)	×	×	2	×	ECM-213	
P1144	1144	HO2S1 (B1)	×	×	2	×	ECM-218	
P1146	1146	HO2S2 (B1)	×	×	2	×	ECM-223	Ρ
P1147	1147	HO2S2 (B1)	×	×	2	×	ECM-230	
P1211	1211	TCS C/U FUNCTN		_	2	_	ECM-237	
P1212	1212	TCS/CIRC		_	2	_	ECM-238	
P1217	1217	ENG OVER TEMP	_	_	1	×	ECM-239	
P1225	1225	CTP LEARNING-B1	—	—	2	—	ECM-243	

ECM-333

< ECU DIAGNOSIS >

DTC* ¹		Items		Test value/			Deference
CONSULT-III	E014*3	(CONSULT-III screen	SRT code	Test limit	Trip	MI	page
GST*2	ECIVI	terms)		(GST only)			1.0
P1226	1226	CTP LEARNING-B1	—	_	2	—	<u>ECM-245</u>
P1229	1129	SENSOR POWER/CIRC	—	_	1	×	ECM-247
P1564	1564	ASCD SW	—	_	1	_	ECM-249
P1572	1572	ASCD BRAKE SW	—	_	1	_	ECM-252
P1574	1574	ASCD VHL SPD SEN	—	—	1	—	ECM-259
P1610	1610	LOCK MODE	—	—	2	—	<u>SEC-37</u>
P1611	1611	ID DISCARD IMM-ECM	—	_	2	_	<u>SEC-38</u>
P1612	1612	CHAIN OF ECM-IMMU	—	_	2	_	<u>SEC-40</u>
P1615	1615	DIFFERENCE OF KEY	—	—	2	—	<u>SEC-43</u>
P1706	1706	P-N POS SW/CIRCUIT	—	_	2	×	ECM-261
P1715	1715	IN PULY SPEED	—	_	2	_	ECM-264
P1740	1740	LU-SLCT SOL/CIRC	—	—	2	×	<u>TM-451</u>
P1777	1777	STEP MOTOR CIRC	—	_	1	×	<u>TM-454</u>
P1778	1778	STEP MOTOR FNCT	_		2	×	<u>TM-457</u>
P1805	1805	BRAKE SW/CIRCUIT	_		2	_	ECM-265
P2122	2122	APP SEN 1/CIRC	—	—	1	×	ECM-268
P2123	2123	APP SEN 1/CIRC	—	_	1	×	ECM-268
P2127	2127	APP SEN 2/CIRC	—	_	1	×	ECM-271
P2128	2128	APP SEN 2/CIRC	—	—	1	×	ECM-271
P2135	2135	TP SENSOR-B1	—	—	1	×	ECM-275
P2138	2138	APP SENSOR	—	—	1	×	<u>ECM-278</u>

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the fail-safe operations for both self-diagnoses occur, the MI illuminates.

How to Set SRT Code

INFOID:000000001308290

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT-III

Perform corresponding DTC CONFIRMATION PROCEDURE one by one based on Performance Priority in the table on "SRT Item".

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.



PBIB3651E

Ρ

The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
 Zono A refere to the range where the time, required for the diagnosis weather accurate and the start is the short.

Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

< ECU DIAGNOSIS > DRIVING PATTERN

ECM-335

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< ECU DIAGNOSIS >

- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)
- Diagnosis is performed as quickly as possible under normal conditions. Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 46 and ground is 3.0 - 4.3V).
- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 46 and ground is lower than 1.4V).
- The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 95 and ground is less than 4.1V).

Pattern 2:

• When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Test Value and Test Limit

INFOID:000000001308291

The following is the information specified in Service \$06 of ISO15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

SRT item	Self-diagnostic test item	DTC	Test (GST d	Test limit	
			TID	CID	
	Three way catalyst function	P0420	01H	01H	Max.
CATALIST	Thee way catalyst function	P0420	02H	81H	Min.
		P0133	09H	04H	Max.
		P1143	0AH	84H	Min.
	Heated oxygen sensor 1	P1144	0BH	04H	Max.
		P0132	0CH	04H	Max.
HO2S		P0134	0DH	04H	Max.
	Heated oxygen sensor 2	P0139	19H	86H	Min.
		P1147	1AH	86H	Min.
		P1146	1BH	06H	Max.
		P0138	1CH	06H	Max.
	Heated exugen senser 1 heater	P0135	29H	08H	Max.
	Theated oxygen sensor Theater	F0133	2AH	88H	Min.
1023 111	Heated exugen senser 2 heater	P01/1	2DH	0AH	Max.
		10141	2EH	8AH	Min.

