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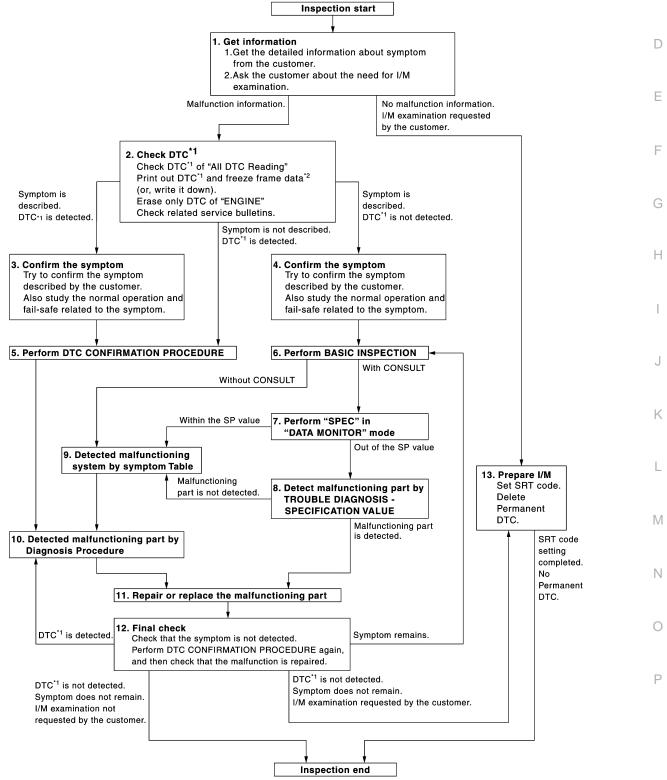
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BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow



OVERALL SEQUENCE



INFOID:000000009360794

А

EC

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

- 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>EC-12</u>, "<u>Diagnostic</u> <u>Work Sheet</u>".)
- 2. Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.

No malfunction information, but a request for I/M examination>>GO TO 13.

2.CHECK DTC

1. Check DTC.

- 2. Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT or GST.)
- Erase DTC. (Refer to EC-152, "On Board Diagnosis Function" or EC-155, "CONSULT Function".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>EC-612</u>, "Symptom Table".)
- 3. Check related service bulletins for information.

Are any symptoms described and any DTCs 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.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

Also study the normal operation and fail-safe related to the symptom. Refer to <u>EC-616</u>, "<u>Description</u>" and <u>EC-571</u>, "Fail safe".

Diagnosis Work Sheet is useful to verify the incident.

Verify 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>EC-616</u>, "<u>Description</u>" and <u>EC-571</u>, "Fail safe".

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.

If two or more DTCs are detected, refer to <u>EC-573, "DTC Inspection Priority Chart"</u> and determine trouble diagnosis order.

NOTE:

- 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.

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?

DIAGNOSIS AND REPAIR WORKFLOW

YES	C INSPECTION > [VQ37VHR] >> GO TO 10.
NO	>> Check according to <u>GI-45, "Intermittent Incident"</u> .
6.per	FORM BASIC INSPECTION
Perforn	EC-14, "BASIC INSPECTION : Special Repair Requirement".
<u>Do you</u>	nave CONSULT?
YES	>> GO TO 7.
NO	>> GO TO 9.
1 .PER	FORM SPEC IN DATA MONITOR MODE
	CONSULT
	ure that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", "A/F ALPHA-B1", and "A/F ALPHA
	within the SP value using CONSULT "SPEC" in "DATA MONITOR" mode. Refer to <u>EC-165, "Compo</u> nction Check".
	easurement value within the SP value?
YES	>> GO TO 9.
NO	>> GO TO 8.
8. det	ECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE
Detect	nalfunctioning part according to EC-166, "Diagnosis Procedure".
<u>Is a ma</u>	functioning part detected?
YES	>> GO TO 11.
NO	>> GO TO 9.
9.DET	ECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE
Detect	
	nalfunctioning system according to EC-612. "Symptom Table" based on the confirmed symptom in
step 4,	nalfunctioning system according to <u>EC-612. "Symptom Table"</u> based on the confirmed symptom in and determine the trouble diagnosis order based on possible causes and symptoms.
step 4,	and determine the trouble diagnosis order based on possible causes and symptoms.
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10.DI	and determine the trouble diagnosis order based on possible causes and symptoms.
10.DI Inspect NOTE:	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. TECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system.
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10.DI Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.RE 1. Re 2. Re 3. Ch 2. Re 3. Ch 3. Ch Check When I Check When S that the	 and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. TECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. gnosis Procedure in EC section described based on open circuit inspection. A short circuit inspectio equired for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-48</u>, "Circuit Inspection functioning part detected? >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON SULT. Refer to <u>EC-534</u>, "Reference Value". PAIR OR REPLACE THE MALFUNCTIONING PART rair or replace the malfunctioning part. onnect parts or connectors disconnected during Diagnosis Procedure again after repair and replace it. ck DTC. If DTC is displayed, erase it. Refer to <u>EC-152</u>, "On Board Diagnosis Function" or <u>EC-155</u>. >> GO TO 12. JAL CHECK TTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function gain, and then make sure that the malfunction have been completely repaired. ymptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure symptom is not detected.
10.DI Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.RE 2. Re 3. Ch 2. Re 3. Ch 3. Ch Check When I Check When S that the IS DTC	 and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. TECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. gnosis Procedure in EC section described based on open circuit inspection. A short circuit inspectio equired for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-48</u>. "Circuit Inspection functioning part detected? >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON SULT. Refer to <u>EC-534</u>. "Reference Value". PAIR OR REPLACE THE MALFUNCTIONING PART rair or replace the malfunctioning part. onnect parts or connectors disconnected during Diagnosis Procedure again after repair and replace it. ck DTC. If DTC is displayed, erase it. Refer to <u>EC-152</u>. "On Board Diagnosis Function" or <u>EC-155</u>. INSULT Function". >> GO TO 12. IAL CHECK TC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Functio gain, and then make sure that the malfunction have been completely repaired. rmptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure symptom is not detected.
10.DI Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.RE 1. Re 2. Re 3. Ch 2. Re 3. Ch 4. Ch 2. Re 3. Ch 4. Ch 3. Ch 4. Ch 3. Ch 4. Ch 5.	 and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. TECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. gnosis Procedure in EC section described based on open circuit inspection. A short circuit inspectio equired for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-48</u>, "Circuit Inspection functioning part detected? >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON SULT. Refer to <u>EC-534</u>, "Reference Value". PAIR OR REPLACE THE MALFUNCTIONING PART rair or replace the malfunctioning part. onnect parts or connectors disconnected during Diagnosis Procedure again after repair and replace it. ck DTC. If DTC is displayed, erase it. Refer to <u>EC-152</u>, "On Board Diagnosis Function" or <u>EC-155</u>. >> GO TO 12. JAL CHECK TTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function gain, and then make sure that the malfunction have been completely repaired. ymptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure symptom is not detected.

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

- NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (Transmission Control Module). Refer to <u>EC-152</u>, "On Board Diagnosis Function" or <u>EC-155</u>, "CONSULT Function".
- NO-2 >> I/M examination, requested from the customer: GO TO 13.

13. PREPARE FOR I/M EXAMINATION

- 1. Set SRT codes. Refer to EC-28, "SRT Set Driving Pattern".
- 2. Erase permanent DTCs. Refer or EC-155, "CONSULT Function".

>> INSPECTION END

Diagnostic Work Sheet

DESCRIPTION

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 an incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the WORKSHEET SAMPLE below in order to organize all the information for troubleshooting. Some conditions may cause the MIL to illuminate steady or blink and DTC to be detected. Examples:

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

• Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.



[VQ37VHR]

INFOID:000000009360795

SEF907L

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

Revision: 2013 May

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

WORKSHEET SAMPLE

Customer nar	me MR/MS	Model & Year	VIN	
Engine #		Trans.	Mileage	
Incident Date		Manuf. Date	In Service Date	
Fuel and fuel	filler cap	r cap		
	☐ Startability	Impossible to start No combus Partial combustion affected by th Partial combustion NOT affected Possible but hard to start Other	nrottle position d by throttle position	
Symptoms	🗌 Idling	□ No fast idle □ Unstable □ H □ Others [High idle 🔲 Low idle	
	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [
	Engine stall	At the time of start While idling While accelerating While dece Just after stopping While loadi	lerating	
Incident occu	rrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night [☐ In the daytime	
Frequency		All the time Under certain cond	ditions	
Weather cond	ditions	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		
Road conditions In town In suburbs Highway Off road (up/dow		Jhway 🛛 Off road (up/down)		
Driving conditions		 Not affected At starting While idling While accelerating While decelerating While turni 	•	
Vehicle speed 0 10			<u> </u> 30 40 50 60 MPH	
Malfunction indicator lamp				

MTBL0017

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< BASIC INSPECTION >

INSPECTION AND ADJUSTMENT BASIC INSPECTION

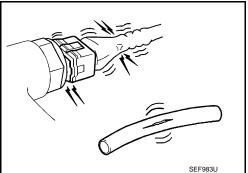
BASIC INSPECTION : Special Repair Requirement

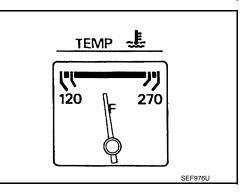
INFOID:000000009360796

[VQ37VHR]

1.INSPECTION START

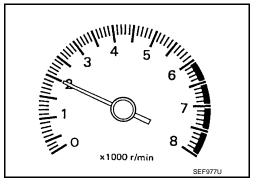
- 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
- 2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses 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.
- 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 or GST.
- Are any DTCs detected?

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



2.REPAIR OR REPLACE

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

>> GO TO 3

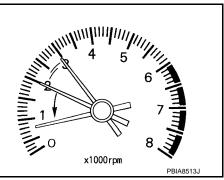
3. CHECK IDLE SPEED

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

< BASIC INSPECTION >

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

3. Check idle speed. For procedure, refer to EC-19, "IDLE SPEED : Special Repair Requirement".



А

For specification, refer to <u>EC-631, "Idle Speed"</u> .	6 DEC
Is the inspection result normal?	
YES >> GO TO 10.	
NO >> GO TO 4.	
	x1000 rpm
4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEAF	PBIA8513J
1. Stop engine.	
2. Perform EC-20, "ACCELERATOR PEDAL RELEASED POSITION ment".	N LEARNING : Special Repair Require-
>> GO TO 5.	F
5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING	
	G
>> GO TO 6.	
6. PERFORM IDLE AIR VOLUME LEARNING	Н
Perform EC-21, "IDLE AIR VOLUME LEARNING : Special Repair Rec	uirement".
Is Idle Air Volume Learning carried out successfully?	
YES >> GO TO 7.	
NO >> Follow the instruction of Idle Air Volume Learning. Then G	io to 4.
7.CHECK IDLE SPEED AGAIN	
1. Start engine and warm it up to normal operating temperature.	
 Check idle speed. For procedure, refer to <u>EC-19</u>, "IDLE SPEED : Special Repair Red 	quirement"
For specification, refer to <u>EC-631, "Idle Speed"</u> .	K
Is the inspection result normal?	
YES >> GO TO 10.	
NO >> GO TO 8.	L
8. DETECT MALFUNCTIONING PART	
Check the Following.	M
• Check camshaft position sensor (PHASE) and circuit. Refer to EC-3	
 Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-309</u> Is the inspection result normal? 	· · · ·
YES >> GO TO 9.	Ν
NO >> Repair or replace. Then GO TO 4.	
9. CHECK ECM FUNCTION	0
 Substitute with a non-malfunctioning ECM to check ECM function. 	
although this is rare.)	
2. Perform initialization of NVIS (NATS) system and registration of al	
SEC-8, "ECM RECOMMUNICATING FUNCTION : Special Repair	Requirement.

>> GO TO 4.

10.CHECK IGNITION TIMING

1. Run engine at idle.

< BASIC INSPECTION >

[VQ37VHR]

- 2. Check ignition timing with a timing light.
 - A :Timing indicator

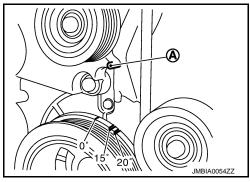
For procedure, refer to <u>EC-19</u>, "IGNITION TIMING : <u>Special</u> <u>Repair Requirement</u>".

For specification, refer to EC-631. "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 11.



11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- Perform EC-20, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-21, "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 IDLE SPEED AGAIN
- 1. Start engine and warm it up to normal operating temperature.
- Check idle speed. For procedure, refer to <u>EC-19</u>, "IDLE SPEED : Special Repair Requirement". For specification, refer to <u>EC-631</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.
- 2. Check ignition timing with a timing light.

A :Timing indicator

For procedure, refer to <u>EC-19</u>, "IGNITION TIMING : <u>Special</u> <u>Repair Requirement</u>". For specification, refer to EC-631, "Ignition Timing".

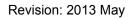
Is the inspection result normal?

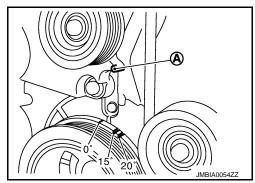
YES >> GO TO 19. NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-56, "Removal and Installation".

- Is the inspection result normal?
- YES >> GO TO 17.
- NO >> Repair the timing chain installation. Then GO TO 4.





< BASIC INSPECTION >

17. DETECT MALFUNCTIONING PART	А
Check the following.	\cap
 Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-313, "Component Inspection"</u>. Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-309, "Component Inspection"</u>. 	
Is the inspection result normal?	EC
YES >> GO TO 18.	
NO >> Repair or replace. Then GO TO 4.	С
18. CHECK ECM FUNCTION	
1. Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)	D
 Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to SEC-8, "ECM RECOMMUNICATING FUNCTION : Special Repair Requirement". 	
	Е
>> GO TO 4.	
19.INSPECTION END	_
If ECM is replaced during this BASIC INSPECTION procedure, go to <u>EC-17</u> , "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".	F
	G
>> INSPECTION END ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM)	
	Н
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Description	
When replacing ECM, the following procedure must be performed. (For details, refer to <u>EC-17, "ADDITIONAL</u> SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".)	Ι
PROGRAMMING OPERATION	
NOTE:	J
After replacing with a blank ECM, programming is required to write ECM information. Be sure to follow the pro- cedure to perform the programming.	
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair	Κ
Requirement	
1.CHECK ECM PART NUMBER	L
Check ECM part number to see whether it is blank ECM or not.	
NOTE:	Μ
 Part number of blank ECM is 23703 - xxxxx. Check the part number when ordering ECM or with the one included in the label on the container box. 	1 V I
Is the ECM a blank ECM?	
YES >> GO TO 2.	Ν
NO $>>$ GO TO 4.	
2.SAVE ECM PART NUMBER	0
Read out the part number from the old ECM and save the number, following the programming instructions. Refer to "CONSULT Operation Manual". NOTE:	
 The ECM part number is saved in CONSULT. 	Ρ
 Even when ECM part number is not saved in CONSULT, go to 3. 	
>> GO TO 3.	
3.PERFORM ECM PROGRAMMING	

After replacing ECM, perform the ECM programming. Refer to "CONSULT Operation Manual".

< BASIC INSPECTION >

- **NOTE:** During programming, maintain the following conditions:
- Ignition switch: ON
- Electric load: OFF
- Brake pedal: Not depressed
- Battery voltage: 12 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.)

>> GO TO 5.

4.REPLACE ECM

Replace ECM.

>> GO TO 5.

5. PERFORM INITIALIZATION OF NVIS (NATS) SYSTEM AND REGISTRATION OF ALL NVIS (NATS) IGNITION KEY IDS

Refer to SEC-8, "ECM RECOMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 6.

6.PERFORM VIN REGISTRATION

Refer to EC-20, "VIN REGISTRATION : Special Repair Requirement".

>> GO TO 7.

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-20, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 8.

 $\mathbf{8}$. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to <u>EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"</u>. Is the vehicle with SynchroRev Match mode (S-MODE)?

YES >> GO TO 9.

NO >> GO TO 10.

9. PERFORM M/T NEUTRAL POSITION LEARNING

Refer to EC-25, "M/T NEUTRAL POSITION LEARNING : Special Repair Requirement".

>> GO TO 10.

10. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-21, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MODULE)

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MODULE) : Description

When replacing VVEL control module, the following procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL

INSPECTION AND ADJUSTMENT	[VQ37VHR]	
MODULE) : Special Repair Requirement	INFOID:000000009360800	
1.PERFORM IDLE AIR VOLUME LEARNING		A
Refer to EC-21, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".		
>> END		EC
IDLE SPEED		С
IDLE SPEED : Description	INFOID:000000009360801	
This describes how to check the idle speed. For the actual procedure, follow the instruction INSPECTION".	ons in "BASIC	C
IDLE SPEED : Special Repair Requirement	INFOID:000000009360802	E
1.CHECK IDLE SPEED		
With CONSULT Check idle speed in "DATA MONITOR" mode with CONSULT. Image With GST		F
Check idle speed with Service \$01 of GST.		G
>> INSPECTION END IGNITION TIMING		F
IGNITION TIMING : Description	INFOID:000000009360803	
This describes how to check the ignition timing. For the actual procedure, follow the instruct INSPECTION".	ons in "BASIC	I
IGNITION TIMING : Special Repair Requirement	INFOID:000000009360804	J
1.CHECK IGNITION TIMING		
1. Attach timing light to loop wire as shown.		k
		L
		N
	IA0846ZZ	Ν
1. Loop wireA. Timing lightB. Timing indicator		C
2. Check ignition timing.		
>> INSPECTION END VIN REGISTRATION		F
VIN REGISTRATION : Description	INFOID:000000009360805	

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced. **NOTE:**

< BASIC INSPECTION >

[VQ37VHR]

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

VIN REGISTRATION : Special Repair Requirement

INFOID:000000009360806

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-24, "Information About Identification or Model Code".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT

- 1. Turn ignition switch ON and engine stopped.
- 2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.
- 3. Follow the instruction of CONSULT display.

>> END ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description INFOLD:0000000366607

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 the harness connector of the accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Re-

quirement

INFOID:000000009360808

1.START

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

>> END THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:000000009360809

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 or electric throttle control actuator inside is cleaned.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:000000009360810

1.START

WITH CONSULT

- 1. Turn ignition switch ON.
- 2. Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode.
- 3. Follow the instructions on the CONSULT display.
- 4. Turn ignition switch OFF and wait at least 10 seconds.

Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

WITHOUT CONSULT

1. Start the engine.

NOTE:

Engine coolant temperature is 25°C (77°F) or less before engine starts.

EC-20

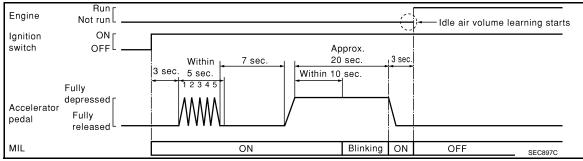
INSPECTION AND ADJUSTMENT	
< BASIC INSPECTION >	[VQ37VHR]
2. Warm up the engine. NOTE:	A
Raise engine coolant temperature until it reaches 65°C (149°F) or more. 3. Turn ignition switch OFF and wait at least 10 seconds.	
Check that throttle valve moves during the above 10 seconds by confirming the operating s	ound. EC
>> END	
IDLE AIR VOLUME LEARNING	С
IDLE AIR VOLUME LEARNING : Description	INFOID:000000009360811
 Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps engine idle the specific range. It must be performed under the following conditions: Each time electric throttle control actuator or ECM is replaced. Each time VVEL actuator sub assembly or VVEL control module is replaced. Idle speed or ignition timing is out of specification. 	e speed within D
IDLE AIR VOLUME LEARNING : Special Repair Requirement	INFOID:000000009360812
1.PRECONDITIONING	F
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. • Battery voltage: More than 12.9 V (At idle)	G
 Engine coolant temperature: 70 - 105°C (158 - 221°F) 	
 PNP switch: ON (M/T models) Selector lever: P or N (A/T models) 	Н
 Electric load switch: OFF (Air conditioner, headlamp, rear window defogger) 	
On vehicles equipped with daytime light systems, if the parking brake is applied before started the headlamp will not be illuminated.	the engine is
 Steering wheel: Neutral (Straight-ahead position) 	
Vehicle speed: StoppedTransmission: Warmed-up	J
 A/T models With CONSULT: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" systematical equations of the systematical equation equation of the systematical equation eq	stem indicates
less than 0.9V.	K
 Without CONSULT: Drive vehicle for 10 minutes. M/T models 	
Drive vehicle for 10 minutes.	L
Do you have CONSULT? YES >> GO TO 2.	
NO >> GO TO 3.	M
2.PERFORM IDLE AIR VOLUME LEARNING	
 With CONSULT Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-20, "ACCELER/</u> <u>RELEASED POSITION LEARNING : Special Repair Requirement"</u>. 	ATOR PEDAL
 Perform Throttle Valve Closed Position Learning. <u>EC-20. "THROTTLE VALVE CLOSE</u> LEARNING : Special Repair Requirement". 	D POSITION
3. 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. 	P
Is "CMPLT" displayed on CONSULT screen?	
YES >> GO TO 4. NO >> GO TO 5.	
2	

3. PERFORM IDLE AIR VOLUME LEARNING

Without CONSULT NOTE:

< BASIC INSPECTION >

- 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.
- 1. Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-20, "ACCELERATOR PEDAL</u> <u>RELEASED POSITION LEARNING : Special Repair Requirement"</u>.
- 2. Perform Throttle Valve Closed Position Learning. <u>EC-20, "THROTTLE VALVE CLOSED POSITION</u> <u>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 for approx. 20 seconds until the MIL stops blinking and illuminates.
- 8. Fully release the accelerator pedal within 3 seconds after the MIL illuminates.
- 9. Start engine and let it idle.
- 10. Wait 20 seconds.



>> GO TO 4.

4.CHECK IDLE SPEED AND IGNITION TIMING

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let it idle for 20 seconds.
- 3. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to <u>EC-631, "Idle Speed"</u> and <u>EC-631, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> INSPECTION END

5.DETECT MALFUNCTIONING PART-I

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?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.DETECT MALFUNCTIONING PART-II

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>EC-165</u>, "<u>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 again:

- Engine stalls.
- Erroneous idle.

>> INSPECTION END

< BASIC INSPECTION >

VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Description

VVEL control shaft position sensor adjustment is an operation to adjust the initial position angle that is the basis for the VVEL control shaft position sensor.

It must be performed each time VVEL actuator sub assembly is replaced. CAUTION:

- It must be performed only on the replaced bank side.
- It must not be performed except when VVEL actuator sub assembly is replaced. If by any chance the adjustment is performed, replace VVEL actuator sub assembly.

VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requirement

1.START

Do you have CONSULT?

Do you have CONSULT?

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

2. PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "VVEL POS SEN ADJ PREP" in "WORK SUPPORT" mode with CONSULT.
- 3. Touch "Start" and wait a few seconds.
- 4. Make sure the "CMPLT" is displayed on CONSULT screen.
- 5. Select "VVEL POSITION SEN- B1" or "VVEL POSITION SEN- B2" in "DATA MONITOR" mode with CON-SULT.
- 6. Loosen the VVEL control shaft position sensor mounting bolt (1).
- Turn the VVEL control shaft position sensor (2) right and left while monitoring the output voltage of "VVEL POSITION SEN-B1" or "VVEL POSITION SEN-B2" and adjust the output voltage to be within the standard value.

Voltage : 500 ± 48 mV

8. Tighten the VVEL control shaft position sensor mounting bolt.

: 7.0 N•m (0.71 kg-m, 62 in-lb)

 Reconfirm that the output voltage of "VVEL POSITION SEN- B1" or "VVEL POSITION SEN- B2" is within the standard value.

Voltage : $500 \pm 48 \text{ mV}$

NOTE:

If it varies from the standard value after the bolt is tightened, perform steps 6 to 8 again.

- 10. Turn ignition switch OFF and wait at least 10 seconds.
- 11. Start engine and warm it up to normal operating temperature.
- 12. Turn ignition switch OFF and wait at least 10 seconds.
- 13. Perform idle air volume learning. Refer to <u>EC-21, "IDLE AIR VOLUME LEARNING : Special Repair</u> P <u>Requirement"</u>.

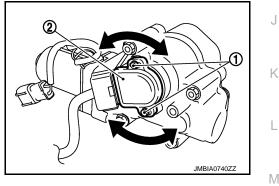
>> INSPECTION END

${\it 3.}$ perform vvel control shaft position sensor adjustment

Without CONSULT

1. Disconnect VVEL control shaft position sensor harness connector.

EC-23



EC

А

[VQ37VHR]

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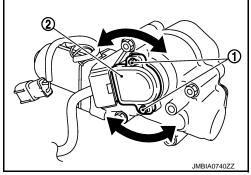
F

Н

Ν

< BASIC INSPECTION >

- 2. Remove VVEL actuator motor relay.
- 3. Turn ignition switch ON, wait at least 5 seconds and then turn OFF.
- 4. Reconnect all harness connectors disconnected.
- 5. Install VVEL actuator motor relay.
- 6. Turn ignition switch ON and wait at least 5 seconds.
- 7. Loosen the VVEL control shaft position sensor mounting bolt (1).
- 8. Turn the VVEL control shaft position sensor (2) right and left while monitoring the output voltage between the VVEL control module terminals with a tester and adjust the output voltage to be within the standard value.



VVEL control module				
Bank	Connector	+	_	Voltage
Dalik	Connector	Terminal	Terminal	
1	E15	3	4	500 ± 48 mV
2	L10	5	6	- 500 ± 48 MV

9. Tighten the VVEL control shaft position sensor mounting bolt.

C : 7.0 N•m (0.71 kg-m, 62 in-lb)

10. Reconfirm that the output voltage of VVEL control shaft position sensor is within the standard value.

VVEL control module				
Bank	Connector	+	_	Voltage
Darik	Connector	Terminal	Terminal	
1	E15	3	4	500 ± 48 mV
2	E13	5	6	500 ± 46 mV

NOTE:

If it varies from the standard value after the bolt is tightened, perform steps 7 to 9 again.

- 11. Turn ignition switch OFF and wait at least 10 seconds.
- 12. Start engine and warm it up to normal operating temperature.
- 13. Turn ignition switch OFF and wait at least 10 seconds.
- 14. Perform idle air volume learning. Refer to <u>EC-21, "IDLE AIR VOLUME LEARNING : Special Repair</u> <u>Requirement"</u>.

>> INSPECTION END MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:000000009360815

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in "Diagnosis Procedure".

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:000000009360816

1.START

With CONSULT

< BASIC INSPECTION >	[VQ37VHR]
 Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT. Clear mixture ratio self-learning value by touching "CLEAR". 	
ogWith GST	
 Start engine and warm it up to normal operating temperature. 	
 Turn ignition switch OFF. Disconnect mass air flow sensor (bank 1) harness connector. 	
4. Restart engine and let it idle for at least 5 seconds.	
5. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.	
6. Select Service \$03 with GST. Make sure DTC P0102 is detected.	
7. Select Service \$04 with GST to erase the DTC P0102.	
>> END	
W/T NEUTRAL POSITION LEARNING	
M/T NEUTRAL POSITION LEARNING : Description	INFOID:000000009360817
M/T Noutral Position Learning is a function in which ECM learns the shift lover neutral posit	ion by monitoring
M/T Neutral Position Learning is a function in which ECM learns the shift lever neutral posit putput voltage of gear lever position sensor.	ion by monitoring
This must be performed when the following conditions are fulfilled.	
Gear lever position sensor is replaced	
 ECM is replaced Shift position indicator "N" is blinking 	
I/T NEUTRAL POSITION LEARNING : Special Repair Requirement	INFOID:000000009360818
START	
Do you have CONSULT?	
Do vou have CONSULT?	
YES >> GO TO 2.	
NO >> GO TO 3.	
2. PERFORM M/T NEUTRAL POSITION LEARNING	
With CONSULT	
1. Check that there is no sticking when shifting shift lever to the neutral position.	
2. Turn ignition switch ON.	
B. Select "M/T NEUTRAL POS LEARN" in "WORK SUPPORT" mode with CONSULT.	
 Touch "Start" and wait a few seconds. NOTE: 	
Never touch shift lever. Otherwise learning may not complete normally.	
5. Make sure the "COMPLETE" is displayed on CONSULT screen.	
NOTE:	
If "INCMP" is displayed, return to step 1 and repeat the procedures again.	
>> END	
3. PERFORM M/T NEUTRAL POSITION LEARNING	
-	
NOTE: It is better to count the time accurately with a clock.	
 It is impossible to switch the learning mode when a clutch interlock switch circuit ha 	s a malfunction.
1. Check that there is no sticking when shifting shift lever to the neutral position.	
2. Turn ignition switch ON and wait 5 seconds.	
 Within 5 seconds repeat the following operation 3 times. Fully depress and fully release operation and holding S MODE switch 	slutch pedal while
pressing and holding S-MODE switch.	

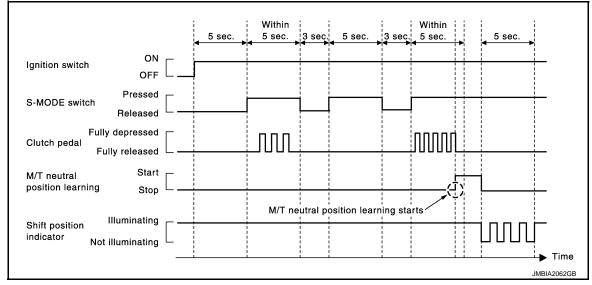
- 4. Wait 3 seconds while S-MODE switch is released.
- 5. Wait 5 seconds while pressing S-MODE switch.
- 6. Wait 3 seconds while S-MODE switch is released.

< BASIC INSPECTION >

- Within 5 seconds repeat the following operation 5 times. Fully depress and fully release clutch pedal while pressing and holding S-MODE switch.
 - ECM starts M/T Neutral Position Learning.

NOTE:

Never touch shift lever. Otherwise learning may not complete normally.



8. Shift position indicator on combination meter blinks for 5 seconds when the leaning is complete. **NOTE:**

If shift position indicator does not blink or blinks continuously, return to step 1 and repeat the procedures again.

>> END

< BASIC INSPECTION >

HOW TO SET SRT CODE

Description

INFOID:000000009360819

[VQ37VHR]

OUTLINE

In order to set all SRTs, the self-diagnoses as in the "SRT ITEM" table must have been performed at least once. Each diagnosis may require actual driving for a long period of time under various conditions.

SRT ITEM

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

SRT item ^{*1} (CONSULT indication)	Performance Priority ^{*2}	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.	C
CATALYST	1	Three way catalyst function	P0420, P0430	_
EVAP SYSTEM	1	EVAP control system purge flow monitoring	P0441	E
	1	EVAP control system	P0456	
HO2S	1	Air fuel ratio (A/F) sensor 1	P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D	F
		Heated oxygen sensor 2	P0137, P0157	(-
		Heated oxygen sensor 2	P0138, P0158	G
		Heated oxygen sensor 2	P0139, P0159	
EGR/VVT SYSTEM	2	Intake value timing control function	P0011, P0021	F

*1: Though displayed on the CONSULT screen, "HO2S HTR" is not SRT item.

*2: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

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, referring to the following flowchart.

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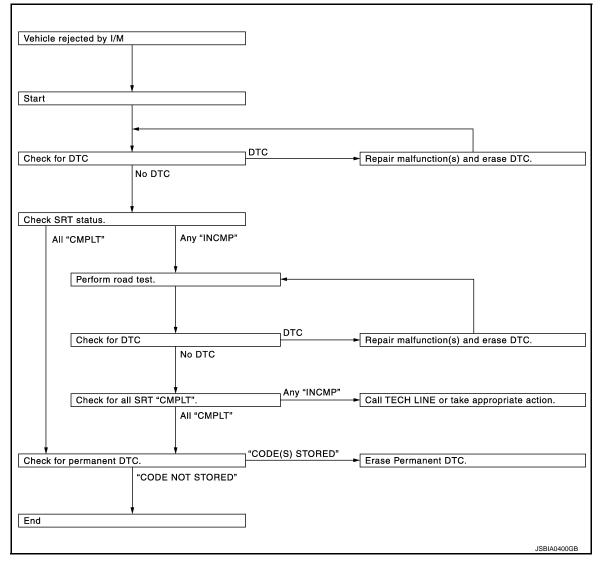
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< BASIC INSPECTION >



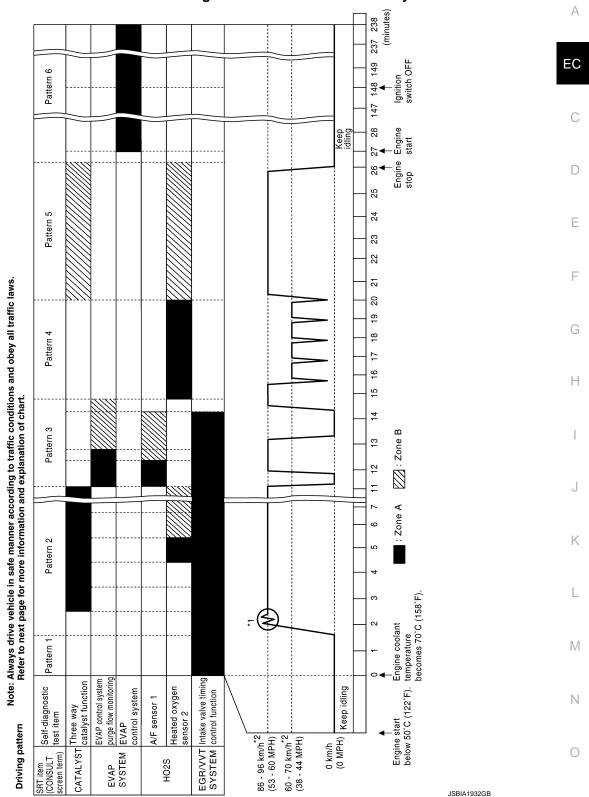
SRT Set Driving Pattern

INFOID:000000009360820

CAUTION:

< BASIC INSPECTION >

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



*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal P and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

- *2: Checking the vehicle speed with GST is advised.
- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
- "Zone A" is the fastest time where required for the diagnosis under normal conditions*. If the diagnosis is not completed within "Zone A", the diagnosis can still be performed within "Zone B".

< BASIC INSPECTION >

- *: Normal conditions
- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)

NOTE:

Diagnosis is performed as quickly as possible under normal conditions. However, under other conditions, diagnosis may also be performed. [For example: ambient air temperature other than $20 - 30^{\circ}C$ ($68 - 86^{\circ}F$)]

Work Procedure

INFOID:000000009360821

1. СНЕСК DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-575, "DTC Index".

NO >> GO TO 2.

2. CHECK SRT STATUS

With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

Without CONSULT

Perform "SRT status" mode with EC-152, "On Board Diagnosis Function".

With GST

Select Service \$01 with GST.

Is SRT code(s) set?

- YES >> GO TO 12.
- NO-1 >> With CONSULT: GO TO 3.
- NO-2 >> Without CONSULT: GO TO 4.

3. DTC CONFIRMATION PROCEDURE

- 1. Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT.
- For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-27, "Description"</u>.
- 3. Check DTC.

Is any DTC detected?

- YES >> Repair malfunction(s) and erase DTC. Refer to EC-575. "DTC Index".
- NO >> GO TO 11.

4.PERFORM ROAD TEST

- Check the "Performance Priority" in the "SRT ITEM" table. Refer to EC-27, "Description".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-28, "SRT Set Driving</u> <u>Pattern"</u>.

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5.PATTERN 1

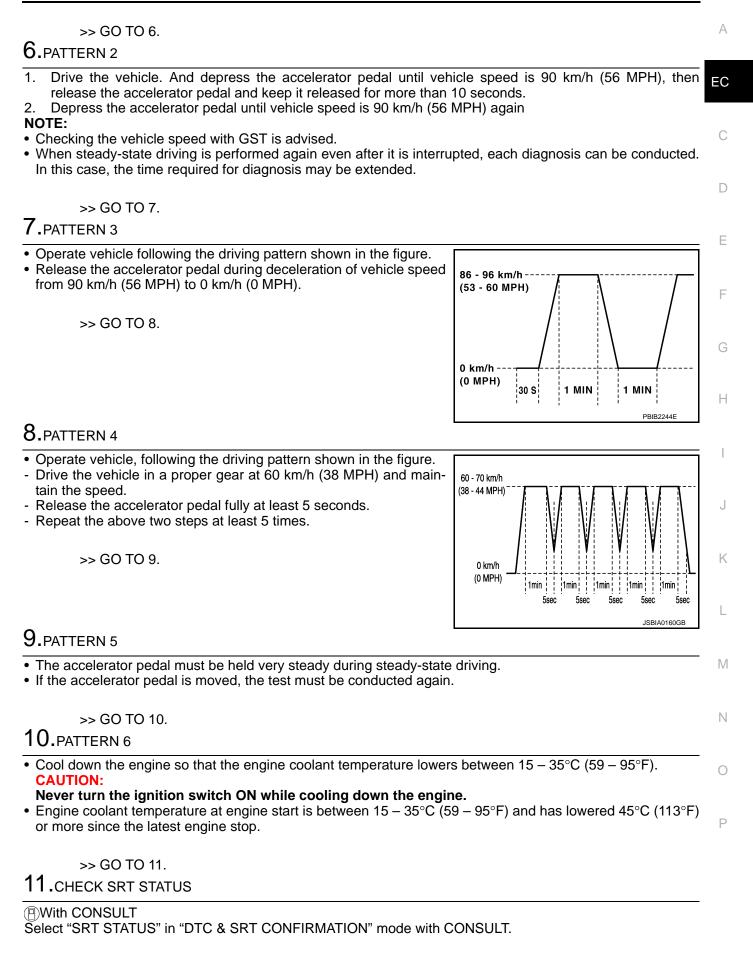
- 1. Check the vehicle condition;
- Engine coolant temperature is –10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
- 2. Start the engine.
- 3. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:

- ECM terminal voltage is follows;
- Engine coolant temperature
- −10 to 35°C (14 to 95°F): 3.0 − 4.3 V
- 70°(158°F): Less than 4.1 V
- Fuel tank temperature: Less than 1.4 V
- Refer to EC-534, "Reference Value".

< BASIC INSPECTION >

[VQ37VHR]



EC-31

< BASIC INSPECTION >

Without CONSULT
 Perform "SRT status" mode with <u>EC-152, "On Board Diagnosis Function"</u>.
 With GST
 Select Service \$01 with GST.
 <u>Is SRT(s) set?</u>
 YES >> GO TO 12.

NO >> Call TECH LINE or take appropriate action.

12.CHECK PERMANENT DTC

NOTE:

Permanent DTC cannot be checked with a tool other than CONSULT or GST. With CONSULT Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT. With GST Select Service \$0A with GST. Is permanent DTC(s) detected?

YES >> Go to EC-27, "Description".

NO >> END

< BASIC INSPECTION >

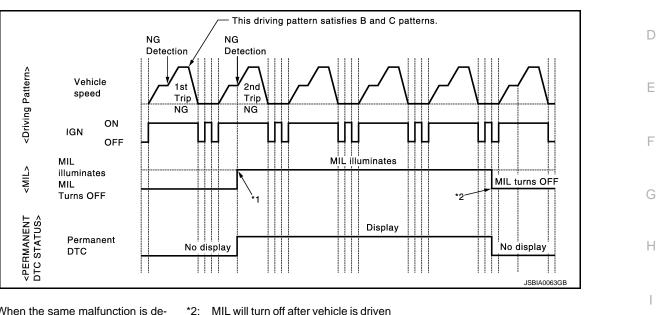
HOW TO ERASE PERMANENT DTC

Description

OUTLINE

When a DTC is stored in ECM

When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a raw.



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate. MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

The erasing method depends on a permanent DTC stored in ECM. Refer to the following table. **NOTE:**

If the applicable permanent DTC includes multiple groups, perform the procedure of Group B first. If the per-

		\times : Applicable —: Not applicable		
Group [*]	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern		L
		В	D	
А	×	—	—	M
В	_	×	×	

*: For group, refer to <u>EC-575, "DTC Index"</u>.

PERMANENT DTC ITEM

For permanent DTC items, MIL turns ON. Refer to EC-575, "DTC Index".

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[VQ37VHR]

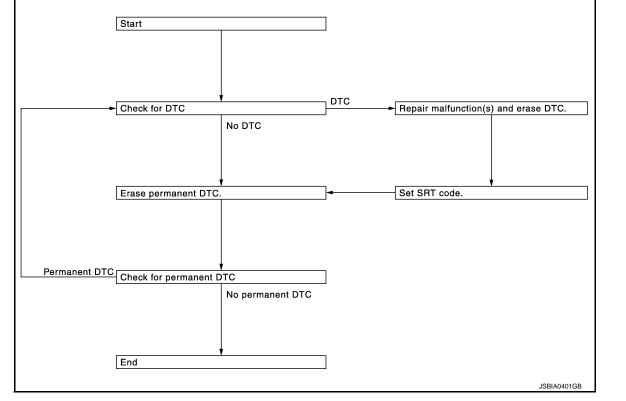
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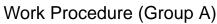
HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

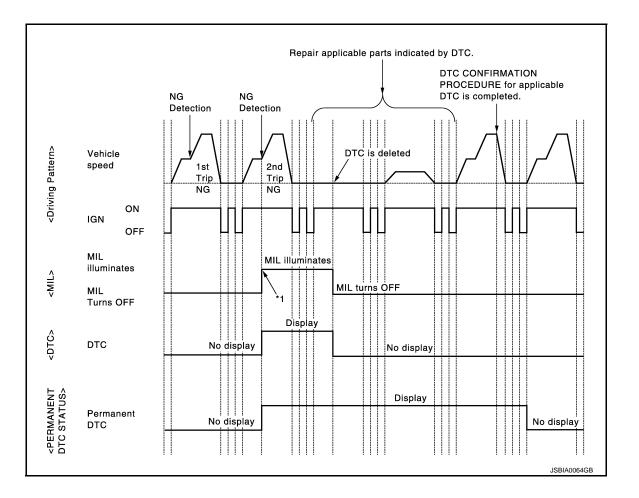
[VQ37VHR]

PERMANENT DTC SERVICE PROCEDURE





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HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

*1: When the same malfunction is de-А tected in two consecutive trips, MIL will illuminate. 1.CHECK DTC EC Check DTC. Is any DTC detected? YES >> Repair malfunction(s) and erase DTC. Refer to EC-152, "On Board Diagnosis Function", EC-155. "CONSULT Function". NO >> GO TO 2. D 2.CHECK PERMANENT DTC With CONSULT Е 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. 4. Turn ignition switch ON. F Select "PERMANENT DTC STATUS" mode with CONSULT. 5. With GST 1. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 2. 3. Turn ignition switch OFF and wait at least 10 seconds. 4. Turn ignition switch ON. 5. Select Service \$0A with GST. Н Is any permanent DTC detected? YES >> GO TO 3. NO >> END **3.** PERFORM DTC CONFIRMATION PROCEDURE Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in J ECM. Refer to EC-575, "DTC Index". >> GO TO 4. Κ **4.**CHECK PERMANENT DTC With CONSULT ĭ. L Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. 4. Turn ignition switch ON. Μ 5. Select "PERMANENT DTC STATUS" mode with CONSULT. With GST 1. Turn ignition switch OFF and wait at least 10 seconds. Ν 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON. 4. Select Service \$0A with GST. 5. Is any permanent DTC detected? YES >> GO TO 1. NO Ρ >> END

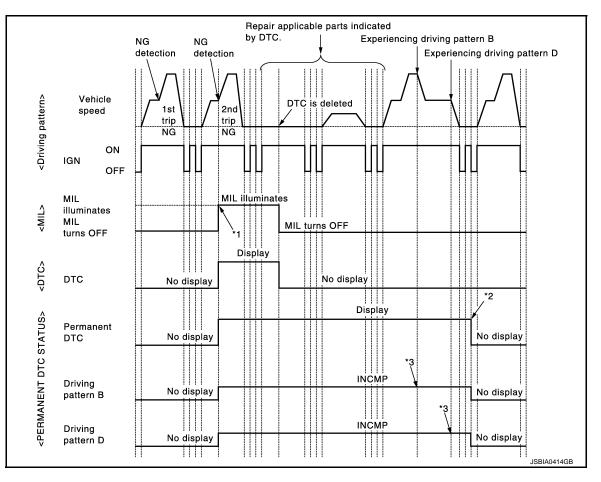
HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

Work Procedure (Group B)

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[VQ37VHR]



- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: After experiencing driving pattern B *3: and D, permanent DTC is erased.

Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing driving pattern B or D.

NOTE:

Drive the vehicle according to only driving patterns indicating "INCMP" in driving patterns B and D on the "PERMANENT DTC STATUS" screen.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-152. "On Board Diagnosis Function"</u>, <u>EC-155.</u> <u>"CONSULT Function"</u>.

NO >> GO TO 2.

2. CHECK PERMANENT DTC

With CONSULT

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" mode with CONSULT.

With GST

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION > [VQ37]	/HR]
4. Turn ignition switch ON.	
5. Select Service \$0A with GST. <u>Is any permanent DTC detected?</u>	A
YES >> GO TO 3.	
NO >> END	EC
3. DRIVE DRIVING PATTERN B	
CAUTION:	
Always drive at a safe speed.	С
• Never erase self-diagnosis results.	di dina na
 If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset. 	TVING D
(B)With CONSULT	
1. Start engine and warm it up to normal operating temperature.	
2. Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to	
ing pattern B. Refer to <u>EC-155, "CONSULT Function"</u> , <u>EC-149, "DIAGNOSIS DESCRIPTION : D</u> Pattern".	riving
With GST	
1. Start engine and warm it up to normal operating temperature.	F
2. Drive the vehicle according to driving pattern B. Refer to <u>EC-149, "DIAGNOSIS DESCRIPTION : D</u>	riving
Pattern".	G
>> GO TO 4.	9
4.CHECK PERMANENT DTC	Н
With CONSULT	
1. Turn ignition switch OFF and wait at least 10 seconds.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	
4. Turn ignition switch ON.	
5. Select "PERMANENT DTC STATUS" mode with CONSULT.	
@With GST	J
1. Turn ignition switch OFF and wait at least 10 seconds.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	K
4. Turn ignition switch ON.	
5. Select Service \$0A with GST.	
Is any permanent DTC detected?	L
YES >> GO TO 5.	
NO >> END	
5. DRIVE DRIVING PATTERN D	M
CAUTION:	
Always drive at a safe speed.	Ν
 Never erase self-diagnosis results. If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B or D, t	
pattern B and D is reset.	
1. Drive the vehicle according to driving pattern D. Refer to <u>EC-149</u> , "DIAGNOSIS DESCRIPTION : D	oriving O
Pattern".	
>> GO TO 6.	-
6.CHECK PERMANENT DTC	Р
U. CHECK PERMANENT DIC	

- With CONSULT
 Turn ignition switch OFF and wait at least 10 seconds.
 Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.

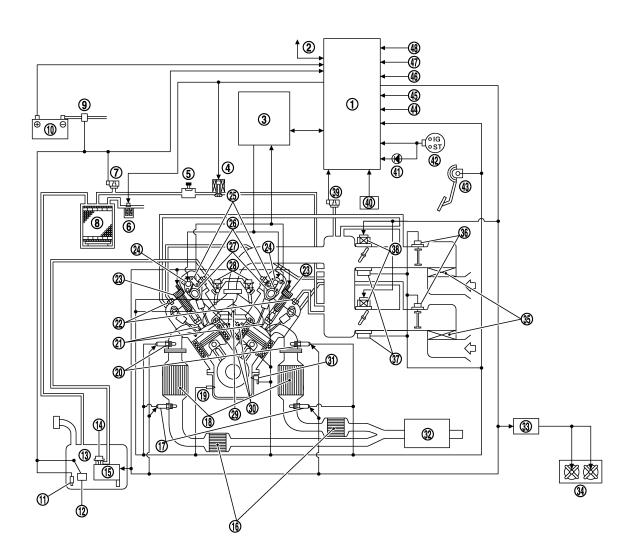
< BASIC INSPECTION >

- Select "PERMANENT DTC STATUS" mode with CONSULT. 5.
- With GST
 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 3.
- 4.
- 5. Select Service \$0A with GST.
- Is any permanent DTC detected?
- YES >> GO TO 1.
- NO >> END

< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION ENGINE CONTROL SYSTEM

System Diagram



- 1. ECM
- 4. EVAP canister purge volume control 5. solenoid valve
- 7. EVAP control system pressure sen- 8. sor
- 10. Battery
- 13. Fuel tank
- 16. Three way catalyst 2
- 19. Engine oil temperature sensor
- 22. PCV valve

- 2. CAN communication
 - EVAP service port
 - EVAP canister
- 11. Fuel tank temperature sensor
- 14. Fuel pressure regulator
- 17. Heated oxygen sensor 2
- 20. A/F sensor 1
- 23. Ignition coil (with power transistor)

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VVEL control module
 EVAP canister vent control valve
 Battery current sensor
 Fuel level sensor
 Fuel pump
 Three way catalyst 1
 Spark plug

JSBIA0157ZZ

24. VVEL actuator motor

< SYSTEM DESCRIPTION >

[VQ37VHR]

- 25. VVEL control shaft position sensor 26. Intake valve timing control solenoid valve 28. Fuel damper 29. Engine coolant temperature sensor Crankshaft position sensor (POS) 32. Muffler 31. 34. Cooling fan 35. Air cleaner 37. Electric throttle control actuator 38. Throttle position sensor
- 43. Accelerator pedal position sensor
- 46. PNP signal

System Description

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

Component Parts Location

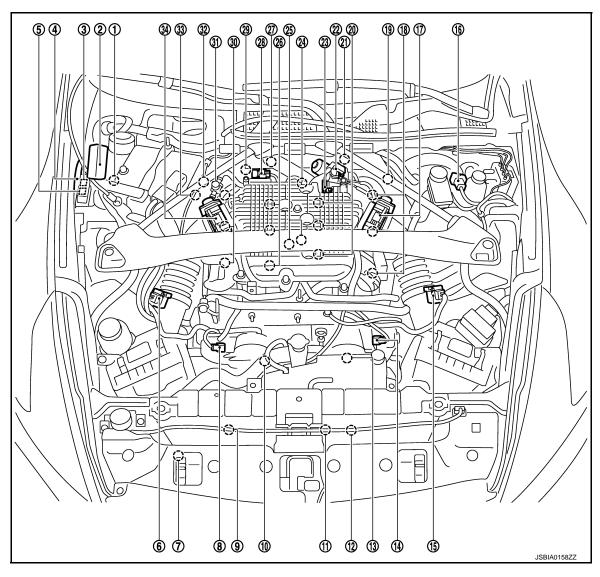
40. Brake booster pressure sensor

- 41. MIL 44. Power steering pressure sensor
- 47. Gear lever position sensor

- 27. Camshaft position sensor (PHASE)
- 30. Knock sensor
- 33. Cooling fan control module
- 36. Mass air flow sensor (with intake air temperature sensor)
- Manifold absolute pressure (MAP) 39. sensor
- 42. Ignition switch
- 45. Refrigerant pressure sensor
- 48 Input speed sensor

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- Battery current sensor 1.
- 4. VVEL control module
- IPDM E/R 2.
- 5. VVEL actuator motor relay
- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)

< SYSTEM DESCRIPTION >

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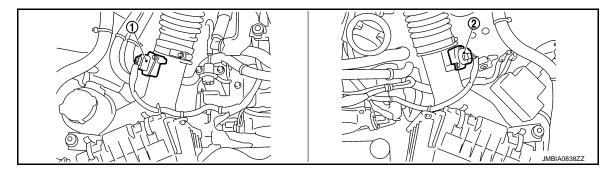
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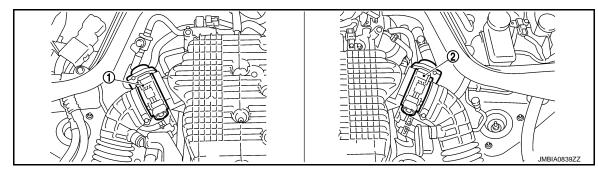
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve
- 31. EVAP service port
- 34. Electric throttle control actuator (bank 1)

- Camshaft position sensor (PHASE) 9. (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)
- 32. A/F sensor 1 (bank 1)

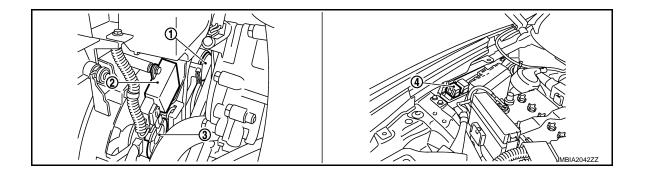
- Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)
- 33. Crankshaft position sensor (POS)



1. Mass air flow sensor (with intake air 2. Mass air flow sensor (bank 2) temperature sensor) (bank 1)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

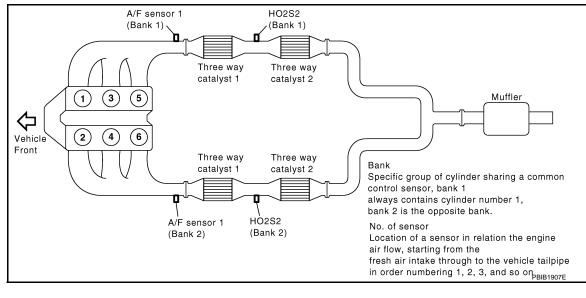


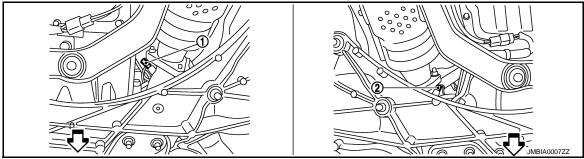
< SYSTEM DESCRIPTION >

C: Vehicle front

- 1. Cooling fan motor-2
- 2. Cooling fan control module
- 3. Cooling fan motor-1

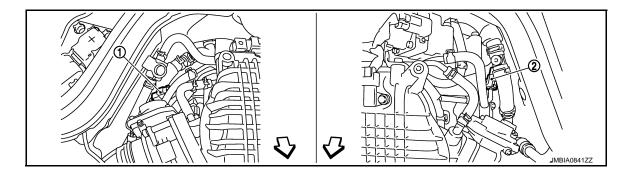
4. Cooling fan relay





C : Vehicle front

- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)

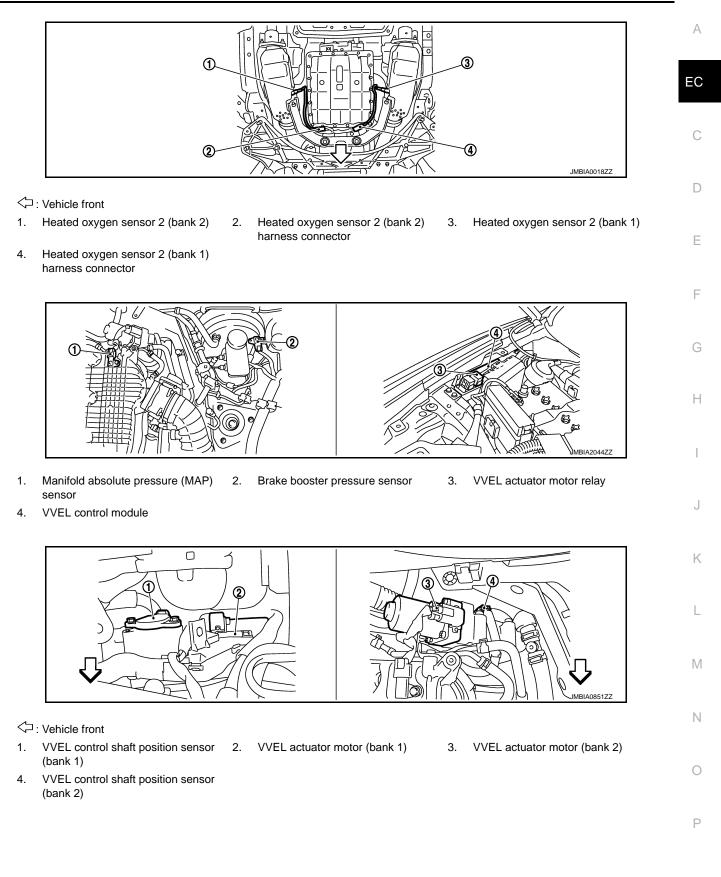


C: Vehicle front

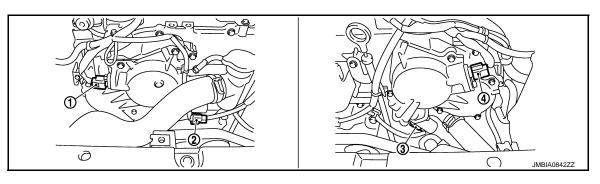
1. A/F sensor 1 (bank 1) harness con- 2. A/ nector ne

A/F sensor 1 (bank 2) harness connector

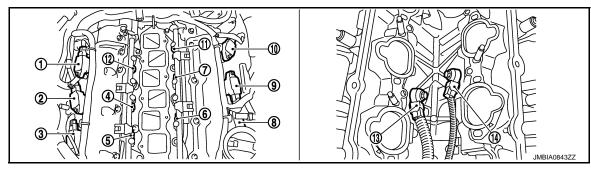
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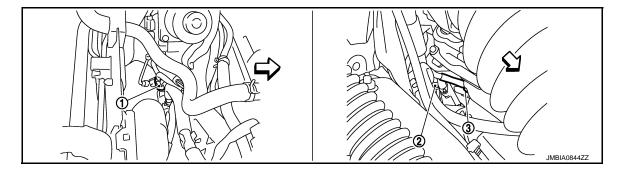
- Camshaft position sensor (PHASE) 2. 1. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No.5 (with power transis- 2. 1. tor)
- 4. Fuel injector No.3
- Fuel injector No.4 7.
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6 tor)
- 13. Knock sensor (bank 1)

- Ignition coil No.3 (with power transis- 3. tor)
- 5. Fuel injector No.1
- 8. Ignition coil No.2 (with power transis- 9. tor)
- 14. Knock sensor (bank 2)

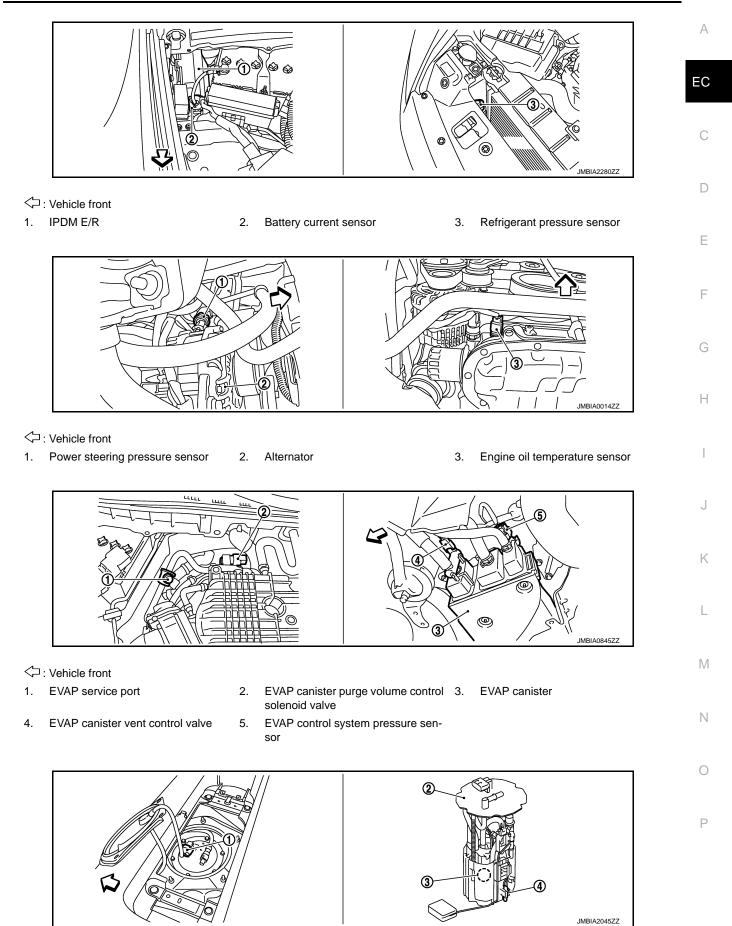
- Ignition coil No.1 (with power transistor)
- 6. Fuel injector No.2
 - Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5



C: Vehicle front

- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1) 1.
- Crankshaft position sensor (POS) 3.

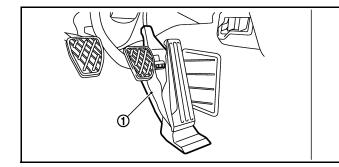
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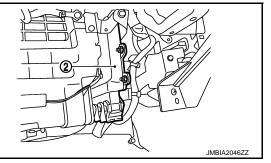


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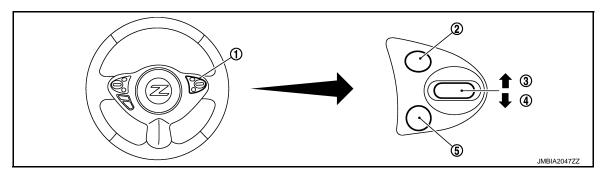
C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor





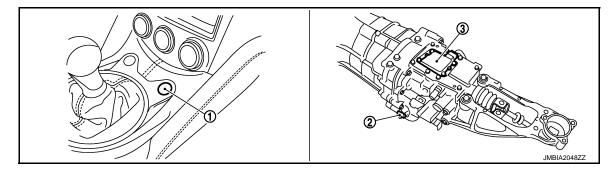
1. Accelerator pedal position sensor 2. ECM



- 1. ASCD steering switch
- 4. SET/COAST switch
- 2. CANCEL switch

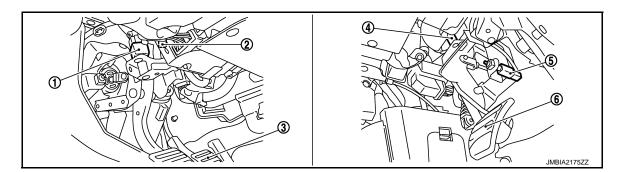
5.

- MAIN switch
- 3. RESUME/ACCELERATE switch



1. S-mode switch

- 2. Input speed sensor
- 3. Gear lever position sensor



< SYSTEM DESCRIPTION >

[VQ37VHR]

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- 1. Stop lamp switch
- 4. Clutch pedal position switch
- 2. ASCD brake switch
- 5. Clutch interlock switch
- 3. Brake pedal
 - 6. Clutch pedal

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EC

Component Description

Component	Reference	
A/F sensor 1	EC-235, "Description"	
A/F sensor 1 heater	EC-188, "Description"	
Accelerator pedal position sensor	EC-481, "Description"	
ASCD brake switch	EC-457, "Description"	
ASCD steering switch	EC-454, "Description"	
Brake booster pressure sensor	EC-383, "Description"	
Camshaft position sensor (PHASE)	EC-310. "Description"	
Clutch pedal position switch	EC-406. "Description"	
Clutch interlock switch	EC-401, "Description"	
Cooling fan control module	EC-502, "Description"	
Cooling fan motor	EC-502, "Description"	
Crankshaft position sensor (POS)	EC-306, "Description"	
Electric throttle control actuator	EC-447, "Description"	
Engine coolant temperature sensor	EC-221, "Description"	
Engine oil temperature sensor	EC-287, "Description"	
EVAP canister purge volume control solenoid valve	EC-324, "Description"	
EVAP canister vent control valve	EC-332, "Description"	
EVAP control system pressure sensor	EC-340, "Description"	
Fuel injector	EC-508, "Description"	
Fuel level sensor	EC-361, "Description"	
Fuel pump	EC-511, "Description"	
Fuel tank temperature sensor	EC-280, "Description"	
Gear lever position sensor (PHASE)	EC-396, "Description"	
Heated oxygen sensor 2	EC-245, "Description"	
Heated oxygen sensor 2 heater	EC-191, "Description"	
Ignition signal	EC-514, "Description"	
Input speed sensor	EC-493, "Description"	
Intake air temperature sensor	EC-215, "Description"	
Intake valve timing control solenoid valve	EC-194, "Description"	
Knock sensor	EC-303, "Description"	
Manifold absolute pressure (MAP) sensor	EC-209, "Description"	
Mass air flow sensor	EC-197, "Description"	
PCV valve	EC-525, "Description"	
Power steering pressure sensor	EC-380, "Description"	
Refrigerant pressure sensor	EC-527, "Description"	
Stop lamp switch	EC-473, "Description"	
Throttle control motor	EC-445, "Description"	
Throttle control motor relay	EC-452, "Description"	
Throttle position sensor	EC-224, "Description"	

< SYSTEM DESCRIPTION >

Component	Reference
VVEL actuator motor	EC-423, "Description"
VVEL actuator motor relay	EC-427, "Description"
VVEL control module	EC-467, "Description"
VVEL control shaft position sensor	EC-420, "Description"

< SYSTEM DESCRIPTION >

MULTIPORT FUEL INJECTION SYSTEM

System Diagram



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[VQ37VHR]

Crankshaft position sensor (POS)	Engine speed ^{*2} & Piston position				
Camshaft position sensor (PHASE)					
Mass air flow sensor	Amount of intake air				
Intake air temperature sensor	Intake air temperature				
Engine coolant temperature sensor	Engine coolant temperature	•			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas	•			
Throttle position sensor	Throttle position		Fuel injection & mixture ratio		
Accelerator pedal position sensor	Accelerator pedal position	ECM	control	Fuel injector	
Park/neutral position (PNP) switch (M/T models) TCM(A/T models)	Gear position	•			
Battery	Battery voltage ^{*2}	•			
Knock sensor	□ Engine knocking condition	•			
Power steering pressure sensor	Power steering operation	•			
Heated oxygen sensor 2 ^{*1}	Density of oxygen in exhaust gas	•			
ABS actuator and electric unit (control unit)	VDC/TCS operation command				
	Air conditioner operation & Vehicle speed				
Combination meter		•			

System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed* ³			
Camshaft position sensor (PHASE)	Piston position			
Mass air flow sensor	Amount of intake air Intake air temperature			
Intake air temperature sensor				
Engine coolant temperature sensor	Engine coolant temperature			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas			
Throttle position sensor	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position	Fuel initiation		
Park/neutral position (PNP) switch (M/T models) TCM (A/T models)	Gear position	 Fuel injection & mixture ratio control 	Fuel injector	
Battery	Battery voltage*3			
Knock sensor	Engine knocking condition			
Power steering pressure sensor	Power steering operation			
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas	_		
ABS actuator and electric unit (control unit)*2	VDC/TCS operation command			
Combination meter	Air conditioner operation* ²			
	Vehicle speed*2			

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



< SYSTEM DESCRIPTION >

[VQ37VHR]

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

*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.

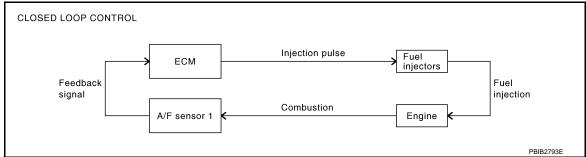
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T 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 1 can better reduce CO, HC and NOx emissions. This system uses A/F 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 A/F sensor 1, refer to <u>EC-235</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 1. Even if the switching characteristics of A/F 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 A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F 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

EC-50

< SYSTEM DESCRIPTION >

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 A/F 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.

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

FUEL INJECTION TIMING

• Sequential multiport fuel injection system	• Simultaneous multiport fuel injection system
No. 1 cylinder	No. 1 cylinder

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 six cylinders twice each engine cycle. In other words, pulse signals of
 the same width are simultaneously transmitted from the ECM.
 The six 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

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.

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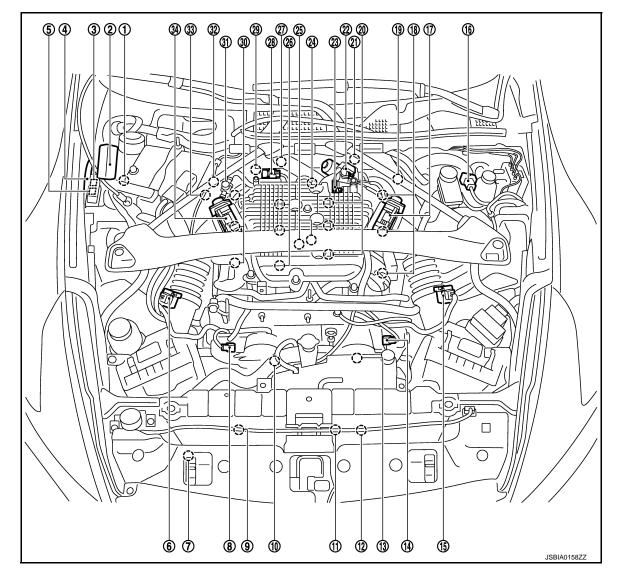
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< SYSTEM DESCRIPTION >

Component Parts Location

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- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

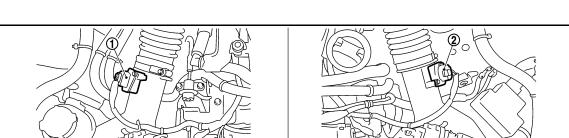
< SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

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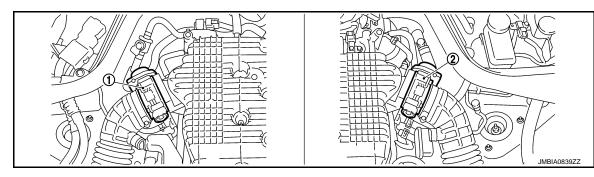
[VQ37VHR]

34. Electric throttle control actuator (bank 1)

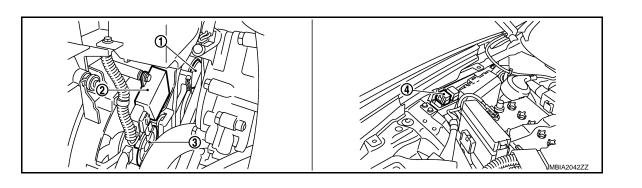


Mass air flow sensor (with intake air 2. 1. Mass air flow sensor (bank 2) temperature sensor) (bank 1)

2.



- Electric throttle control actuator 1. (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

- Cooling fan motor-2 1.
- 4. Cooling fan relay

- Cooling fan control module
- 3. Cooling fan motor-1

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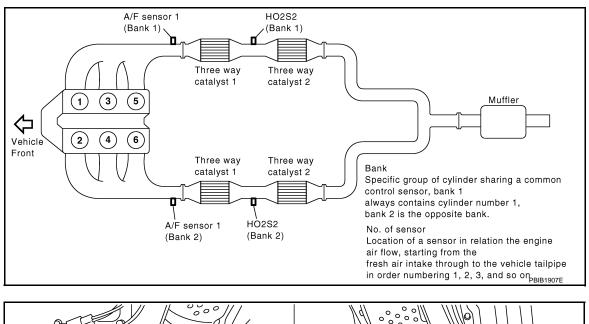
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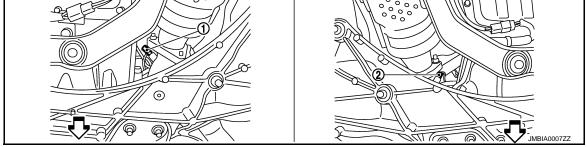
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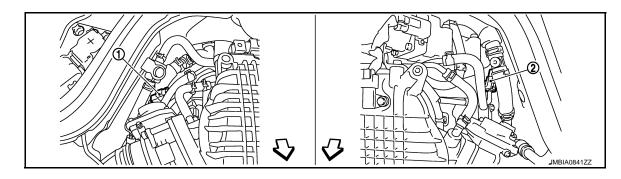
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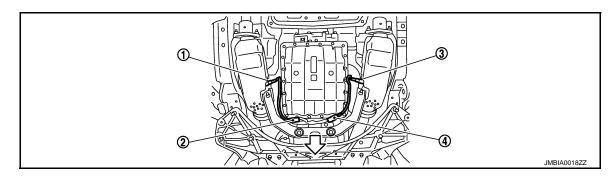
C: Vehicle front

- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C : Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



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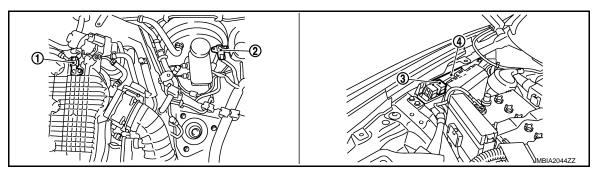
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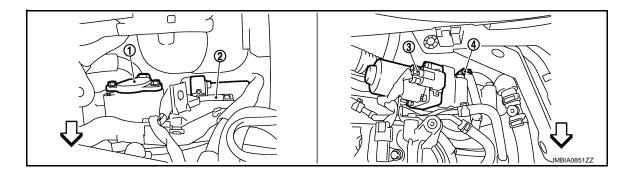
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

Heated oxygen sensor 2 (bank 1) 4. harness connector



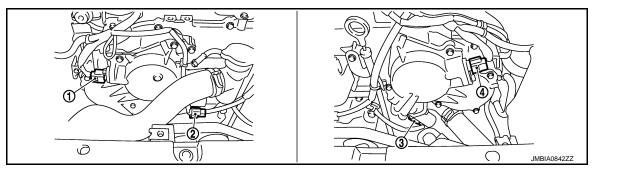
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

- VVEL control shaft position sensor 1. 2. VVEL actuator motor (bank 1) (bank 1)
- 3.
- VVEL actuator motor (bank 2)

4. VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

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Ignition coil No.3 (with power transis- 3.

Ignition coil No.2 (with power transis- 9.

- Ignition coil No.5 (with power transis- 2. 1. tor)
- 4. Fuel injector No.3

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- 7. Fuel injector No.4
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6 tor)
- 13. Knock sensor (bank 1)

Fuel injector No.1

14. Knock sensor (bank 2)

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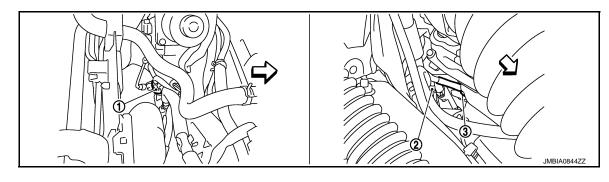
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Ignition coil No.1 (with power transistor)

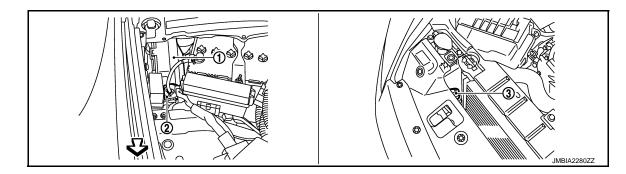
[VQ37VHR]

- 6. Fuel injector No.2
 - Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5



└□: Vehicle front

- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1) 1.
- 3. Crankshaft position sensor (POS)



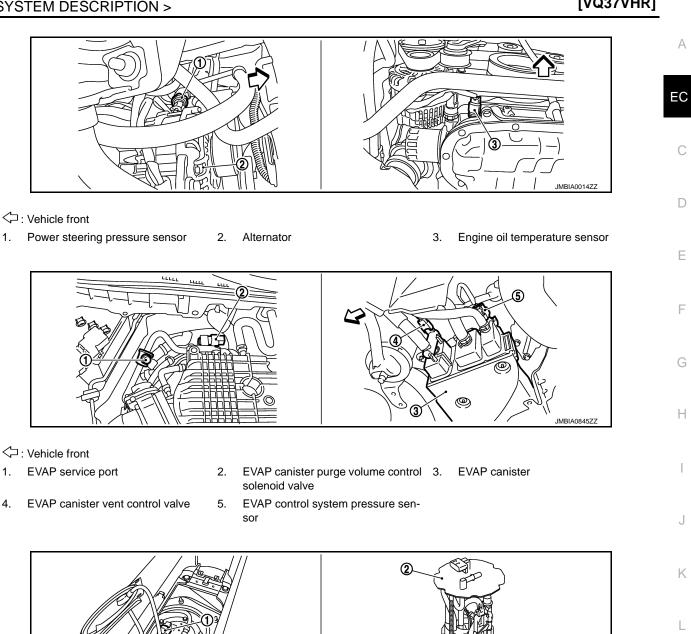
└─ : Vehicle front

IPDM E/R 1.

- 2. Battery current sensor
- Refrigerant pressure sensor 3.

< SYSTEM DESCRIPTION >

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C: Vehicle front

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1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector

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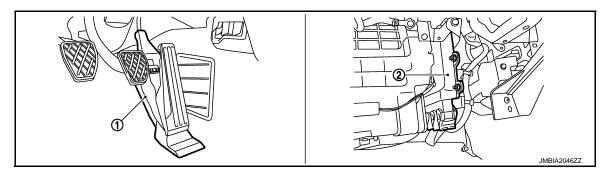
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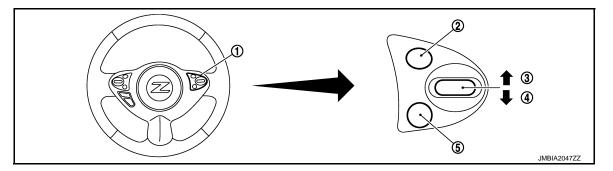
Fuel tank temperature sensor

< SYSTEM DESCRIPTION >

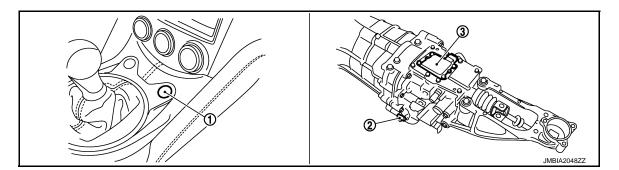
[VQ37VHR]



Accelerator pedal position sensor 2. ECM 1.

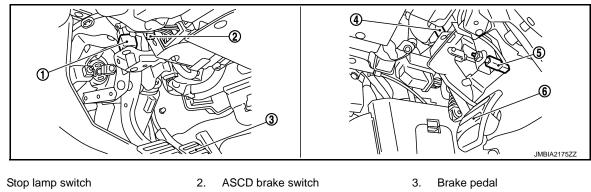


- ASCD steering switch 1.
- 2. CANCEL switch
- 4. SET/COAST switch
- 5.
 - MAIN switch
- **RESUME/ACCELERATE** switch 3.



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



Clutch pedal position switch 4.

Component Description

- 5. Clutch interlock switch
- 6. Clutch pedal

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< SYSTEM DESCRIPTION >

[VQ37VHR]

Component	Reference	٨
A/F sensor 1	EC-235, "Description"	A
Accelerator pedal position sensor	EC-481, "Description"	
Camshaft position sensor (PHASE)	EC-310, "Description"	EC
Crankshaft position sensor (POS)	EC-306, "Description"	
Engine coolant temperature sensor	EC-221, "Description"	
Fuel injector	EC-508, "Description"	С
Heated oxygen sensor 2	EC-245, "Description"	
Intake air temperature sensor	EC-215, "Description"	D
Knock sensor	EC-303, "Description"	
Mass air flow sensor	EC-197, "Description"	
Power steering pressure sensor	EC-380, "Description"	E
Throttle position sensor	EC-224, "Description"	

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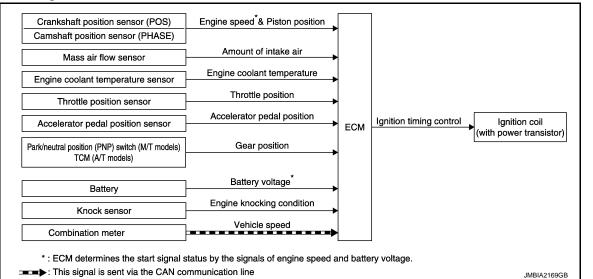
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Revision: 2013 May

< SYSTEM DESCRIPTION >

ELECTRIC IGNITION SYSTEM

System Diagram



System Description

INFOID:000000009360834

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed* ²		
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	- Ignition timing	Ignition coil (with power transistor)
Accelerator pedal position sensor	Accelerator pedal position	Ignition timing control	
Park/neutral position (PNP) switch (M/T models) TCM (A/T models)	Gear position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Combination meter	Vehicle speed*1		

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

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

SYSTEM DESCRIPTION

Ignition order: 1 - 2 - 3 - 4 - 5 - 6

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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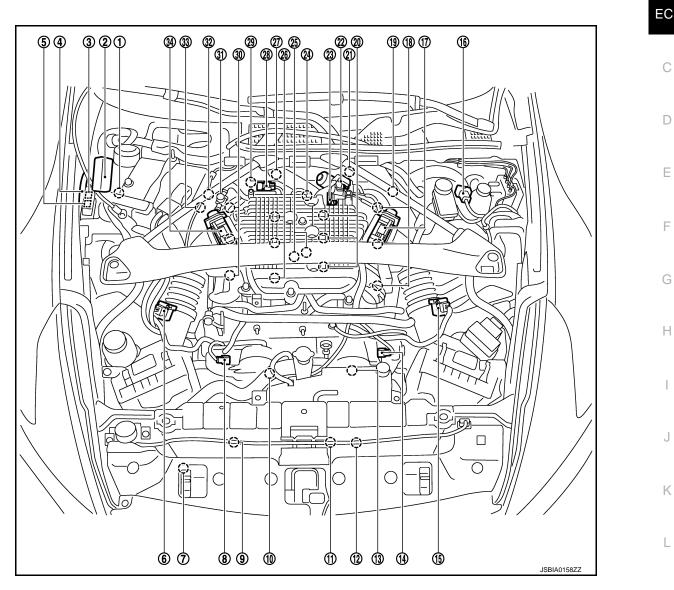
[VQ37VHR]

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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

INFOID:000000009360835



- 1. Battery current sensor
- VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- EVAP canister purge volume control 2 solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)
- 3. Cooling fan relay
 Mass air flow sensor (with intake air temperature sensor) (bank 1)
 9. Cooling fan motor-2
 12. Cooling fan motor-1
 15. Mass air flow sensor (bank 2)
 18. Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)

and spark plug (bank 2)

- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)



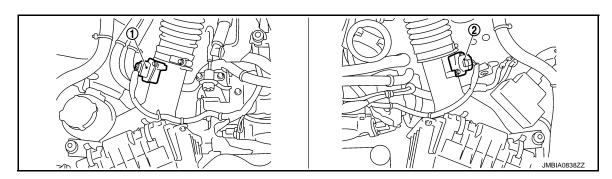
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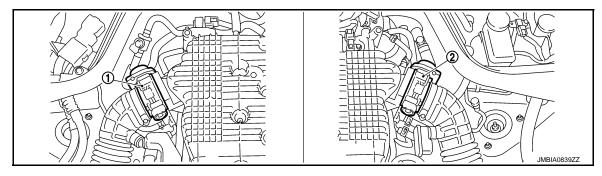
[VQ37VHR]

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

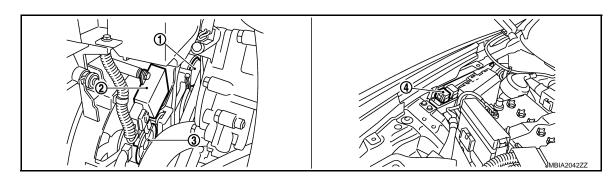
34. Electric throttle control actuator (bank 1)



1. Mass air flow sensor (with intake air 2. Mass air flow sensor (bank 2) temperature sensor) (bank 1)



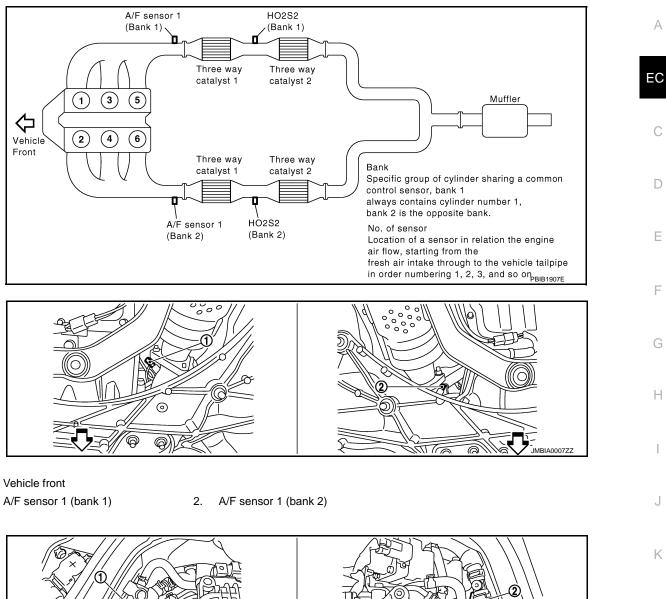
- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



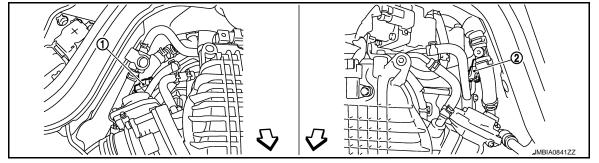
C: Vehicle front

- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

< SYSTEM DESCRIPTION >

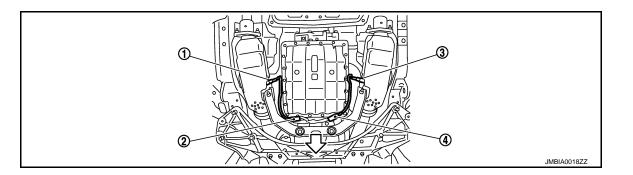


- C: Vehicle front
- 1.



C: Vehicle front

- A/F sensor 1 (bank 1) harness con- 2. 1. nector nector
 - A/F sensor 1 (bank 2) harness con-



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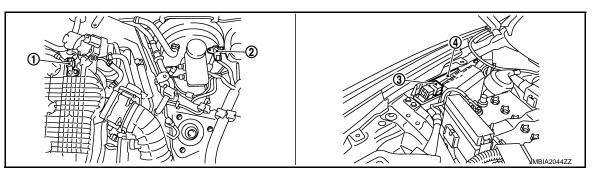
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< SYSTEM DESCRIPTION >

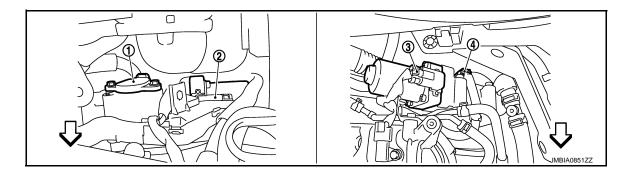
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module

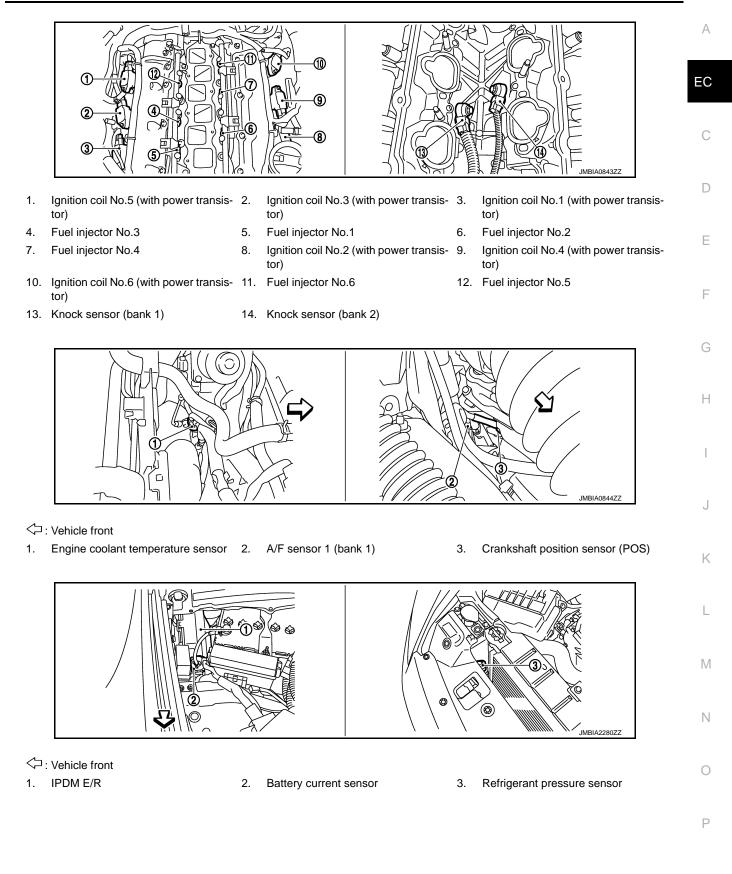


C: Vehicle front

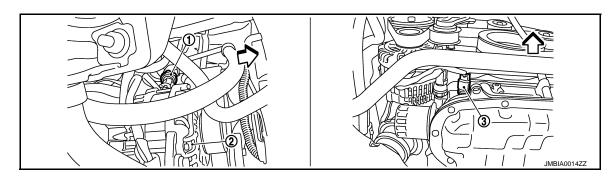
- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- 1) 3. VVEL actuator motor (bank 2)

- VVEL control shaft position sensor (bank 2)
- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

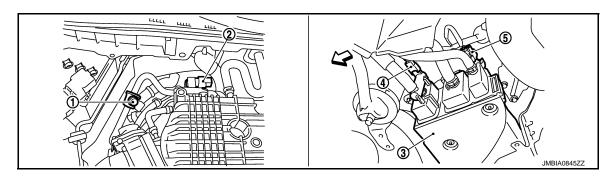


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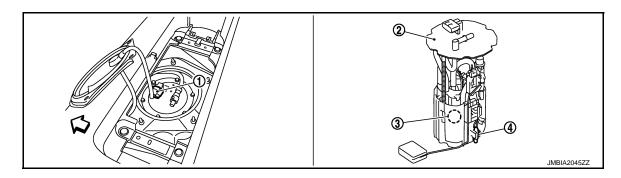


- C: Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



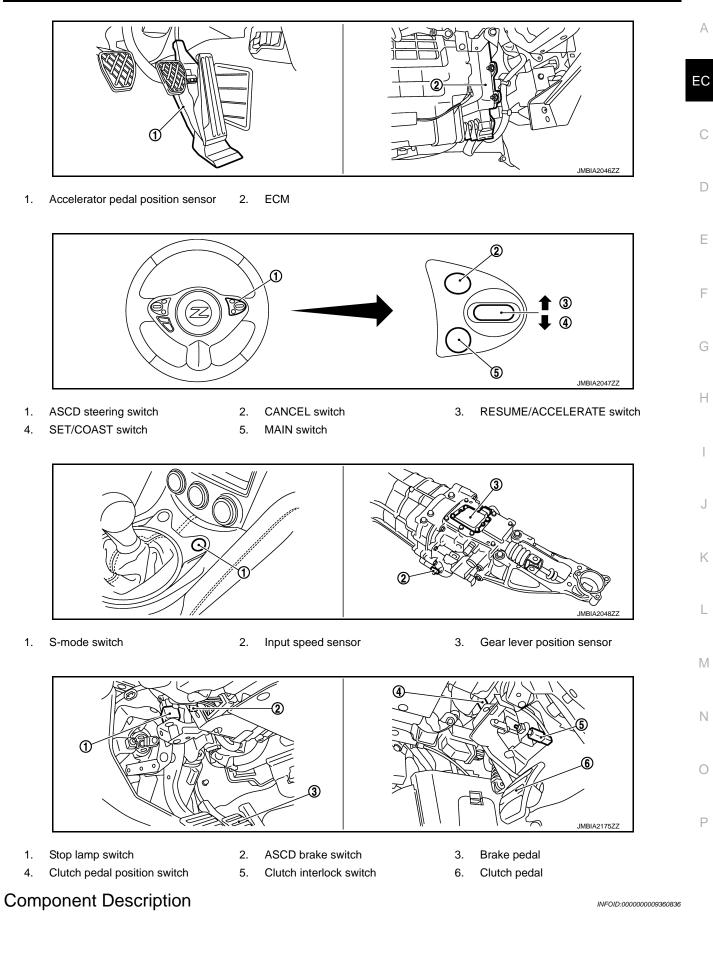
- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 5. EVAP control system pressure sensor



C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor

< SYSTEM DESCRIPTION >



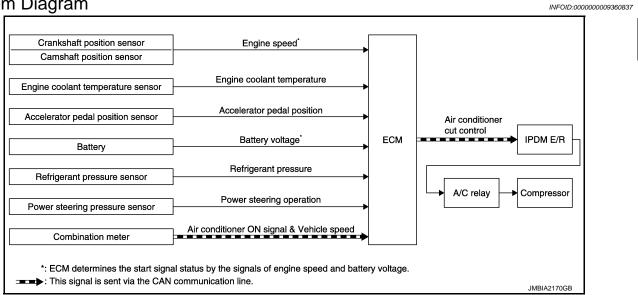
< SYSTEM DESCRIPTION >

Component	Reference
Accelerator pedal position sensor	EC-481, "Description"
Camshaft position sensor (PHASE)	EC-310, "Description"
Crankshaft position sensor (POS)	EC-306, "Description"
Engine coolant temperature sensor	EC-221, "Description"
Ignition signal	EC-514, "Description"
Knock sensor	EC-303, "Description"
Mass air flow sensor	EC-197, "Description"
Throttle position sensor	EC-224, "Description"

< SYSTEM DESCRIPTION >

AIR CONDITIONING CUT 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) Camshaft position sensor (PHASE)	Engine speed* ²			
Engine coolant temperature sensor	Engine coolant temperature			
Accelerator pedal position sensor	Accelerator pedal position		A/C relay	
Battery	Battery voltage*2	Air conditioner		
Refrigerant pressure sensor	Refrigerant pressure	cut control		
Power steering pressure sensor	Power steering operation			
Combination meter	Air conditioner ON signal* ¹			
	Vehicle speed*1			

*1: This signal is sent to the ECM via the 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.
When refrigerant pressure is excessively low or high.

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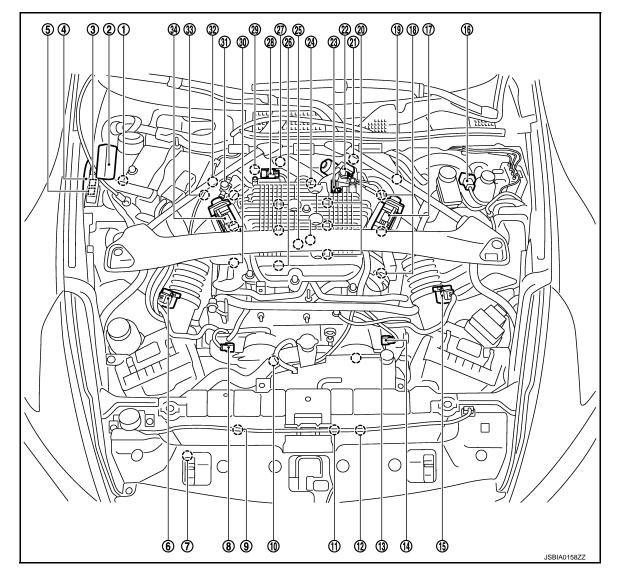
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< SYSTEM DESCRIPTION >

Component Parts Location

INFOID:000000009360839



- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

< SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

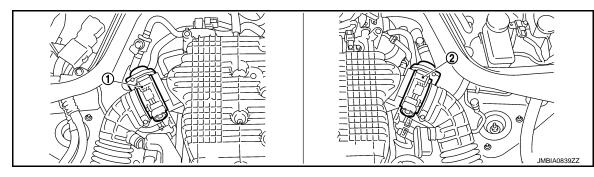
34. Electric throttle control actuator (bank 1)



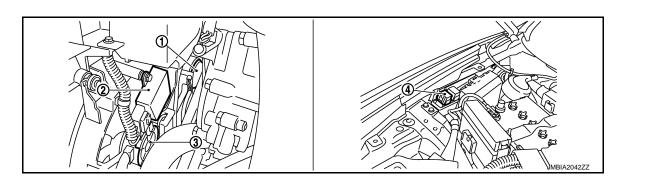
[VQ37VHR]

- 2 JMBIA0838ZZ
- Mass air flow sensor (with intake air 2. 1. Mass air flow sensor (bank 2) temperature sensor) (bank 1)

2.



- Electric throttle control actuator 1. (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

- Cooling fan motor-2 1.
- 4. Cooling fan relay

- Cooling fan control module
- 3. Cooling fan motor-1

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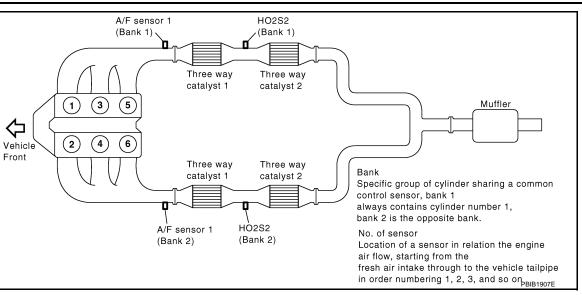
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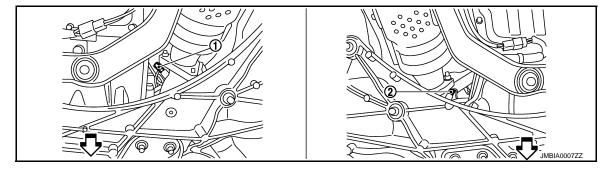
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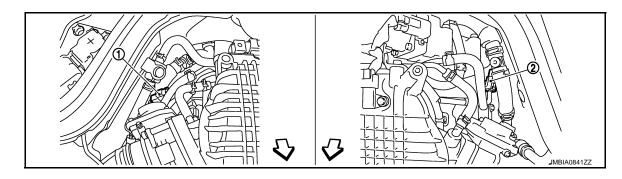
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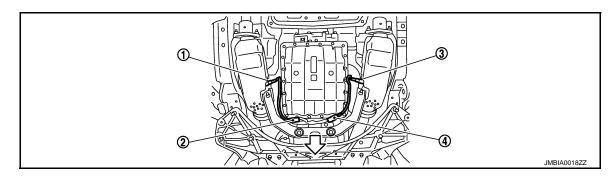
└□: Vehicle front

- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C : Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



< SYSTEM DESCRIPTION >

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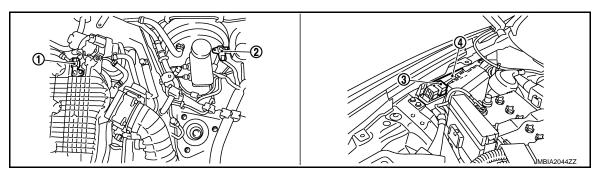
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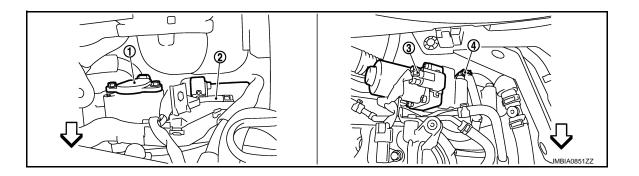
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



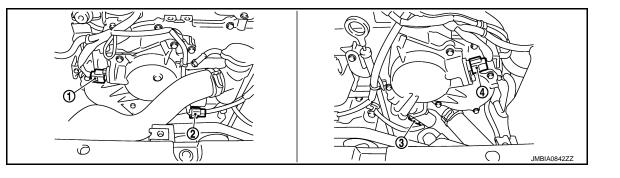
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- motor (bank 1) 3.
 - VVEL actuator motor (bank 2)

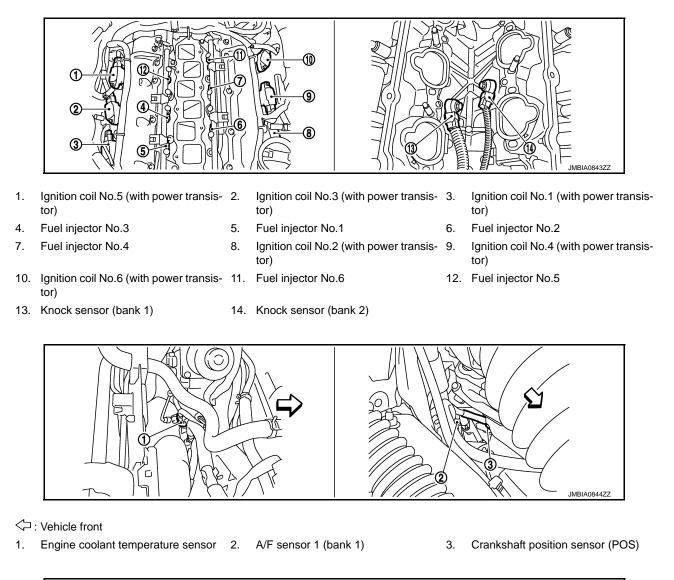
4. VVEL control shaft position sensor (bank 2)

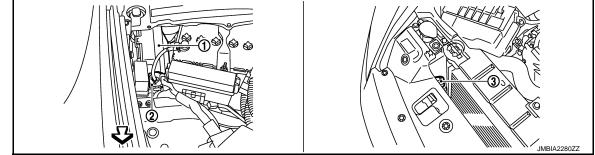


- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

[VQ37VHR]





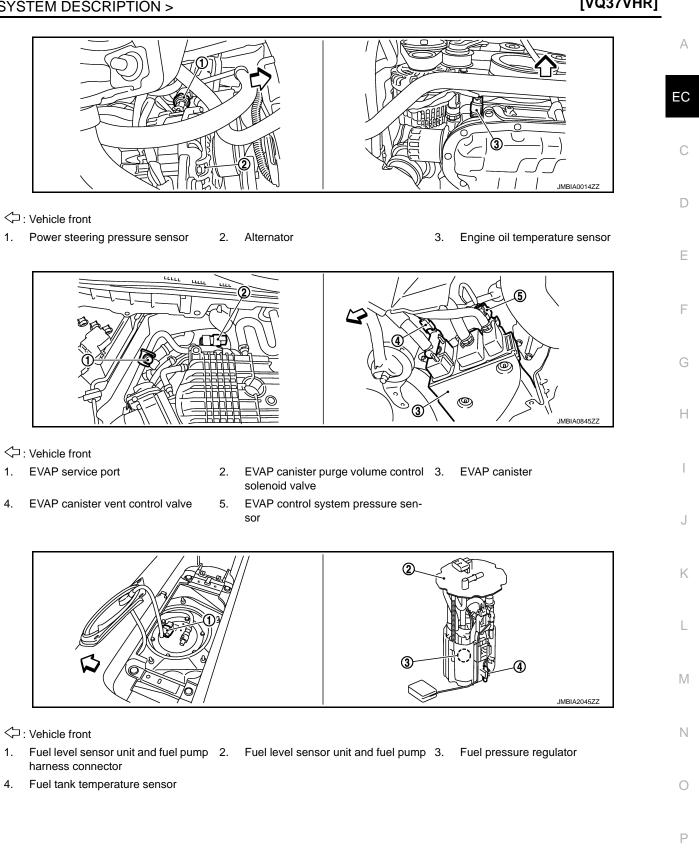
C: Vehicle front

1. IPDM E/R

- 2. Battery current sensor
- 3. Refrigerant pressure sensor

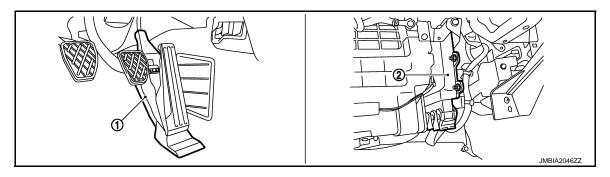
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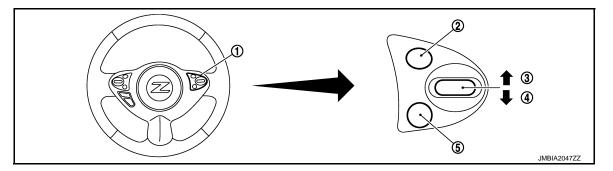


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[VQ37VHR]

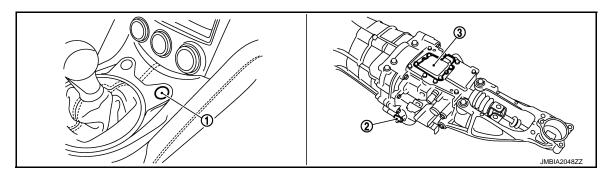


Accelerator pedal position sensor 2. ECM 1.



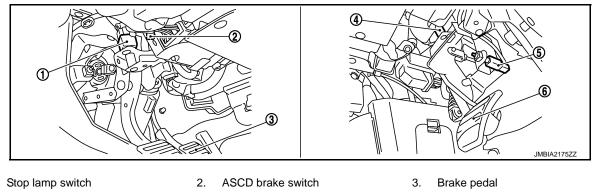
- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5. MAIN switch

RESUME/ACCELERATE switch 3.



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



Clutch pedal position switch 4.

Component Description

- 5. Clutch interlock switch
- - 6. Clutch pedal

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< SYSTEM DESCRIPTION >

[VQ37VHR]

Component	Reference	٨
Accelerator pedal position sensor	EC-481, "Description"	A
Camshaft position sensor (PHASE)	EC-310, "Description"	
Crankshaft position sensor (POS)	EC-306, "Description"	EC
Engine coolant temperature sensor	EC-221, "Description"	
Power steering pressure sensor	EC-380, "Description"	
Refrigerant pressure sensor	EC-527, "Description"	С

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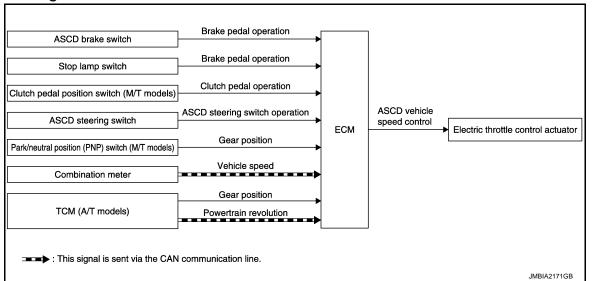
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< SYSTEM DESCRIPTION >

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram



System Description

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[VQ37VHR]

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
ASCD brake switch	Brake pedal operation			
Stop lamp switch	Brake pedal operation			
Clutch pedal position switch (M/T models)	Clutch pedal operation			
ASCD steering switch	ASCD steering switch operation ASCD vehicle speed control		Electric throttle control	
Park/neutral position (PNP) switch (M/T models)	Gear position	ASCD venicle speed control	actuator	
Combination meter	nbination meter Vehicle speed*			
TCM (A/T modele)	Gear position			
TCM (A/T models)	Powertrain revolution*			

*: This signal is sent to the ECM via the 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 malfunction occurs in the ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in a 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 144 km/h (89 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

< SYSTEM DESCRIPTION >

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 maintain the new set speed.