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

							S	YMPT	OM							U
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	D F G
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	ECM-296	
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			ECM-349	
	Fuel injector circuit	1	1	2	3	2		2	2			2			ECM-293	
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>ECM-60</u>	1
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>ECM-305</u>	J
	Incorrect idle speed adjustment						1	1	1	1		1			ECM-13	K
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<u>ECM-202,</u> <u>ECM-204</u>	
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			ECM-14	L
	Ignition circuit	1	1	2	2	2		2	2			2			ECM-299	
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			ECM-104	
Mass air	flow sensor circuit	1			2										ECM-114	M
Engine	coolant temperature sensor circuit						3			3					ECM-122	
Heated	oxygen sensor 1 circuit		1	2	3	2		2	2			2			ECM-128, ECM-132, ECM-138, ECM-213, ECM-218	N
Throttle	position sensor circuit						2			2					ECM-125, ECM-169, ECM-243, ECM-245, ECM-275	P
Accelera	ator pedal position sensor circuit			3	2	1									ECM-268, ECM-271, ECM-275	
Knock s	ensor circuit			2								3			<u>ECM-177</u>	
Cranksh	aft position sensor (POS) circuit	2	2												ECM-179	

[MR20DE]

INFOID:000000001308292

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ECM

< SYMPTOM DIAGNOSIS >

[MR20DE]

		SYMPTOM												
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	3	2												ECM-183
Vehicle speed signal circuit		2	3		3						3			ECM-195
ECM	2	2	3	3	3	3	3	3	3	3	3			ECM-197
Intake valve timing control solenoid valve cir- cuit		3	2		1	3	2	2	3		3			<u>ECM-199</u>
PNP switch circuit			3		3		3	3			3			ECM-261
Refrigerant pressure sensor circuit		2				3			3		4			ECM-306
Electrical load signal circuit							3							ECM-291
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	<u>HAC-13</u>
ABS actuator and electric unit (control unit)			4											<u>BRC-9</u>

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

< SYMPTOM DIAGNOSIS >

							S	YMPT	OM							А
		EXCP. HA)		SPOT		ELERATION					RATURE HIGH	TION	NO	RGE)		ECM
		START (E		NG/FLAT S	ONATION	DOR ACCI	ш	ŊŊ		to Idle	R TEMPER	ONSUMP ⁻	NSUMPTIC	DER CHA	Reference	С
		START/RE	TALL	N/SURGII	IOCK/DET	OWER/P0	VLOW IDLI	ILE/HUNTI	BRATION	RETURN.	TS/WATEF	'E FUEL C	E OIL COI	DEAD (UN	page	D
		HARD/NO	ENGINE S	HESITATIO	SPARK KN	LACK OF I	HIGH IDLE	ROUGH ID	IDLING VI	SLOW/NO	OVERHEA	EXCESSIV	EXCESSIV	BATTERY		E
Warranty s	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		F
Fuel	Fuel tank	-													<u>FL-9</u>	
	Fuel piping	5		5	5	5		5	5			5			<u>EM-36</u>	G
	Vapor lock		5												_	
	Valve deposit Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5				Η
Air	Air duct														EM-27	
	Air cleaner	-													EM-25	
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5		-	5				J
	Electric throttle control actuator	5			5		5			5					<u>EM-27</u>	
	Air leakage from intake manifold/ Collector/Gasket															Κ
Cranking	Battery	1	1	1		1		1	1					1	PG-133	
	Generator circuit	0													CHG-6	L
		3	_									1			51K-5 EM 76	
	Signal plate	6													<u>EM-76</u> , <u>EM-81</u>	\mathbb{M}
	PNP switch	4													<u>TM-403</u> or <u>TM-511</u>	
Engine	Cylinder head	Б	Б	5	Б	Б		Б	Б			Б			EM 67	Ν
	Cylinder head gasket	5	5	5	5	5		5	5		4	5	3			
	Cylinder block															\cap
	Piston	-											4			0
	Piston ring	6	6	6	6	6		6	A			6			EM-68	
	Connecting rod				0	0			0			0				Ρ
	Bearing															
	Crankshaft															

< SYMPTOM DIAGNOSIS >

[MR20DE]