CANCEL OPERATION

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 the N, P, R position (A/T 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 while 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 maintain 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)
- A/T selector lever is the P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

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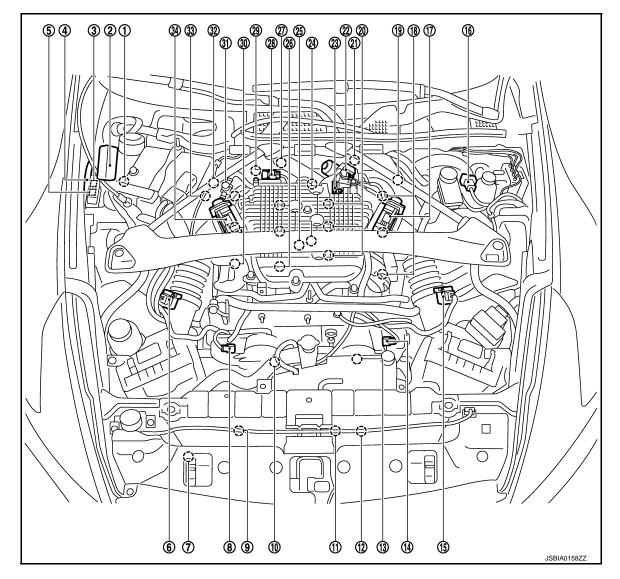
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< SYSTEM DESCRIPTION >

Component Parts Location

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[VQ37VHR]



- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

< SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

[VQ37VHR]

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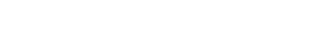
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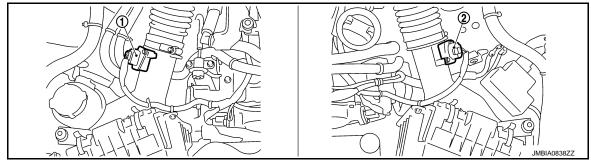
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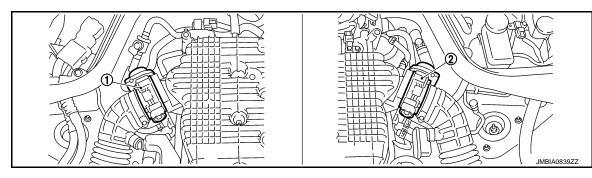
34. Electric throttle control actuator (bank 1)



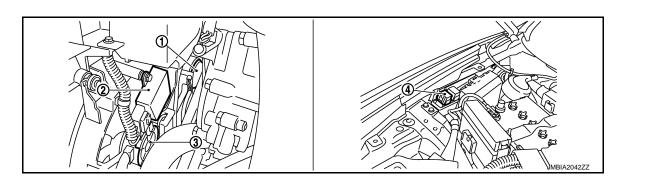


1. Mass air flow sensor (with intake air 2. Mass air flow sensor (bank 2) temperature sensor) (bank 1)

2.



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

- 1. Cooling fan motor-2
- 4. Cooling fan relay

Cooling fan control module 3. Cooling fan motor-1

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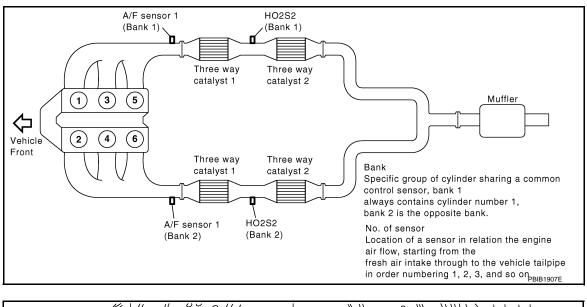
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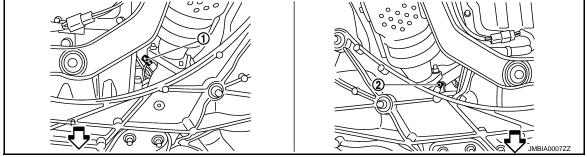
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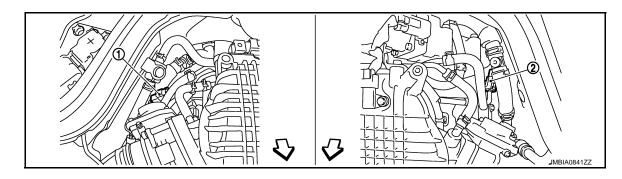
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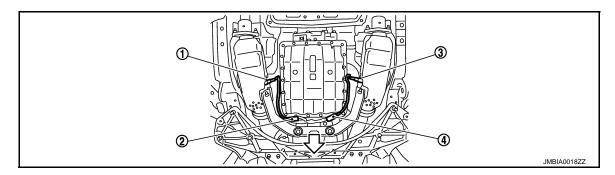


- : Vehicle front
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C: Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



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< SYSTEM DESCRIPTION >

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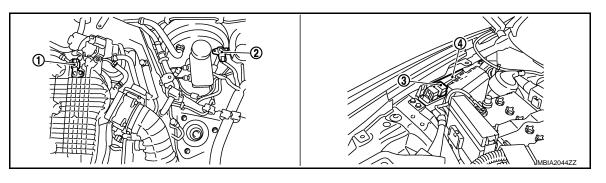
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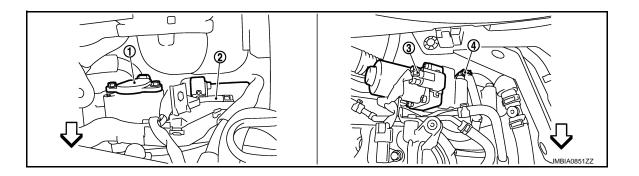
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



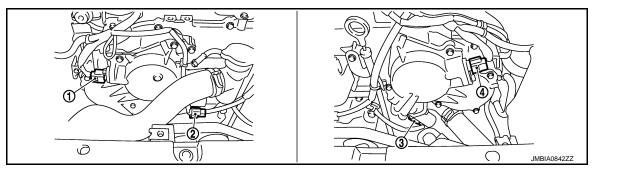
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- r motor (bank 1) 3.
 - VVEL actuator motor (bank 2)

 VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

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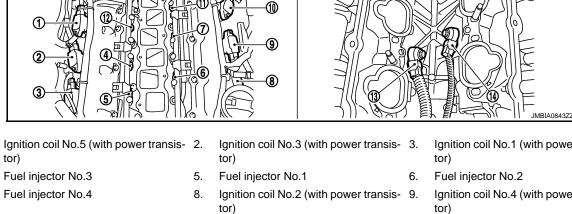
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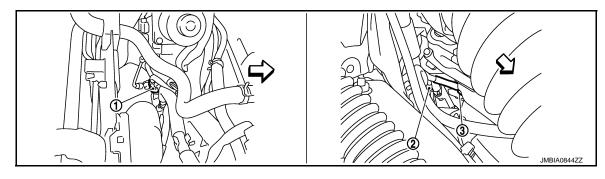


- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6 tor)
 - 14. Knock sensor (bank 2)

Ignition coil No.1 (with power transis-

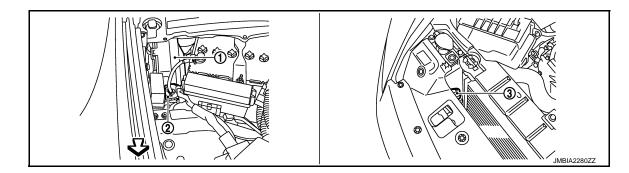
[VQ37VHR]

- Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5



C: Vehicle front

- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1) 1.
- 3. Crankshaft position sensor (POS)



└─ : Vehicle front

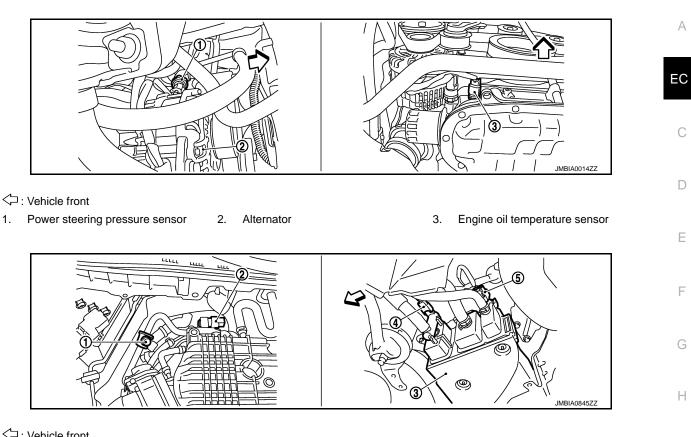
IPDM E/R 1.

- Battery current sensor 2.
- Refrigerant pressure sensor 3.

13. Knock sensor (bank 1)

< SYSTEM DESCRIPTION >

[VQ37VHR]



- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- 2. EVAP canister purge volume control 3. **EVAP** canister solenoid valve 5. EVAP control system pressure sen-
- sor 2 3 JMBIA2045ZZ

C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
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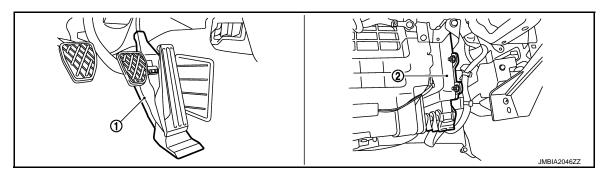
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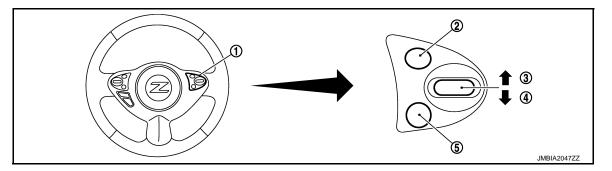
Fuel tank temperature sensor 4.

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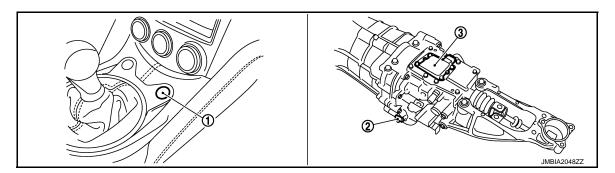


Accelerator pedal position sensor 2. ECM 1.



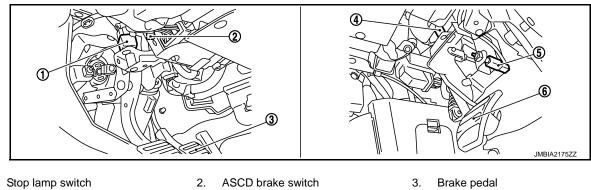
- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5. MAIN switch

3. RESUME/ACCELERATE switch



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



- 1.
- 4. Clutch pedal position switch
- ASCD brake switch
- 5. Clutch interlock switch
- Brake pedal
- 6. Clutch pedal

< SYSTEM DESCRIPTION >

Component Description

Revision: 2013 May

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Component	Reference	
ASCD brake switch	EC-457, "Description"	EC
ASCD indicator	EC-501, "Description"	
ASCD steering switch	EC-454, "Description"	0
Clutch pedal position switch	EC-406. "Description"	
Electric throttle control actuator	EC-452, "Description"	
Stop lamp switch	EC-457, "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-25, "CAN Communication Signal Chart", about CAN communication for detail.

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[VQ37VHR]

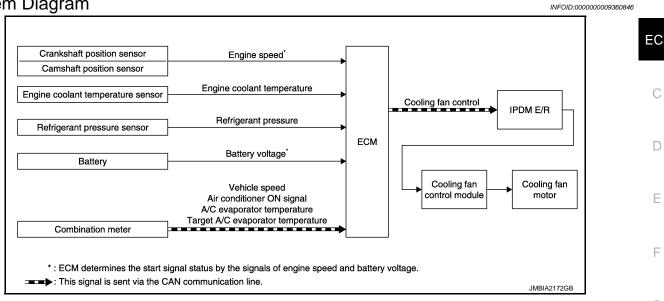
< SYSTEM DESCRIPTION >

COOLING FAN CONTROL



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System Diagram



System Description

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1		
Engine coolant temperature sensor Refrigerant pressure sensor	Engine coolant temperature	_	
	Refrigerant pressure		IPDM E/R
Battery	Battery voltage*1	Cooling fan control	↓ Cooling fan control module
Combination meter	Vehicle speed*2		\downarrow
	Air conditioner ON signal*2		Cooling fan motor
	A/C evaporator temperature* ²	-	
	Target A/C evaporator temperature*2		

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

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

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, air conditioner ON signal, refrigerant pressure, target A/C evaporator temperature and A/C evaporator temperature. Cooling fan control signal is sent to IPDM E/R from ECM by CAN communication line. Then, IPDM E/R sends ON/OFF pulse duty signal to cooling fan control module. Corresponding to this ON/OFF pulse duty signal, cooling fan control module gives cooling fan motor operating voltage to cooling fan motors. Cooling fan speed is controlled by duty cycle of cooling fan motor operating voltage sent from cooling fan control module.

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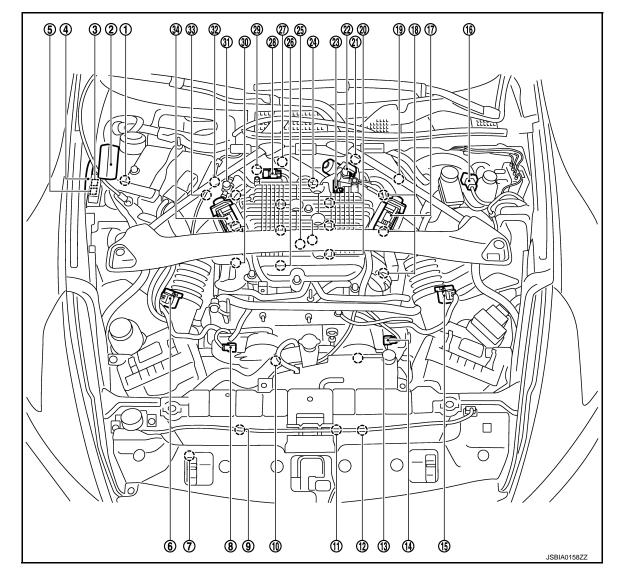
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< SYSTEM DESCRIPTION >

Component Parts Location

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[VQ37VHR]



- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

< SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

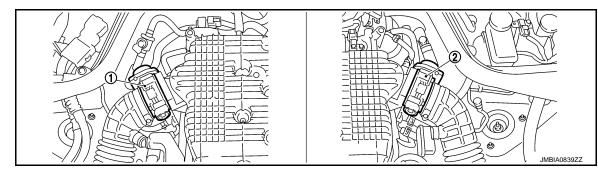
34. Electric throttle control actuator (bank 1)



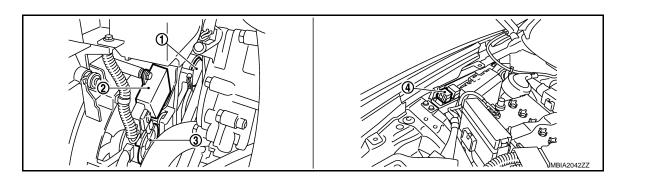
[VQ37VHR]

- 2 JMBIA0838ZZ
- Mass air flow sensor (with intake air 2. 1. Mass air flow sensor (bank 2) temperature sensor) (bank 1)

2.



- Electric throttle control actuator 1. (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

- Cooling fan motor-2 1.
- 4. Cooling fan relay

- Cooling fan control module
- 3. Cooling fan motor-1

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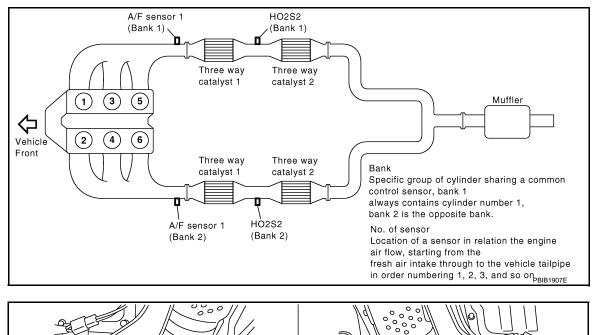
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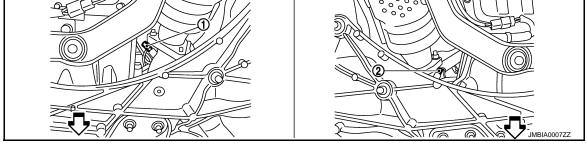
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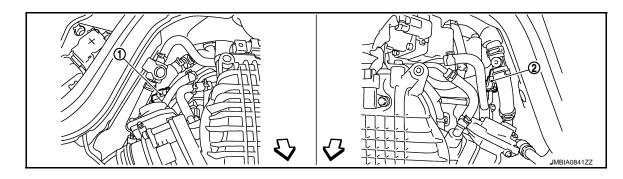
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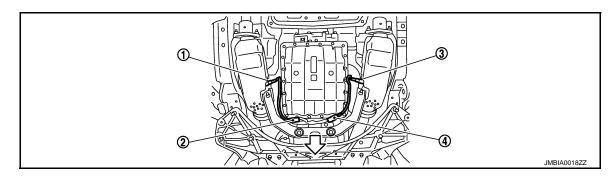


- └□: Vehicle front
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C : Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



< SYSTEM DESCRIPTION >

[VQ37VHR]

C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- Heated oxygen sensor 2 (bank 1)

- Heated oxygen sensor 2 (bank 1) 4. harness connector
- 3.

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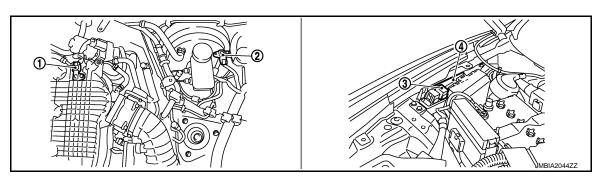
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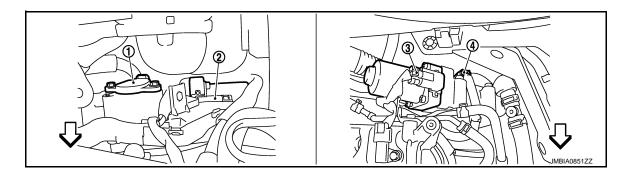
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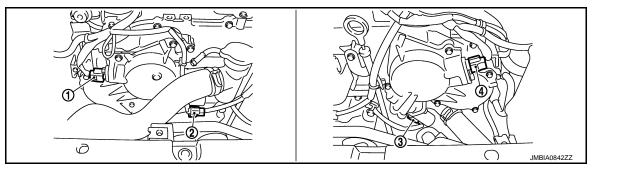
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

- VVEL control shaft position sensor 1. 2. VVEL actuator motor (bank 1) (bank 1)
 - 3.
- VVEL actuator motor (bank 2)

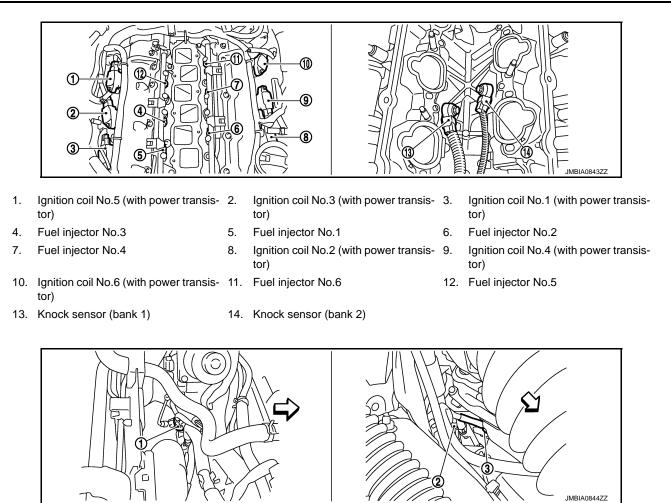
4. VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

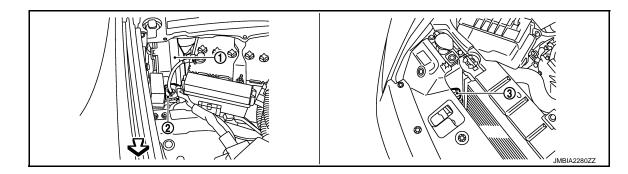
< SYSTEM DESCRIPTION >

[VQ37VHR]



C: Vehicle front

- 1. Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor (POS)



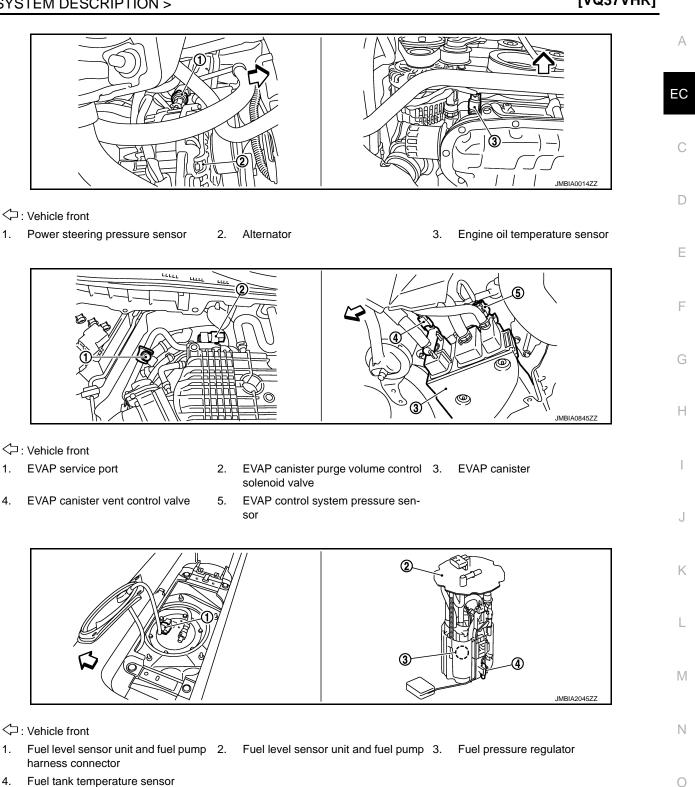
C: Vehicle front

1. IPDM E/R

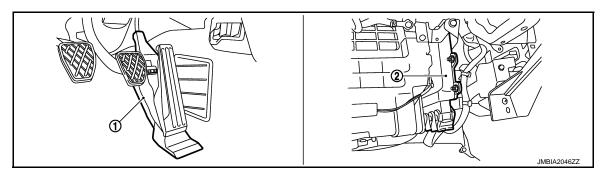
- 2. Battery current sensor
- 3. Refrigerant pressure sensor

< SYSTEM DESCRIPTION >

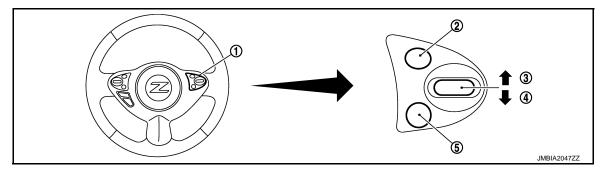
[VQ37VHR]



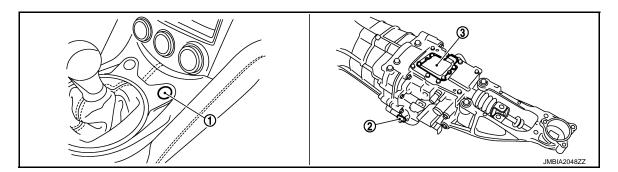
< SYSTEM DESCRIPTION >



Accelerator pedal position sensor 2. ECM 1.

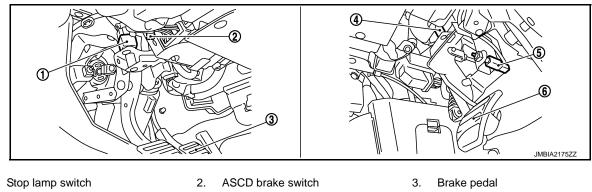


- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5.
 - MAIN switch
- **RESUME/ACCELERATE** switch 3.



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



- Clutch pedal position switch 4.
- **Component Description**
- 5. Clutch interlock switch
- 6. Clutch pedal

INFOID:000000009360849

1.

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component	Reference	
Camshaft position sensor (PHASE)	EC-310, "Description"	A
Cooling fan control module	EC-502, "Description"	
Cooling fan motor	EC-502, "Description"	EC
Crankshaft position sensor (POS)	EC-306, "Description"	
Engine coolant temperature sensor	EC-221, "Description"	
Refrigerant pressure sensor	EC-527, "Description"	С

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< SYSTEM DESCRIPTION >

EVAPORATIVE EMISSION SYSTEM

System Diagram

Crankshaft position sensor	Engine speed & Piston position			
Camshaft position sensor				
Mass air flow sensor	Amount of intake air	•		
Engine coolant temperature sensor	Engine coolant temperature			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas	•		
Throttle position sensor	Throttle position	ЕСМ	EVAP canister purge flow control	EVAP canister purge volume
Accelerator pedal position sensor	Accelerator pedal position		,	control solenoid valve
Battery	Battery voltage			
Fuel tank temperature sensor	Fuel temperature in fuel tank			
EVAP control system pressure sensor	Pressure in purge line			
Combination meter	Vehicle speed	•		

System Description

INFOID:000000009360851

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1			
Mass air flow sensor	Amount of intake air		EVAP canister purge vol- ume control solenoid valve	
Engine coolant temperature sensor	Engine coolant temperature			
Battery	Battery voltage*1	_		
Throttle position sensor	Throttle position	EVAP canister purge flow control		
Accelerator pedal position sensor	Accelerator pedal position			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	_		
Fuel tank temperature sensor	Fuel temperature in fuel tank			
EVAP control system pressure sensor	Pressure in purge line			
Combination meter	Vehicle speed* ²			

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

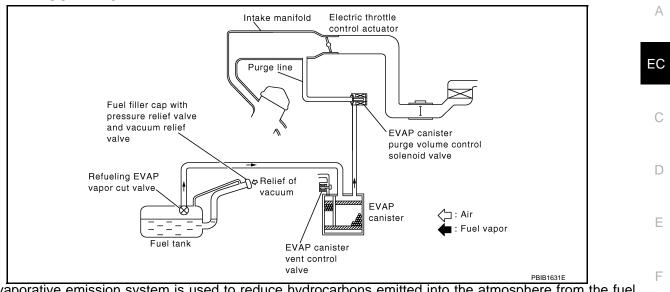
*2: This signal is sent to the ECM via the CAN communication line.

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< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

[VQ37VHR]



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 manifold 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 and idling.

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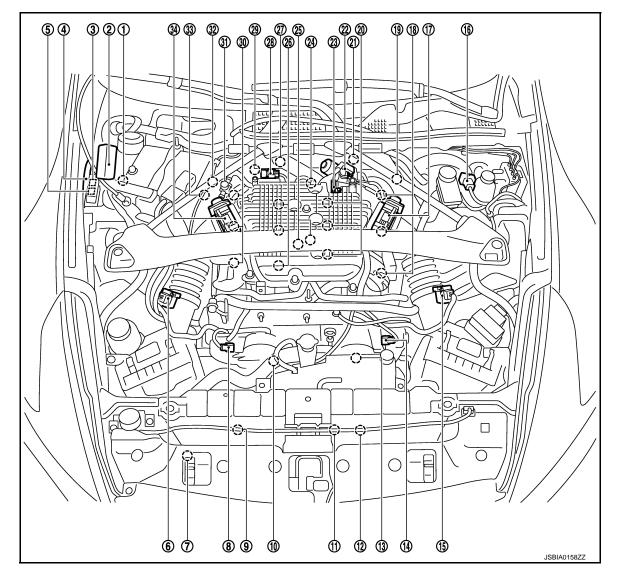
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< SYSTEM DESCRIPTION >

Component Parts Location

INFOID:000000009360852

[VQ37VHR]



- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

< SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

[VQ37VHR]

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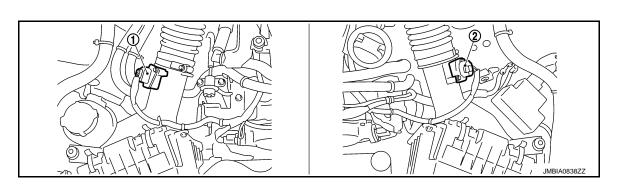
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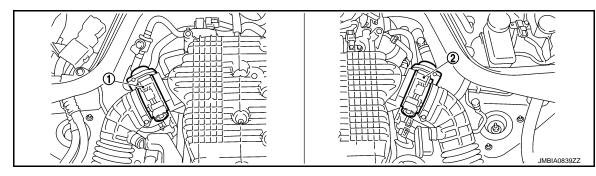
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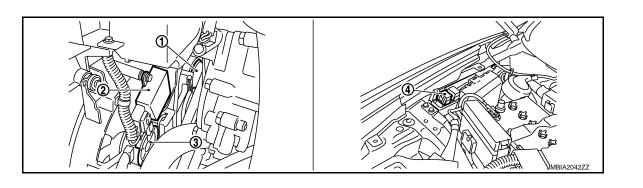
34. Electric throttle control actuator (bank 1)



1. Mass air flow sensor (with intake air 2. Mass air flow sensor (bank 2) temperature sensor) (bank 1)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

- 1. Cooling fan motor-2
- 4. Cooling fan relay

Cooling fan control module

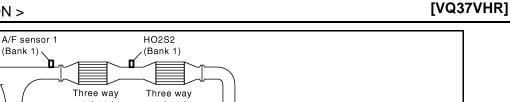
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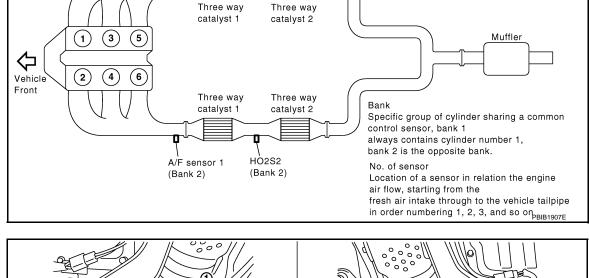
3. Cooling fan motor-1

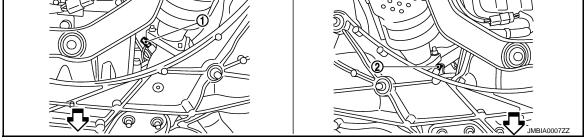
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< SYSTEM DESCRIPTION >

(Bank 1)

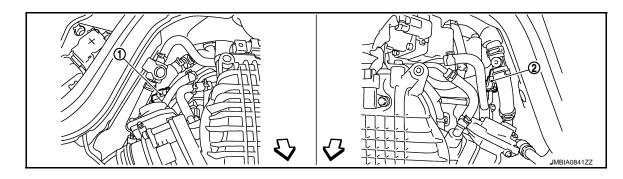






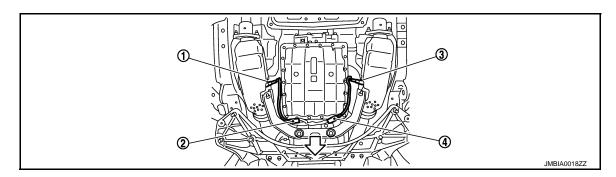
C: Vehicle front

- A/F sensor 1 (bank 1) 1.
- A/F sensor 1 (bank 2) 2.



└□: Vehicle front

1. A/F sensor 1 (bank 1) harness con- 2. A/F sensor 1 (bank 2) harness connector nector



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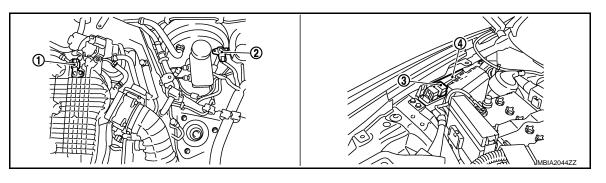
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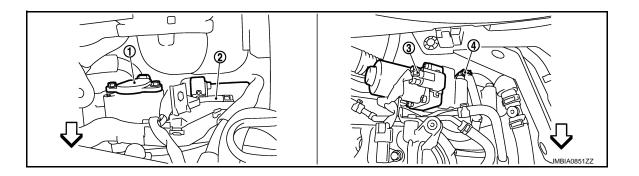
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



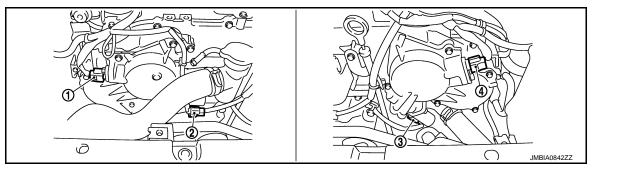
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- r motor (bank 1) 3.
 - VVEL actuator motor (bank 2)

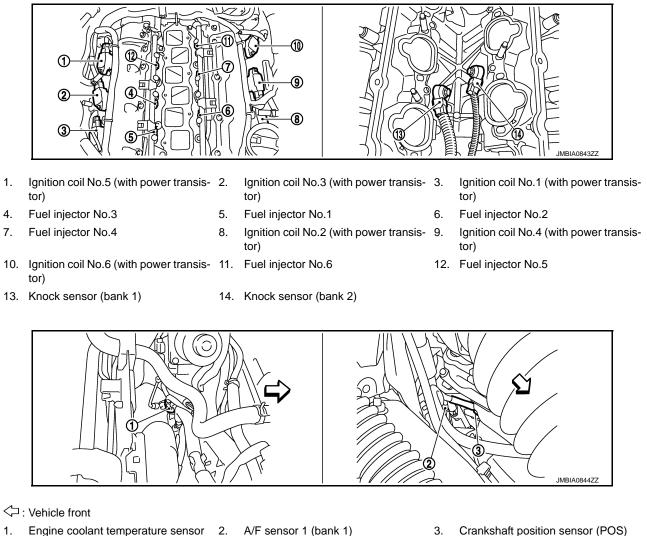
 VVEL control shaft position sensor (bank 2)



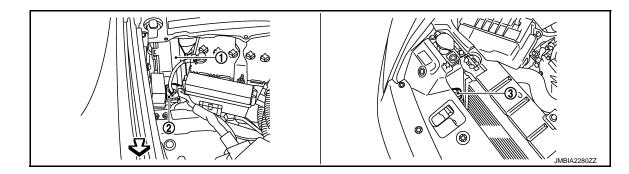
- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

[VQ37VHR]



- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1) 1.
- Crankshaft position sensor (POS)



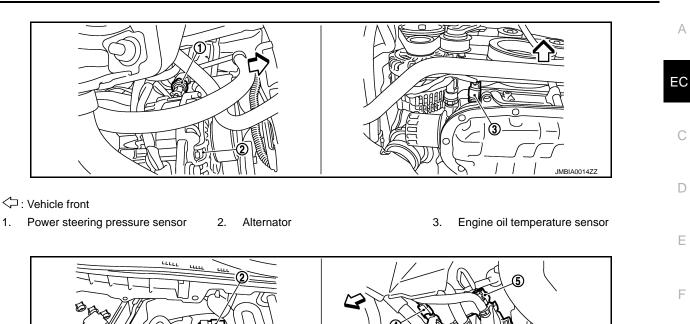
└─ : Vehicle front

IPDM E/R 1.

- 2. Battery current sensor
- Refrigerant pressure sensor 3.

< SYSTEM DESCRIPTION >

[VQ37VHR]



- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- EVAP canister purge volume control 3. EVAP canister solenoid valve
 EVAP control system pressure sen-

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C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor

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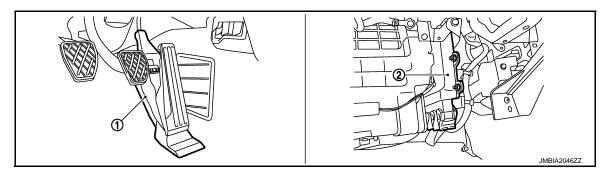
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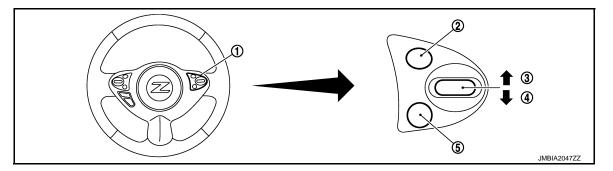
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[VQ37VHR]

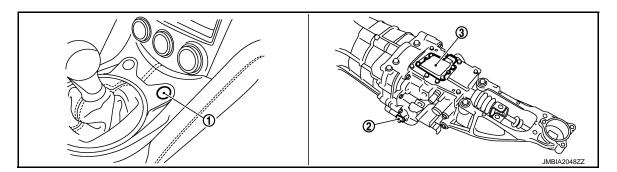


Accelerator pedal position sensor 2. ECM 1.



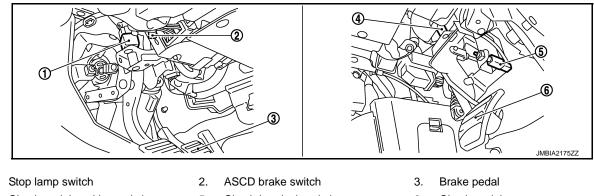
- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5. MAIN switch

RESUME/ACCELERATE switch 3.



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



- Clutch pedal position switch 4.
- **Component Description**
- 5. Clutch interlock switch
- - 6. Clutch pedal

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< SYSTEM DESCRIPTION >

[VQ37VHR]

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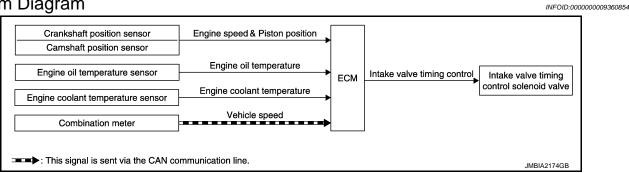
Component	Reference	
A/F sensor 1	EC-235, "Description"	A
Accelerator pedal position sensor	EC-481, "Description"	
Camshaft position sensor (PHASE)	EC-310. "Description"	EC
Crankshaft position sensor (POS)	EC-306. "Description"	
Engine coolant temperature sensor	EC-221, "Description"	
EVAP canister purge volume control solenoid valve	EC-324, "Description"	С
EVAP control system pressure sensor	EC-340. "Description"	
Fuel tank temperature sensor	EC-280, "Description"	D
Mass air flow sensor	EC-197, "Description"	
Throttle position sensor	EC-224, "Description"	
		E

INTAKE VALVE TIMING CONTROL

< SYSTEM DESCRIPTION >

INTAKE VALVE TIMING CONTROL

System Diagram



System Description

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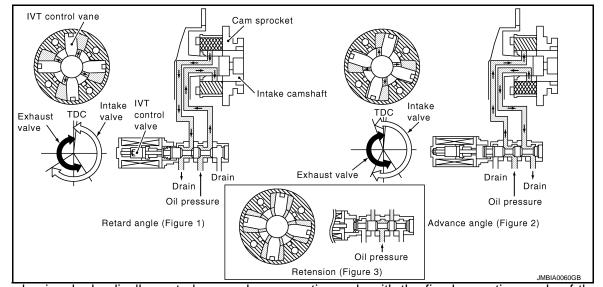
[VQ37VHR]

INPUT/OUTPUT SIGNAL CHART

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

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

SYSTEM DESCRIPTION



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

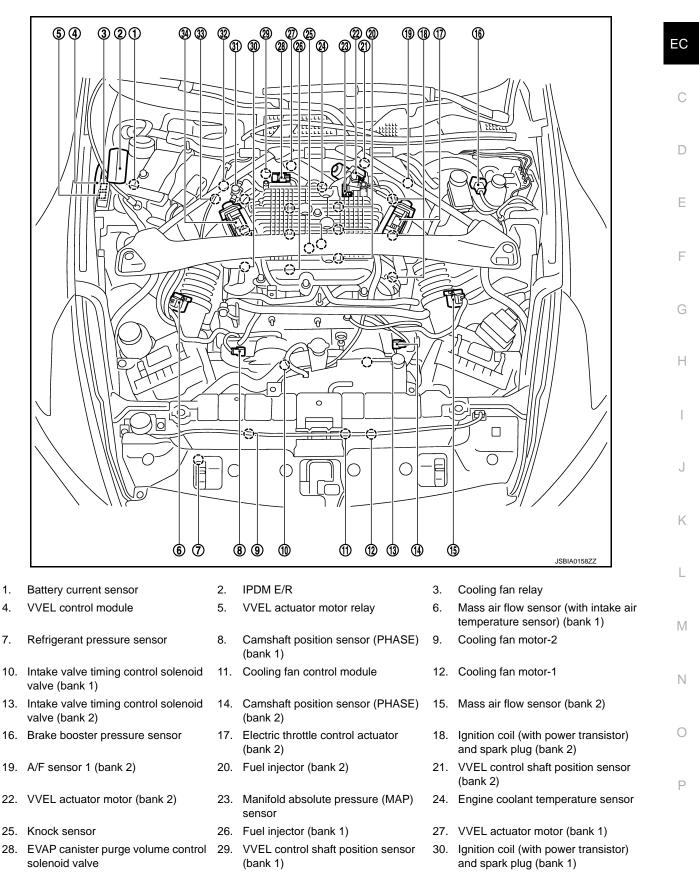
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing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

< SYSTEM DESCRIPTION >

Component Parts Location

[VQ37VHR]

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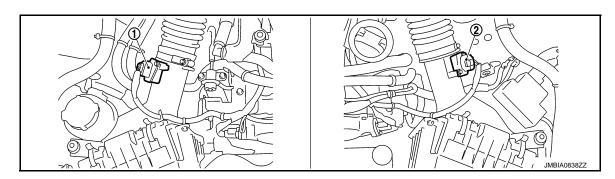
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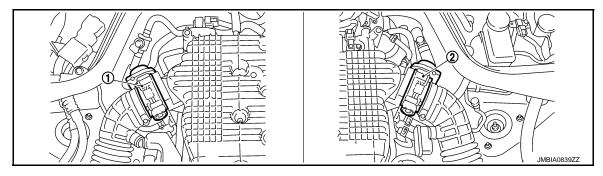
[VQ37VHR]

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

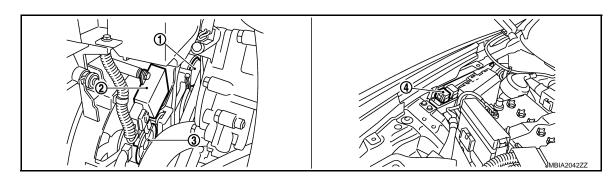
34. Electric throttle control actuator (bank 1)



1. Mass air flow sensor (with intake air 2. Mass air flow sensor (bank 2) temperature sensor) (bank 1)



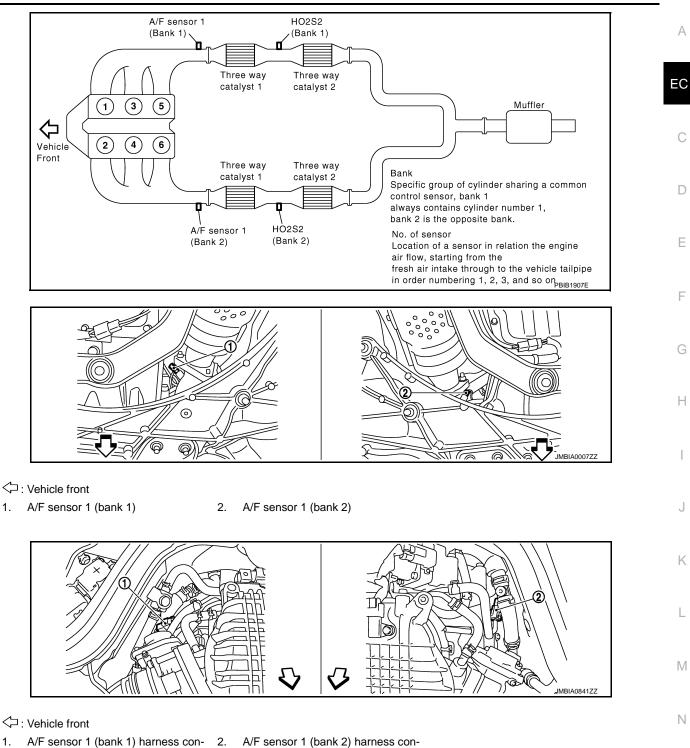
- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

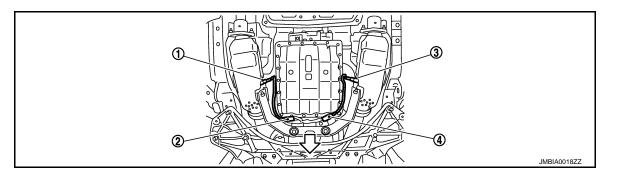
- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

< SYSTEM DESCRIPTION >



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A/F sensor 1 (bank 1) harness con- 2. 1. nector nector



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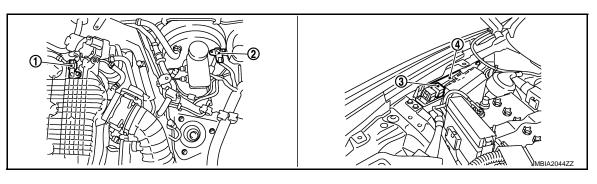
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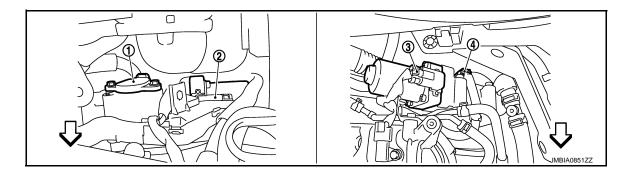
└─ : Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

Heated oxygen sensor 2 (bank 1) 4. harness connector



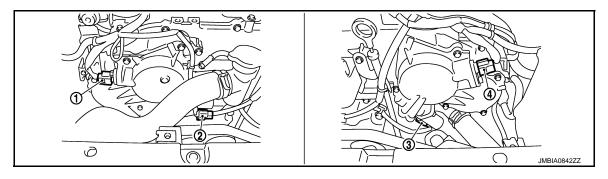
- Manifold absolute pressure (MAP) 1. 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

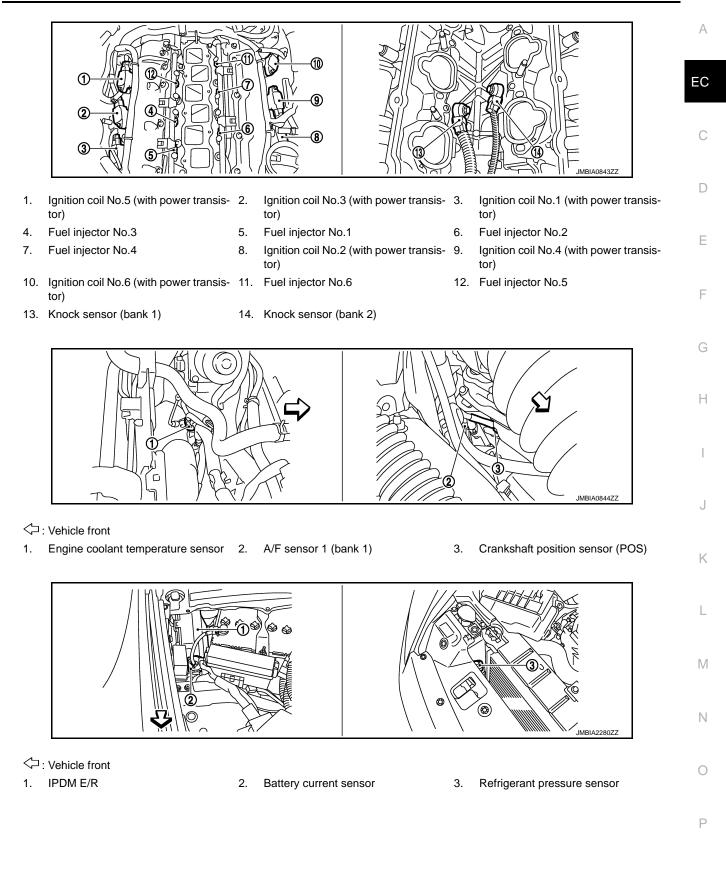
- VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) 1. (bank 1)

- 4. VVEL control shaft position sensor (bank 2)
- 3. VVEL actuator motor (bank 2)

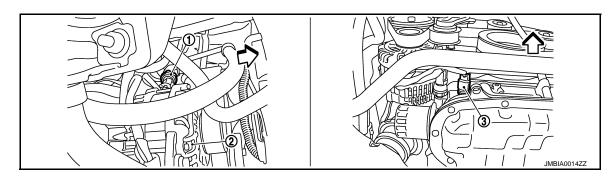


- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

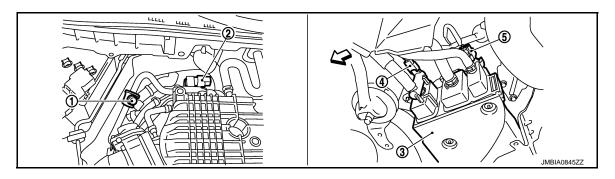


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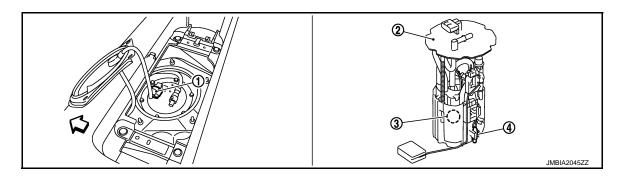


- C: Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



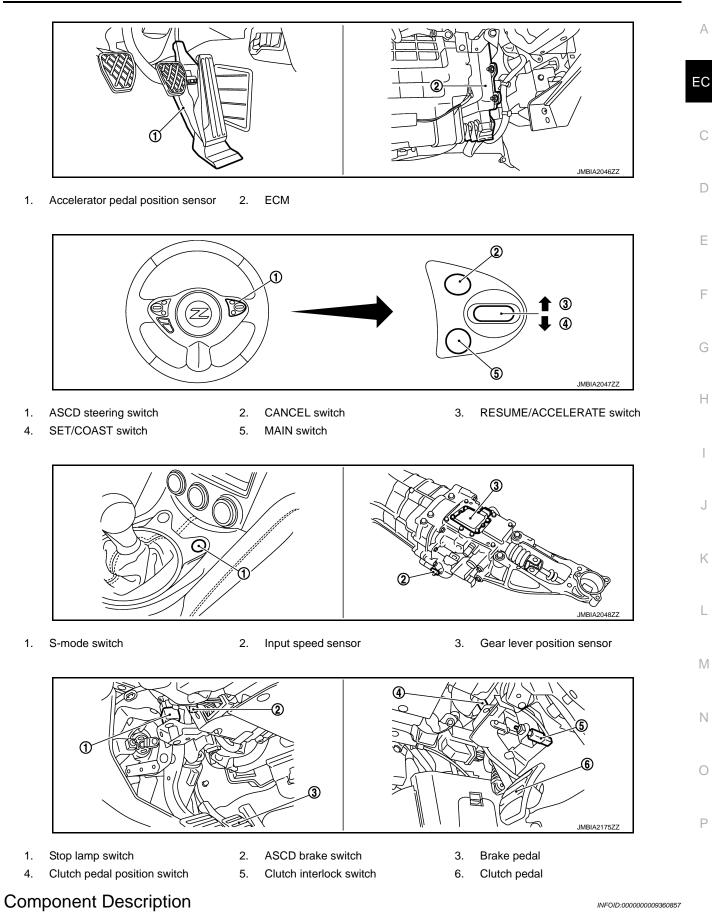
- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 5. EVAP control system pressure sensor



C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor

< SYSTEM DESCRIPTION >



< SYSTEM DESCRIPTION >

Component	Reference
Camshaft position sensor (PHASE)	EC-310, "Description"
Crankshaft position sensor (POS)	EC-306. "Description"
Engine coolant temperature sensor	EC-221, "Description"
Engine oil temperature sensor	EC-287, "Description"
Intake valve timing control solenoid valve	EC-194, "Description"

< SYSTEM DESCRIPTION >

VVEL SYSTEM



[VQ37VHR]

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System Diagram INFOID:000000009360858 Engine speed & Piston position Crankshaft position sensor (POS) EC VVEL control Accelerator pedal position VVEL control module ECM Accelerator pedal position sensor VVEL actuator sub Control shaft actual angle VVEL control shaft position sensor assembly * : ECM determines the start signal status by the signals of engine speed and battery voltage. JMBIA1803GB

System Description

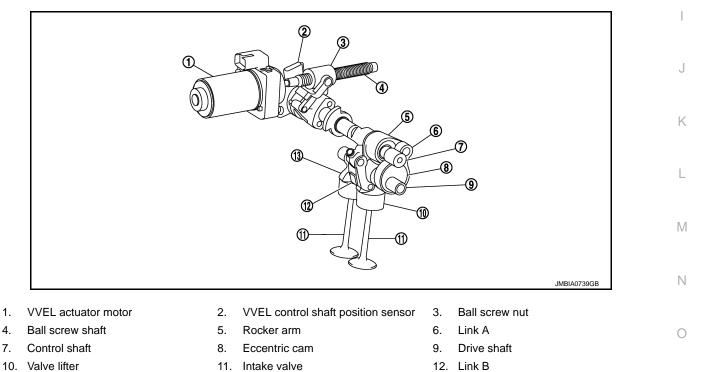
INFOID:000000009360859

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed and piston position		VVEL control module	
Accelerator pedal position sensor	Accelerator pedal position	VVEL control	↓	
VVEL control shaft position sensor	Control shaft actual angle*		VVEL actuator sub assembly	

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

SYSTEM DESCRIPTION



13. Output cam

VVEL (Variable Valve Event & Lift) is a system that controls valve event and valve lift continuously. Rotational movement of the drive shaft equipped with eccentric cam is transmitted to output cam via the rocker arm and two kinds of links to depress the intake valve. ECM decides the target valve lift according to the driving condition and sends the command signal to the VVEL control module. The VVEL control module controls the rotation of the control shaft using the VVEL actuator motor and changes the movement of the output cam by shifting the link supporting point. As a result, valve lift changes continuously to improve engine output and response.

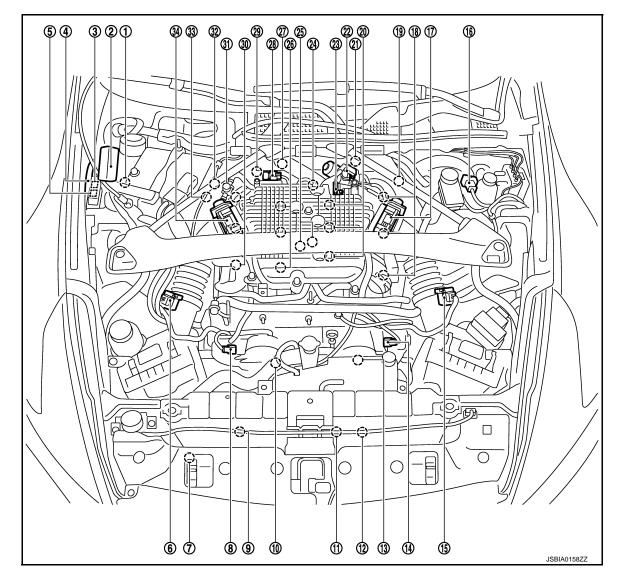
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< SYSTEM DESCRIPTION >

Component Parts Location

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- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

< SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)

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33. Crankshaft position sensor (POS)

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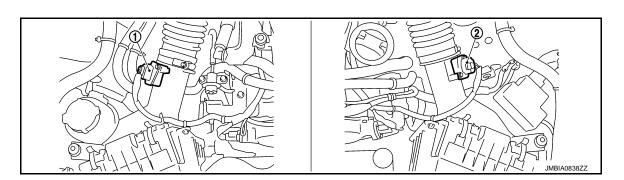
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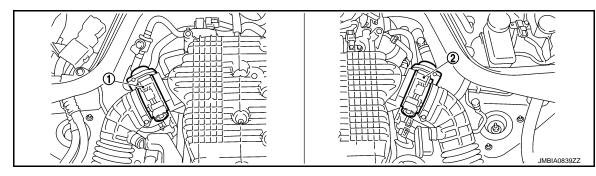
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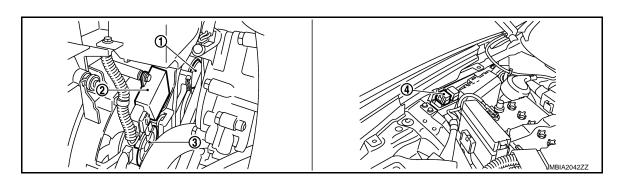
34. Electric throttle control actuator (bank 1)



1. Mass air flow sensor (with intake air 2. Mass air flow sensor (bank 2) temperature sensor) (bank 1)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

- 1. Cooling fan motor-2
- 4. Cooling fan relay

Cooling fan control module

2.

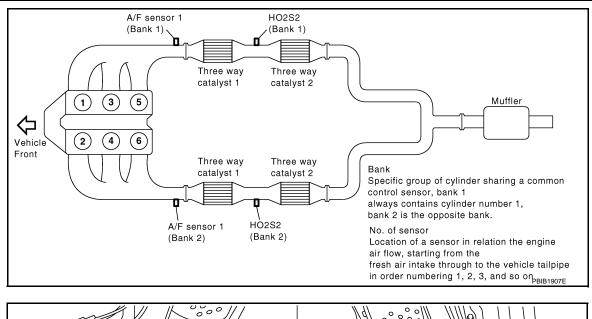
3. Cooling fan motor-1

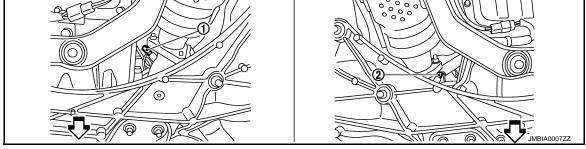
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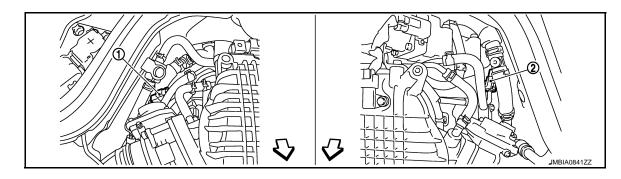
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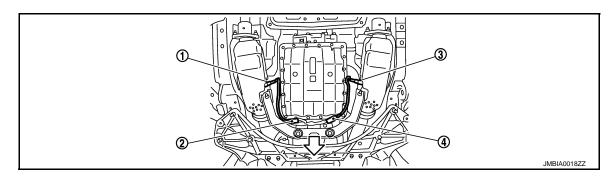


- └□: Vehicle front
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C : Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



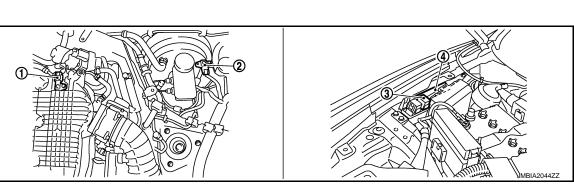
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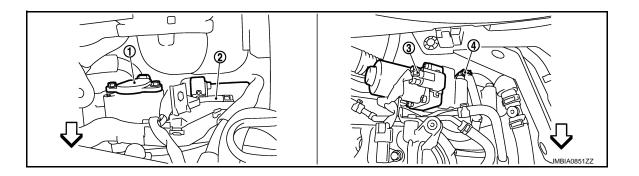
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

Heated oxygen sensor 2 (bank 1) 4. harness connector



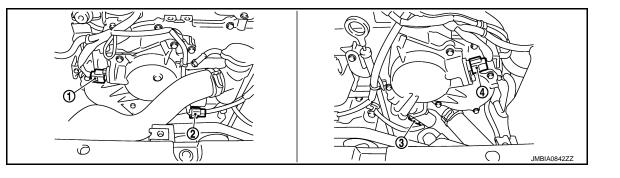
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

- VVEL control shaft position sensor 1. 2. VVEL actuator motor (bank 1) (bank 1)
- 3.
- VVEL actuator motor (bank 2)

4. VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

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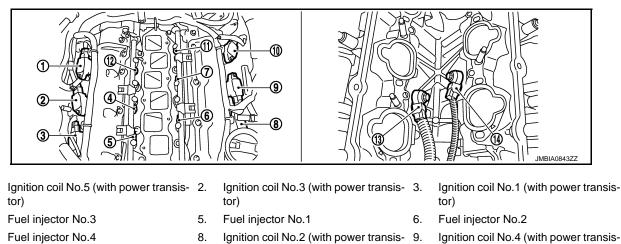
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< SYSTEM DESCRIPTION >

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Fuel injector No.4 7.

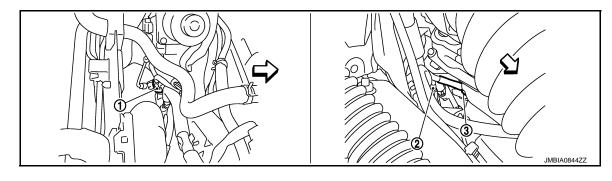
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- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6 tor)
- 13. Knock sensor (bank 1)
- 14. Knock sensor (bank 2)

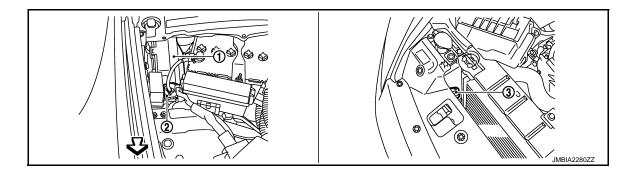
tor)

- Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5



└□: Vehicle front

- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1) 1.
- 3. Crankshaft position sensor (POS)



└─ : Vehicle front

IPDM E/R 1.

- 2. Battery current sensor
- Refrigerant pressure sensor 3.

< SYSTEM DESCRIPTION >

[VQ37VHR]

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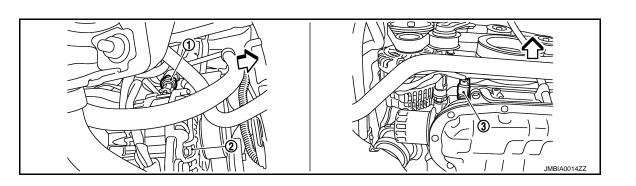
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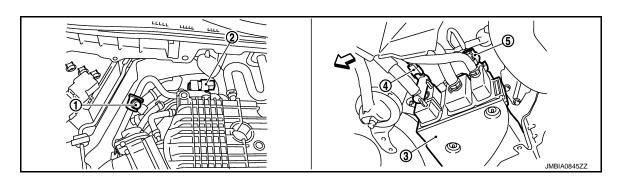
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- C: Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- EVAP canister purge volume control 3. EVAP canister solenoid valve
 EVAP control system pressure sen-

sor

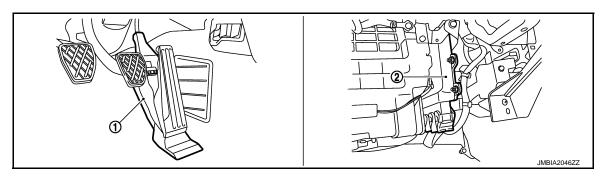
C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor

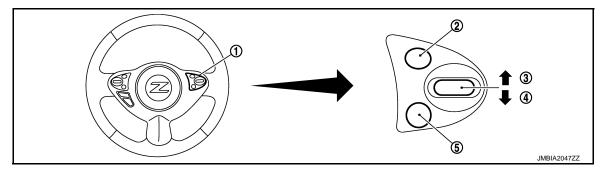
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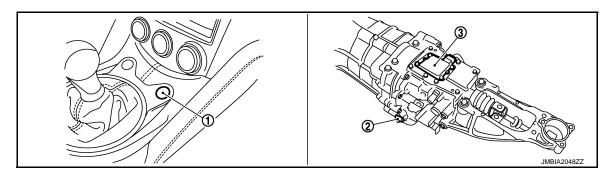


Accelerator pedal position sensor 2. ECM 1.



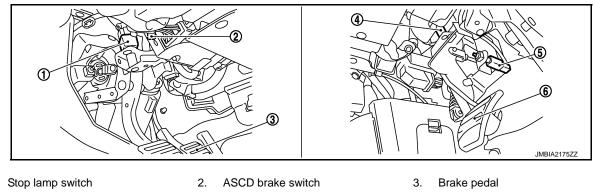
- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5. MAIN switch
- **RESUME/ACCELERATE** switch

3.



S-mode switch 1.

- 2. Input speed sensor
- Gear lever position sensor 3.



- Clutch pedal position switch 4.
- **Component Description**
- 5. Clutch interlock switch
- - 6. Clutch pedal

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< SYSTEM DESCRIPTION >

[VQ37VHR]

Component	Reference	٥
Accelerator pedal position sensor	EC-481, "Description"	A
Crankshaft position sensor (POS)	EC-306. "Description"	
VVEL actuator motor	EC-423, "Description"	EC
VVEL actuator motor relay	EC-427, "Description"	
VVEL control module	EC-467, "Description"	
VVEL control shaft position sensor	EC-420, "Description"	С

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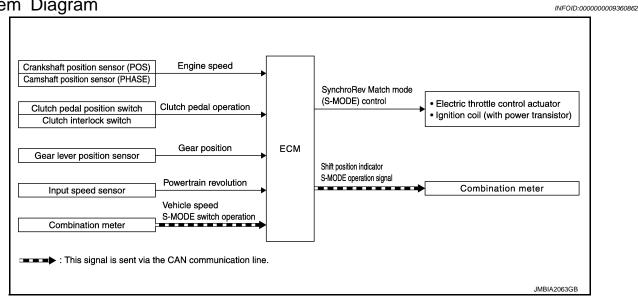
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< SYSTEM DESCRIPTION >

SYNCHROREV MATCH MODE (S-MODE)

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	 SynchroRev Match mode (S-MODE) control Shift position indicator* S-MODE operation signal* 	 Electric throttle control actuator Ignition coil (with power transistor) Combination meter
Camshaft position sensor (PHASE)	Engine speed		
Clutch pedal position switch	Clutch nodel exerction		
Clutch interlock switch	Clutch pedal operation		
Gear lever position sensor	Gear position		
Input speed sensor	Powertrain revolution		
Combination motor	Vehicle speed*		
Combination meter	S-MODE switch operation*		

*: This signal is sent via the CAN communication line.

SYSTEM DESCRIPTION

Refer to Owner's Manual for SynchroRev Match mode (S-MODE) operating instructions.

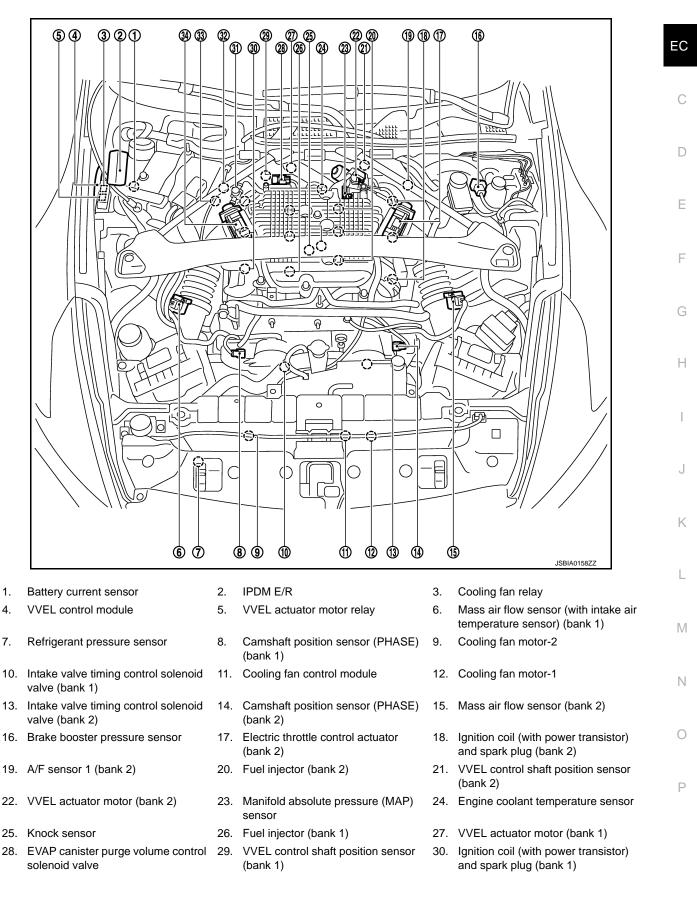
SynchroRev Match mode (S-MODE) controls engine speed at a suitable level from the present to the next gear position. This control is switched by S-MODE switch (Refer to <u>EC-531</u>, "<u>Description</u>"). When clutch pedal is depressed and shift lever is shifted while S-MODE is being operated, gear position signal is sent to ECM. ECM calculates target engine speed by gear position signal and vehicle speed signal, and then controls throt-tle opening angle and ignition timing. When downshift is performed, even if accelerator pedal is not depressed, ECM automatically controls throttle opening angle and increases engine speed. When upshift is performed, ECM controls engine speed so that it does not drop lower than the necessary level that is required after upshifting. Engine speed is controlled according to shifting operation above and driver can perform shifting operation quickly, smoothly, and without shifting shock. When S-MODE malfunction is detected, S-MODE warning on information display illuminates and S-MODE is automatically cancelled. At this time, S-MODE indicator turns OFF.

< SYSTEM DESCRIPTION >

Component Parts Location

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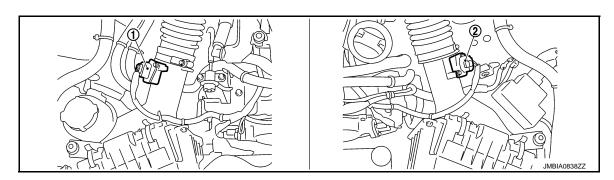
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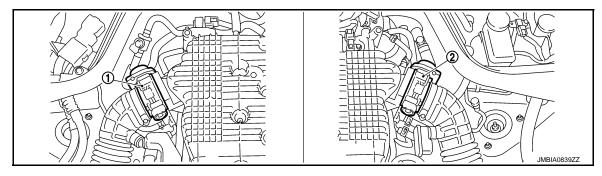
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- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

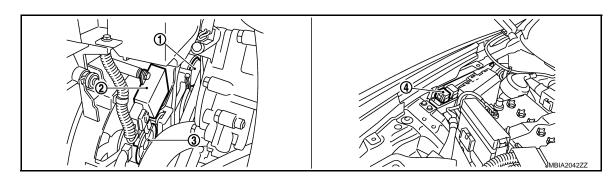
34. Electric throttle control actuator (bank 1)



1. Mass air flow sensor (with intake air 2. Mass air flow sensor (bank 2) temperature sensor) (bank 1)



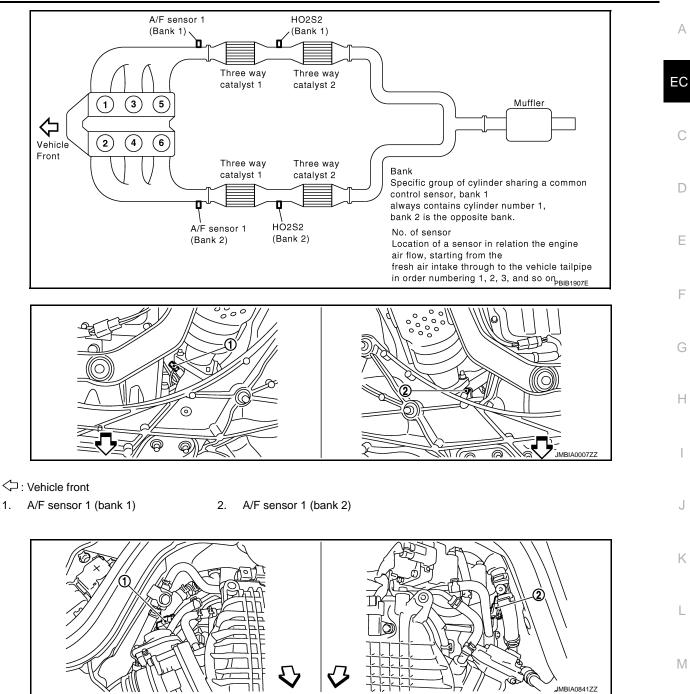
- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

< SYSTEM DESCRIPTION >



C: Vehicle front

1.

A/F sensor 1 (bank 1) harness con- 2. 1. A/F sensor 1 (bank 2) harness connector nector

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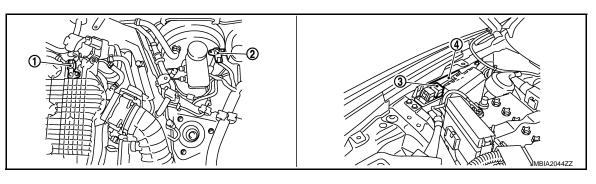
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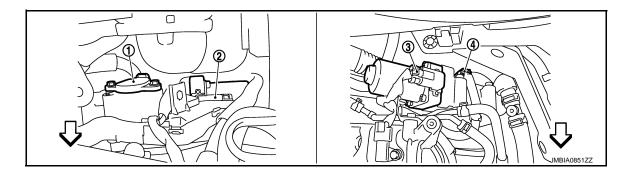
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



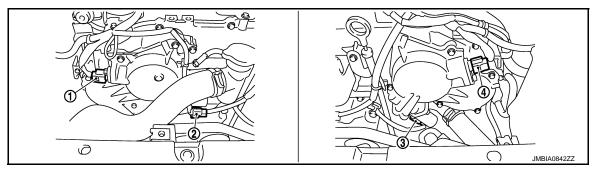
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



✓ : Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- 3. VVEL actuator motor (bank 2)

4. VVEL control shaft position sensor (bank 2)

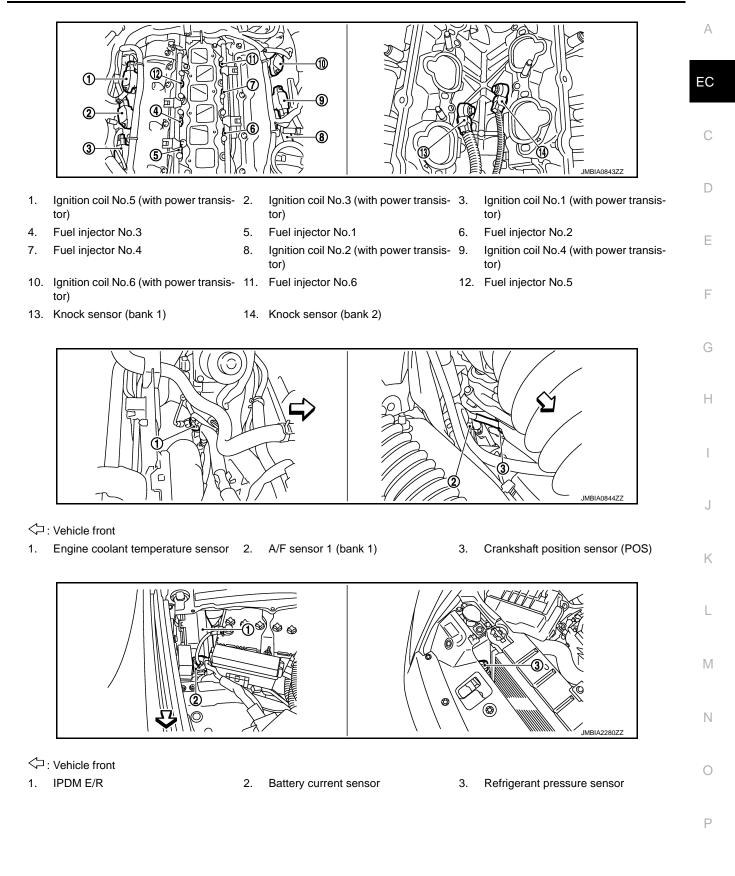


- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)

Intake valve timing control solenoid 3. valve (bank 1) harness connector

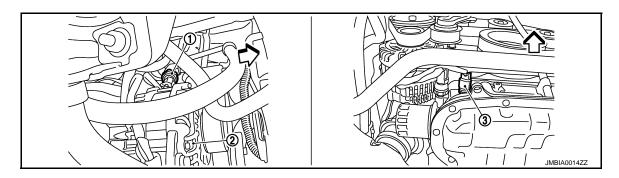
Intake valve timing control solenoid valve (bank 2) harness connector

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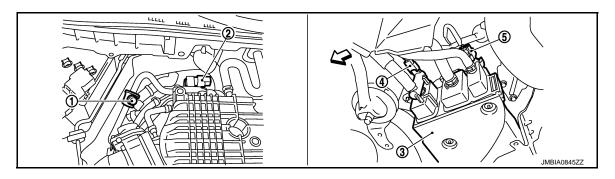
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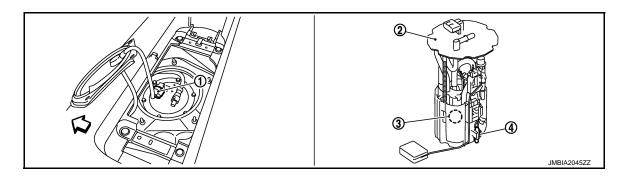


- C : Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 5. EVAP control system pressure sensor

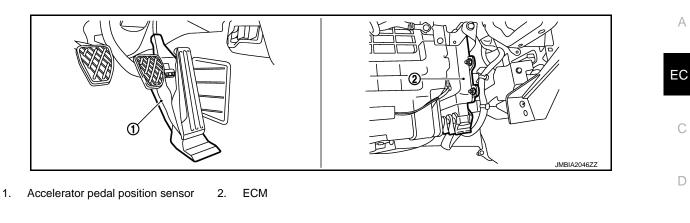


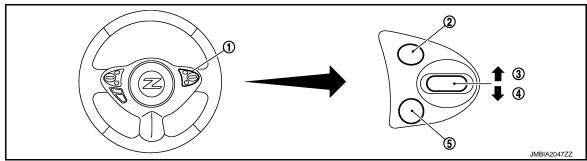
C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor

< SYSTEM DESCRIPTION >

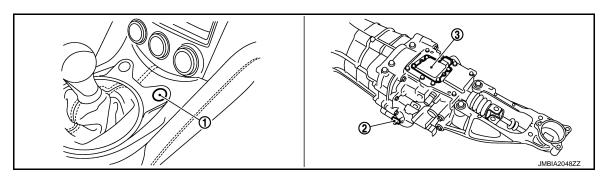
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- ASCD steering switch 1.
- SET/COAST switch 4.
- CANCEL switch 2.
- 5. MAIN switch

RESUME/ACCELERATE switch 3.



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1. S-mode switch 2. Input speed sensor

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3. Gear lever position sensor

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Stop lamp switch 1.

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- Clutch pedal position switch 4.
- **Component Description**
- ASCD brake switch 2.
- 5. Clutch interlock switch
- 3. Brake pedal
 - 6. Clutch pedal

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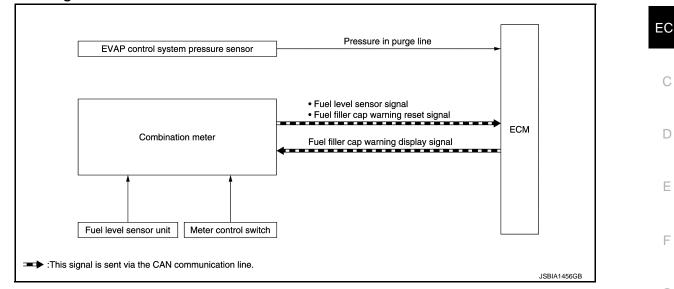
< SYSTEM DESCRIPTION >

Component	Reference
Camshaft position sensor (PHASE)	EC-310, "Description"
Clutch interlock switch	EC-401, "Description"
Clutch pedal position switch	EC-406, "Description"
Crankshaft position sensor (POS)	EC-306, "Description"
Gear lever position sensor	EC-396, "Description"
Input speed sensor	EC-493, "Description"
Shift position indicator	EC-530, "Description"
S-MODE switch	EC-531, "Description"

< SYSTEM DESCRIPTION >

FUEL FILLER CAP WARNING SYSTEM

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Input

Unit/Sensor	Input signal to ECM	ECM function	
EVAP control system pressure sensor	Pressure in purge line		
Combination meter	Fuel level sensor signal [*]	Fuel filler cap warning control	
	Fuel filler cap warning reset signal*		

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

Output

Unit	Output signal	Actuator	11
ECM	Fuel filler cap warning display signal [*]	Combination meter	

*: This signal is sent to the combination meter via the CAN communication line.

SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter.

ECM judges a refueled state, based on a fuel level sensor signal transmitted from the combination meter via CAN communication.

When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.

When receiving the signal, the combination meter turns ON the fuel filler cap warning display. **CAUTION:**

Check fuel filler cap installation condition when the fuel filler cap warning display turns ON.

Reset Operation

The fuel filler cap warning lamp tunes OFF, according to any condition listed below:

- Reset operation is performed by operating the meter control switch on the combination meter. Refer to <u>MWI-</u> <u>27, "INFORMATION DISPLAY : System Description"</u>.
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.

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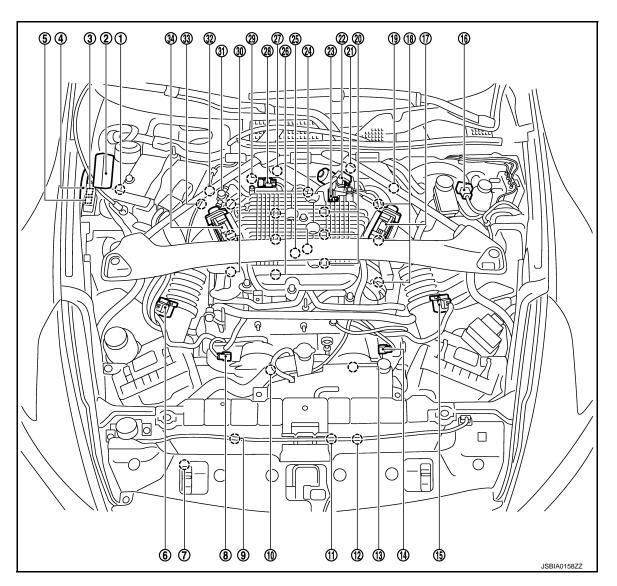
- EVAP leak diagnosis result is normal.
- Fuel refilled.
- DTC erased by using CONSULT.

NOTE:

MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

Component Parts Location

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- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)

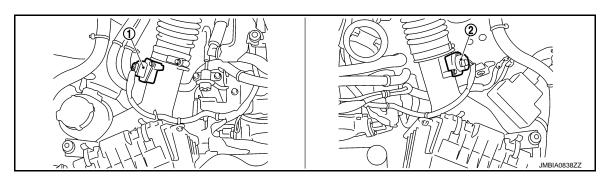
- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)

< SYSTEM DESCRIPTION >

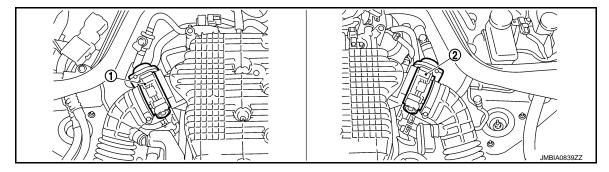
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve
- 31. EVAP service port

- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)
- 32. A/F sensor 1 (bank 1)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)
- 33. Crankshaft position sensor (POS)

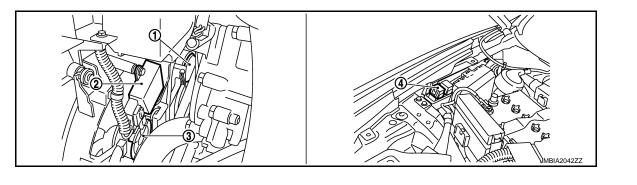
34. Electric throttle control actuator (bank 1)



1. Mass air flow sensor (with intake air 2. Mass air flow sensor (bank 2) temperature sensor) (bank 1)



- Electric throttle control actuator 1. (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

4.

- 1. Cooling fan motor-2 Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

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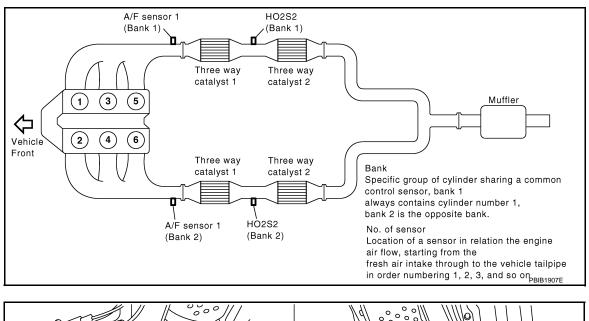
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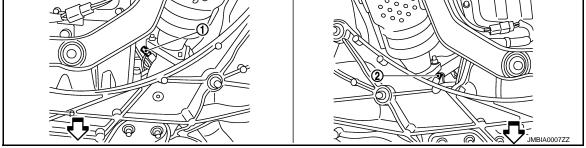
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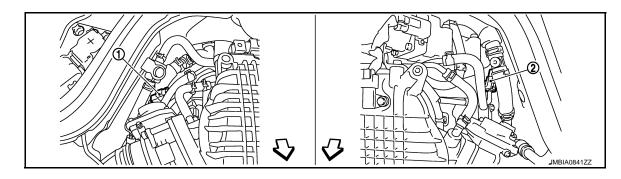
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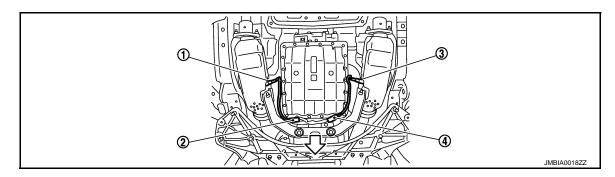
C: Vehicle front

- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C : Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



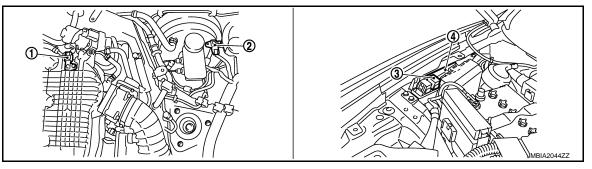
< SYSTEM DESCRIPTION >

[VQ37VHR]

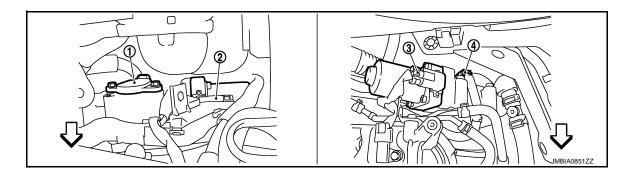
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

Heated oxygen sensor 2 (bank 1) 4. harness connector



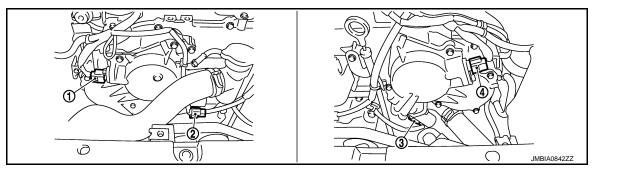
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

- VVEL control shaft position sensor 1. 2. VVEL actuator motor (bank 1) (bank 1)
 - 3.
- VVEL actuator motor (bank 2)

4. VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

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Ignition coil No.5 (with power transis- 2. Ignition coil No.3 (with power transis- 3. tor) tor) Fuel injector No.1 Fuel injector No.3 5. 6. Fuel injector No.2 Ignition coil No.2 (with power transis- 9. Fuel injector No.4 8. tor) tor)

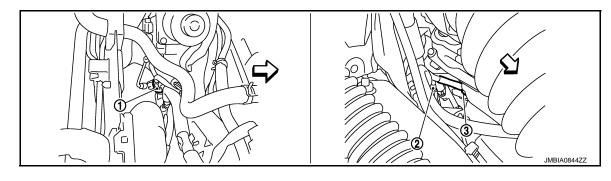
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6 tor)
- 14. Knock sensor (bank 2)

Ignition coil No.1 (with power transis-

JMBIA0843ZZ

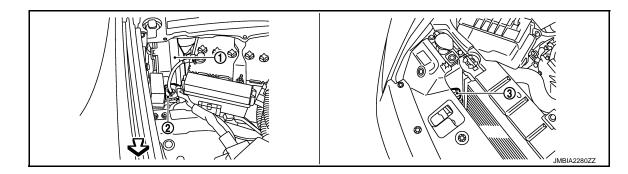
[VQ37VHR]

- Ignition coil No.4 (with power transis-
- 12. Fuel injector No.5



└□: Vehicle front

- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1) 1.
- 3. Crankshaft position sensor (POS)



└─ : Vehicle front

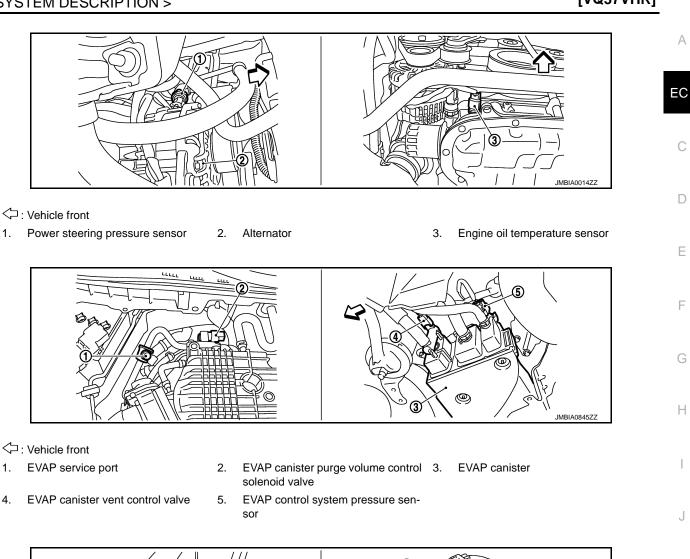
IPDM E/R 1.

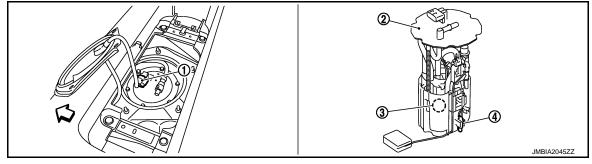
- 2. Battery current sensor
- Refrigerant pressure sensor 3.

13. Knock sensor (bank 1)

< SYSTEM DESCRIPTION >

[VQ37VHR]





C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- Fuel tank temperature sensor 4.

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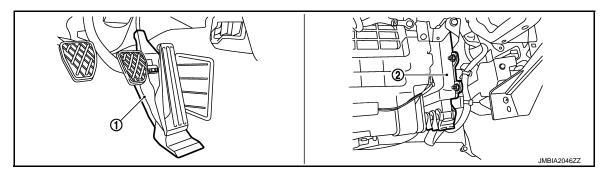
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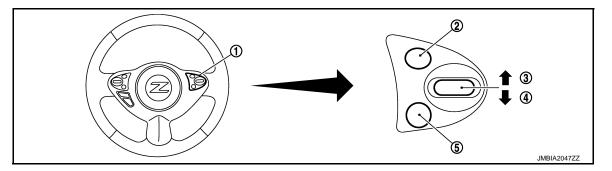
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< SYSTEM DESCRIPTION >

[VQ37VHR]

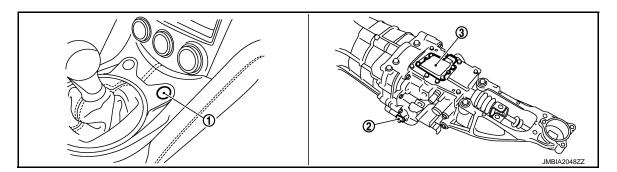


Accelerator pedal position sensor 2. ECM 1.



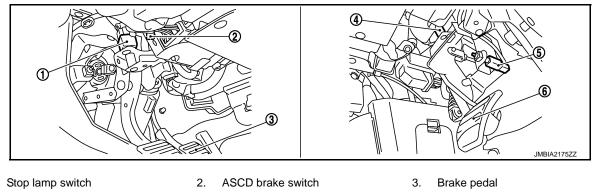
- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5. MAIN switch

RESUME/ACCELERATE switch 3.



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



Clutch pedal position switch 4.

Component Description

- 5. Clutch interlock switch
- - 6. Clutch pedal

INFOID:000000009360869

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< SYSTEM DESCRIPTION >

[VQ37VHR]

Component	Reference
EVAP control system pressure sensor	EC-340, "Description"
Fuel level sensor	EC-361, "Description"

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in ECU memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

INFOID:000000009360871

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to <u>EC-144</u>, "<u>Diagnosis Description</u>".

NOTE:

Service \$0A is not applied for regions where it is not mandated.

INFOID:000000009360870

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:000000009360872 EC

А

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 MIL will not illuminate 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 MIL illuminates. The MIL illuminates 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 illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

						×: Арр	licable —: N	lot applicable	
		N	IIL		D	ГС	1st tri	p DTC	Ε
Items	1:	st trip	2r	nd trip	1st trip	2nd trip	1st trip	2nd trip	
	Blinking	Illuminated	Blinking	Illuminated	displaying	displaying	displaying	displaying	_
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0308 is being detected	×	_	_	_	_	_	×	_	F
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0308 is being detected	_	_	×	_	_	×	_	_	G
One trip detection diagnoses (Refer to EC-575, "DTC Index".)	_	×	_	_	×	—	—	_	Н
Except above		_	_	×	_	×	×	—	

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:000000009360873

DTC AND 1ST TRIP DTC

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 recur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL 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 saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL 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 MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

For malfunctions in which 1st trip DTCs are displayed, refer to <u>EC-575, "DTC Index"</u>. 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.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

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>EC-9</u>, "Work Flow". Then perform DTC Confirmation 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 or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

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< SYSTEM DESCRIPTION >

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/MIL 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. The ECM has the following priorities to update the data.

Priority		Items			
1	Freeze frame data	Misfire — DTC: P0300 – P0308 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175			
2		Except the above items			
3	1st trip freeze frame d	ata			

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was saved 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 or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and 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.

DIAGNOSIS DESCRIPTION : Counter System

INFOID:000000009360874

RELATIONSHIP BETWEEN MIL, 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 MIL will come on.
- The MIL will turn OFF after the vehicle is driven 3 times (driving 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 (driving 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 (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CON-SULT will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

COUNTER SYSTEM CHART

Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

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 "MIS-FIRE <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 MIL, DTC, 1st Trip DTC and Driving Patterns for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"

EC-146

< SYSTEM DESCRIPTION >

А This driving pattern satisfies with B and C patterns. This driving pattern EC satisfies with C but not B. NG This driving pattern NG OK NG Detection satisfies with B but not C. Detection Detection Detection <Driving Pattern> Vehicle 1st speed Trip Trip Trip Trip D NG OK NG NG IGN ON MIL MIL illuminates illuminates MIL turns off F MIL turns off ۲Ż в ЦC 0 Ω 0 Counter DTC & DISPLAY NO DISPLAY Freeze NO DISPL Data> Н Frame Data *4 °3 DISPLAY DISPLAY Frame 1st trip CLEAR CLEAR Freeze Frame Freeze 6 Data DISPLAY DISPLAY 1st trip CLEAR CLEAF trip) DTC (1st 1 6 *8 ∞ DTC 80 С 79 5 Counter Κ trip) <(1st L JMBIA1417GB Μ *1: When the same malfunction is de-*2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any tected in two consecutive trips, MIL tected in two consecutive trips, the will light up. malfunctions. DTC and the freeze frame data will be stored in ECM. Ν *4: The DTC and the freeze frame data *6: The 1st trip DTC and the 1st trip *5: When a malfunction is detected for freeze frame data will be cleared at will not be displayed any longer after the first time, the 1st trip DTC and the 1st trip freeze frame data will be the moment OK is detected. vehicle is driven 80 times (pattern C) without the same malfunction. (The stored in ECM. DTC and the freeze frame data still remain in ECM.) *7: When the same malfunction is de-*8: 1st trip DTC will be cleared when ve-Ρ tected in the 2nd trip, the 1st trip hicle is driven once (pattern C) with-

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

is stored in ECM.

out the same malfunction after DTC

Driving Pattern B Refer to <u>EC-149, "DIAGNOSIS DESCRIPTION : Driving Pattern"</u>.

freeze frame data will be cleared.

EC-147

< SYSTEM DESCRIPTION >

Driving Pattern C Refer to <u>EC-149</u>, "<u>DIAGNOSIS DESCRIPTION</u> : <u>Driving Pattern</u>". Example: If the stored freeze frame data is as per the following:

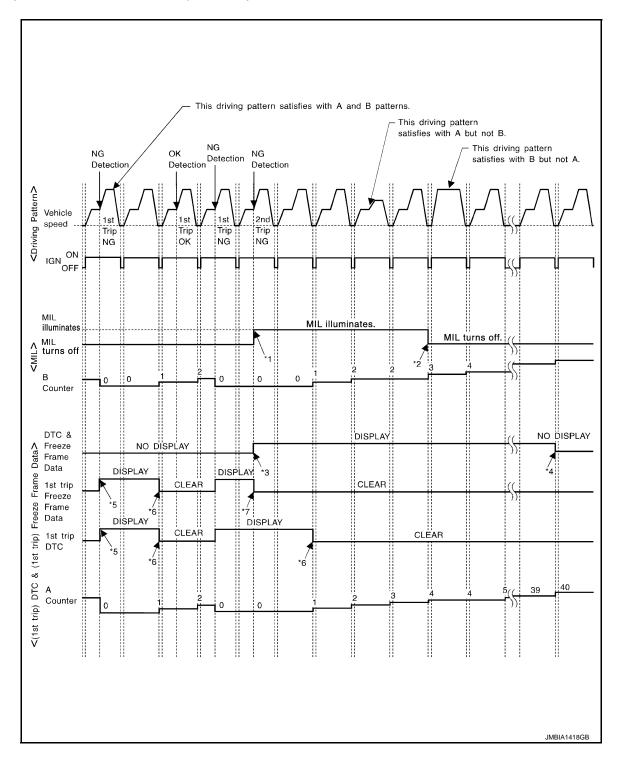
If the stored freeze frame data is as per the following:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

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 $70^{\circ}C$ ($158^{\circ}F$)

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



< SYSTEM DESCRIPTION >

[VQ37VHR]

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*1: When the same malfunction is de- tected in two consecutive trips, MIL will light up. *2: MIL will turn OFF after vehicle is driv- en 3 times (pattern B) without any malfunctions. *3: When the same malfunction is de- tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.	A
*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.*5:When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip DTC and the the first time, the 1st trip DTC and the stored in ECM.*6:1st trip DTC will be cleared after vehi- cle is driven once (pattern B) without the same malfunction.	EC
(The DTC and the freeze frame data still remain in ECM.)	C
*7: When the same malfunction is de- tected in the 2nd trip, the 1st trip freeze frame data will be cleared.	D
Explanation for Driving Patterns Except for "Misfire <exhaust deterioration="" quality="">", "Fuel Injection System"</exhaust>	E
Driving Pattern A Refer to <u>EC-149, "DIAGNOSIS DESCRIPTION : Driving Pattern"</u> .	F
Driving Pattern B Refer to <u>EC-149, "DIAGNOSIS DESCRIPTION : Driving Pattern"</u> .	
DIAGNOSIS DESCRIPTION : Driving Pattern	5 G
CAUTION: Always drive at a safe speed.	Н
DRIVING PATTERN A	
 Driving pattern A means a trip satisfying the following conditions. Engine speed reaches 400 rpm or more. Engine coolant temperature rises by 20°C (36°F) or more after starting the engine. 	I
 Engine coolant temperature reaches 70°C (158°F) or more. The ignition switch is turned from ON to OFF. NOTE: 	J
 When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern A. 	
 When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A. 	, K
DRIVING PATTERN B Driving pattern B means a trip satisfying the following conditions.	L
 Engine speed reaches 400 rpm or more. Engine coolant temperature reaches 70°C (158°F) or more. 	
 Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control or closed loop. 	f M
 Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control or closed loop. 	
 Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition. 	e N
 The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total. A lapse of 22 minutes or more after engine start. 	0
NOTE:Drive the vehicle at a constant velocity.	
 When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern B. 	P
 When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B. 	I
DRIVING PATTERN C	

Driving pattern C means operating vehicle as per the following: The following conditions should be satisfied at the same time: Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

EC-149

< SYSTEM DESCRIPTION >

Calculated load value: (Calculated load value in the freeze frame data) x (1 ± 0.1) [%] Engine coolant temperature condition:

- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:

- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:000000009360876

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/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.

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 MIL 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 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.

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				Example			/
Self-diagno	osis result	Diagnosis	$\leftarrow ON \rightarrow$	$\begin{array}{rl} \text{Ignitio} \\ \text{OFF} & \leftarrow \text{ON} \rightarrow & \text{O} \end{array}$	$n cycle \ FF \ \leftarrow ON o \ OFF$	$\leftarrow ON \rightarrow$	
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)	E
		P0402	OK (1)	— (1)	— (1)	OK (2)	•
		P1402	OK (1)	OK (2)	— (2)	— (2)	
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"	- C
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)	
		P0402	— (0)	— (0)	OK (1)	— (1)	D
		P1402	OK (1)	OK (2)	— (2)	— (2)	-
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"	_
NG exists	Case 3	P0400	ОК	ОК		—	E
		P0402	—	—		—	
		P1402	NG	_	NG	NG (Consecutive NG)	F
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)	G
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"	G

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.

When all SRT related self-diagnoses show 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 show 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 show 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 the number one (1) for each self-diagnosis (Case 1 & 2) or the number 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.
- During SRT driving pattern, the 1st trip DTC (NG) is detected prior to "CMPLT" of SRT and the self-diagnosis

 memory must be erased from the 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".

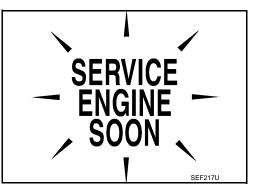
DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.

 The MIL illuminates when ignition switch is turned ON (engine is not running).
 NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to <u>EC-519, "Component Function Check"</u>.

2. When the engine is started, the MIL should go off. **NOTE:**



INFOID:000000009360877

< SYSTEM DESCRIPTION >

If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

INFOID:000000009360878

[VQ37VHR]

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to <u>EC-20, "ACCELER-</u> ATOR PEDAL RELEASED POSITION LEARNING : Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to <u>EC-20, "THROTTLE VALVE</u> <u>CLOSED POSITION LEARNING : Description"</u> .
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-21, "IDLE AIR VOLUME LEARNING : Description".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to <u>EC-24. "MIXTURE RATIO</u> <u>SELF-LEARNING VALUE CLEAR : Description"</u> .

BULB CHECK MODE

Description

This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).

Operation Procedure

- 1. Turn ignition switch ON.
- The MIL on the instrument panel should stay ON. If it remains OFF, check MIL circuit. Refer to <u>EC-519, "Diagnosis Procedure"</u>.

SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to <u>EC-150, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code"</u>.

Operation Procedure

- 1. Turn ignition switch ON and wait 20 seconds.
- 2. SRT status is indicated as shown blow.
 - ECM continues to illuminate MIL if all SRT codes are set.

< SYSTEM DESCRIPTION >

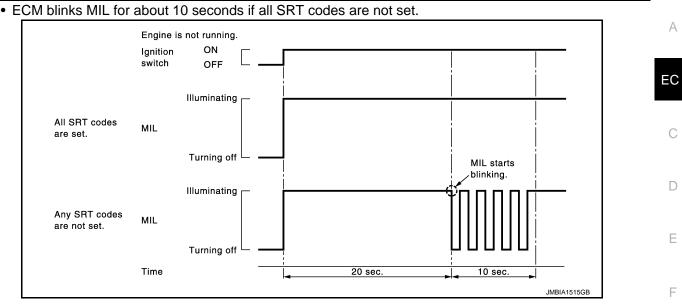
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MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

- Turn ignition switch ON.
 Check that MIL illuminates. If it remains OFF, check MIL circuit. Refer to EC-519, "Diagnosis Procedure".
- 3. Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

How to Set Self-diagnostic Results 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 mal-function.
- After ignition switch is turned off, ECM is always released from the "self-diagnostic results" mode.
- 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.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
- 3. Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.

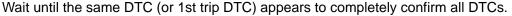
NOTE:

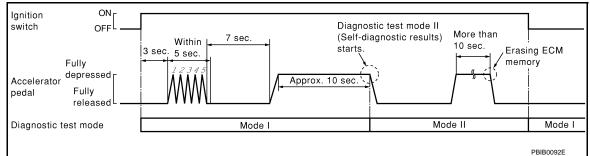
Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

4. Fully release the accelerator pedal. ECM has entered to "Self-diagnostic results" mode.

< SYSTEM DESCRIPTION >

NOTE:

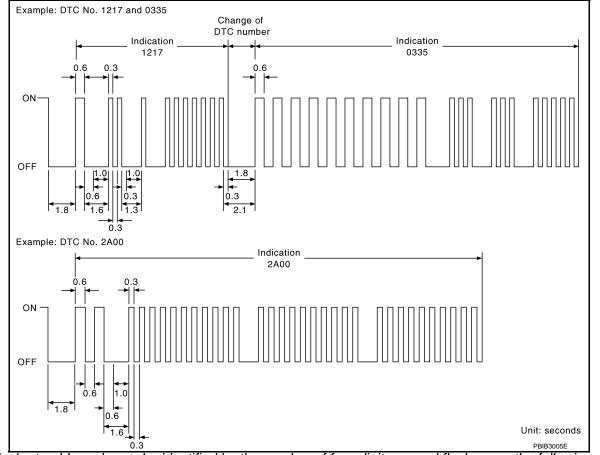




How to Read Self-diagnostic Results

The DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below.

The DTC and 1st trip DTC are displayed at the same time. If the MIL 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 MIL illuminates in "malfunction warning" mode, 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 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 per the following.

Number	0	1	2	3	4	5	6	7	8	9	А	В	С	D	Е	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds 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-seconds OFF.

EC-154

< SYSTEM DESCRIPTION >

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to <u>EC-575</u>, "<u>DTC Index</u>".

How to Erase Self-diagnostic Results

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By performing this procedure, ECM memory is erased and the following diagnostic information is erased as	
well.	E
Discussed in translation of the second se	

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

Test values

NOTE:

Also, if a battery terminal is disconnected, ECM memory is erased and the diagnostic information as listed above is erased. (The amount of time required for erasing may vary from a few seconds to several hours.)

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Set ECM in "self-diagnostic results" mode.
- 6. The diagnostic information has been erased from the backup memory in the ECM. Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
- 7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

FUNCTION

Diagnostic test mode	Function
Self diagnostic result	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.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECU identification	ECM part number can be read.
DTC Work Support	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.

*: The following emission-related diagnostic information is 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 SELF DIAGNOSTIC RESULT MODE

Regarding items of DTC and 1st trip DTC, refer to EC-575, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in "self-diag results".

- When ECM detects a 1st trip DTC, 1t" is displayed for "TIME".
- When ECM has detected a current DTC, "0" is displayed for "TIME".
- If "TIME" is neither "0" nor "1t", the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

How to Erase DTC and 1st Trip DTC

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NOTE:

- 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.
- If the DTC is not for A/T related items (see <u>EC-575. "DTC Index"</u>), skip step 1.
- 1. Erase DTC in TCM. Refer to TM-204, "Diagnosis Description".
- 2. Select "ENGINE" with CONSULT.
- 3. Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

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 that is displayed as PXXXX. (Refer to <u>EC-575</u> , "DTC Index".)
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
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.
L-FUEL TRM-B2 [%]	 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.
S-FUEL TRM-B2 [%]	• 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
FUEL SYS-B1	• "Fuel injection system status" at the moment a malfunction is detected is displayed.
FUEL SYS-B2	 One of the following mode 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
INT MANI PRES [kPa]	These items are displayed but are not applicable to this model.
COMBUST CONDITION	

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

DATA MONITOR MODE

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For reference values of the following items, refer to EC-534, "Reference Value".