							S	(MPT	OM						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDTE/TOM IDTE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty s	ymptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve	Timing chain														<u>EM-44</u>
mecha- nism	Camshaft														<u>EM-54</u>
morn	Intake valve timing control	5	5	5	5	5		5	5			5			<u>EM-44</u>
	Intake valve												0		EM 67
	Exhaust valve												3		
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EM-30, EX-</u>
	Three way catalyst														У У
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>EM-34, LU-</u> <u>9, LU-10</u>
	Oil level (Low)/Filthy oil														<u>LU-6</u>
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-18</u>
	Thermostat									5					<u>CO-27</u>
	Water pump														<u>CO-25</u>
	Water gallery	5	5	5	5	5		5	5		4	5			<u>CO-4, CO-</u> <u>5</u>
	Cooling fan														<u>CO-23</u>
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-10</u>
NATS (Niss	san Anti-theft System)	1	1												<u>SEC-16</u>

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

Description INFOID:0000	000001308293					
FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)	ral and	ECM				
engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut ies based on engine speed.	engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off var- es based on engine speed.					
Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled. NOTE:		0				
This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC</u> <u>"System Diagram"</u> .	<u>CM-25.</u>	D				
		E				
		F				
		G				
		Н				
		I				
		J				

ECM-341

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< PRECAUTION > PRECAUTION PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SRS AIRBAG" and "SEAT BELT" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIRBAG".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:000000001583162

NOTE:

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYS-TEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the "LOCK" position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.

For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.

If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables. **NOTE:**

Supply power using jumper cables if battery is discharged.

- 2. Use the Intelligent Key or mechanical key to turn the ignition switch to the "ACC" position. At this time, the steering lock will be released.
- 3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
- 4. Perform the necessary repair operation.
- 5. When the repair work is completed, return the ignition switch to the "LOCK" position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
- 6. Perform a self-diagnosis check of all control units using CONSULT-III.

ECM-342

< PRECAUTION >

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.

PIIB3706J Precautions For Xenon Headlamp Service INFOID:000000001583156 WARNING: Comply with the following warnings to prevent any serious accident. Disconnect the battery cable (negative terminal) or the power supply fuse before installing, remov-F ing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts. Never work with wet hands. Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.) Н Never touch the bulb glass immediately after turning it OFF. It is extremely hot. CAUTION: Comply with the following cautions to prevent any error and malfunction. Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.) Never perform HID circuit inspection with a tester. • Never touch the xenon bulb glass with hands. Never put oil and grease on it. Dispose of the used xenon bulb after packing it in thick vinyl without breaking it. Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.). On Board Diagnostic (OBD) System of Engine and CVT INFOID:000000001308296 Κ The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MI) to warn the driver of a malfunction causing emission deterioration. CAUTION: Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up. Μ · Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.) Ν Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-120, "Description". Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit. Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the EVAP system or fuel injection system, etc. Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and Ρ TCM (Transmission control module) before returning the vehicle to the customer.

Precaution for Procedure without Cowl Top Cover



[MR20DE]

INFOID:000000001555410

PRECAUTIONS

< PRECAUTION >

General Precautions

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.
- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 2. ECM
 - A. Loosen









• When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- Securely connect ECM harness connectors.
 A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.



ECM-345

< PRECAUTION >

• Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>ECM-308, "Reference Value"</u>.

PRECAUTIONS

- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

• When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and

Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

• Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



Perform ECM in-

put/output signal)

inspection before

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PRECAUTIONS

< PRECAUTION >

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
 Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



PREPARATION

< PREPARATION > PREPARATION PREPARATION

Special Service Tools

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ECM

Tool number Tool name		Description
KV10117100 Heated oxygen sensor wrench	S-N1379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	s-NT636	Loosening or tightening heated oxygen sensor 2 a: 22 mm (0.87 in)
KV10118400 Fuel tube adapter	PBIB3043E	Measuring fuel pressure
Commercial Service	e Tools	INFOID:000000001308295
Tool name		Description
Quick connector re-		Removing fuel tube quick connectors in engine room
lease	PBIC0198E	(Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)

INFOID:000000001308298

S-NT705

PREPARATION

< PREPARATION >

Tool name		Description
Oxygen sensor thread cleaner	Mating surface shave cylinder	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti- seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirco- nia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Tita- nia Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica- tion MIL-A-907)	S-N1779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