Monitored Item

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	 Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and cam- shaft 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			• When the engine is stopped, a
MAS A/F SE-B2	V	 The signal voltage of the mass air flow sensor is dis- played. 	 certain value is indicated. When engine is running, specification range is indicated in "SPEC".

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
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, speci- fication range is indicated in "SPEC".
A/F ALPHA-B1	%	 The mean value of the air-fuel ratio feedback correc- tion factor per cycle is indicated. 	 When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. When engine is running, specification range is indicated in "SPEC".
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 tem- perature sensor is open or short-circuited, ECM enters fail- safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is	
HO2S2 (B2)	V	displayed.	
HO2S2 MNTR (B1)		Display of heated oxygen sensor 2 signal:	
HO2S2 MNTR (B2)	RICH/LEAN	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.
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 ACCEL SEN 2	V	 The accelerator pedal position sensor signal voltage is displayed. 	 ACCEL SEN 2 signal is con- verted by ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 1-B1			TP SEN 2-B1 signal is convert-
TP SEN 2-B1	V	 The throttle position sensor signal voltage is dis- played. 	ed by ECM internally. Thus, they differs from ECM terminal voltage signal.
FUEL T/TMP SE	°C or °F	• The fuel temperature (determined by the signal volt- age of the fuel tank temperature sensor) is displayed.	
EVAP SYS PRES	V	The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE	V	The signal voltage of the fuel level sensor is dis- played.	
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 displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	 Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal. 	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
LOAD SIGNAL	ON/OFF	 Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or light- ing switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF. 	
IGNITION SW	ON/OFF	 Indicates [ON/OFF] condition from ignition switch signal. 	
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. 	
INJ PULSE-B1		Indicates the actual fuel injection pulse width com-	• When the engine is stopped, a
INJ PULSE-B2	msec	pensated by ECM according to the input signals.	certain computed value is indi- cated.
IGN TIMING	BTDC	 Indicates the ignition timing computed by ECM ac- cording 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 air flow divided by peak air flow.	
MASS AIRFLOW	g/s	 Indicates the mass air flow computed by ECM ac- cording to the signal voltage of the mass air flow sen- sor. 	
PURG VOL C/V	%	 Indicates the EVAP canister purge volume control so- lenoid valve control value computed by the ECM ac- cording to the input signals. The opening becomes larger as the value increases. 	
INT/V SOL (B1)		The control value of the intake valve timing control	
INT/V SOL (B2)	%	solenoid valve (determined by ECM according to the input signals) is indicated.The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (deter- mined by ECM according to the input signals) is indi- cated.	
FUEL PUMP RLY	ON/OFF	• Indicates the fuel pump relay control condition deter- mined by ECM according to the input signals.	
VENT CONT/V	ON/OFF	 The control condition of the EVAP canister vent con- trol valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open 	
THRTL RELAY	ON/OFF	• Indicates the throttle control motor relay control con- dition determined by the ECM according to the input signals.	
A/F S1 HTR (B2)	%	 Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 	
HO2S2 HTR (B1)		Indicates [ON/OFF] condition of heated oxygen sen-	
HO2S2 HTR (B2)	ON/OFF	sor 2 heater determined by ECM according to the in- put signals.	
I/P PULLY SPD	rpm	• Indicates the engine speed computed from the input speed sensor signal.	
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks	Δ
IDL A/V LEARN	YET/CMPLT	 Displays the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully. 		EC
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.		
ENG OIL TEMP	°C or °F	• The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.		С
A/F S1 HTR (B1)	%	 Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 		D
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.		E
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.		_
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch sig- nal.		F
CANCEL SW	ON/OFF	Indicates [ON/OFF] condition from CANCEL switch signal.		G
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. 		Н
BRAKE SW1	ON/OFF	 Indicates [ON/OFF] condition from ASCD brake switch signal. 		I
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch sig- nal.		
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 op- eration is cut off. 		J
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. 		L
AT OD MONITOR	ON/OFF	Always OFF is displayed.This item is not efficient for Z34 models.		IVI
AT OD CANCEL	ON/OFF	Always OFF is displayed.This item is not efficient for Z34 models.		Ν
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp deter- mined by the ECM according to the input signals.		_
SET LAMP	ON/OFF	 Indicates [ON/OFF] condition of SET lamp deter- mined by the ECM according to the input signals. 		0
FAN DUTY	%	• Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.		Ρ
AC EVA TEMP	°C or °F	Indicates A/C evaporator temperature sent from combination meter.		
AC EVA TARGET	°C or °F	 Indicates target A/C evaporator temperature sent from "unified meter and A/C amp.". 		

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
A/F ADJ-B1 A/F ADJ-B2	_	• Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
TP SEN 1-B2 TP SEN 2-B2	V	 The throttle position sensor signal voltage is displayed. 	• TP SEN 2-B2 signal is convert- ed by ECM internally. Thus, they differs from ECM terminal voltage signal.
P/N POSI SW	ON/OFF	 Indicates [ON/OFF] condition from the park/neutral position (PNP) 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.	
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sen- sor is displayed.	
A/F SEN1 (B2)	V	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
ATOM PRES SEN	mV	Always a certain value is displayed.This item is not efficient for Z34 models.	
BRAKE BST PRES SE	mV	Always a certain value is displayed.This item is not efficient for Z34 models.	
INT/V TIM (B1) INT/V TIM (B2)	°CA	Indicates [°CA] of intake camshaft advance angle.	
MAP SENSOR	V	Always a certain value is displayed.This item is not efficient for Z34 models.	
EVAP LEAK DIAG	YET/CMPLT	 Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully. 	
EVAP DIAG READY	ON/OFF	Indicates the ready condition of EVAP leak diagnosis. ON: Diagnosis has been ready condition. OFF: Diagnosis has not been ready condition.	
VVEL LEARN	YET/DONE	Display the condition of VVEL learning YET: VVEL learning has not been performed yet. DONE: VVEL learning has already been performed successfully.	
VVEL SEN LEARN- B1			
VVEL SEN LEARN- B2	V	 Indicates the VVEL learning value. 	
VVEL POSITION SEN-B1	V	The VVEL control shaft position sensor signal volt-	
VVEL POSITION SEN-B2	v	age is displayed.	
VVEL TIM-B1	deg	Indicates [deg] of VVEL control shaft angle.	
VVEL TIM-B2	ucy		
ALTDUTY	%	• Indicates the duty ratio of the power generation com- mand value.	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks	-
ALT DUTY SIG	ON/OFF	 The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. ON: Power generation voltage variable control is ac- tive. OFF: Power generation voltage variable control is in- active. 		EC
GEAR POSITION	1/2/3/4/5/6/N/R/ ##	Indicates the shift position determined by the ECM according to the input signals.	"##" is displayed when shift posi- tion cannot be judged.	С
M/T SYN REV STAT	INACT/ACTIVE	 Displays SynchroRev Match mode (S-MODE) is condition. INACT: S-MODE is not operated ACTIVE: S-MODE is operated 		D
M/T SYNCHRO SW	ON/OFF	Indicates [ON/OFF] condition from S-MODE switch signal.		E
CPP SW	ON/OFF	Indicates [ON/OFF] condition from clutch pedal position switch signal.		F
CLUTCH INTLCK SW	ON/OFF	Indicates [ON/OFF] condition from clutch interlock switch signal.		
M/T N POS LEARN	YET/DONE	 Displays the M/T Neutral Position Learning condition. YET: M/T neutral position learning is not complete yet. DONE: M/T neutral position learning is successfully complete. 		G
THRTL STK CNT B1 [*]		_		
HO2 S2 DIAG1 (B1)	INCMP/CMPLT	 Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		l J
HO2 S2 DIAG1 (B2)	INCMP/CMPLT	 Indicates DTC P0159 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		K
HO2 S2 DIAG2 (B1)	INCMP/CMPLT	 Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		L
HO2 S2 DIAG2 (B2)	INCMP/CMPLT	 Indicates DTC P0159 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		Μ
A/F SEN1 DIAG1 (B1)	INCMP/CMPLT	 Indicates DTC P015A or P015B self-diagnosis condi- tion. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		Ν
A/F SEN1 DIAG1 (B2)	INCMP/CMPLT	 Indicates DTC P015C or P015D self-diagnosis con- dition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		0
A/F SEN1 DIAG2 (B1)	INCMP/CMPLT	 Indicates DTC P014C or P014D self-diagnosis con- dition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		Ρ
A/F SEN1 DIAG2 (B2)	INCMP/CMPLT	 Indicates DTC P014E or P014F self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		

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Monitored item	Unit	Description	Remarks
A/F SEN1 DIAG3 (B1)	ABSNT/PRSNT	 Indicates DTC P014C, P014D, P015A or P015B self- diagnosis condition. ABSNT: The vehicle condition is not within the diag- nosis range. PRSNT: The vehicle condition is within the diagnosis range. 	
A/F SEN1 DIAG3 (B2)	ABSNT/PRSNT	 Indicates DTC P014C, P014D, P015A or P015B self- diagnosis condition. ABSNT: The vehicle condition is not within the diag- nosis range. PRSNT: The vehicle condition is within the diagnosis range. 	

*: The item is indicated, but not used.

NOTE:

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

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
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
EVAP SYSTEM CLOSE	 Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. Ignition switch ON Engine not running Ambient temperature is above 0°C (32°F). No vacuum and no high pressure in EVAP system Fuel tank temp. is more than 0°C (32°F). Within 10 minutes after starting "EVAP SYSTEM CLOSE" When trying to execute "EVAP SYSTEM CLOSE" under the condition except above, CONSULT will discontinue it and display appropriate instruction. NOTE: When starting engine, CONSULT may display "Battery voltage is low. Charge battery", even when using a charged battery. 	When detecting EVAP vapor leak in the EVAP system
FUEL PRESSURE RELEASE	 Fuel pump will stop by touching "START" during idling. Crank a few times after engine stalls. 	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	• The coefficient of self-learning control mixture ratio returns to the original coefficient.	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 timing
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
VVEL POS SEN ADJ PREP	Use this item only when replacing VVEL actuator sub assembly.Ignition on and engine stopped.	When adjusting VVEL control shaft position sensor
M/T NEUTRAL POS LEARN	 Ignition on and engine stopped.Shift position: neutral	When ECM is replaced When gear lever position sensor is replaced When shift position indicator "N" is blinking
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position

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

< SYSTEM DESCRIPTION >

Test Item

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TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)	I
VENT CONTROL/V	 Ignition switch: ON (Engine stopped) Turn solenoid valve ON and OFF with the CONSULT and listen to operating sound. 	Solenoid valve makes an operating sound.	Harness and connectorsSolenoid valve	EC
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT. 	If trouble symptom disap- pears, see CHECK ITEM.	 Harness and connectors Engine coolant temperature sensor Fuel injector 	С
FUEL INJECTION	 Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT. 	If trouble symptom disap- pears, see CHECK ITEM.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1 	D
FUEL/T TEMP SEN	Change the fuel tank temperature using CO	NSULT.		Е
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. 	Engine speed changes ac- cording to the opening per- cent.	Harness and connectorsSolenoid valve	F
FUEL PUMP RELAY	 Ignition switch: ON (Engine stopped) Turn the fuel pump relay ON and OFF using CONSULT and listen to operating sound. 	Fuel pump relay makes the operating sound.	Harness and connectorsFuel pump relay	G
IGNITION TIMING	 Engine: Return to the original trouble condition Timing light: Set 	If trouble symptom disap- pears, see CHECK ITEM.	Perform Idle Air Volume Learning.	Н

Cooling fan speed changes.

Battery voltage changes.

Engine runs rough or dies.

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

Retard the ignition timing using CONSULT.

· Change duty ratio using CONSULT.

· Change duty ratio using CONSULT.

• Engine: After warming up, idle the engine.

• Selector lever: P or N (A/T), Neutral (M/T)

· Cut off each injector signal one at a time us-

Ignition switch: ON

· Engine: Idle

· A/C switch OFF

ing CONSULT.

DTC WORK SUPPORT MODE

Test item

FAN DUTY CONTROL*

ALTERNATOR DUTY

POWER BALANCE

Test mode	Test item	Corresponding DTC No.	Reference page	
	EVP SML LEAK P0442*/P1442*	—	—	0
EVAPORATIVE SYSTEM	EVP V/S LEAK P0456/P1456*	P0456	<u>EC-355</u>	
EVAPORATIVE STSTEM	PURG VOL CN/V P1444	P0443	<u>EC-324</u>	_
	PURG FLOW P0441	P0441	<u>EC-319</u>	Р
	A/F SEN1 (B1) P1278/P1279	—	_	
A/F SEN1	A/F SEN1 (B1) P1276	P0130	<u>EC-235</u>	
A/F SENT	A/F SEN1 (B2) P1288/P1289	_	_	
	A/F SEN1 (B2) P1286	P0150	EC-235	

· Harness and connectors Cooling fan motor

• Cooling fan control module

· Harness and connectors

• Harness and connectors

· Cooling fan relay

• IPDM E/R

• IPDM E/R

Alternator

Compression

• Power transistor

· Fuel injector

· Spark plug

· Ignition coil

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< SYSTEM DESCRIPTION >

Test mode	Test item	Corresponding DTC No.	Reference page
	HO2S2 (B1) P1146	P0138	<u>EC-251</u>
	HO2S2 (B1) P1147	P0137	<u>EC-245</u>
HO2S2	HO2S2 (B1) P0139	P0139	<u>EC-259</u>
10232	HO2S2 (B2) P1166	P0158	<u>EC-251</u>
	HO2S2 (B2) P1167	P0157	<u>EC-245</u>
	HO2S2 (B2) P0159	P0159	<u>EC-259</u>

*: DTC P0442, P1442 and P1456 does not apply to Z34 models but appears in DTC Work Support Mode screens.

SRT & P-DTC MODE

SRT STATUS Mode

- For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.
- "SRT STATUS" provides the presence or absence of permanent DTCs stored in ECM memory.

PERMANENT DTC STATUS Mode

How to Display Permanent DTC Status

- 1. Turn ignition switch OFF and wait at 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at 10 seconds.
- 4. Turn ignition switch ON.

NOTE:

Permanent DTCs stored in ECM memory are displayed on the CONSULT screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP). CAUTION:

Since the "PERMANENT DTC STATUS" screen displays the previous trip information, repeat the following twice to update the information: "Ignition switch OFF", "Wait for more than 10 seconds" and "Ignition switch ON".

CAUTION: Turn ignition switch fro status screen.	m ON to OFF twice to update the inform	ation on the	
PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D	<u> </u>
XXXX	INCMP	INCMP	
xxxx	CMPLT	INCMP	
xxxx	INCMP	CMPLT	
xxxx	CMPLT	INCMP	
XXXX	INCMP	INCMP	
XXXX	INCMP	INCMP	
	The previous trip information is displayed		

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

SRT WORK SUPPORT Mode

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

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

EC-164

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" in "DATA MONI-TOR" mode of CONSULT during normal operation of the Engine Control System. When the value in "SPEC" in "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" in "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 illuminate

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

- 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/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1/B2 (The signal voltage of the mass air flow sensor)

Component Function Check

1.preconditioning	0
Make sure that all of the following conditions are satisfied.	G
 TESTING CONDITION Vehicle driven distance: More than 5,000 km (3,107 miles) 	Ш
 Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm², 14.25 - 15.12 psi) Atmospheric temperature: 20 - 30°C (68 - 86°F) 	Η
 Engine coolant temperature: 75 - 95°C (167 - 203°F) 	
 Transmission: Warmed-up For A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until "ATF 	I
TEMP 1" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F). - For M/T models: After the engine is warmed up to normal operating temperature, drive for 5 minutes.	
Electrical load: Not applied	J
 Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead. 	
Engine speed: Idle	K
>> GO TO 2.	
2. PERFORM SPEC IN DATA MONITOR MODE	L
	в.4
NOTE: Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.	Μ
 Perform <u>EC-14, "BASIC INSPECTION : Special Repair Requirement"</u>. Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2", "MAS A/F SE-B1" and "MAS A/F SE-B2" in 	
"SPEC" of "DATA MONITOR" mode with CONSULT.	Ν
 Make sure that monitor items are within the SP value. <u>Is the measurement value within the SP value?</u> 	
YES >> INSPECTION END	0
NO >> Go to <u>EC-166, "Diagnosis Procedure"</u> .	
	Ρ

EC-165

INFOID:000000009360880

INEOID:00000000936088

А

EC

Ε

F

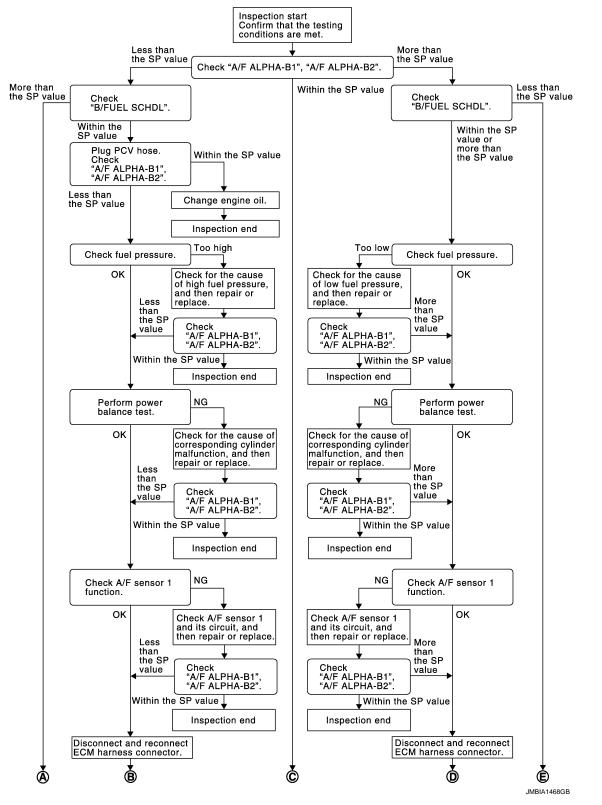
< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000009360882

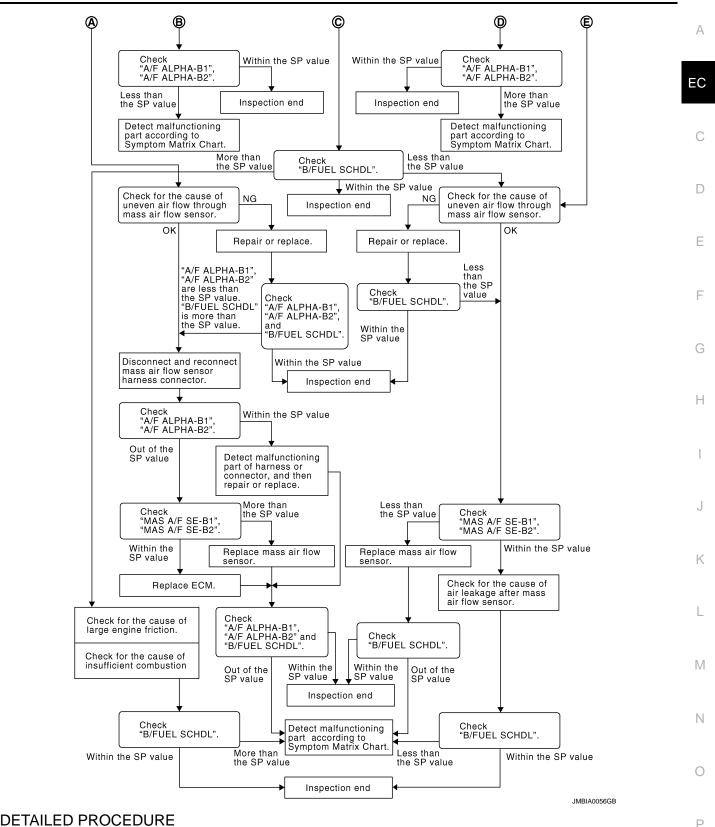
[VQ37VHR]

OVERALL SEQUENCE



< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]



1.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

With CONSULT

- 1. Start engine.
- 2. Confirm that the testing conditions are met. Refer to EC-165, "Component Function Check".
- 3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

EC-167

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NOTE:

Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

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.

2.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 >> GO TO 4.
- NO >> More than the SP value: GO TO 19.

3.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 >> GO TO 6.
- NO-1 >> More than the SP value: GO TO 6.
- NO-2 >> Less than the SP value: GO TO 25.

4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- 1. Stop the engine.
- 2. Disconnect PCV hose, and then plug it.
- 3. Start engine.
- 4. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.

NO >> GO TO 6.

5.CHANGE ENGINE OIL

- 1. Stop the engine.
- 2. 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 too short during winter). The symptom will not be detected after changing engine oil or changing driving conditions.

>> INSPECTION END

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-628, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" (Refer to <u>FL-5, "Exploded</u> <u>View"</u>.) and then GO TO 8.

NO-2 >> Fuel pressure is too low: GO TO 7.

1.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly" (Refer to <u>FL-5, "Exploded View"</u>.) and then GO TO 8. NO >> Repair or replace and then GO TO 8.

< DTC/CIRCUIT DIAGNOSIS >

< DTC/CIRCUIT DIAGNOSIS >	
8. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	
 Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and r each indication is within the SP value. 	nake sure that
<u>Is the measurement value within the SP value?</u> YES >> INSPECTION END NO >> GO TO 9.	
9. PERFORM POWER BALANCE TEST	
 Perform "POWER BALANCE" in "ACTIVE TEST" mode. Make sure that the each cylinder produces a momentary engine speed drop. <u>Is the inspection result normal?</u> YES >> GO TO 12. 	
NO $>>$ GO TO 10.	
10. DETECT MALFUNCTIONING PART	
 Check the following bellow. Ignition coil and its circuit (Refer to <u>EC-514</u>, "<u>Component Function Check</u>".) Fuel injector and its circuit (Refer to <u>EC-508</u>, "<u>Component Function Check</u>".) Intake air leakage Intake air leakage 	
 Low compression pressure (Refer to <u>EM-27, "Inspection"</u>.) Is the inspection result normal? 	
YES >> Replace fuel injector (Refer to <u>EM-42, "Exploded View"</u> .) and then GO TO 11. NO >> Repair or replace malfunctioning part and then GO TO 11.	
11. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	
 Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and r each indication is within the SP value. 	nake sure that
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 12.	
12.CHECK A/F SENSOR 1 FUNCTION	
 Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1. For DTC P0130, P0150, refer to <u>EC-235. "DTC Logic"</u>. For DTC P0131, P0151, refer to <u>EC-239. "DTC Logic"</u>. For DTC P0132, P0152, refer to <u>EC-242. "DTC Logic"</u>. For DTC P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D, refer to <u>EC-266. "D</u> 	DTC Logic"
 For DTC P2096, P2097, P2098, P2099, refer to <u>EC-476, "DTC Logic"</u>. 	<u> C Logio</u> .
Are any DTCs detected?	
YES >> GO TO 13. NO >> GO TO 15.	
13. CHECK A/F SENSOR 1 CIRCUIT	
Perform Diagnosis Procedure according to corresponding DTC.	
>> GO TO 14.	
14. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	
 Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and r each indication is within the SP value. 	nake sure that
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 15.	

< DTC/CIRCUIT DIAGNOSIS >

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

- 1. Stop the engine.
- 2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- 1. Start engine.
- 2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> Detect malfunctioning part according to <u>EC-612, "Symptom Table"</u>.
- 17.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-1 >> More than the SP value: GO TO 18.
- NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

- 1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
- 2. 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?

YES >> GO TO 21.

NO >> Repair or replace malfunctioning part, and then GO TO 20.

20.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1", "A/F ALPHA-B2" are less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
 Disconnect mass air flow sensor harness connector. Check pin terminal and connector then reconnect it again. 	for damage and
>> GO TO 22. 22. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	E
 Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and each indication is within the SP value. 	make sure that
<u>Is the measurement value within the SP value?</u> YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>E</u> <u>sis Procedure</u> ". Then GO TO 29. NO >> GO TO 23.	<u>C-204, "Diagno-</u>
23. CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"	
Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode, and mak 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 malfunctioning mass air flow sensor (Refer to <u>E</u> <u>View"</u> .) and then GO TO 29.	
24.REPLACE ECM	
 Replace ECM. Go to <u>EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM)</u> <u>Requirement"</u>. 	: Special Repair
>> 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 in air cleaner element Uneven dirt in air cleaner element Improper specification in 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 indica SP value.	ation is within the
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", "MAS A/F SE-B2"	
Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode, and mak indication is within the SP value.	e sure that each
Is the measurement value within the SP value?	
YES >> GO TO 28.	
NO >> Less than the SP value: Replace malfunctioning mass air flow sensor (Refer to <u>E</u> <u>View</u> ".) and then GO TO 30.	<u>IVI-31, "Exploded</u>
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

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- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks in PCV valve
- Disconnection or cracks in EVAP purge hose, stuck open EVAP canister purge volume control solenoid valve
- Malfunctioning seal in rocker cover gasket
- Disconnection, looseness, or cracks in hoses, such as a vacuum hose, connecting to intake air system parts
- Malfunctioning seal in intake air system, etc.

>> GO TO 30.

29. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <u>EC-612, "Symptom Table"</u>.

30.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> Detect malfunctioning part according to <u>EC-612, "Symptom Table"</u>.

POWER SUPPLY AND GROUND CIRCUIT Diagnosis Procedure A check GROUND CONNECTION 1. Turn ignition switch OFF. 2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I 1. Disconnect ECM harness connector. 2. Check the continuity between ECM harness connector and ground. Total Table Image: Terminal for and for a second continuity F101 8 123 Ground continuity Existed Existed M107 124 Ground continuity S. Also check harness for short to power. Existed NO >> GO TO 3. 3. 3. Also check harness for short to power. NO Is the inspection result normal? YES YES >> GO TO 3. 3.DETECT MALFUNCTIONING PART Check the following. • Harness connectors F103, M116 F104 dotted more and between dotted more dotted mo	A 3 EC
1. CHECK GROUND CONNECTION 1. Turn ignition switch OFF. 2. Check ground connection M95. Refer to Ground Inspection in GI-48. "Circuit Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I 1. Disconnect ECM harness connector. 2. Check the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. Total and the continuity between ECM harness connector and ground. 3. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 3. 3. DETECT MALFUNCTIONING PART Check the following. • Harness connectors F103, M116	3
1. Turn ignition switch OFF. 2. Check ground connection M95. Refer to Ground Inspection in GI-48. "Circuit Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I 1. Disconnect ECM harness connector. 2. CHECK the continuity between ECM harness connector and ground. The connector Terminal Ground Continuity F101 8 123 123 M107 124 Ground Existed 3. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 3. 3. 3. DETECT MALFUNCTIONING PART Check the following. • Harness connectors F103, M116 M16	EC
 2. Check ground connection M95. Refer to Ground Inspection in <u>GI-48, "Circuit Inspection"</u>. <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace ground connection. 2. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I 1. Disconnect ECM harness connector. 2. Check the continuity between ECM harness connector and ground. <u>ECM</u> <u>Ground</u> <u>Continuity</u> <u>F101 8</u> <u>123</u> <u>Ground</u> <u>Existed</u> 3. Also check harness for short to power. <u>Is the inspection result normal?</u> YES >> GO TO 4. NO >> GO TO 3. 3. DETECT MALFUNCTIONING PART <u>Check the following.</u> • Harness connectors F103, M116 	-
1. Disconnect ECM harness connector. 2. Check the continuity between ECM harness connector and ground. Image: team of team	C
Connector Terminal Ground Continuity F101 8 123 4 123 124 Ground Existed 127 128 128 5 3. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 3. 3. DETECT MALFUNCTIONING PART Check the following. • Harness connectors F103, M116	E
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	
123 Ground Existed 124 Ground Existed 127 128 Ground Existed 3. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 3. S.DETECT MALFUNCTIONING PART Check the following. • Harness connectors F103, M116	F
128 3. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 3. 3.DETECT MALFUNCTIONING PART Check the following. • Harness connectors F103, M116	G
3. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 3. 3.DETECT MALFUNCTIONING PART Check the following. • Harness connectors F103, M116	Н
Harness connectors F103, M116	 J
Harness for open or short between ECM and ground	K
 >> Repair open circuit or short to power in harness or connectors. 4.CHECK ECM POWER SUPPLY CIRCUIT-I 1. Reconnect ECM harness connector. 	L
 Reconnect ECM harness connector. Turn ignition switch ON. Check the voltage between ECM harness connector and ground. 	N
ECM	h.
+ – Voltage	Ν
Connector Terminal Connector Terminal F102 53 M107 128 Battery voltage	~
Is the inspection result normal? YES YES YES SOTO 6. NO >> GO TO 5. 5.DETECT MALFUNCTIONING PART	O P

- Harness connectors E3, F1
 IPDM E/R harness connector E7
- 10 A fuse (No. 44)
- Harness for open or short between ECM and fuse

< DTC/CIRCUIT DIAGNOSIS >

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

6.CHECK ECM POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Check the voltage between ECM harness connector terminals as follows.

ECM				
Connector	+	-	Voltage	
Connector	Terminal	Terminal	-	
M107	125	128	After turning ignition switch OFF, battery volt- age will exist for a few seconds, then drop to approximately 0V.	

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 9.

7.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON.

2. Check the voltage between IPDM E/R harness connector and ground.

IPDN	IPDM E/R		Voltage
Connector	Terminal	Ground	voltage
E7	53	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace IPDM E/R.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Check the voltage between ECM harness connector terminals as follows.

	ECM			
	+	-	-	Voltage
Connector	Terminal	Connector	Terminal	
F101	24	M107	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 10.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.

2. Disconnect IPDM E/R harness connector.

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

E	СМ	IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F101	24	E7	69	Existed

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRC	UIT DIAGNO					[VQ37VHR]	
		short to grou	nd and short	to power.			
	ion result nori	-		I			А
	GO TO 12.						
	GO TO 11.						EC
-		IONING PART	Γ				
Check the fol	lowing. connectors E	2 51					
	nnectors F10						С
 Harness for 	r open or shor	t between EC	M and IPDM	E/R			
~ [Popair opop ci	rcuit or short t	o around or a	bort to powo	r in harness or connectors.		D
12.снеск			o ground or s				
		No. 50) from I	PDM E/R.				Е
2. Check 15			,				
· · · ·	tion result nori	mal?					_
	GO TO 15. Replace 15A fi	100					F
	•	R SUPPLY CII					
		ess connector.					G
		harness connector.					
				ector and IPI	DM E/R harness connector.		Н
					_		
	CM	IPDM		Continuity			
Connector	Terminal	Connector	Terminal	F 144 J	_		
M107	125	E7	49 red and ab art	Existed	_		
	ck namess for	short to grou	na ana snort	to power.			J
	GO TO 15.	<u>na:</u>					
	GO TO 14.						
14.DETEC	T MALFUNCT	IONING PAR	Т				K
Check the fol	lowing.						
	connectors E						L
• Hamess io	open of shor	t between EC	ivi and ipdivi	E/K			
>> F	Repair open ci	rcuit or short t	o around or s	short to powe	r in harness or connectors.		M
		NT INCIDEN					IVI
Refer to GI-4	5, "Intermitten	t Incident".					
· · · ·	ion result nori	mal?					Ν
	Replace IPDM			bort to pours	r in harnood ar connectors		
NO >> F	cepair open ci		o ground of s	mon to powe	r in harness or connectors.		0

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POWER SUPPLY AND GROUND CIRCUIT (VVEL CONTROL MODULE) [VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

POWER SUPPLY AND GROUND CIRCUIT (VVEL CONTROL MODULE)

Diagnosis Procedure

INFOID:000000009360884

1. CHECK GROUND CONNECTION

Turn ignition switch OFF. 1.

Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection". 2.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.check vvel control module ground circuit for open and short

Disconnect VVEL control module harness connector. 1

Check the continuity between VVEL control module harness connector and ground. 2.

VVEL con	trol module	Ground	Continuity	
Connector	Terminal	Ground	Continuity	
E15	14	Ground	Existed	

Also check harness for short to power. 3.

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK VVEL CONTROL MODULE POWER SUPPLY CIRCUIT-I

1. Reconnect VVEL control module harness connector.

Turn ignition switch ON. 2.

Check the voltage between VVEL control module harness connector and ground. 3.

VVE	EL control mo	dule	
Connector	+	-	Voltage
Connector	Terminal	Terminal	
E15	8	14	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK VVEL CONTROL MODULE POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF and wait at least 10 seconds.

Disconnect VVEL control module harness connector. 2.

Disconnect IPDM E/R harness connector. 3.

4. Check the continuity between VVEL control module harness connector and IPDM E/R harness connector.

VVEL control module		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	8	E7	49	Existed

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

Is the inspection result normal?

YES >> EC-173, "Diagnosis Procedure"

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

POWER SUPPLY AND GROUND CIRCUIT (VVEL CONTROL MODULE) [VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal? YES >> Replace IPDM E/R. NO >> Repair open circuit, short to ground or short to power in harness or connectors. EC

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U0101 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:000000009360886

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0101	Lost communication with TCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) with TCM for 2 seconds or more.	 CAN communication line between TCM and ECM (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 DTC.

Is DTC detected?

- YES >> EC-178, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-15, "Trouble Diagnosis Flow Chart".

INFOID:000000009360885

INFOID:000000009360887

< DTC/CIRCUIT DIAGNOSIS >

U1001 CAN COMM CIRCUIT

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle mul-EC 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:000000009360889

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 CON	FIRMATION PRO	CEDURE	
1.PERFO	RM DTC CONFIRM	ATION PROCEDURE	
1. Turn ig 2. Check Is DTC det	DTC.	d wait at least 3 seconds.	
YES >>	 <u>EC-179</u>, "Diagnosis INSPECTION END 		
Diagnosi	s Procedure		INFOID:000000093608
Go to <u>LAN</u> -	-15, "Trouble Diagno	sis Flow Chart".	

INFOID:00000009360888

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U1003 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. ECM and VVEL control module are connected with two communication lines (CAN H line and CAN L line) and transmit/ receive data. ECM shares information and links with the VVEL control module during operation.

DTC Logic

INFOID:000000009360892

DTC DETECTION LOGIC

NOTE:

If DTC U1003 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-392, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1003	Lost communication with VVEL control module	CAN communication signal other than OBD (emission related diagnosis) is not received between VVEL control module and ECM for 2 seconds or more.	 Harness or connectors (VVEL CAN communication line is open or shorted) ECM VVEL control module

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.

2. Check DTC.

Is DTC detected?

YES >> Go to EC-180, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009360893

1. CHECK VVEL CAN COMMUNICATION CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect VVEL control module harness connector.
- 4. Check the continuity between ECM harness connector and VVEL control module harness connector.

E	CM	VVEL control module		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	54	E15	24	Existed
1102	55		11	

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

Is the inspection result normal?

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

2 DETECT MALE

2. DETECT MALFUNCTIONING PART

Check the following.

INFOID:000000009360891

U1003 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHF	۲]
 Harness connector E3, F1 Harness for open or short between ECM and VVEL control module 	A
>> Repair open circuit, short to ground or short to power in harness or connectors.	
3. CHECK INTERMITTENT INCIDENT	EC
Refer to GI-45, "Intermittent Incident".	
Is the inspection result normal?	С
YES >> GO TO 4. NO >> Repair or replace.	
4. REPLACE VVEL CONTROL MODULE	D
	D
 Replace VVEL control module. Go to <u>EC-18</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOL <u>ULE) : Special Repair Requirement"</u>. 	<u>D-</u> E
>> GO TO 5.	
5. PERFORM DTC CONFIRMATION PROCEDURE	F
1. Reconnect all harness connectors disconnected	
2. Turn ignition switch ON.	G
 Erase DTC. Perform DTC Confirmation Procedure. 	
See <u>EC-180, "DTC Logic"</u> .	
5. Check DTC.	Н
Is the DTC U1003 displayed again?	
YES >> GO TO 6. NO >> INSPECTION END	
6.REPLACE ECM	
-	
 Replace ECM. Go to <u>EC-17</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repairs 	J air
Requirement".	
	Κ
>> INSPECTION END	
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U1024 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. ECM and VVEL control module are connected with two communication lines (CAN H line and CAN L line) and transmit/ receive data. ECM shares information and links with the VVEL control module during operation.

DTC Logic

INFOID:000000009360895

DTC DETECTION LOGIC **NOTE**:

If DTC U1024 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-392, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1024	VVEL CAN communication	 When VVEL control module cannot transmit/receive can communication signal from ECM. When detecting error during the ini- tial diagnosis of CAN controller of VVEL control module. 	 Harness or connectors (CAN communication line is open or shorted) ECM VVEL control module

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 3 seconds.
- 2. Check DTC.
- Is DTC detected?
- YES >> Go to EC-182, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009360896

1. CHECK VVEL CAN COMMUNICATION CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Disconnect VVEL control module harness connector.
- 4. Check the continuity between ECM harness connector and VVEL control module harness connector.

ECM		VVEL con	trol module	Continuity
Connector	Terminal	Connector	Continuity	
F102	54	E15	24	Existed
1102	55		11	LAISIGU

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

Is the inspection result normal?

YES >> GO TO 2.

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

2. CHECK INTERMITTENT INCIDENT

EC-182

U1024 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
Refer to GI-45, "Intermittent Incident".		
Is the inspection result normal?		А
YES >> GO TO 3. NO >> Repair or replace.	-	
3. REPLACE VVEL CONTROL MODULE	E	С
1. Replace VVEL control module.		
 Go to <u>EC-18. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CULE) : Special Repair Requirement"</u>. 	ONTROL MOD-	С
>> GO TO 4.		D
4. PERFORM DTC CONFIRMATION PROCEDURE		D
 Recnnect all harness connectors disconnected. Turn ignition switch ON. Erase DTC. 		E
 Perform DTC Confirmation Procedure. See <u>EC-182, "DTC Logic"</u>. 		F
<u>Is the DTC U1024 displayed again?</u> YES >> GO TO 5. NO >> INSPECTION END		G
5. REPLACE ECM		
 Replace ECM. Go to <u>EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) :</u> <u>Requirement"</u>. 		Η
>> INSPECTION END		
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< DTC/CIRCUIT DIAGNOSIS >

P0011, P0021 IVT CONTROL

DTC Logic

[VQ37VHR]

INFOID:000000009360897

DTC DETECTION LOGIC

NOTE:

- If DTC P0011 or P0021 is displayed with DTC P0075 or P0081, first perform the trouble diagnosis for DTC P0075, P0081. Refer to <u>EC-194, "DTC Logic"</u>.
- If DTC P0011 or P0021 is displayed with DTC P0524, first perform the trouble diagnosis for DTC P0524. Refer to <u>EC-377, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause		
P0011	Intake valve timing control performance (bank 1)		 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve 		
P0021	Intake valve timing control performance (bank 2)	There is a gap between angle of target and phase-control angle degree.	 Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for in- take valve timing control 		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.

VHCL SPEED SE	100 - 120 km/h (63 - 75 mph)
ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 7.3 msec
Selector lever	D position (A/T) 5th position (M/T)

CAUTION:

Always drive at a safe speed.

- 4. Stop vehicle with engine running and let engine idle for 10 seconds.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-185. "Diagnosis Procedure"

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Maintain the following conditions for at least 20 consecutive seconds.

1,700 - 3,175 rpm (A constant rotation is maintained.)

COOLAN TEMP/S	More than 70°C (158°F)		EC
Selector lever	1st or 2nd position	•	
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)		С
CAUTION: Always drive at a 3. Check 1st trip DTC Is 1st trip DTC detected	C		D
	-185, "Diagnosis Procedure"		Ε
Diagnosis Proced	lure	INFOID:00000009360898	F
1. CHECK OIL PRES	SURE WARNING LAMP		
 Start engine. Check oil pressunated. 	re warning lamp and confirm it is not illumi-		G
Is oil pressure warning YES >> Go to LU- NO >> GO TO 2.	7, "Inspection"		Η
			Ι
			J
2. CHECK INTAKE V	ALVE TIMING CONTROL SOLENOID VALVE	PBIA8559J	
Refer to EC-186, "Cor	nponent Inspection".		K
Is the inspection result			
YES >> GO TO 3. NO >> Replace n	nalfunctioning intake valve timing control soleno	id valve	L
`	AFT POSITION SENSOR (POS)		
Refer to <u>EC-309</u> , "Cor			M
Is the inspection result			
YES >> GO TO 4.			
	crankshaft position sensor (POS).		Ν
	T POSITION SENSOR (PHASE)		
Refer to EC-313, "Cor			0
Is the inspection result			
YES >> GO TO 5. NO >> Replace n	nalfunctioning camshaft position sensor (PHASE	Ξ).	Р
	-	/	Γ

5.CHECK CAMSHAFT (INTAKE)

Check the following.

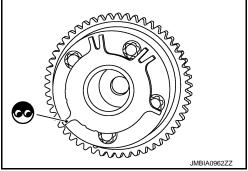
А

< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris on the signal plate of camshaft front end
- Chipping signal plate of camshaft front end

Is the inspection result normal?

- YES >> GO TO 6. NO >> Remove debris and
- NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Refer to <u>EM-90</u>, <u>"Exploded View"</u>.



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-56, "Removal and Installation"</u>.

NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to <u>EM-100, "Inspection"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 8.

NO >> Clean lubrication line.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000009360899

[VQ37VHR]

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 (Ω)
1 and 2	7.0 - 7.7 [at 20°C (68°F)]
1 or 2 and ground	(Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

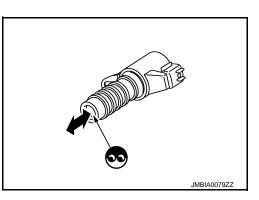
1. Remove intake valve timing control solenoid valve.

 Provide 12 V 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 12 V 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?



< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve.

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P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

Description

INFOID:000000009360900

[VQ37VHR]

SYSTEM DESCRIPTION

Sensor	Sensor Input Signal to ECM		Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS) Engine speed		Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		Tiedlei

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

DTC Logic

INFOID:000000009360901

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031	Air fuel ratio (A/F) sensor 1 heater (bank 1) control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater
P0032	Air fuel ratio (A/F) sensor 1 heater (bank 1) control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is shorted.) A/F sensor 1 heater
P0051	Air fuel ratio (A/F) sensor 1 heater (bank 2) control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater
P0052	Air fuel ratio (A/F) sensor 1 heater (bank 2) control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is shorted.) A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5 V and 16 V 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 EC-189, "Diagnosis Procedure".
- NG >> INSPECTION END

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

[VQ37VHR]

< DTC/CIRCU		•		031,100		SENSOR THEATE	[VQ37VHR]
Diagnosis	Proce	dure					INFOID:00000009360902
1.check ground connection							
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-48, "Circuit Inspection"</u>. <u>Is the inspection result normal?</u> YES >> GO TO 2. 							
NO >> R 2.CHECK AI	•	replace gr RATIO (A			ER SUPP	LY CIRCUIT	C
2. Turn ignit	ion swit	ch ON.		1 harness o or 1 harness		or and ground.	D
DTC		A/F senso	r 1	Ground	Voltag	10	-
	Bank	Connector	Terminal		Volid		_
P0031, P0032	1	F61	4	Ground	Battery v	bltage	F
P0051, P0052	2	F62	4				
<u>Is the inspecti</u> YES >> G	on resu O TO 4						G
	O TO 3						
3.DETECT N	IALFUN		G PART				Н
Check the foll	owing.						
Harness corIPDM E/R h			- 7				
• 15 A fuse (N		connector					
 Harness for 		r short betw	veen A/F	sensor 1 ar	nd fuse		
5							J
	•					UT	
4.CHECK A/			IER OUI	PUT SIGN	AL CIRCU	JI I	К
 Turn ignit Disconne 		ch OFF. harness co	onnector.				
				nsor 1 harne	ess conne	ctor and ECM harness co	
							L
DTC		A/F sensor		EC		Continuity	
	Bank	Connector	Terminal	Connector	Terminal		M
P0031, P0032 P0051, P0052	1	F61 F62	3	F101	1 5	Existed	
		-	-	d and short	-		Ν
Is the inspecti			t to groun	u anu shon	t to power.		11
•	0 TO 5						
_			-	round or sh	nort to pow	er in harness or connecto	ors. O
5. CHECK A/	F SENS	SOR 1 HEA	TER				
Refer to EC-1	90, "Co	mponent Ir	spection"				P
Is the inspection result normal?							
YES >> GO TO 7. NO >> GO TO 6.							
6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1							
			· · /				
Replace malfu	unctioni	ng air fuel i	atio (A/F)	sensor 1.			

CAUTION:

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

- Discard any A/F 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 A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:000000009360903

1.CHECK AIR FUEL RATIO (A/F) SENSOR 1

1. Turn ignition switch OFF.

2. Disconnect A/F sensor 1 harness connector.

3. Check resistance between A/F sensor 1 terminals as follows.

Terminal	Resistance (Ω)
3 and 4	1.8 - 2.44 [at 25°C (77°F)]
3 and 1, 2	~
4 and 1, 2	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any air fuel ratio (A/F) 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 air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

P0037, P0038, P0057, P0058 HO2S2 HEATER

Description

SYSTEM DESCRIPTION

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

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	Heated oxygen sensor 2 heater	F
Above 3,600 rpm	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	G

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name DTC detecting condition		Possible cause
P0037	Heated oxygen sensor 2 heater (bank 1) 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
P0038	Heated oxygen sensor 2 heater (bank 1) control circuit high	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) Heated oxygen sensor 2 heater
P0057	Heated oxygen sensor 2 heater (bank 2) 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
P0058	Heated oxygen sensor 2 heater (bank 2) control circuit high	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Turn ignition switch OFF and wait at least 10 seconds. 1.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at idle.

>> GO TO 2.

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P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. Check 1st trip DTC.

Is 1st tip DTC detected?

YES >> Go to EC-192, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between HO2S2 harness connector and ground.

DTC	HO2S2			Ground	Voltage
ыс	Bank	Connector	Terminal	Gibunu	voltage
P0037, P0038	1	F60	2	Ground	Battery voltage
P0057, P0058	2	F59	2	Orbana	Dattery Voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- IPDM E/R harness connector E7
- 15 A fuse (No. 46)

• Harness for open or short between heated oxygen sensor 2 and fuse

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

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

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

DTC	HO2S2			E	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0037, P0038	1	F60	3	F101	17	Existed
P0057, P0058	2	F59	3	1 101	33	LAISIEU

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

P	0037, P0038, P0057, P0058 HO2S2 HEAT	
< DTC/CIRCUIT DIAGNO)SIS >	[VQ37VHR]
Is the inspection result not	mal?	
YES >> GO TO 5. NO >> Repair open of	ircuit, short to ground or short to power in harness or c	onnectors
_ · · · · · · · · ·	GEN SENSOR 2 HEATER	
Refer to <u>EC-193, "Compo</u>	· · · · · · · · · · · · · · · · · · ·	
<u>s the inspection result no</u> YES >> GO TO 7.		
NO >> GO TO 6.		
3. REPLACE HEATED OX	XYGEN SENSOR 2	
Replace malfunctioning he		
CAUTION:		
Before installing new	such as a concrete floor; use a new one. heated oxygen sensor, clean exhaust system thre hercial service tool (J-43897-18 or J-43897-12)] and ice tool).	
>> INSPECTION	FND	
7. CHECK INTERMITTEN		
Refer to <u>GI-45, "Intermitte</u>		
>> INSPECTION	END	
Component Inspection	วท	INFOID:00000009360907
1 .CHECK HEATED OXY	GEN SENSOR 2 HEATER	
	FF. ygen sensor 2 harness connector. veen HO2S2 terminals as follows.	
Terminal	Resistance (Ω)	
2 and 3	3.4 - 4.4 [at 25°C (77°F)]	
1 and 2, 3, 4	∞ (Constinuity should not quist)	
4 and 1, 2, 3	(Continuity should not exist)	
Is the inspection result not		
YES >> INSPECTION NO >> GO TO 2.		
2.REPLACE HEATED O	YGEN SENSOR 2	
Replace malfunctioning he	ated oxygen sensor 2.	
CAUTION:		
in) onto a hard surface	ygen sensor which has been dropped from a heigh such as a concrete floor; use a new one. oxygen sensor, clean exhaust system threads usi	

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0075, P0081 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.

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 DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075	Intake valve timing control so- lenoid valve (bank 1) circuit	An improper voltage is sent to the ECM	Harness or connectors (Intake valve timing control solenoid
P0081	Intake valve timing control so- lenoid valve (bank 2) circuit	through intake valve timing control solenoid valve.	valve circuit is open or shorted.)Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

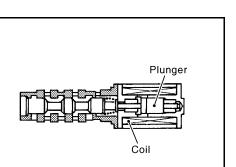
- YES >> Go to EC-194, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009360910

$1. \mathsf{CHECK} \text{ intake valve timing control solenoid valve power supply circuit}$

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between intake valve timing (IVT) control solenoid valve harness connector and ground.



[VQ37VHR]

INFOID:000000009360908

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P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	IVT	control solen	oid valve			_
DTC	Bank	Connector	Terminal	Ground	Voltage	
P0075	1	F28	2	Oneveral	Dattanuska	
P0081	2	F29	2	Ground	Battery voltag	ge
YES > NO > 2.DETEC Check the Harness Harness 3.CHECH AND SHO 1. Turn i 2. Disco	> GO To > GO To T MALE followir connect for ope > Repai (INTAK RT gnition sonnect E0	D 2. FUNCTION g. tors E3, F1 n or short b r open circu E VALVE T witch OFF. CM harness	ING PART etween inta uit, short to g IMING CON	ground or ITROL SO	short to pow OLENOID VA	ol solenoid valve and IPDM E/R ver in harness or connectors. ALVE OUTPUT SIGNAL CIRCUIT FOR OPE
ness o	connecto	•		1	ECM	olenoid valve harness connector and ECM ha
DTC	Ba			Connecto	-	- Continuity
P0075	1	F28	1	– F101	18	Existed
P0081	2	F29	1		29	
YES > NO > I.CHECP Refer to <u>E</u> s the insp YES > NO > I.CHECP	> GO T > Repai (INTAK <u>C-195, '</u> <u>ection r</u> > GO T > Repla (INTER	r open circu E VALVE T Componen esult norma D 5. ce malfunc MITTENT I	uit, short to g IMING CON <u>t Inspection</u> I? tioning intak NCIDENT	TROL SC	DLENOID VA	ver in harness or connectors. ALVE solenoid valve.
Refer to <u>G</u>	<u>I-45, "In</u>	termittent l	ncident".			
>	> INSPI	ECTION EN	ID			
Compor	ent In	spection				INF0/D:000000093603
		•	IMING CON	ITROL SC	DLENOID VA	ALVE-I
2. Disco	nnect in					ess connector. noid valve terminals as follows.

3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance (Ω)
1 and 2	7.0 - 7.7 [at 20°C (68°F)]
1 or 2 and ground	(Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve.

 $2. {\sf CHECK} \text{ intake valve timing control solenoid valve-ii}$

1. Remove intake valve timing control solenoid valve.

2. Provide 12 V 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:

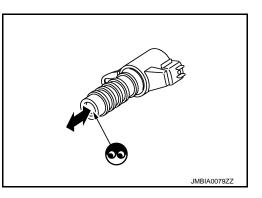
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve.

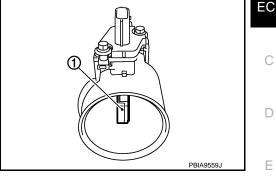


P0101, P010B MAF SENSOR

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 greater air flow, 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.



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DTC Logic

DTC DETECTION LOGIC **NOTE**:

If DTC P0101 or P010B is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0101	MAF SEN/CIRCUIT-B1 (Mass air flow sensor (bank 1) circuit range/performance)	 A high voltage from the sensor is sent to ECM under light load driving condition. 	 Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor (bank 1) EVAP control system pressure sensor Intake air leaks Intake air temperature sensor
P010B	MAF SEN/CIRCUIT-B2 (Mass air flow sensor (bank 2) circuit range/performance)	 A low voltage from the sensor is sent to ECM under heavy load driving condition. 	 Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor (bank 2) EVAP control system pressure sensor Intake air leaks Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead ${}^{\rm M}$ of running engine at idle speed.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

2. Drive the vehicle for at least 5 seconds under the following conditions:

CAUTION:

Always drive at a safe speed.

Selector lever	Suitable position
Vehicle speed	40 km/h (25 MPH) or more

NOTE:

- The gear must be fixed while driving the vehicle.
- Keep the accelerator pedal as steady as possible during cruising.
- 3. Check 1st trip DTC.

EC-197

2014 370Z

Is 1st trip DTC detected?

- YES >> Proceed to EC-198, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK INTAKE SYSTEM

Check the following for connection.

Air duct

Vacuum hoses

• Intake air passage between air duct and intake manifold

Is the inspection result normal?

YES >> GO TO 2.

NO >> Reconnect the parts.

2. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.

2. Turn ignition switch ON.

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

DTC	I	Mass air flow s	sensor	Ground	Voltage	
DIC	Bank	Connector	Terminal	Giouna		
P0101	1	F31	5	Ground	Battery voltage	
P010B	2	F42	5	Giounu	Ballery Vollage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors E106, M6

• Harness connectors M116, F103

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

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

4.CHECK MASS AIR FLOW 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.

DTC	N	lass air flow s	ensor	EC	M	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0101	1	F31	4	F102	68	Existed
P010B	2	F42	4	1102	94	LAISIEU

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, short to ground or short to power in harness or connectors.

 ${f 5.}$ CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

EC-198

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

DTC	Ν	Aass air flow s	ensor	EC	CM	Continuity		
ВТО	Bank	Connector	Terminal	Connector	Terminal	Continuity		
P0101	1	F31	3	F102	77	Existed		
P010B	2	F42	3		79			
		harness fo		ground an	d short to	power.		
		n result nor	mal?					
) TO 6. pair open ci	ircuit sho	rt to aroun	d or short	to power in har	mess or connectors.	
<u>~</u>		AKE AIR TI		-				
						Component Ins	nection"	
		n result nor			LO-210,	<u>component ins</u>	<u>pection</u> .	
	-) TO 7.						
NO	>> Re	place mass	air flow s	ensor (with	n intake ai	r temperature s	sensor).	
7.снес	CK EVA		OL SYST	EM PRES	SURE SEI	NSOR		
Refer to	EC-34	3, "Compor	ent Inspe	ction".				
<u>Is the ins</u>	pectio	n result nor	mal?					
		20101 is de						
		2010B is de place EVAF			ssure sen	sor		
~		SS AIR FLO				301.		
				•		Component Inc	naction"	
		n result nor	•). Relef to	<u>EC-199,</u>	Component Ins	spection.	
				ent. Refer	to GI-45.	Intermittent Inc	cident".	
		place mass					<u>indonte</u> i	
9. CHEC	K MA	SS AIR FLO	OW SENS	OR (BAN	< 2)			
Check m	ass air	flow senso	or (bank 2). Refer to	EC-199, "	Component Ins	spection".	
		n result nor	•			·		
						Intermittent Inc	<u>cident"</u> .	
NO	>> Re	place mass	air flow s	ensor (bar	nk 2).			
Compo	nent	Inspectio	on					INFOID:000000009360915
1 CHEC		SS AIR FLO						
			JVV SEINS					
With C		JLT n switch Of	==					
		all harness		ors disconr	nected.			
3. Start		e and warm						
		ONSULT ar S A/F SF-F				iode. I check the indi	cation	
Monitor	item			Conditio	n		Indication (V)	
		Ignition switc						
	L		h ON (Engii	ne stopped.)			Approx. 0.4	
MAS A/F	SE-B1	Idle (Engine			operating ter	nperature.)	Approx. 0.4 0.7 - 1.2	

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

Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.

Idle to about 4,000 rpm

0.7 - 1.2 to Approx. 2.4*

< DTC/CIRCUIT DIAGNOSIS >

- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM			
Connector	+	-	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77 [MAF sensor (bank 1)	68	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	signal]	08	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79	94	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 2) signal]	94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: 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 >> 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 the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Intake valve deposits
- 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

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

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

Without CONSULT

- 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 under the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	ECM				
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
			Ignition switch ON (Engine	stopped.)	Approx. 0.4
	77 [MAF sensor (bank 1)	68	Idle (Engine is warmed-up to ing temperature.)	o normal operat-	0.7 - 1.2
	signal]	00	2,500 rpm (Engine is warme operating temperature.)	ed-up to normal	1.3 - 1.7
F102			Idle to about 4,000 rpm		0.7 - 1.2 to Approx. 2.4*
FIUZ	79 [MAF sensor (bank 2) 94 signal]		Ignition switch ON (Engine s	stopped.)	Approx. 0.4
		04	Idle (Engine is warmed-up to ing temperature.)	o normal operat-	0.7 - 1.2
			94	2,500 rpm (Engine is warme operating temperature.)	ed-up to normal
			Idle to about 4,000 rpm		0.7 - 1.2 to Approx. 2.4*
NO >: 4.CHECK	> INSPECTION EN > GO TO 4. (MASS AIR FLOW DNSULT gnition switch OFF.				
2. Discor 3. Start e 4. Conne	nect mass air flow engine and warm it u ect CONSULT and s	ip to normal ope elect "DATA MO	connector and reconnect i rating temperature. NITOR" mode. E-B2", and check the indic	-	
Monitor ite	em	Conditio	n	Indication	(V)
	Ignition switch OI	N (Engine stopped.)		Approx. 0	.4
MAS A/F SI	E-B1 Idle (Engine is wa	armed-up to normal	operating temperature.)	0.7 - 1.2	2
MAS A/F SI		e is warmed-up to n	ormal operating temperature.)	1.3 - 1.7	,
	Idle to about 4,00	0		0.7 - 1.2 to App	

Without CONSULT

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 terminals under the following conditions.

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< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	-	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77	68	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 1) signal]	68	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79	04	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 2) signal]	94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: 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 malfunctioning mass air flow sensor.

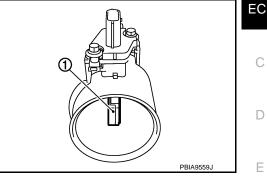
< DTC/CIRCUIT DIAGNOSIS >

P0102, P0103, P010C, P010D 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

Trouble diagnosis DTC No. DTC detecting condition Possible cause name Harness or connectors Mass air flow sensor An excessively low voltage from the sensor is sent (The sensor circuit is open or shorted.) P0102 (bank 1) circuit low to ECM. Intake air leaks input Mass air flow sensor Mass air flow sensor · Harness or connectors An excessively high voltage from the sensor is P0103 (bank 1) circuit high (The sensor circuit is open or shorted.) sent to ECM. input · Mass air flow sensor · Harness or connectors Mass air flow sensor An excessively low voltage from the sensor is sent (The sensor circuit is open or shorted.) P010C (bank 2) circuit low to ECM. · Intake air leaks input · Mass air flow sensor Mass air flow sensor · Harness or connectors An excessively high voltage from the sensor is P010D (bank 2) circuit high (The sensor circuit is open or shorted.) sent to ECM. Mass air flow sensor input

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

Which DTC is detected?

P0102, P010C>>GO TO 2. P0103, P010D>>GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102 AND P010C

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

Is 1st trip DTC detected?

YES >> Go to EC-204, "Diagnosis Procedure".

NO >> INSPECTION END

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-I

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

2. Check DTC.

EC-203

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P0102, P0103, P010C, P010D MAF SENSOR [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Is DTC detected? YES >> Go to EC-204, "Diagnosis Procedure". NO >> GO TO 4. 4. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-II Start engine and wait at least 5 seconds. 2. Check DTC. Is DTC detected? YES >> Go to EC-204, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:000000009360918 **1.**INSPECTION START Confirm the detected DTC. Which DTC is detected? P0102, P010C>>GO TO 2. P0103, P010D>>GO TO 3. 2.CHECK INTAKE SYSTEM

Check the following for connection.

Air duct

Vacuum hoses

Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.

NO >> Reconnect the parts.

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.

2. Turn ignition switch ON.

3. Check the voltage between MAF sensor harness connector and ground.

DTC		MAF sens	or	Ground	Voltage
ыс	Bank	Connector	Terminal	Ciouna	voltage
P0102, P0103	1	F31	5	Ground	Battery voltage
P010C, P010D	2	F42	5	Giouna	Ballery vollage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E106, M6

• Harness connectors M116, F103

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

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

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

EC-204

< DTC/CIRCUIT DIAGNOSIS >

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC		MAF sense	or	EC	CM	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity		
P0102, P0103	1	F31	4	F102	68	Existed		
P010C, P010D	2	F42	4	1102	94	Existed		
. Also chec			rt to grour	nd and sho	ort to powe	er.		
s the inspecti								
	O TO 7 enair o		short to a	around or s	short to po	wer in harn	ss or connectors.	
	•	-		-	•			
. Check the	contin		EN MAF S	ensor narn	iess conne	ector and E	M harness connector.	
		MAF sense	or	EC	CM			
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity		
P0102, P0103	1	F31	3	E 400	77	- · · · ·		
P010C, P010D	2	F42	3	F102	79	Existed		
. Also chec	k harne	ess for sho	rt to grour	nd and sho	ort to powe	er.		
s the inspecti	on resu	<u>ilt normal?</u>						
	0 T O 8							
~	•	-		ground or s	snort to po	wer in harn	ss or connectors.	
3. CHECK M/	ASS AI	R FLOW S	ENSOR					
Refer to EC-2		-	nspection	<u>.</u>				
s the inspecti								
YES >> G	O TO 9).						
		malfunctio	ning mag	a air flow o	onsor			

9.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT 1. Turn ignition sv

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected. 2.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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

Without CONSULT

- 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 under the following conditions.

	ECM			
Connector	+	-	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77	68	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 1) signal]	00	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79	04	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 2) signal]	94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: 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 >> 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 the 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

(B) With CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

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

Without CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.

EC-206

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+	-	Condition		Voltage (V)
Connector	Terminal	Terminal			
			Ignition switch ON (Engine st	opped.)	Approx. 0.4
	77 [MAF sensor (bank 1)	68	Idle (Engine is warmed-up to ing temperature.)	normal operat-	0.7 - 1.2
	signal]	00	2,500 rpm (Engine is warmed operating temperature.)	l-up to normal	1.3 - 1.7
F102			Idle to about 4,000 rpm		0.7 - 1.2 to Approx. 2.4*
FTUZ			Ignition switch ON (Engine st	opped.)	Approx. 0.4
	79 [MAF sensor (bank 2)	94	Idle (Engine is warmed-up to ing temperature.)	normal operat-	0.7 - 1.2
	signal]	94	2,500 rpm (Engine is warmed operating temperature.)	l-up to normal	1.3 - 1.7
			Idle to about 4,000 rpm		0.7 - 1.2 to Approx. 2.4*
With CO		SENSOR-III			
With CO . Turn ig 2. Discord 3. Start e 4. Conne	DNSULT gnition switch OFF. nnect mass air flow engine and warm it u ect CONSULT and s	sensor harness up to normal ope elect "DATA MC	connector and reconnect it erating temperature. NITOR" mode. E-B2", and check the indica	-	
With CO With CO Discord Start e Conne	DNSULT gnition switch OFF. nect mass air flow engine and warm it u ect CONSULT and s "MAS A/F SE-B1" a	sensor harness up to normal ope elect "DATA MC	erating temperature. NITOR" mode. E-B2", and check the indica	-	
With CO Turn ig Discor Start e Conne Select	DNSULT gnition switch OFF. nnect mass air flow engine and warm it us ect CONSULT and s "MAS A/F SE-B1" a	sensor harness up to normal ope elect "DATA MC and "MAS A/F S	erating temperature. NITOR" mode. E-B2", and check the indica	ition.	
With CO Turn ig Discor Start e Conne Select	DNSULT gnition switch OFF. nect mass air flow engine and warm it u ect CONSULT and s "MAS A/F SE-B1" a em	sensor harness up to normal ope elect "DATA MC and "MAS A/F S Conditic V (Engine stopped.)	erating temperature. NITOR" mode. E-B2", and check the indica	tion.).4
With CO Turn ig Discor Start e Conne Select	DNSULT gnition switch OFF. nnect mass air flow engine and warm it used ect CONSULT and s "MAS A/F SE-B1" a em Ignition switch OI E-B1 Idle (Engine is water)	sensor harness up to normal ope elect "DATA MC and "MAS A/F S Conditic V (Engine stopped.) armed-up to normal	erating temperature. NITOR" mode. E-B2", and check the indica	Indication).4 2
With CO . Turn ig . Discor . Start e . Conne . Select Monitor it	DNSULT gnition switch OFF. nnect mass air flow engine and warm it used ect CONSULT and s "MAS A/F SE-B1" a em Ignition switch OI E-B1 Idle (Engine is water)	sensor harness up to normal ope elect "DATA MC and "MAS A/F S Condition N (Engine stopped.) armed-up to normal e is warmed-up to r	erating temperature. DNITOR" mode. E-B2", and check the indication on operating temperature.) normal operating temperature.)	Indication Approx. 0 0.7 - 1.2).4 2 7
With CO Turn ig Discor Start e Conne Select Monitor it MAS A/F S MAS A/F S MAS A/F S *: Chec Withou Turn ig Start e	DNSULT gnition switch OFF. nnect mass air flow engine and warm it used ect CONSULT and s "MAS A/F SE-B1" a em Ignition switch OI E-B1 Idle (Engine is wathout a structure) 2,500 rpm (Engine) Idle to about 4,000 k for linear voltage rise in the structure of the stru	sensor harness up to normal ope elect "DATA MC and "MAS A/F S Condition (Engine stopped.) armed-up to normal e is warmed-up to normal o rpm n response to engine sensor harness up to normal ope	erating temperature. DNITOR" mode. E-B2", and check the indication on operating temperature.) normal operating temperature.)	ttion. Indication Approx. 0 0.7 - 1.2 1.3 - 1.7 0.7 - 1.2 to App rpm. again.).4 2 7 prox. 2.4*

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	ECM			
Connector	+	-	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77 [MAF sensor (bank 1) 68 signal]	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2	
		68	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
FIUZ		Ignition switch ON (Engine stopped.)	Approx. 0.4	
	79	04	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 2) 94 signal]		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: 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 malfunctioning mass air flow sensor.

< DTC/CIRCUIT DIAGNOSIS >

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

Description

The manifold absolute pressure (MAP) sensor is placed at intake manifold collector. It detects intake manifold pressure and sends the voltage signal to the ECM.

The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.

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DTC Logic

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DTC DETECTION LOGIC

NOTE:

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-393, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P010A	Manifold absolute pressure sensor circuit	 An excessively low voltage from the sensor is sent to ECM. An excessively high voltage from the sensor is sent to ECM. 	 Harness or connectors (The sensor circuit is open or shorted.) Manifold absolute pressure (MAP) sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Start engine and let it idle for 10 seconds. 1.

2. Check DTC.

Is DTC detected?

>> Go to EC-209, "Diagnosis Procedure". YES

>> INSPECTION END NO

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- Turn ignition switch OFF. 1.
- Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection". 2.

Is the inspection result normal?

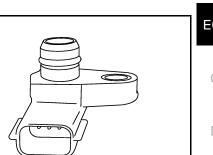
YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK MAP SENSOR POWER SUPPLY CIRCUIT

Disconnect manifold absolute pressure (MAP) sensor harness connector. 1.

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< DTC/CIRCUIT DIAGNOSIS >

2. Turn ignition switch ON.

3. Check the voltage between MAP sensor harness connector and ground.

MAP	sensor	Ground	Voltage (V)
Connector	Terminal	Ground	voltage (v)
F50	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between MAP sensor harness connector and ECM harness connector.

MAP	MAP sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F50	3	F102	96	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

 ${f 4.}$ CHECK MAP SENSOR INTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

MAP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	2	F101	38	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK MAP SENSOR

Refer to EC-210, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace MAP sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK MAP SENSOR-I

1. Turn ignition switch OFF.

- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 4. Check the voltage between ECM harness connector terminals as follows.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

ECM			
+		-	_
Connector	Terminal	Connector	Terminal
F101	38	F102	96

NOTE:

- To avoid the influence of intake manifold vacuum, check the voltage 1 or more minutes past after engine (is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.
- 5. Measure the atmospheric pressure.

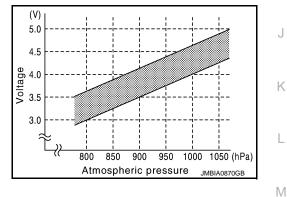
NOTE:

As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the pressure with the following chart.

Compensated pressure (hPa)
0
-24
-47
-70
-92
-114
-168
-218

6. Check the manifold absolute pressure sensor value corresponding to the atmospheric pressure.

Atmospheric pressure (hPa)	Voltage (V)
800	3.1 – 3.7
850	3.3 - 3.9
900	3.5 – 4.1
950	3.8 - 4.3
1000	4.0 - 4.6
1050	4.2 - 4.8



Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace MAP sensor.

2.CHECK MAP SENSOR-II

- 1. Start engine and let it idle.
- 2. Check intake manifold vacuum.

3. Check the voltage between ECM harness connector terminals as per the following.

ECM			
+		-	_
Connector	Terminal	Connector	Terminal
F101	38	F102	96

4. Confirm the difference of the voltage when engine is stopped and at idling is within the values shown in the following chart.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Intake manifold vacuum [kPA (mmHg)]	Voltage difference (V)
-40 (-300)	1.5 – 2.0
-53.3 (-400)	2.0 - 2.6
-66.7 (-500)	2.6 - 3.2
-80 (-600)	3.2 - 3.8

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace MAP sensor.

P0111 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0111 IAT SENSOR

DTC Logic

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INFOID:000000009360924

[VQ37VHR]

DTC DETECTION LOGIC

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DTC No.	Trouble diagnosis	DTC detecting condition	Possible cause
P0111	(Trouble diagnosis content) IAT SENSOR 1 B1 [Intake air temperature (IAT) sensor circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor is higher/ lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the IAT sensor circuit) IAT sensor
	NFIRMATION PROCEDUR	E	
YES NO	ssary to erase permanent DTC >> GO TO 3. >> GO TO 2. ORM COMPONENT FUNCTIC		
Perform	component function check. Ref	er to EC-214, "Component Function Check	,II
1st trip D Is the ins YES NO	component function check to cl TC might not be confirmed. <u>pection result normal?</u> >> INSPECTION END >> Proceed to <u>EC-214, "Diagn</u> CONDITIONING	neck the overall function of the IAT sensor	circuit. During this check, a
lf DTC C dure befo 1. Turn		has been previously conducted, always p t least 10 seconds.	erform the following proce-
 Turn TESTING Before Before 	ignition switch OFF and wait a CONDITION: performing the following pro- performing the following pro-		
	>> GO TO 4.		
	ORM DTC CONFIRMATION P		_
	engine and let it idle for 60 mir e the vehicle to a cool place. E:	nutes.	
3. Turn CAU	ignition switch OFF and soak t TION:		(14°F) and 35°C (95°F).
NOT The	vehicle must be cooled with the	e food open.	
CAU	engine and let it idle for 5 minu TION:		

- Never turn ignition switch OFF during idling.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-214, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

1. Turn ignition switch OFF.

2. Disconnect mass air flow sensor (bank 1) harness connector.

3. Check resistance between mass air flow sensor (bank 1) terminals as follows.

Terminals	Condition	Resistance (k Ω)	
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 – 2.200

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to <u>EC-214, "Diagnosis Procedure"</u>.

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-214, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

Check intake air temperature sensor. Refer to EC-214, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to <u>EM-31,</u> <u>"Exploded View"</u>.

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor (bank 1) harness connector.
- 3. Check resistance between mass air flow sensor (bank 1) terminals as follows.

Terminals	Condition	Resistance (k Ω)	
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 – 2.200

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to <u>EM-31</u>. <u>"Exploded View"</u>.

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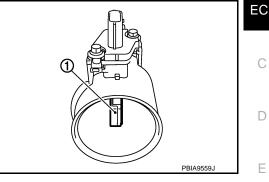
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P0112, P0113 IAT SENSOR

Description

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

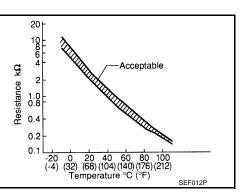
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)	
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 terminals 67 (Intake air temperature sensor) and 68 (Sensor ground).



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DTC Logic

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> 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 EC-216, "Diagnosis Procedure".
- NO >> INSPECTION END

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P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

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1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

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 (MAF) sensor (bank 1) (intake air temperature sensor is built-into) harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between mass air flow sensor (bank 1) harness connector and ground.

MAF sensor (bank 1)		Ground	Voltage (V)
Connector	Terminal	Ciouna	voltage (v)
F31	2	Ground	Approx. 5

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 INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between mass air flow sensor (bank 1) harness connector and ECM harness connector.

MAF sensor (bank 1)		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F31	1	F102	68	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 AIR TEMPERATURE SENSOR

Refer to EC-216, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor).

5.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor (bank 1) harness connector.
- 3. Check resistance between mass air flow sensor (bank 1) terminals as follows.

EC-216

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

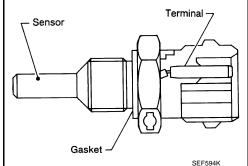
nals	Condition		Resistance (k Ω)	
2	Temperature °C (°F)	25 (77)	1.800 - 2.200	
>>	ion result normal? NSPECTION END			
>> F	Replace mass air flo	ow senso	r (with intake air te	mperature sensor) (bank

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P0116 ECT SENSOR

Description

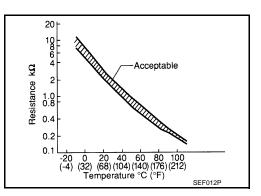
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
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 terminals 71 (Engine coolant temperature sensor) and 84 (Sensor ground).



INFOID:000000009360933

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC [Engine coolant temperature (ECT) sensor circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor is higher/ lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the ECT sensor circuit) ECT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 3. NO

>> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-219, "Component Function Check".

NOTE:

Use the component function check to check the overall function of the ECT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

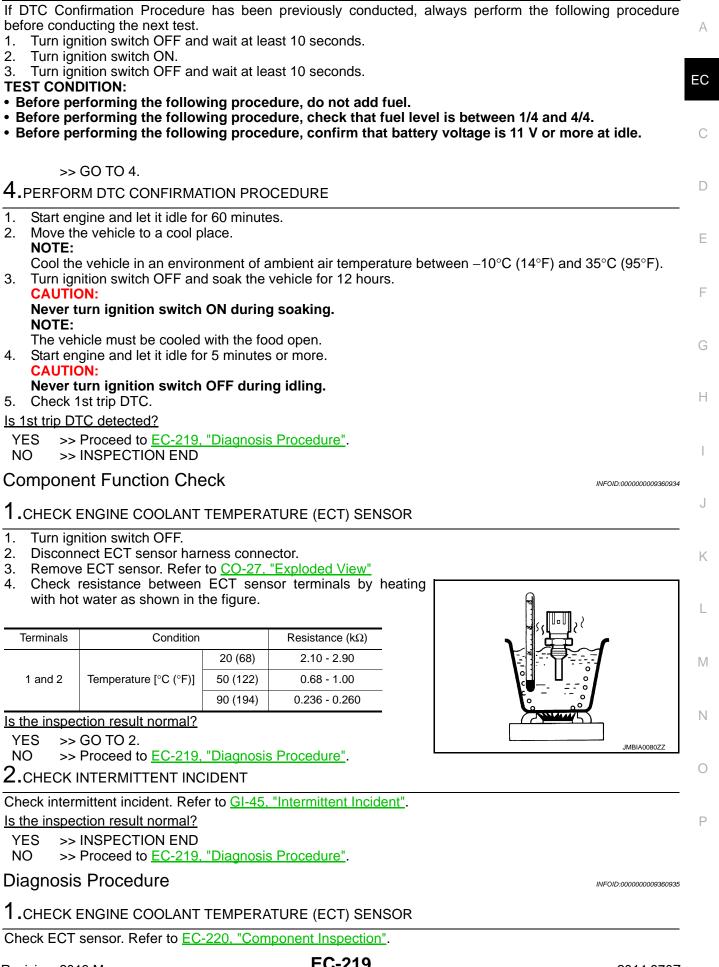
- YES >> INSPECTION END
- NO >> Proceed to EC-219, "Diagnosis Procedure".

3.PRECONDITIONING

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]



Revision: 2013 May

Is the inspection result normal?

OK >> GO TO 2.

NG >> Replace ECT sensor. Refer to <u>CO-27</u>, "Exploded View".

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

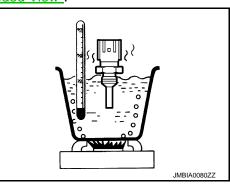
1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-27, "Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
		20 (68)	2.10 - 2.90
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

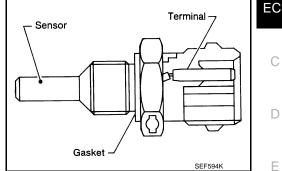
- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor.



P0117, P0118 ECT SENSOR

Description

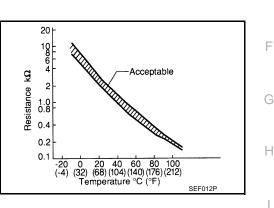
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
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 terminals 71 (Engine coolant temperature sensor) and 84 (Sensor ground).



DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The concert errorities open or shorted)	
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	(The sensor circuit is open or shorted.)Engine coolant temperature sensor	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> 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 EC-222, "Diagnosis Procedure".
- NO >> INSPECTION END

[VQ37VHR]

Diagnosis Procedure

INFOID:000000009360939

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect engine coolant temperature (ECT) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECT sensor harness connector and ground.

ECT	sensor	Ground	Voltage (V)
Connector	Terminal	Glound	voltage (v)
F17	1	Ground	Approx. 5

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F106, F107

• Harness for open or short between engine coolant temperature sensor and ECM

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

4.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT :	sensor	E	CM	Continuity	
Connector	Terminal	Connector Terminal		Continuity	
F17	2	F102	84	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, short to ground or short to power in harness or connectors.

5.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-223, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace engine coolant temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

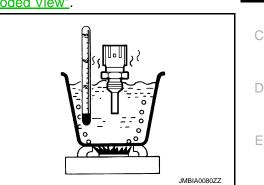
$1. {\sf CHECK} \ {\sf Engine} \ {\sf COOLANT} \ {\sf TEMPERATURE} \ {\sf SENSOR}$

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to <u>CO-27, "Exploded View"</u>.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance ($k\Omega$)
		20 (68)	2.10 - 2.90
1 and 2	Temperature °C (°F)	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor.





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P0122, P0123, P0227, P0228 TP SENSOR

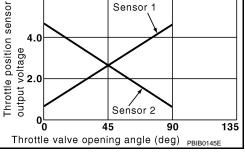
< DTC/CIRCUIT DIAGNOSIS >

P0122, P0123, P0227, P0228 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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls throttle valve opening angle in response to driving conditions via the throttle control motor.



Throttle position sensor

Sensor 1

6.0

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0122, P0123, P0227 or P0228 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-393, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 (bank 1) circuit low in- put	An excessively low voltage from the TP sensor 2 is sent to ECM.	
P0123	Throttle position sensor 2 (bank 1) circuit high in- put	An excessively high voltage from the TP sensor 2 is sent to ECM.	 Harness or connectors (TP sensor 2 circuit is open or shorted.)
P0227	Throttle position sensor 2 (bank 2) circuit low in- put	An excessively low voltage from the TP sensor 2 is sent to ECM.	 Electric throttle control actuator (TP sensor 2)
P0228	Throttle position sensor 2 (bank 2) circuit high in- put	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Turn ignition switch OFF and wait at least 10 seconds. 1.

2. Turn ignition switch ON.

Turn ignition switch OFF and wait at least 10 seconds. 3

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- Check DTC. 2.

Is DTC detected?

- >> Go to EC-225, "Diagnosis Procedure". YES
- NO >> INSPECTION END

INFOID:000000009360941

P0122, P0123, P0227, P0228 TP SENSOR

[VQ37VHR]

DTC/CIRCU	JIT DIA	AGNOSIS	>				[VQ37VHR]
Diagnosis	Proce	dure					INFOID:00000009360943
.CHECK GI	ROUNE		TION				
the inspecti YES >> G NO >> R	ound co <u>on resu</u> O TO 2 epair o	onnection N <u>ult normal?</u> 2. r replace g	round cor	nnection.			rcuit Inspection".
						PLY CIRCUIT	
Turn ignit	on swi						nector and ground.
	Elect	ric throttle co	ntrol actuato				
DTC	Bank	Connector	Termina	Ground	Voltage (V)	
P0122, P0123	1	F6	6	Ground	Approx.	5	
P0227, P0228	2	F27	1	Croana	Approx.	<u> </u>	
	on resu	<u>ult normal?</u>					
YES >> G	о то з		short to	ground or s	short to po	wer in harness	or connectors.
YES >> G NO >> R •CHECK TH Turn ignit Disconne	O TO 3 epair o IROTT ion swit	pen circuit, LE POSITI tch OFF. I harness c	ON SENS	SOR 2 GR	OUND CII	RCUIT FOR OF	or connectors. PEN AND SHORT
YES >> G NO >> R •CHECK TH Turn ignit Disconne Check the	O TO 3 epair o IROTT ion swit ct ECM e contir	pen circuit, LE POSITI tch OFF. I harness c nuity betwe	ON SENS connector. en electri	SOR 2 GR	OUND CII	RCUIT FOR OF	PEN AND SHORT
YES >> G NO >> R •CHECK TH Turn ignit Disconne Check the	O TO 3 epair o IROTT ion swit ct ECM e contir	pen circuit, LE POSITI tch OFF. I harness c	ON SENS connector. en electri	SOR 2 GR	OUND CII	RCUIT FOR OF	PEN AND SHORT
YES >> G NO >> R •.CHECK TH Turn ignit Disconne Check the nector.	O TO 3 epair o IROTT on swit ct ECM e contir	pen circuit, LE POSITI tch OFF. I harness c nuity betwe	ON SENS connector. en electri	SOR 2 GR c throttle c EC Connector	OUND CII	CUIT FOR OF	PEN AND SHORT
YES >> G NO >> R .CHECK TH . Turn ignit . Disconne . Check the nector.	O TO 3 epair o IROTT ion swit ct ECM e contir Electric Bank	pen circuit, LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector	ON SENS connector. en electri rol actuator Terminal	SOR 2 GR	OUND CII	RCUIT FOR OF	PEN AND SHORT
YES >> G NO >> R •CHECK TH • Disconne • Check the nector. DTC P0122, P0123 P0227, P0228 • Also check • the inspection YES >> G	O TO 3 epair o IROTT on swit ct ECM e contir Bank 1 2 k harne on resu O TO 2	pen circuit, LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector F6 F27 ess for sho ult normal?	ON SENS connector. en electri rol actuator Terminal 3 4 rt to groun	C throttle c Connector F101 nd and sho	OUND CII ontrol actor CM Terminal 40 48 vrt to powe	CUIT FOR OF	Connector and ECM harness con-
YES >> G NO >> R CHECK TH Disconne Check the nector. DTC P0122, P0123 P0227, P0228 Also chec Sthe inspecti YES >> G NO >> R	O TO 3 epair o IROTT ion swit ct ECM e contir Bank 1 2 k harne on resu O TO 2 epair o	pen circuit, LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector F6 F27 ess for sho <u>ult normal?</u> 4. pen circuit,	ON SENS connector. en electri rol actuator Terminal 3 4 rt to groun	SOR 2 GR c throttle c Connector F101 nd and sho	OUND CII ontrol acto CM Terminal 40 48 rt to powe	CUIT FOR OF	PEN AND SHORT
YES >> G NO >> R •CHECK TH Turn ignit Disconne Check the nector. DTC P0122, P0123 P0227, P0228 Also chec the inspecti YES >> G NO >> R •CHECK TH	O TO 3 epair o IROTT ion swit ct ECM e contir Bank 1 2 k harne on resu 0 TO 2 epair o IROTT	pen circuit, LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector F6 F27 ess for sho <u>ult normal?</u> 4. pen circuit, LE POSITI	ON SENS connector. en electri rol actuator Terminal 3 4 rt to groun short to g ON SENS	SOR 2 GR c throttle c Connector F101 nd and sho ground or s SOR 2 INP	OUND CII ontrol acto CM Terminal 40 48 rt to powe short to po UT SIGN/	CUIT FOR OF	PEN AND SHORT
YES >> G NO >> R •CHECK TH Disconne Check the nector. DTC P0122, P0123 P0227, P0228 Also check the inspecti YES >> G NO >> R •CHECK TH • Check the nector.	O TO 3 epair o IROTT ion swift ct ECM e contir Bank 1 2 k harne O TO 2 epair o IROTT e contir	pen circuit, LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector F6 F27 ess for sho <u>ult normal?</u> 4. pen circuit, LE POSITI	ON SENS connector. en electri rol actuator Terminal 3 4 rt to groun short to g ON SENS en electri	C throttle c c throttle c Connector F101 nd and sho ground or s SOR 2 INP c throttle c	OUND CII ontrol acto CM Terminal 40 48 rt to powe short to po UT SIGN/	CUIT FOR OF uator harness of Continuity Existed er. Ower in harness AL CIRCUIT FO uator harness of	PEN AND SHORT connector and ECM harness con-
YES >> G NO >> R •CHECK TH Disconne Check the nector. DTC P0122, P0123 P0227, P0228 Also check the inspecti YES >> G NO >> R •CHECK TH Check the	O TO 3 epair o IROTT ion swift ct ECM e contir Bank 1 2 k harne O TO 2 epair o IROTT e contir	pen circuit, LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector F6 F27 ess for sho <u>ult normal?</u> 4. pen circuit, LE POSITI nuity betwe	ON SENS connector. en electri rol actuator Terminal 3 4 rt to groun short to g ON SENS en electri	C throttle c c throttle c Connector F101 nd and sho ground or s SOR 2 INP c throttle c	OUND CII ontrol acto CM Terminal 40 48 rt to powe short to po UT SIGN/ ontrol acto	CUIT FOR OF	PEN AND SHORT connector and ECM harness con-
YES >> G NO >> R •CHECK TH • Turn ignit • Disconne • Check the nector. DTC P0122, P0123 P0227, P0228 • Also chece • the inspecti YES >> G NO >> R •CHECK TH • Check the nector.	O TO 3 epair o IROTT on swit ct ECM e contir Bank 1 2 k harne on resu O TO 2 epair o IROTT e contir	pen circuit, LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector F6 F27 ess for sho ult normal? 4. pen circuit, LE POSITI nuity betwe	ON SENS connector. en electri rol actuator Terminal 3 4 rt to groun short to g ON SENS en electri	SOR 2 GR c throttle c Connector F101 nd and sho ground or s SOR 2 INP c throttle c	OUND CII ontrol acto CM Terminal 40 48 rt to powe short to powe short to powe UT SIGN/ ontrol acto	CUIT FOR OF uator harness of Continuity Existed er. Ower in harness AL CIRCUIT FO uator harness of	PEN AND SHORT connector and ECM harness con-

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

 $5. {\sf CHECK \ THROTTLE \ POSITION \ SENSOR}$

Refer to EC-226, "Component Inspection".

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.Replace electric throttle control actuator

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000009360944

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.

- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (A/T) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+	_	Cond	ition	Voltage (V)
Connector	Terminal	Terminal			
	30 [TP sensor 1 (bank 1)]	40		Fully released	More than 0.36
	SU[IF Selisur (Dark I)]	40		Fully depressed	Less than 4.75
	31 [TP sensor 1 (bank 2)] 34 [TP sensor 2 (bank 1)]	48 40	- Accelerator pedal	Fully released	More than 0.36
F101				Fully depressed	Less than 4.75
1 101				Fully released	Less than 4.75
				Fully depressed	More than 0.36
	35 [TP sensor 2 (bank 2)]	48		Fully released	Less than 4.75
	55 [1F SENSOLZ (DALK Z)]	40		Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

P0125 ECT SENSOR

Description

<Reference data>

DTC Logic

Engine coolant temperature [°C (°F)]

-10(14)

20 (68)

50 (122)

90 (194)

(Engine coolant temperature sensor) and 84 (Sensor ground).

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.

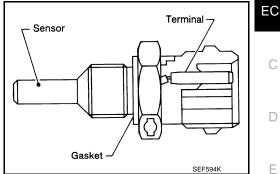
Voltage* (V)

4.4

3.5 2.2

0.9

*: These data are reference values and are measured between ECM terminals 71



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DTC DETECTION LOGIC NOTE: If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0125	Insufficient engine coolant temperature for closed loop fuel control	 Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. Engine coolant temperature is insufficient for closed loop fuel control. 	 Harness or connectors (High resistance in the circuit) Engine coolant temperature sensor Thermostat 	L

Resistance ($k\Omega$)

7.0 - 11.4

2.10 - 2.90

0.68 - 1.00

0.236 - 0.260

DTC CONFIRMATION PROCEDURE

P0118. Refer to EC-221. "DTC Logic".

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT.
- 3. Check that "COOLAN TEMP/S" is above 10°C (50°F).

Is the temperature above 10°C (50°F)?

EC-227

2014 370Z

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EC-228

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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

3.PERFORM DTC CONFIRMATION PROCEDURE

Start engine and run it for 65 minutes at idle speed. If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK. CAUTION:

- Be careful not to overheat engine.
- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> <u>EC-228</u>, "Diagnosis Procedure" NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-228, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine coolant temperature sensor.

3.CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace thermostat. Refer to <u>CO-25, "Removal and Installation"</u>.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.

- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to <u>CO-27, "Exploded View"</u>.

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P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

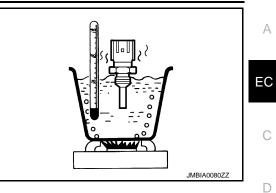
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
1 and 2		20 (68)	2.10 - 2.90
	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



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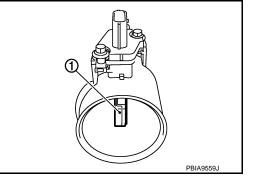
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P0127 IAT SENSOR

Description

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

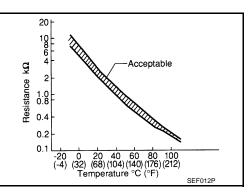
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
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 terminals 67 (Intake air temperature sensor) and 68 (Sensor ground).



DTC Logic

INFOID:000000009360950

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	 Harness or connectors (The sensor circuit is open or shorted) Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

This test 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.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Wait until engine coolant temperature is less than 90°C (194°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.

P0127 IAT SENSOR

< DTC/CIRC	UIT DIAGNOSIS	>			[VQ37VHR]
NOTE: Perform the	e following steps be	efore engi	ne coolant tempe	rature is above 90°C (194°F).	
2. Turn ignit	tion switch ON. DATA MONITOR" m	-	-		
4. Start eng	ine.			100 consecutive seconds.	
CAUTIO	N:		. ,	Too consecutive seconds.	
Always of 5. Check 1s	drive vehicle at a st trip DTC.	sate spe	ed.		
<u>s 1st trip DT(</u>					
	So to <u>EC-231, "Dia</u> NSPECTION END		<u>ocedure"</u> .		
Diagnosis	Procedure				INFOID:000000009360951
	ROUND CONNEC				
	tion switch OFF.				
2. Check gr	ound connection N	/195. Refe	r to Ground Inspe	ction in <u>GI-48, "Circuit Inspection"</u> .	
	<u>ion result normal?</u> GO TO 2.				
	Repair or replace g	round cor	nnection.		
2.CHECK IN	ITAKE AIR TEMPE	ERATURE	SENSOR		
	231, "Component I	nspection	<u>.</u>		
	<u>ion result normal?</u> GO TO 3.				
		ow senso	r (bank 1) (with in	take air temperature sensor).	
3. CHECK IN	ITERMITTENT INC	CIDENT			
Refer to GI-4	5, "Intermittent Inc	ident".			
>>	NSPECTION END				
Componer	nt Inspection				INFOID:000000009360952
	•				
	TAKE AIR TEMPE	ERAIURE	SENSOR		
2. Disconne	ect mass air flow se				
3. Check re	sistance between	mass air f	low sensor (bank	1) terminals as follows.	
	Condition		Resistance (kΩ)		
Terminals				-	
Terminals 1 and 2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200		
1 and 2		25 (77)	1.800 - 2.200		
1 and 2 Is the inspect YES >> II	(°F)] ion result normal? NSPECTION END			take air temperature sensor).	

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P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P0128 THERMOSTAT FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306, first perform the trouble diagnosis for P0300, P0301, P0302, P0303, P0304, P0305, P0306. Refer to <u>EC-297</u>.

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

This is due to a leak in the seal or the thermostat being stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	ThermostatLeakage from sealing portion of thermostatEngine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

NOTE:

Never refuel before and during the following procedure.

1.PRECONDITIONING-I

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PRECONDITIONING-II

With CONSULT

- 1. Turn ignition switch ON.
- 2. Check the following conditions:

Ambient temperature	-10°C (14°F) or more
A/C switch	OFF
Blower fan switch	OFF

3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.

4. Check the following conditions:

COOLAN TEMP/S	−10°C − 52°C (14 − 126°F)

Is the condition satisfied?

YES >> GO TO 3.

- NO >> 1. Satisfy the condition.
 - 2. GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

- 1. Start engine.
- 2. Drive the vehicle until the following condition is satisfied. CAUTION:

Always drive vehicle at safe speed.

STEP 1

Drive the vehicle under the conditions instructed below until the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" becomes at least 25°C (45°F).

EC-232

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	7400 (450			А
COOLAN TEMP/S FUEL T/TMP SE			-	\cap
25°C (45°F) from "COOLAN TEMP/S".*				
*: Example				EC
COOLAN TEM	P/S	FUEL T/TMP SE		
70°C (158°F)	45°C (113°F) or less		С
65°C (149°F)	40°C (104°F) or less	·	
60°C (140°F)	35°C (95°F) or less	•	
		(32 MPH) or more with the diff 25°C (45°F) or more.	erence between "COOLAN TEMP/S" and "FUEL	D
	tor pedal a	as steady as possible during cr	uising.	
NOTE:		(32 MPH) or more until "COOL as steady as possible during cr	AN TEMP/S" increases by 6°C (11°F).	F
<u>Is the condition satis</u> YES >> GO TO NO >> GO TO	<u>fied?</u> 4.	as steady as possible during of	along.	G
		IATION PROCEDURE-II		
				Н
With CONSULT1. Drive the vehicle	e until the t	following condition is satisfied.		I
COOLAN TEMP/S		71°C (159°F) or more		
CAUTION: Always drive vo 2. Check 1st trip D		safe speed.		J
2. Check 1st trip D Is 1st trip DTC detect				
	to <u>EC-23</u>	<u>3. "Diagnosis Procedure"</u> . D		Κ
Diagnosis Proce	edure		INF0ID:00000009360954	I
		T TEMPERATURE SENSOR		
Refer to EC-233, "C				M
Is the inspection res				IVI
YES >> GO TO		<u>-</u>		
		oolant temperature sensor.		Ν
2.CHECK THERM	OSTAT			
Check thermostat. R	efer to <u>C</u> C	D-26, "Inspection".		\sim
Is the inspection res				0
YES >> INSPEC				
NO >> Replace	e thermosta	at.		Ρ
Component Insp	pection		INF0ID:000000009360955	
1.CHECK ENGINE	COOLAN	T TEMPERATURE SENSOR		

1. Turn ignition switch OFF.

2. Disconnect engine coolant temperature sensor harness connector.

3. Remove engine coolant temperature sensor. Refer to CO-27, "Exploded View".

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

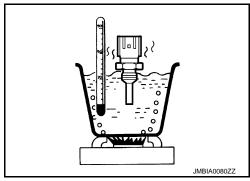
Check resistance between engine coolant temperature sensor 4. terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.10 - 2.90
		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



[VQ37VHR]

P0130, P0150 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor

outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

DTC Logic

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible Cause	
P0130	Air fuel ratio (A/F) sensor 1 (bank 1) circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.		
	(bank r) circuit	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	Harness or connectors (The A/F sensor 1 circuit is open	
P0150	Air fuel ratio (A/F) sensor 1	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.	or shorted.) • A/F sensor 1	Γ
	(bank 2) circuit	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.		ľ

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

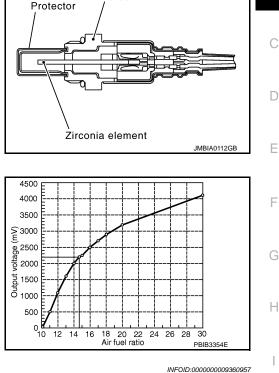
TESTING CONDITION:

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

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P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let engine idle for 2 minutes.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-237, "Diagnosis Procedure".
- NO-1 >> With CONSULT: GO TO 3.
- NO-2 >> Without CONSULT: GO TO 7.

3.CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
- Does the indication fluctuate around 2.2 V?

YES >> GO TO 4.

NO >> Go to EC-237, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

- Select "A/F SEN1 (B1) P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT.
- 2. Touch "START".
- 3. When the following conditions are met, "TESTING" will be displayed on the CONSULT screen.

ENG SPEED	1,100 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (A/T) 5th position (M/T)

If "TESTING" is not displayed after 20 seconds, retry from step 2. CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

 ${f 5}.$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake when releasing the accelerator pedal.

Which does "TESTING" change to?

COMPLETED>>GO TO 6.

OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.

 $\mathbf{6}$. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-237, "Diagnosis Procedure".

7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-237, "Component Function Check".

NOTE:

Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

P0130, P0150 A/F SENSOR 1

	PU130, PU	130 A/F 3E	NOURI		
< DTC/CIRCUIT DIAGNOSIS >	•		[VQ37VH	R]	
YES >> INSPECTION END NO >> Go to <u>EC-237, "Diag</u>	nosis Procedur	<u>e"</u> .		A	
Component Function Che	ck		INF0ID:0000000036	60958	
1.PERFORM COMPONENT FL	JNCTION CHE	СК		EC	
With GST					
 Start engine and warm it up to normal operating temperature. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position. Shift the selector lever to D position (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH). 					
CAUTION: Always drive vehicle at a s	afe speed.			D	
NOTE: Never apply brake when rele	easing the accel	erator pedal.		Е	
4. Repeat steps 2 and 3 for five	e times.	-			
 Stop the vehicle and turn ign Turn ignition switch ON. 	ittion switch OF	Ε.			
 Turn ignition switch OFF and Restart engine. 	d wait at least 10) seconds.		F	
9. Repeat steps 2 and 3 for five					
 Stop the vehicle and connec Check 1st trip DTC. 	t GST to the ve	hicle.		G	
Is 1st trip DTC detected?					
YES >> Go to EC-237. "Diag	nosis Procedur	<u>e"</u> .		Н	
NO >> INSPECTION END					
Diagnosis Procedure			INF0ID:0000000936	50959	
1. CHECK GROUND CONNECT	ΓΙΟΝ			I	
1. Turn ignition switch OFF.					
-	95. Refer to Gro	ound Inspection	in GI-48, "Circuit Inspection".	J	
<u>Is the inspection result normal?</u> YES >> GO TO 2.					
NO >> Repair or replace gro	ound connection	า.		K	
2. CHECK AIR FUEL RATIO (A/	F) SENSOR 1 I	POWER SUPPL	Y CIRCUIT		
1. Disconnect A/F sensor 1 har	ness connector			L	
 Turn ignition switch ON. Check the voltage between <i>i</i> 	A/F sensor 1 ha	rness connecto	r and ground.		
				M	
A/F sensor 1	Ground	Voltage			
	erminal	5		NI	
P0130 1 F61 P0150 2 F62	4 Ground	Battery voltage		Ν	
P0150 2 F62 Is the inspection result normal?	4				
YES >> GO TO 4.				0	
NO >> GO TO 3.					
3. DETECT MALFUNCTIONING	PART			Р	
Check the following.					
 Harness connectors E3, F1 IPDM E/R harness connector E 	7				
15 A fuse (No. 46)Harness for open or short betw	oon A/E concer	1 and fues			

>> Repair or replace harness or connectors.

P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1			EC	Continuity	
DIC	Bank Connector		Terminal	Connector	Terminal	Continuity
P0130	1	F61	1		57	
F0130	I	FOI	2	F102	61	Existed
P0150	2	F62	1	FIUZ	65	EXISTED
FU130		2	66			

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor 1			Continuity
DIC	Bank	Connector Terminal		Ground	Continuity
P0130	1	F61	1		
F0130			2	Ground	Not existed
P0150	2	F62	1	Giouria	NOT EXISTED
P0150	2	F02	2		

DTC	ECM			Ground	Continuity
DIC	Bank	Bank Connector Terminal		Giouna	Continuity
P0130	1		57		Not existed
P0130	I	E100	61	Ground	
P0150	2	F102	65		
	2	-	66		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace.

O.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. **CAUTION:**

- Discard any A/F 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 A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0131, P0151 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor

outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

DTC Logic

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	Κ
P0131	Air fuel ratio (A/F) sensor 1 (bank 1) circuit low voltage	• The A/F signal computed by ECM from the A/	Harness or connectors (The A/F sensor 1 circuit is open or	
P0151	Air fuel ratio (A/F) sensor 1 (bank 2) circuit low voltage	F sensor 1 signal is constantly approx. 0 V.	shorted.) • A/F sensor 1	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

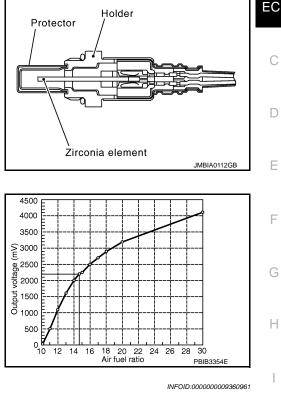
- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Is the indication constantly approx. 0 V?

EC-239

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P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

YES >> Go to EC-240, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Restart engine.
- 5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION:

Always drive vehicle at a safe speed.

6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

• Keep the accelerator pedal as steady as possible during cruising.

• If this procedure is not completed within 1 minute after restarting engine at step 4, return to step

1.

7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-240, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009360962

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F senso	r 1	Ground	Voltage
DIC	Bank	Connector	Terminal	Ciouna	voltage
P0130	1	F61	4	Ground	Battery voltage
P0150	2	F62	4	Ground	Dattery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

IPDM E/R harness connector E7

15 A fuse (No. 46)

• Harness for open or short between A/F sensor 1 and fuse

EC-240

P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

-	DTC	A/F sensor 1			EC	Continuity		
	DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
-	P0130	1	F61	1		57		
	F0130	1	FOI	F102	61	Existed		
-	P0150	2	F62	1	1102	65	LAISIEU	
	P0150	2	FOZ	2		66	1	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	hk Connector Terminal		Giouna	Continuity
P0130	1	F61	1		Not existed
F0130	I	FUI	2	Ground	
D0150	2	Feb	1	Giouna	
P0150	0150 2 F62		2		

DTC	、			Ground	Continuity
DIC	Bank	ank Connector Terminal		Giouna	
P0130	P0130 1		57		
F 0130	I	F102	61	- Ground	Not existed
P0150	2		65		
			66		

5. Also check harness for short to power.

<u>Is the ir</u>	nspection result normal?				
YES	>> GO TO 5.				
NO	>> Repair open circuit, short to ground or short to power in harness or connectors.				
5. CHECK INTERMITTENT INCIDENT					
Perform GI-45, "Intermittent Incident".					

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. CAUTION:

- Discard any A/F 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 A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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P0132, P0152 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

DTC Logic

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 (bank 1) circuit high voltage	The A/F signal computed by ECM from the A/F	Harness or connectors (The A/F sensor 1 circuit is open or
P0152	Air fuel ratio (A/F) sensor 1 (bank 2) circuit high voltage	sensor 1 signal is constantly approx. 5 V.	shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

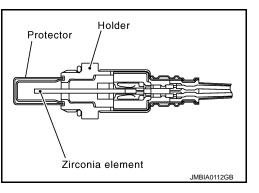
Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

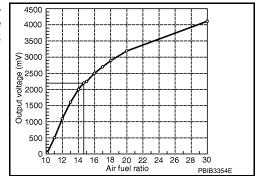
>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Is the indication constantly approx. 5V?





< DTC/CI	RCUIT	DIAGNOS		32, P0	152 A/F SE	NSOR 1		[VQ37VHR]	
NO >	•> GO T		-						A
3.PERFC	DRM D1	IC CONFIR	MATION P	ROCED	URE				
 Turn i Turn i 	gnition gnition	switch OFF switch ON. switch OFF							EC
5. Drive CAUT	TION:	celerate vel			0 km/h (25 MPH	l) within 20 s	seconds after r	estarting engine.	С
		e vehicle a following co			0 consecutive s	econds.			D
ENG SPEE	=D		1,000 - 3,200	rom					
VHCL SPE			More than 40		mph)				E
B/FUEL SC			1.5 - 9.0 mse						
Selector le	ver		Suitable posit	ion					
NOTE			•						F
• If th 1.	i is proc ≪1st trip	edure is not o DTC.			s possible duri n 1 minute afte			p 4, return to step	(-
YES >	·> Go to	EC-243, "I ECTION E		Procedure	<u>e"</u> .				ŀ
Diagnos	sis Pro	ocedure						INFOID:000000009360965	
1.CHECH	< GROI	JND CONN	IECTION						
	•	switch OFF		er to Gro	ound Inspection	in GI-48 "Ci	ircuit Inspectio	n"	,
	-	result norm							
	•> GO T								
•		air or replac	-						
					POWER SUPPL	Y CIRCUIT			
		/F sensor 1 switch ON.	harness co	onnector					
			en A/F sen	sor 1 ha	rness connecto	r and ground	J.		
									N
DTC		A/F senso	r 1	Ground	Voltage				
	Bank	Connector	Terminal		5				1
P0130	1	F61	4	Ground	Battery voltage				
P0150	2	F62	4						
YES >	→ GO T → GO T → GO T		<u>ai </u>						(
-		FUNCTION	IING PART						F
Check the • Harness • IPDM E/ • 15 A fus	followii conneo (R harno e (No. 4	ng. ctors E3, F ² ess connec	1 tor E7		1 and fire -				

Harness for open or short between A/F sensor 1 and fuse

EC-243

P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1			EC	Continuity		
DIC	Bank	Connector Terminal		Connector	Terminal	Continuity	
P0130	1	F61	1		57		
F0130	1	FUI	2	F102	61	Existed	
P0150	2	0 500	1	1102	65	LAISIEU	
P0150	2	F62	2		66		

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor	Ground	Continuity		
DIC	Bank Connector Terminal		Terminal		Giouna	
P0130	1	F61	1			
F0130	1	FUI	2	Ground	Not existed	
D0150	2	F62	1	Giouna		
P0150	2	г02	2			

DTC		ECM		Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	
P0130	1		57		Not existed
F 0130	I	F102	61	Ground	
P0150	0	F102	65	Giouna	
P0150	2		66	-	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. **CAUTION:**

- Discard any A/F 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 A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0137, P0157 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) 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 1 V in richer conditions to 0 V in leaner conditions.