FUEL PRESSURE

<u>ON-VEHICLE REPAIR</u> ON-VEHICLE REPAIR FUEL PRESSURE

Ins	pection	INFOID:000000001308300	ECM
FUI	EL PRESSURE RELEASE		
<u>ا</u> (With CONSULT-III		С
1.	Turn ignition switch ON.		
2.	Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.		D
3.	Start engine.		D
4.	After engine stalls, crank it two or three times to release all fuel pressure.		
5.	Turn ignition switch OFF.		Ε
ا 🛞	With CONSULT-III		
1.	Remove fuel pump fuse located in IPDM E/R.		_
2.	Start engine.		F
3.	After engine stalls, crank it two or three times to release all fuel pressure.		
4.	Turn ignition switch OFF.		G
5.	Reinstall fuel pump fuse after servicing fuel system.		
FUI	EL PRESSURE CHECK		
CA	UTION:		Н
• B • T	efore disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. he fuel hose connection method used when taking fuel pressure check must not be ι	used for other	
p B	urposes.	hat the avial	
ч В С(e careful not to scratch or put depris around connection area when servicing, so t onnector maintains sealability with O-rings inside.		
• D	o not perform fuel pressure check with electrical systems operating (i.e. lights, rear o	lefogger, A/C,	J

etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum. NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because J10 models do not have fuel return system.

- 1. Release fuel pressure to zero.
- 2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
 - <>: To quick connector

 - C: Clamp
 - Use suitable fuel hose for fuel pressure check (genuine NIS-SAN fuel hose without quick connector).
 - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
 - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
 - Use Pressure Gauge to check fuel pressure.
- 3. Remove fuel hose.
 - Do not twist or kink fuel hose because it is plastic hose.



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ECM-349

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FUEL PRESSURE

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- 4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
 - No.2 spool (5)
 - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
 - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
 - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
 - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
 - When reconnecting fuel line, always use new clamps.
 - Use a torque driver to tighten clamps.
 - Install hose clamp to the position within 1 2 mm (0.04 0.08 in).

Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.
- 5. Connect fuel tube adapter to quick connector.
 - A: Fuel pressure gauge
 - B: Fuel hose for fuel pressure check
- 6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
- 7. Turn ignition switch ON and check for fuel leakage.
- 8. Start engine and check for fuel leakage.
- 9. Read the indication of fuel pressure gauge.
 - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
 - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm², 51 psi)

- 10. If result is unsatisfactory, go to next step.
- 11. Check the following.
 - Fuel hoses and fuel tubes for clogging
 - Fuel filter for clogging
 - Fuel pump
 - Fuel pressure regulator for clogging
 - If OK, replace fuel pressure regulator.

If NG, repair or replace.





EVAPORATIVE EMISSION SYSTEM

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EVAPORATIVE EMISSION SYSTEM

Inspection

- 1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
- 2. Check EVAP canister as follows:
- a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).
- b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).

- 3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
- 4. Check fuel check valve as follows:
- a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
- b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.
- c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



a. Wipe clean valve housing.

b.



- Check valve opening pressure and vacuum.
 - Pressure: $15.3 20.0 \text{ kPa} (0.153 0.200 \text{ bar}, 0.156 0.204 \text{ kg/} \text{ cm}^2, 2.22 2.90 \text{ psi})$ Vacuum: $-6.0 \text{ to} -3.4 \text{ kPa} (-0.06 \text{ bar to} --0.034 \text{ bar}, -0.061 \text{ to} -0.035 \text{ kg/cm}^2, -0.87 \text{ to} -0.49 \text{ psi})$
- c. If out of specification, replace fuel filler cap as an assembly.



Valve A

SEF989X

INFOID:000000001308301

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EVAP canister side

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Idle Speed

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Transmission	Condition	Specification
CVT	No load* (in P or N position)	$700 \pm 50 \text{ rpm}$
M/T	No load* (in Neutral position)	700 ± 50 rpm

*: Under the following conditions

• A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

Steering wheel: Kept in straight-ahead position

Ignition Timing

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Transmission	Condition	Specification				
CVT	No load* (in P or N position)	$15\pm5^\circ$ BTDC				
M/T	No load* (in Neutral position)	$15\pm5^\circ$ BTDC				

*: Under the following conditions

• A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

• Steering wheel: Kept in straight-ahead position

Calculated Load Value

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Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	1.0 – 1.2V*
Mass air flow (Using CONSULT-III or GST)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.