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

DTC Logic



The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 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 various driving conditions such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0137	Heated oxygen sensor 2 (bank 1) circuit low volt- age		 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 	_
P0157	Heated oxygen sensor 2 (bank 2) circuit low volt- age	reach the specified voltage.	Fuel pressureFuel injectorIntake air leaks	

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

2. PRECONDITIONING

If DTC confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 3.

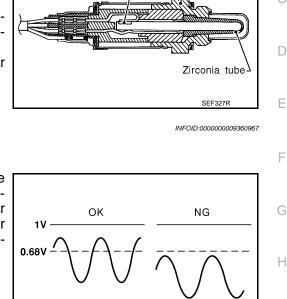
EC-245

Holder

INFOID:000000009360966

А

EC



Heater pad

0V

J

SEF259VA

Ν

Μ

0

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. 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 70°C (158°F). 9. Open engine hood.
- 10. Select "HO2S2 (B1) P1147" (for DTC P0137) or "HO2S2 (B2) P1167" (for DTC P0157) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 11. Start engine and follow the instruction of CONSULT display. **NOTE:**

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-247, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-246, "Component Function Check".

NOTE:

Use component function check to 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 EC-247, "Diagnosis Procedure".

Component Function Check

INFOID:000000009360968

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

- 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 under the following condition.

		ECM				
DTC	Connector	+	_	Condition Voltage		
	Connector	Terminal	Terminal			
P0137	F102	76	Revving up to 4,000 rpm under no load at		The voltage should be above 0.68 V at	
P0157	1102	80	04	least 10 times	least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

А

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

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

T		ECM			
DTC	Connector	+	_	Condition	Voltage
	Connector	Terminal	Terminal		
P0137	F102	76	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at
P0157		80			least once during this procedure.
	pection re				
	>> INSPE >> GO TC		ND		
-				TION CHECK-III	
				ness connector terminals under the f	following condition
	e vollage i	Jeiweenn			
		ECM			
DTC	0	+	_	Condition	Voltage
	Connector	Terminal	Terminal		
P0137	F102	76	84	Coasting from 80 km/h (50 MPH) in D po-	The voltage should be above 0.68 V at
P0157	1102	80	04	sition (A/T), 4th gear position (M/T)	least once during this procedure.
	pection re				
	>> INSPE			s Procedure".	
			Diagnosi	<u>s Flocedule</u> .	
lagno	sis Proc	eaure			INFOID:000000009360
.CHEC			ECTION		
Turn	ignition sv	vitch OFF			
	-			Refer to Ground Inspection in <u>GI-48.</u>	"Circuit Inspection".
	pection re		<u>al?</u>		
	>> GO TC >> Repair		e around	connection.	
	•	•	0	LF-LEARNING VALUE	
				ng value. Refer to EC-24, "MIXTUR	RE RATIO SELF-LEARNING VALU
<u>CLE</u>	AR : Speci	al Repair	Require	<u>ment"</u> .	
	-			es at idle speed.	
	-			etected? Is it difficult to start engine? s for DTC P0171 or P0174. Refer to	
	>> GO TC		ulayilosis		LC-272, DTC Logic.
	K HO2S2	GROUN	D CIRCU	IT FOR OPEN AND SHORT	
.CHEC					
	ignition sv	VITCH UFF			
Turn Disco		ated oxyg	en sensc	r 2 harness connector.	
Turn Disco Disco	onnect hea onnect EC	ated oxyg M harnes	en senso s connec	ctor.	arness connector
Turn Disco Disco	onnect hea onnect EC	ated oxyg M harnes	en senso s connec		arness connector.

DTC	HO2S2			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0137	1	F60	1	F102	84	Existed
P0157	2	F59	1	1102	04	LAISteu

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

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

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	HO2S2			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0137	1	F60	4	F102	76	Existed
P0157	P0157 2 F		4	FIUZ	80	EXISTED

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

DTC		HO2S2	Ground	Continuity		
DIC	Bank	Connector	Terminal	Giouna	Continuity	
P0137	1	F60	4	Ground	Not existed	
P0157	2	F59	4	Gibuliu	NUL EXISIEU	

DTC		ECM		Ground	Continuity	
DIC	Bank	Connector	Terminal	Cround	Continuity	
P0137	1	F102	76	Ground	Not existed	
P0157	2	1 102	80	Gibunu	NOT EXISTED	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-249, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning 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 heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000009360970

[VQ37VHR]

1.INSPECTION START Do you have CONSULT? EC Do you have CONSULT? YES >> GO TO 2. NO >> GO TO 3. 2.CHECK HEATED OXYGEN SENSOR 2 With CONSULT Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT. D 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. E Let engine idle for 1 minute. 5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item 6. with CONSULT. F 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%. (Reference data) 1.28 The voltage should be above 0.68V at least one time. 0.64 Н The voltage should be below 0.18V at least one time. 0.00 PBIB3458E "HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V 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 Κ Without CONSULT 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 under the following condition. Μ ECM Ν + Condition Voltage Connector Terminal Terminal 76 [HO2S2 The voltage should be above 0.68 V at (bank 1)] Revving up to 4,000 rpm under no load at least once during this procedure. F102 84

Is the inspection result normal?

80

[HO2S2 (bank 2)]

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

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

least 10 times

EC-249

Ρ

The voltage should be below 0.18 V at

least once during this procedure.

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

ECM					
Connector	+	_	Condition	Voltage	
Connector	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)] 84		Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.	
FIUZ	80 [HO2S2 (bank 2)]	04		The voltage should be below 0.18 V 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 under the following condition.

ECM				
Connector	+	_	Condition	Voltage
	Terminal	Terminal		
F102	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D po- sition (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	80 [HO2S2 (bank 2)]			

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning 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 heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0138, P0158 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) 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 1 V in richer conditions to 0 V in leaner conditions.

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

Heater pad Holder C Zirconia tube SEF327R

ΟK

1.2V

1V

٥٧

DTC Logic

0:0000000009360972

NG

PBIB1848F

PBIB2376E

[VQ37VHR]

INFOID:00000000936097

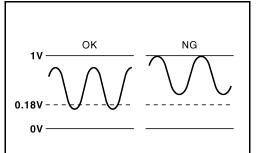
DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/ F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. **MALFUNCTION A**

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



To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	-
P0138	Heated oxygen sensor 2 (bank 1) circuit high volt- age	A)	An excessively high voltage from the sen- sor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 	0
		B)	The minimum 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 	Ρ

EC

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P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
P0158	Heated oxygen sensor 2 (bank 2) circuit high volt- age	A)	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
		B)	The minimum 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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

Is 1st trip DTC detected?

- YES >> Go to EC-254, "Diagnosis Procedure".
- NO-1 >> With CONSULT: GO TO 3.
- NO-2 >> Without CONSULT: GO TO 5.

$\mathbf{3}.$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:

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

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. 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 70°C (158°F).
- 9. Open engine hood.
- 10. Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 11. Start engine and follow the instruction of CONSULT display. **NOTE:**
- It will take at most 10 minutes until "COMPLETED" is displayed.
- 12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-254, "Diagnosis Procedure".

CON NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

: DTC/C	IRCUIT DI	[VQ37VHR]						
. Perf	orm DTC co	onfirmatio	n proced	ure again.				
	>> GO TO	3						
D.PERF			FUNCTI	ON CHECK FOR MALFUNCTION	В			
	component	function	check. Re	efer to EC-253, "Component Function	on Check".			
check, a	ponent fun 1st trip DT spection res	C might n	ot be con		oxygen sensor 2 circuit. During this			
YES	>> INSPEC	CTION EN	ID					
NO			-	Procedure".				
Compo	onent Fur	nction C	heck		INFOID:000000009360973			
1.PERF	ORM COM	IPONENT	FUNCTI	ON CHECK-I				
2. Turn 3. Star 4. Let e	i ignition sw t engine and engine idle	vitch OFF d keep the for 1 minu	and wait e engine s ite.	normal operating temperature. at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under t	n for at least 1 minute under no load. the following condition.			
		ECM						
DTC	Connector	+	_	Condition	Voltage			
	Connector	Terminal	Terminal					
P0138 P0158	F102	76 80	84	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be below 0.18 V at least once during this procedure.			
YES NO 2. PERF		CTION EN 2. 1PONENT	ID FUNCTI	ON CHECK-II ess connector terminals under the fe	ollowing condition			
onook a	lo voltago s		omnann					
		ECM						
DTC	Connector	+	_	Condition Voltage				
		Terminal	Terminal					
P0138	F102	76	84	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at			
P0158	1	80		least once during this procedure.				

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

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

	ECM					
DTC	Connector	+	-	Condition	Voltage	
	Connector	Terminal	Terminal			
P0138	F102	76	84	Coasting from 80 km/h (50 MPH) in D po- sition (A/T), 4th gear position (M/T)	The voltage should be below 0.18 V at	
P0158	1102	80	04		least once during this procedure.	

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- <u>Is the inspection result normal?</u> YES >> INSPECTION END
- NO >> Go to <u>EC-254, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000009360974

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-251, "DTC Logic".

Which malfunction is detected?

- A >> GO TO 2
- B >> GO TO 9.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

$\mathbf{3.}$ CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.

2. Disconnect ECM harness connector.

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

DTC	HO2S2			EC	Continuity	
DIC			Connector	Terminal	Continuity	
P0138	1	F60	1	F102	84	Existed
P0158	2	F59	1	1102	04	LAISIEU

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, short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	HO2S2			EC	Continuity	
DIC	Bank Connector		Terminal	Connector	Terminal	Continuity
P0138	1	F60	4	F102	76	Existed
P0158	2	F59	4	1102	80	LAISIEU

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

DTC		HO2S2		EC	ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Ground	Continuity
P0138	1	F60	4	F102	76	Ground	Not existed
P0158	2	F59	4	80	Giouna	NUL EXISIEU	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Revision: 2013 May

Water should not exist.
Is the inspection result normal?
YES >> GO TO 6.
NO >> Repair or replace harness or connectors.
6.CHECK HEATED OXYGEN SENSOR 2
Refer to EC-256. "Component Inspection".
Is the inspection result normal?
YES >> GO TO 8.
NO $>>$ GO TO 7.
I.REPLACE HEATED OXYGEN SENSOR 2
Replace malfunctioning heated oxygen sensor 2.
• 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 heated oxygen sensor, clean exhaust system threads using Oxygen Sensor
Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubri- cant (commercial service tool).
>> INSPECTION END
8. CHECK INTERMITTENT INCIDENT
Refer to GI-45, "Intermittent Incident".
>> INSPECTION END
9. CHECK GROUND CONNECTION
1. Turn ignition switch OFF.
 Check ground connection M95. Refer to Ground Inspection in <u>GI-48, "Circuit Inspection"</u>.
Is the inspection result normal?
YES >> GO TO 10.
NO >> Repair or replace ground connection.
10.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE
1. Clear the mixture ratio self-learning value. Refer to EC-24, "MIXTURE RATIO SELF-LEARNING VALUE
CLEAR : Special Repair Requirement"
2. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?
 YES >> Perform trouble diagnosis for DTC P0172, P0175. Refer to <u>EC-276, "DTC Logic"</u>. NO >> GO TO 11.
11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT
 Turn ignition switch OFF. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
DIC	Bank	Connector Terminal		Connector	Terminal	Continuity
P0138	1	F60	1	F102	84	Existed
P0158	2	F59	1	1102	04	LAISIGU

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

Is the inspection result normal?

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P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 12.

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

12. CHECK H02S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	CM	Continuity
DIC	Bank Connector		Terminal	Connector	Terminal	Continuity
P0138	1	F60	4	F102	76	Existed
P0158	2	F59	4	1102	80	LAISLEU

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

DTC		HO2S2	Ground	Continuity	
DIC	Bank	Connector	Terminal	Giouna	Conunuity
P0138	1	F60	4	Ground	Not existed
P0158	2	F59	4	Giouna	NUL EXISLEU

DTC		ECM		Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0138	1	F102	76	Ground	Not existed
P0158	2	1102	80		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

13.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-256, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

14.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning 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 heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

15. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT?

Revision: 2013 May

INFOID:000000009360975

Do you have CONSULT? А YES >> GO TO 2. NO >> GO TO 3. 2. CHECK HEATED OXYGEN SENSOR 2 EC ()With CONSULT Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT. 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. Let engine idle for 1 minute. 5. 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item D with CONSULT. 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%. ٧ (Reference data) Е 1.28 The voltage should be above F 0.68V at least one time. 0.64 The voltage should be below 0.18V at least one time. 0.00 PBIB3458E "HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%. Н "HO2S2 (B1)/(B2)" should be below 0.18 V 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 Start engine and warm it up to the normal operating temperature. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3. Κ 4. Let engine idle for 1 minute. 5. Check the voltage between ECM harness connector terminals under the following condition. ECM

Connector	+	_	Condition	Voltage	
Connector	Terminal	Terminal			M
F102	76 [HO2S2 (bank 1)]	84	Revving up to 4,000 rpm under no load at	The voltage should be above 0.68 V at least once during this procedure.	N
F 102	80 [HO2S2 (bank 2)]	04	least 10 times	The voltage should be below 0.18 V 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 under the following condition.

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P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terminal	Terminal		
F102	76 [HO2S2 (bank 1)]	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.
1 102	80 [HO2S2 (bank 2)]	04	Neeping engine at lot 10 10 minutes	The voltage should be below 0.18 V 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 under the following condition.

ECM					
Connector	+ –		Condition	Voltage	
Connector	Terminal	Terminal			
E102	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D posi- tion (A/T), 4th gear position (A/T)	The voltage should be above 0.68 V at least once during this procedure.	
F102 -	80 [HO2S2 (bank 2)]			The voltage should be below 0.18 V 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 malfunctioning 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 heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0139, P0159 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) 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 air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 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 various driving conditions such as fuel cut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0139	Heated oxygen sensor 2 (bank 1) circuit slow response	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 	
P0159	Heated oxygen sensor 2 (bank 2) circuit slow response	time computed by ECM.	 Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks 	

0V

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT? YES >> GO TO 2.

NO >> GO TO 7.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Turn ignition switch OFF and wait at least 10 seconds. 1.

2. Turn ignition switch ON.

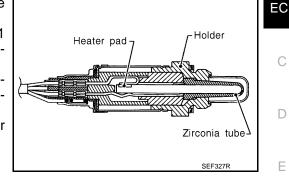
Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

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

>> GO TO 3.

EC-259



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3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- 9. Drive the vehicle in a proper gear at 60 km/h (38MPH) and maintain the speed. CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- Enable the engine brake.
- Always drive carefully.
- Never apply brake when releasing the accelerator pedal.
- 11. Repeat step 9 and 10 at least 8 times.
- 12. Check the following item of "DATA MONITOR".

DTC	Data monitor item	Status
P0139	HO2 S2 DIAG1 (B1)	
F0139	HO2 S2 DIAG2 (B1)	CMPLT
P0159	HO2 S2 DIAG1 (B2)	GMFLI
F0159	HO2 S2 DIAG2 (B2)	

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 6.

NO-1: "CMPLT" is not displayed on DIAG 1>>Perform DTC confirmation procedure again. NO-2: "CMPLT" is not displayed on DIAG 2>>GO TO 4.

4.PERFORM DTC WORK SUPPORT

- 1. Open engine hood.
- Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 3. Start engine and follow the instruction of CONSULT display. **NOTE:**

It will take at most 10 minutes until "COMPLETED" is displayed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 3.

6.PERFORM SELF-DIAGNOSIS

With CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" or "P0159" detected?

YES >> Proceed to EC-262, "Diagnosis Procedure".

NO >> INSPECTION END

/.PERFORM COMPONENT FUNCTION CHECK

< DTC/CIRCUIT DIAGNOSIS > Perform component function check. Refer to EC-261, "Component Function Check". NOTE: А Use component function check to 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? EC YES >> INSPECTION END NO >> Proceed to EC-262, "Diagnosis Procedure". Component Function Check INFOID:000000009360978 1.PERFORM COMPONENT FUNCTION CHECK-I D Without CONSULT Start engine and warm it up to the normal operating temperature. 1. 2. Turn ignition switch OFF and wait at least 10 seconds. E Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3. 4. Let engine idle for 1 minute. Check the voltage between ECM harness connector terminals under the following condition. 5. F ECM DTC + Condition Voltage Connector Terminal Terminal P0139 76 Revving up to 4,000 rpm under no load at A change of voltage should be more than F102 84 least 10 times 0.24 V for 1 second during this procedure. P0159 80 Н Is the inspection result normal? >> INSPECTION END YES NO >> GO TO 2. 2.PERFORM COMPONENT FUNCTION CHECK-II Check the voltage between ECM harness connector terminals under the following condition. ECM DTC Condition + Voltage _ Κ Connector Terminal Terminal P0139 76 A change of voltage should be more than F102 84 Keeping engine at idle for 10 minutes L 0.24 V for 1 second during this procedure. P0159 80 Is the inspection result normal? YES >> INSPECTION END Μ NO >> GO TO 3. ${\it 3.}$ PERFORM COMPONENT FUNCTION CHECK-III Ν Check the voltage between ECM harness connector terminals under the following condition.

		ECM				\sim
DTC	Connector	+	-	Condition	Voltage	0
	Connector	Terminal	Terminal			
P0139	F102	76	84	Coasting from 80 km/h (50 MPH) in D po-	A change of voltage should be more than	Р
P0159	1102	80	04	sition (A/T), 4th gear position (M/T)	0.24 V for 1 second during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-262, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "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>EC-24</u>, "<u>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, P0172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-272, "DTC Logic"</u> or <u>EC-276, "DTC Logic"</u>.

NO >> GO TO 3.

 ${f 3.}$ CHECK HO2S2 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.

DTC		HO2S2		EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0139	1	F60	1	F102	84	Existed
P0159	2	F59	1	1102	04	LAISted

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

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0139	1	F60	4	F102	76	Existed
P0159	2	F59	4	FIUZ	80	EXISTED

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

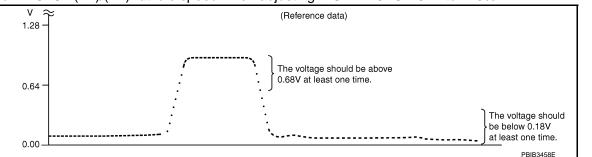
DTC		HO2S2		Ground	Continuity	
DIC	Bank	Connector	Terminal	Ciouna	Continuity	
P0139	1	F60	4	Ground	Not existed	
P0159	2	F59	4	Cibulia	NUL EXISIEU	

< DTC/CIRCUIT DIAGNOSIS >

							Δ
DTC		ECM		Ground	Continuity		А
	Bank	Connector	Terminal				
P0139 P0159	1 2	F102	76 80	Ground	Not existed		EC
3. Also c	heck h	arness for	short to po	ower.			
Is the insp			al?				С
	> GO T > Rena		cuit short	to around	or short to i	power in harness or connectors.	
5.CHECK	•	•	-	0			D
Refer to E							
Is the insp		•	-				Е
-	> GO 1	-					
•	> GO T						
6.REPLA							F
Replace m CAUTION		tioning hea	ted oxyge	n sensor 2			
 Discard 	any he					ropped from a height of more than 0.5 m (19.7	G
					floor; use a or. clean e	new one. xhaust system threads using Oxygen Sensor	
Thread (Cleane	er [comme	rcial serv			or J-43897-12)] and approved Anti-seize Lubri-	Н
cant (co	mmero	cial servic	e tool).				
>	> INSP	ECTION E	ND				
7.CHECK	-			IT			I
Refer to G							
							J
>:	> INSP	PECTION E	ND				
Compon	ent Ir	nspectior	า			INFOID:00000009360980	Κ
1.INSPEC	CTION	START					
Do you ha	ve COI	NSULT?					L
<u>Do you ha</u>							
	> GO 1 > GO 1						M
2.CHECK			EN SENS	OR 2			
(P)With CC							NI
-			and selec	t "DATA M	ONITOR" n	node with CONSULT.	Ν
					perating ten	iperature.	
4. Start e	ngine a		ne engine			and 4,000 rpm for at least 1 minute under no load.	0
5. Let en	gine id	le for 1 mir	nute.	·			
	ONSU				Ji moue, a	and select "HO2S2 (B1)/(B2)" as the monitor item	Ρ

< DTC/CIRCUIT DIAGNOSIS >





"HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V 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

- 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 under the following condition.

ECM					
Connector	+ –		Condition	Voltage	
CONNECTOR	Terminal	Terminal			
E102	76 [HO2S2 (bank 1)]	84	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.	
F102 -	80 [HO2S2 (bank 2)]			The voltage should be below 0.18 V 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 under the following condition.

	ECM			
Connector	+ –		Condition	Voltage
Connector	Terminal	Terminal		
F102 -	76 [HO2S2 (bank 1)]	84	Keeping angine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.
FIUZ -	80 [HO2S2 (bank 2)]	04	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V 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 under the following condition.

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 6. .REPLACE HEATED OXYGEN SENSOR 2 eplace malfunctioning heated oxygen sensor 2.		ECM			
Terminal Terminal F102 76 [HO2S2 (bank 1)] 84 Coasting from 80 km/h (50 MPH) in D posi- tion (A/T), 4th gear position (M/T) The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. the inspection result normal? (ES >> INSPECTION END NO >> GO TO 6. . REPLACE HEATED OXYGEN SENSOR 2 . eplace malfunctioning heated oxygen sensor 2. AUTION: 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 heated new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubri- cant (commercial service tool).	Connector	+	_	Condition	Voltage
$F102 \frac{\begin{bmatrix} HO2S2 \\ (bank 1) \end{bmatrix}}{80} \\ \begin{bmatrix} HO2S2 \\ (bank 2) \end{bmatrix} \\ 84 Coasting from 80 km/h (50 MPH) in D position during this procedure. The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during the voltage should be below 0.18 V at least once during the voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during the voltage should be below 0.18 V at least once during the voltage should be below 0.18 V at least once during the voltage should be below 0.18 V at least o$		Terminal	Terminal		
 VES >> INSPECTION END NO >> GO TO 6. .REPLACE HEATED OXYGEN SENSOR 2 eplace malfunctioning heated oxygen sensor 2. AUTION: 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 heated new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool). 	F102 –	[HO2S2 (bank 1)] 80 [HO2S2	84		once during this procedure. The voltage should be below 0.18 V at least
 NO >> GO TO 6. REPLACE HEATED OXYGEN SENSOR 2 eplace malfunctioning heated oxygen sensor 2. AUTION: 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 heated new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool). 	the inspe	ection result r	normal?		
REPLACE HEATED OXYGEN SENSOR 2 eplace malfunctioning heated oxygen sensor 2. AUTION: 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 heated new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubri- cant (commercial service tool).			ON END		
eplace malfunctioning heated oxygen sensor 2. AUTION: 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 heated new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubri- cant (commercial service tool).					
AUTION: 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 heated new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubri- cant (commercial service tool).					
in) onto a hard surface such as a concrete floor; use a new one. Before installing heated new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubri- cant (commercial service tool).	AUTION:	•	-	-	
Before installing heated new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubri- cant (commercial service tool).	Discard a	any heated	oxygen se	nsor which has been dropped from	a height of more than 0.5 m (19.7
>> INSPECTION END	Before in Thread C	nstalling hea leaner [com	ated new on mercial se	oxygen sensor, clean exhaust syst ervice tool (J-43897-18 or J-43897-1	em threads using Oxygen Sensor 2)] and approved Anti-seize Lubri-
	>>				

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1 < DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR

DTC Logic

INFOID:000000009360981

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	
P014C	Air fuel ratio (A/F) sensor 1 (bank 1)			
P014D	circuit slow response		 Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1 	
P015A	Air fuel ratio (A/F) sensor 1 (bank 1)	• The response time of a Λ/E con		
P015B	circuit delayed response	 The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM. 		
P014E	Air fuel ratio (A/F) sensor 1 (bank 2)			
P014F	circuit slow response			
P015C	Air fuel ratio (A/F) sensor 1 (bank 2)			
P015D	circuit delayed response			

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- 8. Fully release accelerator pedal and then let engine idle for about 1 minute.
- 9. Check the items status of "DATA MONITOR" as follows.
 - NOTE:

If "PRSNT" changed to "ABSNT", refer to EC-237, "Component Function Check".

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

				Δ	
DTC	Data monitor item	Status		А	
P014CP014DP015AP015B	A/F SEN1 DIAG3 (B1)	PRSNT		EC	
 P014E P014F P015C P015D 	A/F SEN1 DIAG3 (B2)		С		
Is "PRSNT" displa	aved on CONSULT screen	<u>?</u>		D	
YES >> GO T NO >> GO T	O 3.			D	
3. PERFORM DT	C CONFIRMATION PRO	CEDURE-2		Е	
	T firmation procedure-1 aga aved on CONSULT screen			F	
YES >> GO T	•	<u> </u>			
	to EC-237, "Component	Function Check".			
4.PERFORM DT	C CONFIRMATION PRO	CEDURE-2		G	
2. Check the iter	T t 20 seconds at idle. ms status of "DATA MONI	TOR" as follows.		Н	
	hanged to "INCMP", ref		omponent Function Check".	I	
DTC	Data monitor item	Status			
P014CP014D	A/F SEN1 DIAG1 (B1)			J	
P015AP015B	A/F SEN1 DIAG2 (B1)	CMPLT			
P014EP014F	A/F SEN1 DIAG1 (B2)			Κ	
P0141P015CP015D	A/F SEN1 DIAG2 (B2)			1	
Is "CMPLT" displa	yed on CONSULT screen	?			
YES >> GO T					
_	to EC-237, "Component	Function Check [*] .		Μ	
5.PERFORM SE					
With CONSUL Check the "SELF-				Ν	
Is any DTC detect					
-	ed to <u>EC-268, "Diagnosis</u>	Procedure".		0	
NO >> INSPECTION END					
b. CHECK AIR-F	UEL RATIO SELF-LEARN	IING VALUE			
	and warm it up to normal c e \$01 with GST.	operating tempera	ture.	Ρ	
3. Calculate the	total value of "Short term	fuel trim" and "Lo	ng term fuel trim" indications.		
•	<u>tage within ±15%?</u>				
YES >> GO T NO >> GO T					

7. DETECT MALFUNCTIONING PART

Check the following.

- Intake air leaks
- Exhaust das leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

8. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- 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. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- 7. Fully release accelerator pedal and then let engine idle for about 1 minute.
- Check 1st trip DTC. 8.

Is 1st trip DTC detected?

>> Proceed to EC-268, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000009360982

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF. 1.
- Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection". 2.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.RETIGHTEN A/F SENSOR 1

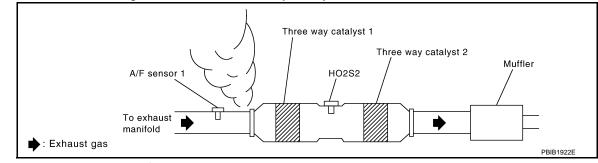
Loosen and retighten the A/F sensor 1. Refer to EM-38, "Exploded View".

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.

Listen for an exhaust gas leak before three way catalyst 1. 2.



Is exhaust gas leak detected?

YES >> Repair or replace. NO >> GO TO 4.

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

4. CHECK	FOR IN	ITAKE AIR L	.EAK				А
Listen for a	an intake	e air leak afte	er the mass	air flow se	ensor.		
Is intake ai							
	> Repair > GO TC	or replace.					EC
5.CLEAR	THE MI	XTURE RAT	IO SELF-LI	EARNING	VALUE		0
		ure ratio self ial Repair Re			r to <u>EC-24, "MIX</u>	TURE RATIO SELF-LEARNING VALUE	С
		r at least 10					
-						ficult to start engine?	D
YES >>		m trouble dia 276, "DTC L		DTC P017	1, P0174 or P01	72, P0175. Refer to <u>EC-272, "DTC Logic"</u>	
NO >>	> GO TC		<u>ogic</u> .				Е
6. снеск	AIR FU	EL RATIO (A	A/F) SENSC	OR 1 POW	VER SUPPLY CII	RCUIT	
		= sensor 1 h	arness conr	nector.			F
		witch ON. age betweer	n A/F senso	r 1 harnes	s connector and	ground.	
		0				_	G
DTC		A/F sensor	1	Ground	Voltage	-	0
	Bank	Connector	Terminal			-	
 P014C P014D P015A P015B 	1	F61	4		D. H.		Н
P014EP014FP015CP015D	2	F62	4	Ground	Battery voltage		J
Is the inspe	ection re	sult normal?	<u>,</u>	<u> </u>		-	
-	> GO TC > GO TC						K
-		UNCTIONIN					IX.
Check the • Harness • IPDM E/F	following connect R harnes	g. ors E3, F1 ss connector					L
 15 A fuse Harness 		ි) n or short bet	ween A/F s	ensor 1 a	nd fuse		M
•	-	or replace h			3. T FOR OPEN AN	ND SHORT	Ν
2. Discor	nect EC	witch OFF. M harness of tinuity betwe		sor 1 harn	less connector a	nd ECM harness connector.	0
							Ρ

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1 < DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

DTC	A/F sensor 1			EC	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
• P014C			1		57		
P014DP015AP015B	1	F61	2	F102	61	Existed	
• P014E			1		65	LAISIEU	
P014FP015CP015D	2	F62	2			66	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor	Ground	Continuity	
DIC	Bank Connector Te		Terminal		Ground
• P014C			1		Not existed
P014DP015AP015B	1	F61	2	Ground	
• P014E			1	Ground	NUL EXISIEU
P014FP015CP015D	2	F62	2		

		5014				
DTC	ECM			Ground	Continuity	
DIC	Bank Connector		Terminal	Giouna	Continuity	
• P014C			57			
P014DP015AP015B	1	F102	61	Ground	Not existed	
• P014E			1102	65	Ciouna	NOT EXISTED
P014FP015CP015D	2		66			

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-190, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 13.

10.CHECK MASS AIR FLOW SENSOR

Check both mass air flow sensor (bank 1 and bank 2). Refer to <u>EC-199</u>, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning mass air flow sensor. Refer to <u>EM-31, "Exploded View"</u>.

11.CHECK PCV VALVE

Refer to EC-525, "Component Inspection".

Is the inspection result normal?

P014C, P014D, P014E, P014F, P015A, P015B, P015C, P015D A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 12. NO >> Repair or replace PCV valve. Refer to <u>EM-52, "Exploded View"</u> .	А
12. CHECK INTERMITTENT INCIDENT	/ (
Perform <u>GI-45, "Intermittent Incident"</u> .	FO
Is the inspection result normal?	EC
YES >> GO TO 13.	
NO >> Repair or replace.	С
13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1	
Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-38, "Exploded View".	
CAUTION:	D
• Discard any A/F 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 A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).	E
>> INSPECTION END	F
	G
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	0
	Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000009360983

[VQ37VHR]

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 A/F sensor 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 illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator	
A/F 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
P0171	Fuel injection system too lean (bank 1)		 Intake air leaks A/F sensor 1
P0174	Fuel injection system too lean (bank 2)	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to <u>EC-24, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.

2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-273, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 5 minutes.

2. Check 1st trip DTC.

P0171, P0174 I	FUEL INJECTION SYSTEM FUNCTION	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VH	IR]
Is 1st trip DTC detected?		
YES >> Go to <u>EC-273, "Diagnosis</u> NO >> GO TO 5.		A
5. PERFORM DTC CONFIRMATION I	PROCEDURE-III	
1. Turn ignition switch OFF and wait	at least 10 seconds.	EC
 Start engine. Maintain the following conditions for 	or at least 10 consecutive minutes	
Hold the accelerator pedal as stea		С
VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)	
CAUTION:		D
Always drive vehicle at a safe sp 4. Check 1st trip DTC.	peed.	
Is 1st trip DTC detected?		Е
YES >> Go to EC-273, "Diagnosis	Procedure".	
NO >> INSPECTION END		F
Diagnosis Procedure	INFOID:0000000093	
1. CHECK EXHAUST GAS LEAK		
1. Start engine and run it at idle.		G
2. Listen for an exhaust gas leak befor	pre three way catalyst 1.	
	Three way catalyst 1	Н
	Three way catalyst 1	
A/F sensor 1	Muffler	I
To exhaust		1
manifold ➡ : Exhaust gas		0
Is exhaust gas leak detected?	PBIB1922E	
YES >> Repair or replace.		K
NO >> GO TO 2.		
2. CHECK FOR INTAKE AIR LEAK		L
 Listen for an intake air leak after th Check PCV hose connection. 	ne mass air flow sensor.	
Is intake air leak detected?		Μ
YES >> Repair or replace.		
NO >> GO TO 3.		5. F
3.CHECK A/F SENSOR 1 INPUT SIG	GNAL CIRCUIT	N
1. Turn ignition switch OFF.		
 Disconnect corresponding A/F sen Disconnect ECM harness connect 		0
A = O[a + b] + b = a + b + b + b + b + b + b + b + b + b +		

4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

				1		
DTC		A/F sensor	r 1 EC		CM	Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0171	1	F61			57	
10171		FOI	2	F102	61	Existed
P0174	2	F62	1	1102	65	LAISteu
F0174	2	1 02	2		66	

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< DTC/CIRCUIT DIAGNOSIS >

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	Connector Terminal		Gibuliu	Continuity
P0171	1	F61 -	1		
P0171	1		2	Ground	Not existed
D0174	2	F62	1		
P0174 2	F02	2			

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0171	1	F102	57		
P0171			61	- Ground	Not existed
D0174	2	FIUZ	65		
P0174			66		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-628, "Inspection".

2. Install fuel pressure gauge and check fuel pressure. Refer to EC-628, "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

(B) With CONSULT

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. For specification, refer to <u>EC-631, "Mass Air Flow Sensor"</u>.

With GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to <u>EC-631, "Mass Air Flow Sensor"</u>.

Is the measurement value within the specification?

- YES >> GO TO 7.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-204, "Diagnosis Procedure"</u>.

7.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

1. Start engine.

< DTC/CIRCUIT DIAGNOSIS >

- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

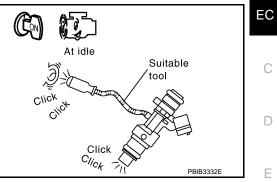
Without CONSULT

- 1. Start engine and let it idle.
- 2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-508</u>, "Diagnosis Procedure".



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.
- 4. Remove fuel tube assembly. Refer to <u>EM-42</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. For DTC P0171, reconnect fuel injector harness connectors on bank 1. For DTC P0174, reconnect fuel injector harness connectors on bank 2.
- 6. Disconnect all ignition coil harness connectors.
- 7. Prepare pans or saucers under each fuel injector.
- Crank engine for about 3 seconds. For DTC P0171, make sure that fuel sprays out from fuel injectors on bank 1. For DTC P0174, make sure that fuel sprays out from fuel injectors on bank 2.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

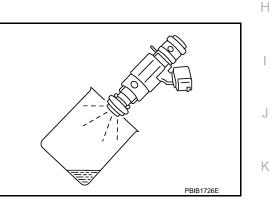
YES >> GO TO 9.

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-45, "Intermittent Incident".

>> INSPECTION END



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< DTC/CIRCUIT DIAGNOSIS >

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000009360985

[VQ37VHR]

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 A/F sensor 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 illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F 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
P0172	Fuel injection system too rich (bank 1)	Fuel injection system does not operate properly.	 A/F sensor 1 Fuel injector
P0175	Fuel injection system too rich (bank 2)	The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	 Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Clear the mixture ratio self-learning value. Refer to <u>EC-24</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".
- 2. Start engine.

Is it difficult to start engine?

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

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too. Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-277, "Diagnosis Procedure".

NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 10 minutes.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-277, "Diagnosis Procedure".

NO >> GO TO 5.

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > 5. PERFORM DTC CONFIRMATION PROCEDURE-III А Turn ignition switch OFF and wait at least 5 seconds. 1. 2. Turn ignition switch ON. 3. Start engine. EC Maintain the following conditions for at least 10 consecutive minutes. 4. Hold the accelerator pedal as steady as possible. VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH) **CAUTION:** Always drive vehicle at a safe speed. 5. Check 1st trip DTC. D Is 1st trip DTC detected? YES >> Go to EC-277, "Diagnosis Procedure". Е >> INSPECTION END NO **Diagnosis** Procedure INFOID:000000009360986 F **1.**CHECK EXHAUST GAS LEAK 1. Start engine and run it at idle. 2. Listen for an exhaust gas leak before three way catalyst 1. Three way catalyst 1 Н Three way catalyst 2 Muffler HO2S2 A/F sensor 1 To exhaust manifold : Exhaust gas PBIB1922E Is exhaust gas leak detected? YES >> Repair or replace. NO >> GO TO 2. Κ 2.CHECK FOR INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor. L Is intake air leak detected? YES >> Repair or replace. NO >> GO TO 3. Μ **3.**CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT 1. Turn ignition switch OFF.

- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC		A/F sensor	1	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0172	1	F61	1		57	
FUITZ		2	F102	61	Existed	
P0175	2	F62	1	FIUZ	65	EXISTED
F0175	2	FUZ	2		66	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

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< DTC/CIRCUIT DIAGNOSIS >

DTC		A/F sensor	1	Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0172	1	F61	1		
FUITZ	1	101	2	Ground	Not existed
P0175	2	F62	1	Giouna	NUL EXISTED
FU1/5	2	F02	2		

DTC		ECM		Ground	Continuity	
DIC	Bank	Connector	Terminal	Giouna	Continuity	
P0172	1		57			
10172	I	I	F102	61	Ground	Not existed
P0175	2	FIUZ	65	Giouna	NUL EXISTED	
FU175	Z		66			

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-628, "Inspection".

2. Install fuel pressure gauge and check fuel pressure. Refer to EC-628, "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace "fuel filter and fuel pump assembly".

 ${f 5.}$ CHECK MASS AIR FLOW SENSOR

With CONSULT

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. For specification, refer to <u>EC-631, "Mass Air Flow Sensor"</u>.

With GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in "Service \$01" with GST. For specification, refer to <u>EC-631, "Mass Air Flow Sensor"</u>.

Is the measurement value within the specification?

- YES >> GO TO 6.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-204, "Diagnosis Procedure"</u>.

6.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Start engine and let it idle.

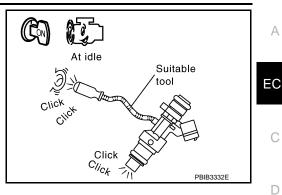
< DTC/CIRCUIT DIAGNOSIS >

2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-508, "Diagnosis Procedure"</u>.



7. CHECK FUELINJECTOR 1. Remove fuel injector assembly. Refer to EM-42, "Removal and Installation". Keep fuel hose and all fuel injectors connected to fuel tube. Ε 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. Disconnect all fuel injector harness connectors. 3. 4. Disconnect all ignition coil harness connectors. 5. Prepare pans or saucers under each fuel injector. F 6. Crank engine for about 3 seconds. Make sure fuel that does not drip from fuel injector. Is the inspection result normal? YES >> GO TO 8. NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one. 8. CHECK INTERMITTENT INCIDENT Н Refer to GI-45, "Intermittent Incident". >> INSPECTION END Κ

Revision: 2013 May

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P0181 FTT SENSOR

Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel 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**>

 Fluid temperature [°C (°F)]
 Voltage* (V)
 Resistance (kΩ)

 20 (68)
 3.5
 2.3 - 2.7

 50 (122)
 2.2
 0.79 - 0.90

*: These data are reference values and are measured between ECM terminals 106 (Fuel tank temperature sensor) and 128 (sensor ground).

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)		DTC detecting condition	Possible cause
	FTT SENSOR [Fuel tank temperature	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor.	 Harness or connectors (The FTT sensor circuit is open or shorted) FTT sensor
P0181	(FTT) sensor circuit range/ performance]	B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other tempera- ture sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the FTT sensor circuit) FTT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7. NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

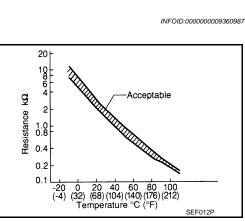
1. Turn ignition switch ON and wait at least 10 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-282, "Diagnosis Procedure".

NO >> GO TO 4.



P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
4. CHECK ENGINE COOLANT TEMPERATURE	
 Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT. Check "COOLAN TEMP/S" value. 	
<u>"COOLAN TEMP/S" less than 60°C (140°F)?</u>	
YES >> INSPECTION END NO >> GO TO 5.	
5. PERFORM DTC CONFIRMATION PROCEDURE-II	
 Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F). Wait at least 10 seconds. Check 1st trip DTC. 	
Is 1st trip DTC detected?	
YES >> Go to <u>EC-282. "Diagnosis Procedure"</u> . NO >> GO TO 6.	
6. PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)	
Perform component function check. Refer to <u>EC-282, "Component Function Check"</u> . NOTE:	
Use the component function check to check the overall function of the FTT sensor circles 1st trip DTC might not be confirmed.	cuit. During this check, a
Is the inspection result normal?	
YES >> INSPECTION END NO >> Proceed to <u>EC-282, "Diagnosis Procedure"</u> .	
7.PRECONDITIONING	
If DTC CONFIRMATION PROCEDURE has been previously conducted, always perfected.	orm the following proce-
dure before conducting the next test.	sini the following proce
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON 	
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	
TEST CONDITION:	
 Before performing the following procedure, do not add fuel. Before performing the following procedure, check that fuel level is between 1/ Before performing the following procedure, confirm that battery voltage is 11 v 	
>> GO TO 8.	
8. PERFORM DTC CONFIRMATION PROCEDURE B	
 Start engine and let it idle for 60 minutes. Move the vehicle to a cool place. NOTE: 	
Cool the vehicle in an environment of ambient air temperature between -10° C (14 3. Turn ignition switch OFF and soak the vehicle for 12 hours.	4°F) and 35°C (95°F).
CAUTION: Never turn ignition switch ON during soaking.	
NOTE: The vehicle must be cooled with the food open.	
 Start engine and let it idle for 5 minutes or more. CAUTION: 	
Never turn ignition switch OFF during idling.	
5. Check 1st trip DTC. Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-282, "Diagnosis Procedure"</u> .	

NO >> INSPECTION END

Component Function Check

1.CHECK FUEL TANK TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit. Refer to FL-5, "Exploded View".
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
4 and 5	Tomporaturo [°C (°E)]	20 (68)	2.3 - 2.7
4 anu 5	Temperature [°C (°F)]	50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to <u>EC-282</u>, "Diagnosis Procedure".

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-282. "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-280, "DTC Logic".

Which malfunction is detected?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-34. "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to <u>MWI-48</u>, "Component Function Check".

 ${f 3.}$ CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.

3. Turn ignition switch ON.

4. Check the voltage between "fuel level sensor unit and fuel pump (main)" harness connector and ground.

Fuel level sensor unit	and fuel pump (main)	Ground	Voltage (V)
Connector	Terminal	Cround	voliage (v)
B22	4	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M7, B1

• Harness for open or short between ECM and "fuel level sensor unit and fuel pump (main)"

EC-282

INFOID:000000009360989



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P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

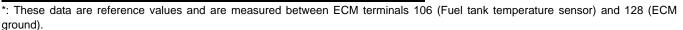
. Discor . Check	gnition switch (nnect combina the continuity meter harnes	tion mete between	fuel leve			d fuel pum	np (main)" h	narness con	nector and co	ombi-
	sensor unit and ump (main)	Comb	pination met	ter	Continuity					
Connector	Terminal	Connecto	or Tern	ninal						
B22	5	M53		24	Existed	_				
<u>s the inspe</u> YES >: NO >:	heck harness <u>ection result n</u> > GO TO 7. > GO TO 6.	ormal?	-	and sho	οπ το ρον	ver.				
	T MALFUNCT	IONING	PART							
Harness	following. connectors M for open or sh meter		en "fuel le	evel sens	sor unit a	and fuel p	ump (main)	" and "unifie	ed meter and	com-
_	> Repair open (FUEL TANK)		-	-		o power ir	n harness c	or connector	r.	
CHECK		TEMPER	ATURE S	-		o power ir	n harness c	or connector	r.	
CHECK	FUEL TANK C-283, "Comp ection result n	TEMPER onent Ins	ATURE S	-		o power ir	n harness o	or connector	r	
CHECK efer to <u>E(</u> the inspective YES >: NO >:	FUEL TANK	TEMPER onent Ins ormal? el level se	ATURE S	SENSOR	2		n harness c	or connector	r.	
CHECK	C-283, "Comp ection result n GO TO 8. Replace "fue	TEMPER onent Ins ormal? el level se ENT INCII	ATURE S pection". ensor unit DENT	SENSOR	2		n harness c	or connector	r.	
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CHECK efer to E the insper- YES >: NO >: CHECK efer to G >: CHECK . Turn iq Discor . Remov Check (main) ure.	FUEL TANK C-283, "Comp ection result n > GO TO 8. > Replace "fuel INTERMITTE I-45, "Intermitte > INSPECTIO ent Inspect C FUEL TANK gnition switch of nect "fuel level sec resistance be " terminals by	TEMPER onent Ins ormal? el level se ENT INCII ent Incide N END tion TEMPER OFF. el sensor ensor unit etween "fu	ATURE S pection". ensor unit DENT ent". ATURE S unit and fuel unit and fuel uel level s with hot w	and fuel	R I pump (n (main)' nain). Re nit and fu shown ir	nain)". " harness efer to <u>FL</u> - uel pump	connector.			09360991
CHECK efer to E the insper- YES >: NO >: CHECK efer to G CHECK . CHECK . Turn ig . CHECK . Turn ig . Check . Check . (main)	FUEL TANK C-283, "Comp ection result n > GO TO 8. > Replace "fuel INTERMITTE I-45, "Intermitte > INSPECTIO ent Inspect C FUEL TANK gnition switch of nect "fuel level sec resistance be " terminals by	TEMPER onent Ins ormal? el level se ENT INCII ent Incide N END tion TEMPER OFF. el sensor ensor unit etween "fu heating v	ATURE S pection". ensor unit DENT ent". ATURE S unit and f t and fuel uel level s	SENSOR and fuel SENSOR fuel pum pump (n ensor un vater as	R I pump (n p (main)' main). Re nit and fu shown ir nce (kΩ) • 2.7	nain)". " harness efer to <u>FL</u> - uel pump	connector.			09360991

P0182, P0183 FTT SENSOR

Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel 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**>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



DTC Logic

INFOID:000000009360993

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel tank temperature 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.)
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	 Fuel tank temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> 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 EC-284, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".
- Is the inspection result normal?

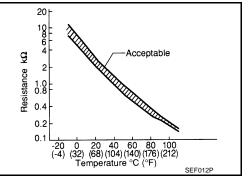
YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK DTC WITH COMBINATION METER

[VQ37VHR]

INFOID:000000009360992



INFOID:00000000936099

P0182, P0183 FTT SENSOR

		PUI	82, PU1	183 FII SENSUR
< DTC/CIRCUIT DI	AGNOSIS	>		[VQ37VHR]
Refer to MWI-34, "C	ONSULT F	unction (I	METER/M	<u>1&A)"</u> .
Is the inspection res	ult normal?	<u>?</u>		
YES >> GO TO				
NO >> Go to <u>№</u>				
3. CHECK FUEL TA	NK TEMP	ERATURI	E SENSO	R POWER SUPPLY CIRCUIT
1. Turn ignition sw				
 Disconnect "fue Turn ignition sw 		sor unit an	id fuel pun	np" harness connector.
		n "fuel lev	el sensor (unit and fuel pump" harness connector and ground.
	-			
Fuel level sensor unit ar	d			
fuel pump	Ground	Voltage	(V)	
Connector Termina				
B22 4	Ground	Approx	κ. 5	
Is the inspection res		2		
YES >> GO TO NO >> GO TO				
4.DETECT MALFU				
	NCTIONIN	IG PART		
Check the following.	ro M7 D1			
 Harness connecto Harness for open 		tween EC	M and "fue	el level sensor unit and fuel pump"
· · · · · · · · · · · · · · · · · · ·				
>> Repair o	pen circuit	t, short to	ground or	r short to power in harness or connector.
	•		-	R GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition sw				
 Disconnect com 		eter harne	ess conne	ector.
		een "fuel l	evel sens	or unit and fuel pump" harness connector and combination
meter harness of	connector.			
Fuel level sensor unit				_
and fuel pump	Combinat	tion meter	Continuity	1
Connector Terminal	Connector	Terminal	Continuity	
B22 5	M53	24	Existed	—
4. Also check harr				
Is the inspection res		•		
YES >> GO TO		-		
NO >> GO TO				
6.DETECT MALFL	NCTIONIN	IG PART		
Check the following.				
 Harness connecto 				
Harness for open	or short be	tween "fue	el level sei	nsor unit and fuel pump" and combination meter
	•		-	r short to power in harness or connector.
7.CHECK FUEL TA	NK TEMP	ERATURI	E SENSO	R
Refer to EC-286, "C	omponent	Inspectior	<u>ו"</u> .	
Is the inspection res	ult normal?	2		
YES >> GO TO	8.			

YES >> GO TO 8. NO >> Replace "fuel level sensor unit and fuel pump".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000009360995

1.CHECK FUEL TANK TEMPERATURE SENSOR

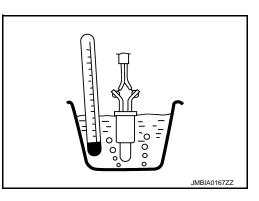
- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit. Refer to <u>FL-5</u>, "Exploded View".
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7
4 anu 5		50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> INSPECTION END

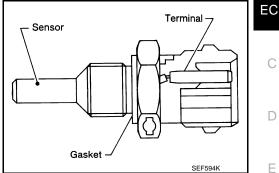
NO >> Replace "fuel level sensor unit and fuel pump".



P0196 EOT SENSOR

Description

The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil 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 oil temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

*: These data are reference values and are measured between ECM terminals 78 (Engine oil temperature sensor) and 84 (Sensor ground).

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0196 is displayed with P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to <u>EC-291, "DTC Logic"</u>.

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DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition		Possible cause	L
	EOT SENSOR [Engine oil temperature (EOT) sensor range/performance	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	 Harness or connectors (The EOT sensor circuit is open or shorted) EOT sensor 	N
P0196		B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the EOT sensor is higher/ lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the EOT sensor circuit) EOT sensor 	N

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES	>> GO TO 6.
NO	>> GO TO 2.
2. pre	CONDITIONING

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P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 3.

3.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. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for 5 minutes and 10 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-290, "Diagnosis Procedure".

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Select "DATA MONITOR" mode with CONSULT.
- Check that "COOLAN TEMP/S" indicates above 80°C (176°F). If it is above 80°C (176°F), go to the following steps. If it is below 80°C (176°F), warm engine up until "COOLAN TEMP/S" indicates more than 80°C (176°F). Then perform the following steps.
- 3. Turn ignition switch OFF and soak the vehicle in a cool place.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Turn ignition switch ON.

NOTE: Do not turn ignition switch OFF until step 10.

- 7. Select "DATA MONITOR" mode with CONSULT.
- 8. Check the following.

COOLAN TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between "COOLAN TEMP/S" and "INT/A TEMP SE"	Within 6°C (11°F)

If they are within the specified range, perform the following steps.

If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.

NOTĚ:

• Do not turn ignition switch OFF.

- If it is supposed to need a long period of time, do not deplete the battery.
- 9. Start engine and let it idle for 5 minutes.
- 10. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-290, "Diagnosis Procedure".

NO >> GO TO 5.

5.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to <u>EC-289, "Component Function Check"</u>.

NOTE:

Use the component function check to check the overall function of the EOT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

P0196 EOT SENSOR

< DTC/CIF	RCUIT DIAGNOSIS >	>		[VQ37VHR]
NO >:	> Proceed to <u>EC-290.</u>	"Diagnos	sis Procedure".	
6.PRECC	NDITIONING	-		
dure before 1. Turn ig 2. Turn ig 3. Turn ig TEST CON • Before p • Before p	e conducting the next gnition switch OFF and gnition switch ON. gnition switch OFF and NDITION: performing the follow performing the follow	test. d wait at I d wait at I ving proc ving proc	east 10 seconds. east 10 seconds. edure, do not add fue edure, check that fue	I level is between 1/4 and 4/4.
• Before p	bertorming the follow	ving proc	edure, confirm that b	attery voltage is 11 V or more at idle.
_ >:	> GO TO 7.			
7.PERFO	RM DTC CONFIRMA	TION PR	OCEDURE B	
2. Move to NOTE		lace.		re between –10°C (14°F) and 35°C (95°F).
	gnition switch OFF and		e vehicle for 12 hours.	
NOTE The ve	turn ignition switch : ehicle must be cooled angine and let it idle fo	with the f	ood open.	
CAUT				
5. Check	1st trip DTC.			
	DTC detected?	"Dis ere se	ie Dreesdure"	
	> Proceed to <u>EC-290</u> , > INSPECTION END	Diagnos	<u>as Procedure</u> .	
Compon	ent Function Che	eck		INFOID:000000009360998
1.снеск	ENGINE OIL TEMPE	ERATURE	E (EOT) SENSOR	
 Discor Remove Check 	nition switch OFF. nect EOT sensor har ve EOT sensor. Refer resistance between ot water as shown in t	to <u>EM-82</u> EOT se	2, "Exploded View". nsor terminals by hea	ating
Terminals	Condition		Resistance (kΩ)	
<u> </u>		20 (68)	2.10 - 2.90	
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00	
		90 (194)	0.236 - 0.260	
YES >: NO >:	<u>ection result normal?</u> > GO TO 2. > Proceed to <u>EC-290.</u> (INTERMITTENT INC	-	sis Procedure".	JMBIA0080ZZ
		er to <u>GI-4</u>	5, "Intermittent Incident	
	ection result normal?			
	> INSPECTION END > Proceed to <u>EC-290</u> ,	"Diagnos	sis Procedure".	

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-290, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace engine oil temperature sensor.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ENGINE OIL TEMPERATURE SENSOR

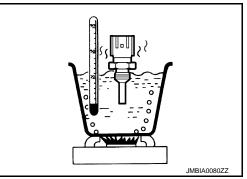
- 1. Turn ignition switch OFF.
- 2. Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor. Refer to EM-49, "Exploded View".
- 4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
		20 (68)	2.10 - 2.90
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor.



INFOID:000000009361000

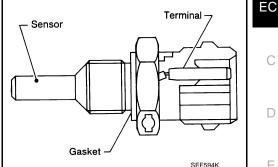
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< DTC/CIRCUIT DIAGNOSIS >

P0197, P0198 EOT SENSOR

Description

The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil 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.



20 10 6 4 Acceptable Resistance kΩ 2 1.0 0.8 0.4 0.2 0.1 0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F) -20 SEF012P

<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

*: These data are reference values and are measured between ECM terminals 78 (Engine oil temperature sensor) and 84 (Sensor ground).

DTC Logic

INFOID:000000009361002

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DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	K
P0197	Engine oil temperature 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.)	N
P0198	Engine oil temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine oil temperature sensor	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 3

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- >> Go to EC-292, "Diagnosis Procedure". YES
- >> INSPECTION END NO

INFOID:000000009361001

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< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK EOT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect engine oil temperature (EOT) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between EOT sensor harness connector and ground.

EOT	sensor	Ground	Voltage (V)
Connector	Terminal	Glound	voltage (v)
F38	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.

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

$\mathbf{3}$. Check eot sensor ground circuit for open and short

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EOT sensor harness connector and ECM harness connector.

EOT sensor		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F38	2	F102	84	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, short to ground or short to power in harness or connectors.

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-292, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine oil temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.

2. Disconnect engine oil temperature sensor harness connector.

3. Remove engine oil temperature sensor. Refer to EM-49, "Exploded View".

INFOID:000000009361004

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

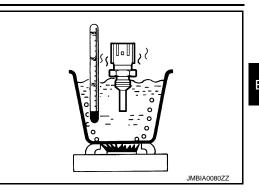
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
		20 (68)	2.10 - 2.90
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor.



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[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

P0222, P0223, P2132, P2133 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 valve movement. The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



135

90

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0222, P0223, P2132 or P2133 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-393, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 (bank 1) circuit low in- put	An excessively low voltage from the TP sensor 1 is sent to ECM.	
P0223	Throttle position sensor 1 (bank 1) circuit high in- put	An excessively high voltage from the TP sensor 1 is sent to ECM.	 Harness or connectors (TP sensor 1 circuit is open or shorted.)
P2132	Throttle position sensor 1 (bank 2) circuit low in- put	An excessively low voltage from the TP sensor 1 is sent to ECM.	 Electric throttle control actuator (TP sensor 1)
P2133	Throttle position sensor 1 (bank 2) circuit high in- put	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V 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?

- YES >> Go to EC-295. "Diagnosis Procedure".
- NO >> INSPECTION END

INFOID:000000009361005

Throttle position sensor

Sensor 1

Seńsor 2

45

Throttle valve opening angle (deg) PBIB0145E

6.0

4.0

output voltage

0[⊾]0

P0222, P0223, P2132, P2133 TP SENSOR

[V037VHR]

	-							
Diagnosis I	roce	dure						INFOID:000000009361007
CHECK GF	ROUNE		TION					
I. Turn igniti								
-				r to Ground	I Inspecti	on in <u>GI-48</u>	<u>3, "Circuit Inspecti</u>	<u>on"</u> .
s the inspection								
	O TO 2 epair o	∠. r replace g	round cor	nection.				
2.снеск тн	•	• •			VER SUF	PLY CIRC	UIT	
				tuator harn				
2. Turn igniti								
3. Check the	voltag	je between	electric th	nrottle contr	rol actuat	or harness	connector and g	round.
				-				
DTC	Bank	ric throttle con		Ground	Voltage	e (V)		
P0222, P0223	1 Dalik	F6	6	1				
P0222, P0223	2	F0 F27	1	Ground	Appro	ox. 5		
			-					
<u>s the inspections the inspection of the second second second second second second second second second second</u>	O TO 3							
NO >> R	enair o	non circuit	short to a	around or sl	hort to po			rc
-	•	•	-	-			ness or connector	
3. CHECK TH . Turn igniti 2. Disconnee 3. Check the	IROTT	LE POSITI tch OFF. I harness c	ON SENS	SOR 1 GRC	OUND CII	RCUIT FO	R OPEN AND SH	
3. CHECK TH 1. Turn igniti 2. Disconne	IROTT ion swit ct ECM e contir	LE POSITI tch OFF. I harness c nuity betwe	ON SENS connector. en electric	SOR 1 GRC	DUND CI	RCUIT FO	R OPEN AND SH	ORT
3. CHECK TH 1. Turn igniti 2. Disconner 3. Check the	IROTT on swit ct ECM e contir	LE POSITI tch OFF. I harness c nuity betwe	ON SENS connector. en electric	SOR 1 GRC	DUND CII	RCUIT FO	R OPEN AND SH	ORT
 B.CHECK TH Turn igniti Disconnee Check the nector. 	IROTT on swit ct ECM e contir Electric Bank	LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector	ON SENS connector. en electric rol actuator Terminal	SOR 1 GRC	DUND CII	RCUIT FOI	R OPEN AND SH	ORT
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 3.CHECK TH 1. Turn igniti 2. Disconnee 3. Check the nector. DTC P0222, P0223 P2132, P2133 4. Also chece 	IROTT on swit ct ECM contin Electric Bank 1 2 k harne	LE POSITI tch OFF. I harness c nuity betwe c throttle cont Connector F6 F27 ess for sho	ON SENS connector. en electric rol actuator Terminal 3 4 rt to grour	SOR 1 GRC c throttle cc EC Connector	DUND CII ontrol actor M Terminal 40 48	CUIT FOI	R OPEN AND SH	ORT
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 $5. {\sf CHECK \ THROTTLE \ POSITION \ SENSOR}$

Refer to EC-296, "Component Inspection".

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.Replace electric throttle control actuator

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000009361008

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.

- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (A/T) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+ –		Condition		Voltage (V)
Connector	Terminal				
	20 ITP concort 1 (bank 1)]	40		Fully released	More than 0.36
	30 [TP sensor 1 (bank 1)]	40		Fully depressed	Less than 4.75
	31 [TP sensor 1 (bank 2)]	48		Fully released	More than 0.36
E 404				Fully depressed	Less than 4.75
F101	24 (TD concer 2 (here); 4)]	40	Accelerator pedal	Fully released	Less than 4.75
	34 [TP sensor 2 (bank 1)]	40		Fully depressed	More than 0.36
		40	1	Fully released	Less than 4.75
	35 [TP sensor 2 (bank 2)]	48		Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

DTC Logic

INFOID:000000009361009

[VQ37VHR]

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, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL 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 MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain illuminating.

If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

2. Two Trip Detection Logic (Exhaust quality deterioration)

For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only illuminate when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP H sensor signal every 1,000 engine revolutions.

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0300	Multiple cylinder misfires detected	Multiple cylinders misfire.	Improper spark plug	
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	 Insufficient compression Incorrect fuel pressure 	J
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	k
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	• The ignition signal circuit is open or short-	
P0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	ed • Lack of fuel	
P0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	 Signal plate A/F sensor 1 Incorrect PCV hose connection 	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure N before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> 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. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Restart engine and let it idle for about 15 minutes.
- 6. Check 1st trip DTC.

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< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to EC-298, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and drive the vehicle under 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.

Similar conditions to (1st trip) Freeze Frame Data mean 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.

Engine speed	Engine speed in the freeze frame data \pm 400 rpm			
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6MPH)			
Base fuel schedule	Base fuel schedule in the freeze frame data \times (1 \pm 0.1)			
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).			
condition	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).			

Driving time varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-298</u>, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- 1. Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leak.
- 3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 2.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.

YES-2 >> Without CONSULT: GO TO 4.

NO >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

() With CONSULT

1. Start engine.

INFOID:000000009361010

[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 4.

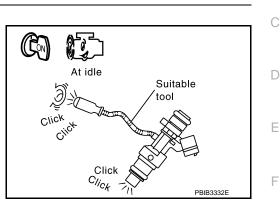
4.CHECK FUNCTION OF FUEL INJECTOR-I

- 1. Start engine and let it idle.
- 2. Listen to each fuel injector operation sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-508, "Diagnosis Procedure"</u>.



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

- 1. Turn ignition switch OFF.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT 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.
- 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.

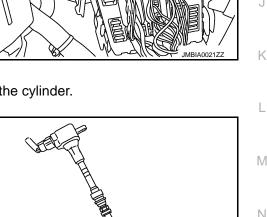
CAUTION:

- During the operation, always stay 50 cm (19.7 in) or more away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

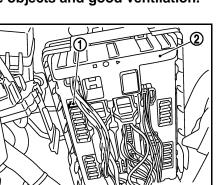
Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.



13 - 17 mm (0.52-0.66 in) Grounded metal portion (Cylinder head, cylinder block, etc.)





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6.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a non-malfunctioning 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.

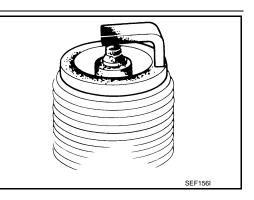
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-514. "Diagnosis Procedure".

7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-21, "Inspection"</u>.
- NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

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 <u>EM-20, "Removal</u> <u>and Installation"</u>.

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-27, "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.

- 2. Release fuel pressure to zero. Refer to EC-628, "Inspection".
- 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-628, "Inspection".

At idle: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly".
- NO >> Repair or replace.

< DTC/CIRCUIT DIAGNOSIS >

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12.CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to <u>EC-14, "BASIC INSPECTION : Special Repair Requirement"</u>. For specification, refer to <u>EC-631, "Idle Speed"</u> and <u>EC-631, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-14, "BASIC INSPECTION : Special Repair Requirement".

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect corresponding A/F sensor 1 harness connector.

3. Disconnect ECM harness connector.

4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

		A/F sensor	1	EC	ECM		
	Bank	Connector	Terminal	Connector	Terminal	Continuity	
	1	F61	1		57		
		101	2	F102	61	Existed	
	2	F62	500	1	FIUZ	65	Existed
			2		66		

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

	A/F sensor	Ground	Continuity		
Bank	Connector	Terminal	Ground	Continuity	
1	F61	1		Not existed	
1	101	2	Ground		
2	F62	1	Ground		
2		2			

		ECM	Ground	Continuity		
	Bank	Connector	Terminal	Ciouna	Continuity	
	1		57		Not evicted	
		F102	61	Ground		
-			65	Ground	Not existed	
2		66				

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

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

14.CHECK A/F SENSOR 1 HEATER

Refer to EC-190, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace (malfunctioning) A/F sensor 1.

15. CHECK MASS AIR FLOW SENSOR

With CONSULT

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT. For specification, refer to EC-631, "Mass Air Flow Sensor".

With GST

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to <u>EC-631, "Mass Air Flow Sensor"</u>.

Is the measurement value within the specification?

YES >> GO TO 16.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-204, "Diagnosis Procedure"</u>.

16.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-612. "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace.

17.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>EC-155</u>, <u>"CONSULT Func-tion"</u>.

>> GO TO 18.

18.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0327, P0328, P0332, P0333 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

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[VQ37VHR]

INFOID:000000009361011

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause	
P0327	Knock sensor (bank 1) circuit low input	An excessively low voltage from the sensor is sent to ECM.		
P0328	Knock sensor (bank 1) circuit high input	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.) 	ſ
P0332	Knock sensor (bank 2) circuit low input	An excessively low voltage from the sensor is sent to ECM.	Knock sensor	
P0333	Knock sensor (bank 2) circuit high input	An excessively high voltage from the sensor is sent to ECM.		(

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

Κ >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Start engine and run it for at least 5 seconds at idle speed. L Check 1st trip DTC. 2. Is 1st trip DTC detected? YES >> Go to EC-303, "Diagnosis Procedure". M NO >> INSPECTION END Diagnosis Procedure INFOID:000000009361013 Ν **1.**CHECK GROUND CONNECTION Turn ignition switch OFF. 1 Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection". 2 Is the inspection result normal? >> GO TO 2. YES Ρ NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and ECM harness connector.

2. Check the continuity between knock sensor harness connector and ECM harness connector.

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P0327, P0328, P0332, P0333 KS

< DTC/CIRCUIT DIAGNOSIS >

DTC		Knock sens	sor	EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F203	2	F102	72	Existed
P0332, P0333	2	F202	2	1102	12	LAISteu

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F9, F201

• Harness for open or short between knock sensor and ECM

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

4. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Knock sensor			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F203	1	F102	73	Existed
P0332, P0333	2	F202	1	1102	69	LAISIEU

2. 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 F9, F201

Harness for open or short between ECM and knock sensor

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

6.CHECK KNOCK SENSOR

Refer to EC-304, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning knock sensor.

1.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.

- 2. Disconnect knock sensor harness connector.
- 3. Check resistance between knock sensor terminals as per the following. **NOTE:**

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EC-304

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INFOID:000000009361014

P0327, P0328, P0332, P0333 KS

< DTC/CIRCUIT DIAGNOSIS >

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lt is n	ecessary to use an ohmmeter which	can measure more than 10 M Ω .	А
Terminal	ls Resistance (kΩ)		
1 and 2	2 Approx. 532 - 588 [at 20°C (68°F)]		C
<u>Is the insp</u> YES >		dropped or physically damaged. Use only new ones.	С
		I	D

< DTC/CIRCUIT DIAGNOSIS >

P0335 CKP SENSOR (POS)

Description

The crankshaft position sensor (POS) is located on the cylinder block 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.

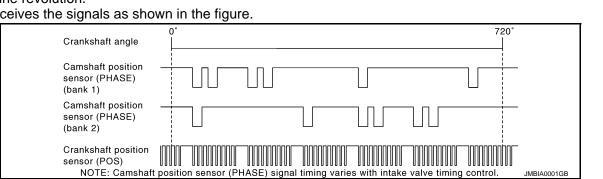
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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

INFOID:000000009361016

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 [CKP sensor (POS) circuit is open or shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) (Gear lever position sensor circuit is shorted) Crankshaft position sensor (POS) Accelerator pedal position sensor EVAP control system pressure sensor Refrigerant pressure sensor Brake booster pressure sensor Gear lever position sensor Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

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< DTC/CIRCUIT DIAGNOSIS > TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

•	> GO TO		ATION PR	OCEDURE						EC
 Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds. Check 1st trip DTC. 									С	
	> Go to <u>E</u>	<u>xted?</u> <u>C-307, "Dia</u> TION ENE		ocedure".						D
Diagnos	is Proce	edure							INFOID:000000009361017	Е
1. CHECK	GROUN		CTION							
	-	onnection		r to Ground In	spection in	<u>GI-4</u>	8, "Cir	cuit Inspectio	<u>n"</u> .	F
YES >	> GO TO		-	nnection.						G
				CKP) SENSOR				PLY CIRCUIT	[-I	Н
	gnition swi the volta		n CKP ser	isor (POS) har	ness conne	ector	and gi	ound.		I
CKP ser	nsor (POS)	Ground	Voltage	(V)						
Connector	Termina									J
F2 Is the insp	1 ection res	Ground	Approx	. 5						
YES >	> GO TO > GO TO	8.	-							К
3. CHECK	CRANKS	SHAFT PO	SITION (C	KP) SENSOR	(POS) PO	WEF	SUP	PLY CIRCUIT	F-11	I
2. Discor		/I harness		ensor (POS) h	arness con	nect	or and	ECM harnes	s connector.	M
CKP sens	sor (POS)	EC	M	Continuity						
Connector	Terminal	Connector	Terminal	Continuity						Ν
F2	1	F101	46	Existed						
NO >	> GO TO > Repair c	4. open circui	t.							0
4.CHECK										Ρ
Check har	ness for s	hort to pov	er and sh	ort to ground,	between the	e foll	owing	terminals.		
EC	CM			Sensor				-		
Connector	Terminal		Name		Connector	Те	minal			

F101

45

46

Brake booster pressure sensor

CKP sensor (POS)

E48

F2

1

< DTC/CIRCUIT DIAGNOSIS >

EC	CM	Sensor			
Connector	Terminal	Name	Connector	Terminal	
F102	74	Gear lever position sensor	F57	3	
	103	APP sensor	E112	6	
M107	107			B30	3
		Refrigerant pressure sensor	E172	3	

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.

- Brake booster pressure sensor (Refer to EC-386. "Component Inspection".)
- Gear lever position sensor (Refer to EC-399, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-343. "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-527. "Diagnosis Procedure".)
- Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-483, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

I.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-4. "Exploded View".

>> INSPECTION END

$\mathbf{8}.$ Check CKP sensor (POS) ground circuit for open and short

- 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 sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F2	2	F101	47	Existed

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, short to ground or short to power in harness or connectors.

 ${f 9.}$ 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	Continuity
F2	3	F101	37	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

	P0335 C	KP SENSOR (POS)	
< DTC/CIRCUIT I	DIAGNOSIS >	[VQ37VHR]	
		or short to power in harness or connectors.	
10. CHECK CRA	NKSHAFT POSITION SENS	OR (POS)	A
Refer to EC-309,	Component Inspection".		
Is the inspection re	esult normal?		EC
YES >> GO TO NO >> Repla			
11.CHECK GEA	ce crankshaft position sensor	(FOS).	
		4	C
Is the inspection re	chipping signal plate gear too	tn.	
YES >> GO T			D
	ce the signal plate.		
12.CHECK INTE	ERMITTENT INCIDENT		E
	termittent Incident".		
>> INSPE	ECTION END		F
Component In	spection	INF0ID:000000009361018	
1. CHECK CRAN	KSHAFT POSITION SENSOR	R (POS)-I	G
1. Turn ignition s			
	ting bolt of the sensor. ankshaft position sensor (PO	S) harness connector	Н
4. Remove the s	ensor. Refer to <u>EM-117, "Exp</u>	loded View".	
•	the sensor for chipping.		1
Is the inspection re			
YES >> GO TO NO >> Repla	ce crankshaft position sensor		
			J
			Κ
		JMBIA0063ZZ	
2.CHECK CRAN	KSHAFT POSITION SENSOR	R (POS)-II	L
Check resistance	between crankshaft position s	ensor (POS) terminals as follows.	
		<u>.</u>	M
Terminals (Polarity)	Resistance (Ω)	_	
1 (+) - 2 (-)	_		Ν
1 (+) - 3 (-)	Except 0 or ∞ [at 25°C (77°F)]		
2 (+) - 3 (-)		-	
Is the inspection re			0
	ECTION END	(POS)	

NO >> Replace crankshaft position sensor (POS).

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< DTC/CIRCUIT DIAGNOSIS >

P0340, P0345 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.

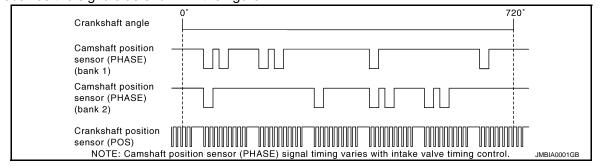
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

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

INFOID:000000009361020

DTC DETECTION LOGIC

NOTE:

If DTC P0340 or P0345 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-393, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) (bank 1) circuit	 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 	 Harness or connectors [CMP sensor (PHASE) (bank 1) circuit is open or shorted.] Camshaft position sensor (PHASE) (bank 1) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery
P0345	Camshaft position sensor (PHASE) (bank 2) circuit		 Harness or connectors [CMP sensor (PHASE) (bank 2) circuit is open or shorted.] Camshaft position sensor (PHASE) (bank 2) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.



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P0340, P0345 CMP SENSOR (PHASE)

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON. А >> GO TO 2. EC 2.PERFORM DTC CONFIRMATION PROCEDURE-I 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. Is 1st trip DTC detected? YES >> Go to EC-311, "Diagnosis Procedure". D NO >> GO TO 3. 3 .perform dtc confirmation procedure-II 1. Е Maintaining engine speed at more than 800 rpm for at least 5 seconds. Check 1st trip DTC. 2. Is 1st trip DTC detected? YES >> Go to EC-311, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:00000000936102 CHECK STARTING SYSTEM Turn ignition switch to START position. Н Does the engine turn over? Does the starter motor operate? YES >> GO TO 2. NO >> Check starting system. (Refer to EC-9, "Work Flow".) 2. CHECK GROUND CONNECTION 1. Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection". 2. Is the inspection result normal? YES >> GO TO 3. Κ NO >> Repair or replace ground connection. ${
m 3.}$ CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT 1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector. L 2. Turn ignition switch ON. Check the voltage between CMP sensor (PHASE) harness connector and ground. 3. M CMP sensor (PHASE) DTC Ground Voltage (V) Bank Connector Terminal Ν P0340 1 F5 1 Ground Approx. 5 P0345 2 F18 1 Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. ${f 4.}$ CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT Ρ 1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

DTC	CMP sensor (PHASE)			EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0340	1	F5	2	F102	96	Existed
P0345	2	F18	2	1102	92	LAISIEU

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 F107, F106 (bank 2)

Harness for open or short between CMP sensor (PHASE) and ECM

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

6.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.

DTC	CMP sensor (PHASE)			EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0340	1	F5	3	F102	59	Existed
P0345	2	F18	3	F IUZ	63	Existed

2. 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 F107, F106 (bank 2)
- Harness for open or short between CMP sensor (PHASE) and ECM

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

8.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-313. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning camshaft position sensor (PHASE).

9.CHECK CAMSHAFT (INTAKE)

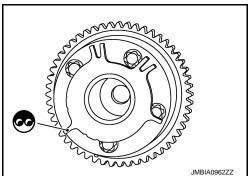
Check the following.

- · Accumulation of debris to the signal plate of camshaft front end
- Chipping signal plate of camshaft front end

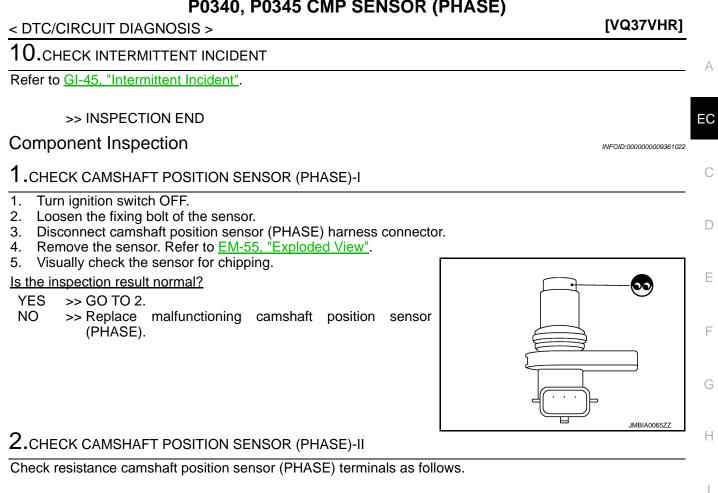
Is the inspection result normal?

YES >> GO TO 10.

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



P0340, P0345 CMP SENSOR (PHASE)



Terminals (Polarity)	Resistance (Ω)
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ [at 25°C (77°F)]
2 (+) - 3 (-)	
Is the inspection res	sult normal?
YES >> INSPEC	CTION END

NO >> Replace malfunctioning camshaft position sensor (PHASE).

Revision: 2013 May

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< DTC/CIRCUIT DIAGNOSIS >

P0420, P0430 THREE WAY CATALYST FUNCTION

DTC Logic

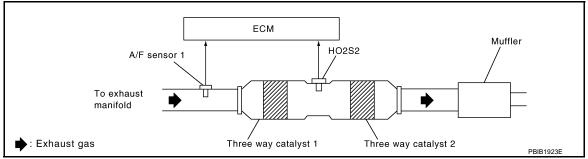
INFOID:000000009361023

[VQ37VHR]

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2. A three way catalyst 1 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 A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst 1 malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold (bank 1)	Three way catalyst (manifold) does not op-	Three way catalyst (manifold)Exhaust tube
P0430	Catalyst system efficiency below threshold (bank 2)	erate properly.Three way catalyst (manifold) does not have enough oxygen storage capacity.	 Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 7.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

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

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.

P0420, P0430 THREE WAY CATALYST FUNCTION	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
 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 70 Open engine hood. 	0°C (158°F). A
 Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSUL" Rev engine up to about 2,000 rpm and hold it for 3 consecutive minutes then release to pedal completely. 	
12. Check the indication of "CATALYST".	
Which is displayed on CONSULT screen?	С
CMPLT >> GO TO 6. INCMP >> GO TO 4.	
4. PERFORM DTC CONFIRMATION PROCEDURE-II	D
 Wait 5 seconds at idle. Rev engine up to about 2,000 rpm and maintain it until "INCMP" of "CATALYST" changes will take approximately 5 minutes). 	to "CMPLT" (It
Does the indication change to "CMPLT"?	
YES >> GO TO 6. NO >> GO TO 5.	_
5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN	F
 Stop engine and cool it down to less than 70°C (158°F). Perform DTC CONFIRMATION PROCEDURE again. 	G
>> GO TO 3.	
6.PERFORM DTC CONFIRMATION PROCEDURE-III	Н
Check 1st trip DTC.	
Is 1st trip DTC detected?	
YES >> Go to <u>EC-316, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
7.PERFORM COMPONENT FUNCTION CHECK	J
Perform component function check. Refer to EC-315, "Component Function Check".	
NOTE: Use component function check to check the overall function of the three way catalyst (manifo check, a 1st trip DTC might not be confirmed.	old). During this
Is the inspection result normal?	1
YES >> INSPECTION END NO >> Go to EC-316, "Diagnosis Procedure".	L
Component Function Check	INFOID:000000009361024
1.PERFORM COMPONENT FUNCTION CHECK	
Without CONSULT	N
 Start engine and warm it up to the normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. 	
 Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute Let engine idle for 1 minute. 	e under no load. $_{\bigcirc}$
 Open engine hood. Check the voltage between ECM harness connector terminals under the following condition 	n. P

< DTC/CIRCUIT DIAGNOSIS >

ECM DTC Condition Voltage + _ Connector Terminal Terminal 76 P0420 [HO2S2 The voltage fluctuation cycle takes more (bank 1)] Keeping engine speed at 2,500 rpm F102 84 than 5 seconds. constant under no load 80 • 1 cycle: 0.6 - 1.0 \rightarrow 0 - 0.3 \rightarrow 0.6 - 1.0 P0430 [HO2S2 (bank 2)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-316, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009361025

1.CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dents.

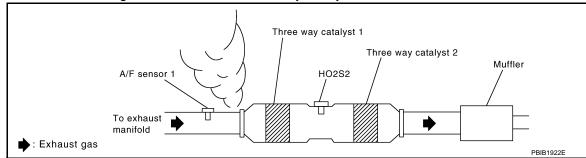
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3.CHECK 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 4.

4.CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to <u>EC-14, "BASIC INSPECTION : Special Repair Requirement"</u>. For specification, refer to <u>EC-631, "Idle Speed"</u> and <u>EC-631, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the EC-14, "BASIC INSPECTION : Special Repair Requirement".

5.CHECK FUEL INJECTORS

1. Stop engine and then turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as per the following.

< DTC/CIRCUIT DIAGNOSIS >

+		_		Voltage
Connector	Terminal	Connector	Terminal	
	81			
	82			
F102	85	M107	128	Pottory voltage
F102	86	WITO7	120	Battery voltage
	89			
	90			

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>EC-508</u>, "Diagnosis Procedure".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT 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:

 During the operation, always stay 50 cm (19.7 in) or more away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.

• It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

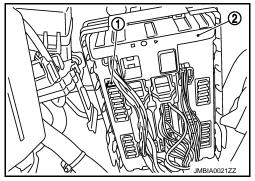
When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

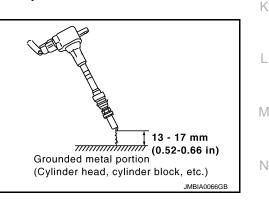
Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

7.CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.





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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 2. Disconnect spark plug and connect a non-malfunctioning 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?

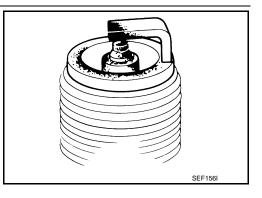
- YES >> GO TO 8.
- NO >> Check ignition coil, power transistor and their circuits. Refer to EC-514, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-21, "Inspection"</u>.
- NO >> Repair or clean spark plug. Then GO TO 9.



9.CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

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 <u>EM-20, "Removal</u> and Installation".
- 10. CHECK FUEL INJECTOR
- 1. Turn ignition switch OFF.
- Remove fuel injector assembly. Refer to <u>EM-42, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel
- Keep fuel hose and all fuel injectors connected to fuel tube.
- 3. Disconnect all ignition coil harness connectors.
- 4. Reconnect all fuel injector harness connectors disconnected.
- 5. Turn ignition switch ON.
- 6. Check that fuel does not drip from fuel injector.

Does fuel drip from fuel injector?

- YES >> Replace the fuel injector(s) from which fuel is dripping.
- NO >> GO TO 11.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace three way catalyst assembly.
- NO >> Repair or replace harness or connector.

< DTC/CIRCUIT DIAGNOSIS >

P0441 EVAP CONTROL SYSTEM

DTC Logic

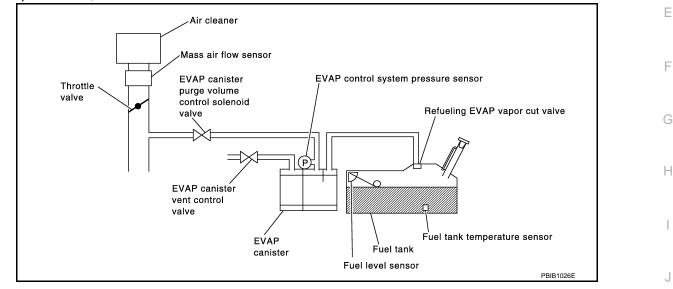
DTC DETECTION LOGIC

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0441	EVAP control system in- correct purge flow	EVAP control system does not operate proper- ly, EVAP control system has a leak between in- take manifold and EVAP control system pressure sensor.	 EVAP canister purge volume control solenoid valve stuck closed EVAP control system pressure sensor and the circuit Loose, disconnected or improper connection of rubber tube Blocked rubber tube Cracked EVAP canister EVAP canister purge volume control solenoid valve circuit Accelerator pedal position sensor Blocked purge port EVAP canister vent control valve 	

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 6.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

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< DTC/CIRCUIT DIAGNOSIS >

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT.
- 7. Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.3 - 9.0 msec
COOLAN TEMP/S	More than 0°C (32°F)

CAUTION:

Always drive vehicle at a safe speed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to <u>EC-321</u>, "Diagnosis Procedure".

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-320, "Component Function Check".

NOTE:

Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-321, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

1. Lift up drive wheels.

INFOID:000000009361027

< DTC/CIRCUIT DIAGNOSIS > [VQ37VI] 2. Start engine (VDC switch OFF) and warm it up to normal operating temperature. 3. Turn ignition switch OFF and wait at least 10 seconds. 4. Turn ignition switch OFF and wait at least 10 seconds. 5. Turn ignition switch OFF and wait at least 10 seconds. 5. Turn ignition switch OFF and wait at least 10 seconds. 6. Start engine and wait at least 70 seconds. 7. Set voltmeter probes to ECM harness connector terminals as per the following. ECM 102 102 M107 (EVAP control system pressure sensor signal) 112 8. Check EVAP control system pressure sensor value at idle speed and note it. 9. Establish and maintain the following conditions for at least 1 minute. Air conditioner switch ON Headlamp switch ON Rear window defogger switch ON Engine speed Approx. 3,000 rpm Gear position Any position other than P, N or R 10. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (n sured at step 8) for at least 1 second. Is the inspection result normal? VEP	
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 B. Establish and maintain the following conditions for at least 1 minute. Air conditioner switch Air conditioner switch Headlamp switch ON Rear window defogger switch ON Engine speed Approx. 3,000 rpm Gear position Any position other than P, N or R O. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (n sured at step 8) for at least 1 second. S the inspection result normal? 	
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Rear window defogger switch ON Engine speed Approx. 3,000 rpm Gear position Any position other than P, N or R 0. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (n sured at step 8) for at least 1 second. s the inspection result normal?	
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sured at step 8) for at least 1 second.	
s the inspection result normal?	nea-
YES >> INSPECTION END	
NO >> Go to EC-321, "Diagnosis Procedure".	
Diagnosis Procedure	09361028
CHECK EVAP CANISTER	
. Turn ignition switch OFF.	
 Check EVAP canister for cracks. <u>s the inspection result normal?</u> 	
YES-1 >> With CONSULT: GO TO 2.	
YES-2 >> Without CONSULT: GO TO 3.	
NO >> Replace EVAP canister.	
CHECK PURGE FLOW	
With CONSULT	
. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP	ser-
vice port. 2. Start engine and let it idle.	
. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.	
. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check vacuum e	xist-
ence.	
PURG VOL C/V Vacuum	
100% Existed	
0% Not existed	
s the inspection result normal?	
YES >> GO TO 7.	
NO >> GO TO 4.	

3. CHECK PURGE FLOW

Without CONSULT

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 1. Start engine and warm it up to normal operating temperature.
- 2. Stop engine.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to <u>EC-98</u>. "System Diagram".
- 4. Start engine and let it idle.
- Do not depress accelerator pedal even slightly.
- 5. Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

6. Revving engine up to 2,000rpm after 100 seconds passed after starting engine.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

4.CHECK EVAP PURGE LINE

- 1. Turn ignition switch OFF.
- Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-98, "System Diagram"</u>.

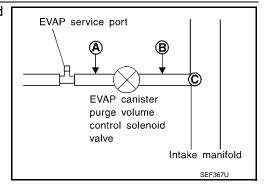
Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair it.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

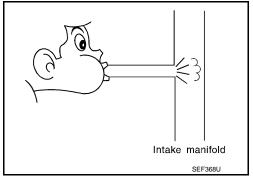
- 1. Disconnect purge hoses connected to EVAP service port **A** and EVAP service purge volume control selencid value **P**
- EVAP canister purge volume control solenoid valve **B**.
- 2. Blow air into each hose and EVAP purge port **C**.



3. Check that air flows freely.

Is the inspection result normal?

- YES-1 >> With CONSULT: GO TO 6.
- YES-2 >> Without CONSULT: GO TO 7.
- NO >> Repair or clean hoses and/or purge port.



6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Start engine.

2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8.

EC-322

P0441 EVAP CONTROL SYSTEM < DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
NO >> GO TO 7.	
7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-328, "Component Inspection".	
Is the inspection result normal?	E
YES >> GO TO 8. NO >> Replace EVAP canister purge volume control solenoid valve.	
8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
 Disconnect EVAP control system pressure sensor harness connector. Check connectors for water. 	
Water should not exist.	
Is the inspection result normal?	
YES >> GO TO 9.	
NO >> Replace EVAP control system pressure sensor. 9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to <u>EC-344, "DTC Logic"</u> for DTC P0452, <u>EC-349, "DTC Logic"</u> for DTC P0453. Is the inspection result normal?	
YES >> GO TO 10.	
NO >> Replace EVAP control system pressure sensor.	
10. CHECK RUBBER TUBE FOR CLOGGING	
1. Disconnect rubber tube connected to EVAP canister vent control valve.	
 Check the rubber tube for clogging. Is the inspection result normal? 	
YES >> GO TO 11.	
NO >> Clean the rubber tube using an air blower.	
11.CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to EC-334, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 12. NO >> Replace EVAP canister vent control valve.	
12. CHECK EVAP PURGE LINE	
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.	
Refer to <u>EC-98, "System Diagram"</u> .	
Is the inspection result normal?	
YES >> GO TO 13. NO >> Replace it.	
13. CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.	
>> GO TO 14.	(
14. CHECK INTERMITTENT INCIDENT	
Refer to GI-45, "Intermittent Incident".	

>> INSPECTION END

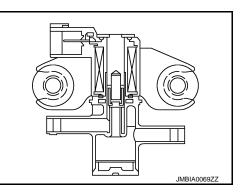
P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE < DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

The EVAP canister purge volume control solenoid valve is used 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.

INFOID:000000009361029



DTC Logic

DTC DETECTION LOGIC

DTC No. Possible cause Trouble diagnosis name DTC detecting condition The canister purge flow is detected during the vehicle is stopped while the engine is running, EVAP control system pressure sensor А even when EVAP canister purge volume control EVAP canister purge volume control solenoid valve is completely closed. solenoid valve EVAP canister purge (The valve is stuck open.) P0443 volume control solenoid EVAP canister vent control valve The canister purge flow is detected during the valve • EVAP canister specified driving conditions, even when EVAP В Hoses canister purge volume control solenoid valve is (Hoses are connected incorrectly or completely closed. clogged.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- Perform "DTC CONFIRMATION PROCEDURE" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60°C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

Do you have CONSULT

YES >> GO TO 2. NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE A

(B) With CONSULT

- 1. Turn ignition switch ON.
- Check that the following condition are met. FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
- 3. Start engine and wait at least 60 seconds.
- 4. Check 1st trip DTC.

IS 1st trip DTC detected?

- OK >> Go to <u>EC-325. "Diagnosis Procedure"</u>.
- NG >> GO TO 3.

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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3.PERFO	3. PERFORM DTC CONFIRMATION PROCEDURE B				Λ	
With CC	 With CONSULT Start engine and warm it up to normal operating temperature. 				A	
2. Turn ignition switch OFF and wait at least 10 accords					EC	
6. Select CONS	CONSULT.					
8. Start e mately If "TES	ngine and let it idle until "TESTIN 10 seconds.) STING" is not displayed after 5		-	"COMPLETED". (It will take approxi-	D	
	"SELF-DIAG RESULTS". splayed on CONSULT screen?				Е	
OK >>	> INSPECTION END					
4	> Go to <u>EC-325, "Diagnosis Proce</u> RM DTC CONFIRMATION PROCE				F	
	ST Inition switch ON. Itmeter probes to ECM harness c	onnector termin	als.		G	
	ECM			_	Н	
Connector	+	_	Voltage (V)			
	Terminal	Terminal		_	I	
M107	106 (Fuel tank temperature sensor signal)	128 (Sensor ground)	3.1 - 4.0			
3. Start e 4. Check	ngine and wait at least 60 second 1st trip DTC.	ls.		_	J	
	DTC detected?					
	> Go to <u>EC-325, "Diagnosis Proce</u> > GO TO 5.	<u>edure"</u> .			K	
_	RM DTC CONFIRMATION PROC	CEDURE B				
@With GS	-					
1. Start e	1. Start engine and warm it up to normal operating temperature.					
3. Turn ig						
 Turn ignition switch OFF and wait at least 10 seconds. Start engine and let it idle for at least 20 seconds. 						
6. Check 1st trip DTC.					Ν	
•	<u>Is 1st trip DTC displayed?</u> YES >> Go to <u>EC-325, "Diagnosis Procedure"</u> .					
NO >> INSPECTION END						
Diagnosis Procedure				0		
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT				Ρ		

- 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.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F7	1	Ground	Battery voltage

Is the inspection result normal?

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

 ~ 3000 > 0002.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- Harness connectors M116, F103
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

 $\mathbf{3}$.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F101	21	Existed

4. 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 F104, F105

• Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

NO >> Replace EVAP control system pressure sensor.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-343. "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 7.

YES-2 >> Without CONSULT: GO TO 8.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID \	ALVE
DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALV < DTC/CIRCUIT DIAGNOSIS > [VQ3	⊏ 7VHR]
NO >> Replace EVAP control system pressure sensor.	
7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
With CONSULT	
 Turn ignition switch OFF. Reconnect harness connectors disconnected. 	I
3. Start engine.	
 Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed according to the valve opening. 	d varies
Does engine speed vary according to the valve opening?	
YES >> GO TO 9. NO >> GO TO 8.	
8.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-328, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 9. NO >> Replace EVAP canister purge volume control solenoid valve.	
9. CHECK RUBBER TUBE FOR CLOGGING	
1. Disconnect rubber tube connected to EVAP canister vent control valve.	
2. Check the rubber tube for clogging.	
Is the inspection result normal?	
YES >> GO TO 10. NO >> Clean the rubber tube using an air blower.	
NO >> Clean the rubber tube using an air blower. 10.CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to EC-334, "Component Inspection".	
Is the inspection result normal? YES >> GO TO 11.	
NO >> Replace EVAP canister vent control valve.	
11. CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure	sensor
attached.	
2. Check if water will drain from EVAP canister (1).	
2 : EVAP canister vent control valve	
Does water drain from the EVAP canister?	
YES >> GO TO 12.	
NO >> GO TO 14.	
РЫ	B2731E

12.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following. • EVAP canister for damage Ο

Ρ

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

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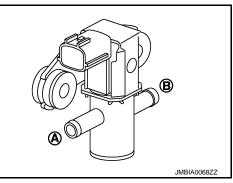
[VQ37VHR]

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT

- 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

IMEAOOGEZZ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve.

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

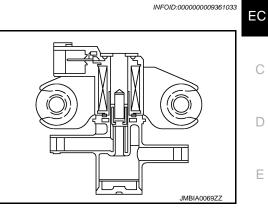
[VQ37VHR]

А

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

The EVAP canister purge volume control solenoid valve is used 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.



INFOID:000000009361034

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
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	 Harness or connectors (The solenoid valve circuit is shorted.) EVAP canister purge volume control solenoid valve
DTC CC	NFIRMATION PROCE	DURE	
1.CONE	DITIONING		
before co 1. Turn 2. Turn 3. Turn TESTING Before p	onducting the next test. ignition switch OFF and v ignition switch ON. ignition switch OFF and v G CONDITION:	vait at least 10 seconds. vait at least 10 seconds.	d, always perform the following procedure
•	Sorm DTC CONFIRMATION	ON PROCEDURE	
2. Che	t engine and let it idle for a ck 1st trip DTC. o DTC detected?	t least 13 seconds.	
YES	>> Go to <u>EC-329</u> , "Diagnotest of the second sec	osis Procedure".	
Diagno	sis Procedure		INFOID:00000009361038
1. CHEC	CK EVAP CANISTER PUR	GE VOLUME CONTROL SOL	ENOID 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.

EC-329

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

EVAP canister purge volume
control solenoid valveGroundVoltageConnectorTerminalGroundBattery voltageF71GroundBattery voltage

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- Harness connectors M116, F103
- · Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

 $\mathbf{3}$.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F101	21	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 5. YES-2 >> Without CONSULT: GO TO 6. NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F104, F105

• Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

5. Check evap canister purge volume control solenoid value operation

With CONSULT

- 1. Reconnect all harness connectors disconnected.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 7.

NO >> GO TO 6.

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-331, "Component Inspection".

Is the inspection result normal?

EC-330

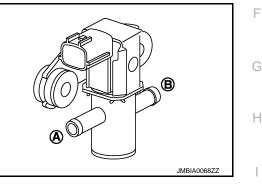
[VQ37VHR]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > YES >> GO TO 7. NO >> Replace EVAP canister purge volume control solenoid valve. А 7. CHECK INTERMITTENT INCIDENT Refer to GI-45, "Intermittent Incident". EC >> INSPECTION END Component Inspection INFOID:000000009361036 **1.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE D With CONSULT 1. Turn ignition switch OFF. 2. Reconnect all harness connectors disconnected. Е 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve. 4. Turn ignition switch ON. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. 5. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG 6. F

VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT

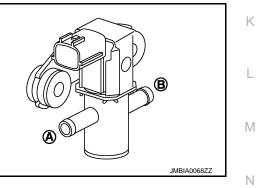
- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V 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.



Р

< DTC/CIRCUIT DIAGNOSIS >

P0447 EVAP CANISTER VENT CONTROL VALVE

Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

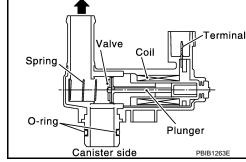
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.

DTC Logic

DTC DETECTION LOGIC



To atmosphere

INFOID:000000009361038

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent con- trol valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	 Harness or connectors (The valve circuit is open or shorted.) EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 8 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-332, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

NO >> GO IO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT

1. Turn ignition switch OFF and then ON.

2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT.

EC-332

2014 370Z

INFOID:000000009361037

INFOID:000000009361039

[VQ37VHR]

< DTC/CIRCU	- • -		AP C	ANISTE	ER VENT CONTROL VALVE	[VQ37VHR]
3. Touch "ON	/OFF" on C	ONSUL				
Clickin	g sound sh	ould be	e heard	s.		
Is the inspectio	n result nor	mal?				EC
NO >> GC) TO 7.) TO 3. AP CANIST	ER VEN			ALVE POWER SUPPLY CIRCUIT	С
 Disconnec Turn ignitic 	on switch Ol	ister ver N.			narness connector. Int control valve harness connector and ground	D.
EVAP canister v trol valve		bund	Voltag	e		E
B31		ound Ba	attery vo	Itage		F
	n result nor) TO 5.) TO 4.	mal?				G
4.DETECT M	ALFUNCTIO	oning f	PART			
Check the follo • Harness coni • Harness coni • Harness coni • Harness for c	nectors E3, nectors F10 nectors M7,	3, M116 B1		AP caniste	er vent control valve and IPDM E/R	——————————————————————————————————————
_	• •			5	short to power in harness or connectors. ALVE OUTPUT SIGNAL CIRCUIT FOR OPEN	J I AND SHORT
	t ECM harn	ess con		canister v	ent control valve harness connector and ECM	K I harness con- L
EVAP canister control valve		ECM		Continuity	-	
	minal Conne		erminal		_	Μ
B31	2 M1		121	Existed		
Is the inspection YES >> GO NO >> GO 6.DETECT M/ Check the follo • Harness contribution	n result nor 0 TO 7. 0 TO 6. ALFUNCTIO wing. nectors B1,	<u>mal?</u> DNING F M7	PART		ort to power.	N 0 P
>> Re 7. CHECK RU	pair open c BBER TUB	ircuit, sh E FOR (nort to g	ground or GING	short to power in harness or connectors.	

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-334. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

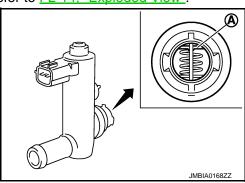
INFOID:000000009361040

1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister. Refer to FL-14, "Exploded View".
- 3. Check portion (A) of EVAP canister vent control valve for rust.

Is it rusted?

- YES >> Replace EVAP canister vent control valve
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)	
ON	Not existed	
OFF	Existed	

Operation takes less than 1 second.

Without CONSULT

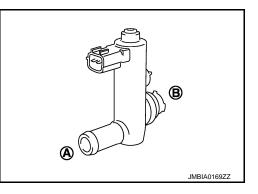
- T. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions.

Make sure that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)			
12 V direct current supply between terminals 1 and 2	Not existed			
OFF	Existed			
Operation takes loss than 1 around				

Operation takes less than 1 second.

Is the inspection result normal?



< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 3. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

Make sure that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

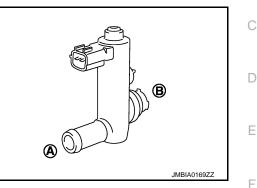
Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve.

EC

[VQ37VHR]



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< DTC/CIRCUIT DIAGNOSIS >

P0448 EVAP CANISTER VENT CONTROL VALVE

Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

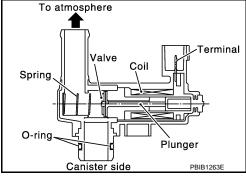
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid value is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.

DTC Logic

DTC DETECTION LOGIC



INFOID:000000009361042

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448	EVAP canister vent con- trol valve close	EVAP canister vent control valve remains closed under specified driving conditions.	 EVAP canister vent control valve EVAP control system pressure sensor and the circuit Blocked rubber tube to EVAP canister vent control valve EVAP canister is saturated with water

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

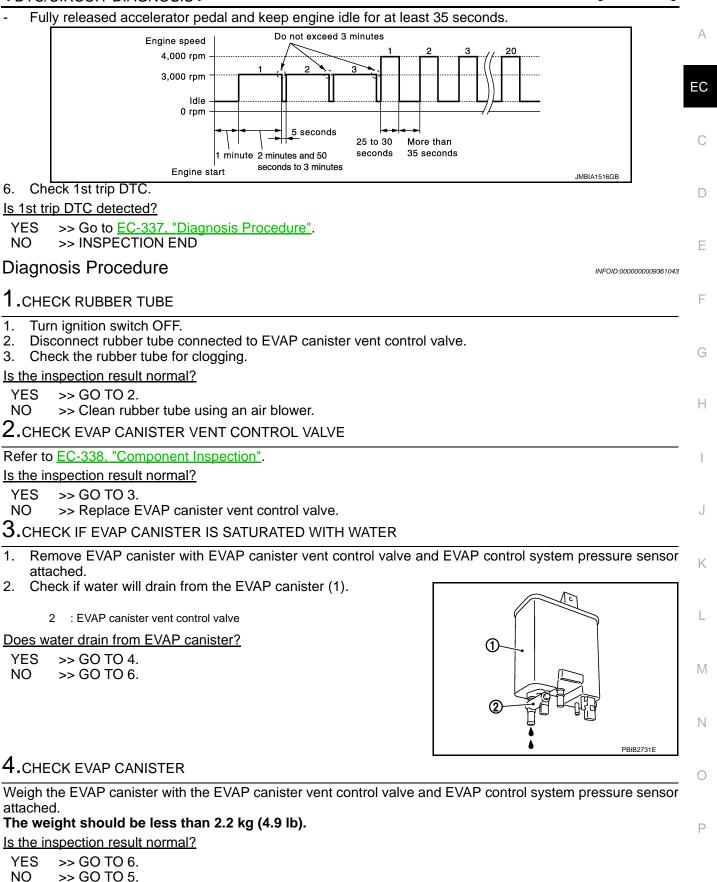
2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and let it idle for at least 1 minute.
- 4. Repeat next procedures five times.
- Increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 2 minutes. **Do not exceed 2 minutes.**
- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- 5. Repeat next procedure 27 times.
- Quickly increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 25 to 30 seconds.

INFOID:00000009361041

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]



5. DETECT MALFUNCTIONING PART

Check the following.EVAP canister for damage

< DTC/CIRCUIT DIAGNOSIS >

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor.

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-343, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

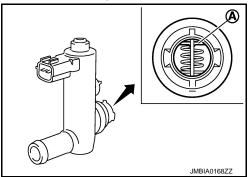
Component Inspection

1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister. Refer to FL-14, "Exploded View".
- 3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve.
- NO >> GO TO 2.



2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

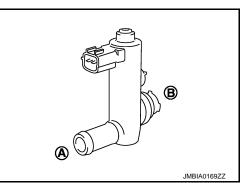
- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

1. Disconnect EVAP canister vent control valve harness connector.



INFOID:000000009361044

< DTC/CIRCUIT DIAGNOSIS >

2. Check air passage continuity and operation delay time under the following conditions. **Make sure that new O-ring is installed properly.**

wake sure that new v	0-111g 13	installed property.	
Condition	Air	passage continuity between (A) and (B)	
12 V direct current supply betw terminals 1 and 2	een	Not existed	
OFF		Existed	
Operation takes less than	1 second.		
<u>s the inspection result nor</u> YES >> INSPECTION NO >> GO TO 3. 3. CHECK EVAP CANIST	END	CONTROL VALVE-III	
 Perform "VENT CONT 	ROL/V" in ntinuity ar	A) to (B)] of EVAP canister vent c n "ACTIVE TEST" mode. nd operation delay time. installed properly.	control valve using an air blower.
Condition VENT CONT/V	Air pass	age continuity between (A) and (B)	
ON		Not existed	K B
OFF		Existed	
control valve using an	air blowe ntinuity ar	nd operation delay time under the	JMBIA0169ZZ
Condition		bassage continuity between (A) and (B)	
12 V direct current supply betw terminals 1 and 2	een	Not existed	
OFF		Existed	
Operation takes less than			
s the inspection result nor YES >> INSPECTION NO >> Replace EVAR	END	vent control valve.	

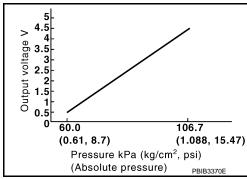
А

< DTC/CIRCUIT DIAGNOSIS >

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

INFOID:000000009361046

[VQ37VHR]

INFOID:000000009361045

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451	EVAP control system pressure sensor perfor- mance	ECM detects a sloshing signal from the EVAP control system pressure sensor	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [CKP sensor (POS) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) (Gear lever position sensor circuit is shorted) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Brake booster pressure sensor Brake booster pressure sensor Gear lever position sensor

DTC CONFIRMATION PROCEDURE **NOTE**:

Never remove fuel filler cap during DTC confirmation procedure.

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

With CONSULT>>GO TO 2. Without CONSULT>>GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

() With CONSULT

1. Start engine and let it idle for least 40 seconds. NOTE:

Do not depress accelerator pedal even slightly.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR		
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
YES >> Proceed to EC-341, "Diagnosis Procedure".		
NO >> GO TO 3.		А
3. PERFORM DTC CONFIRMATION PROCEDURE-2		
(P)With CONSULT		FO
1. Select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE".		EC
2. Let it idle until "OFF" of "EVAP DIAG READY" changes to "ON".		
NOTE: It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".		С
3. Turn ignition switch OFF and wait at least 90 minutes.		
NOTE:		
Never turn ignition switch ON during 90 minutes.		D
 Turn ignition switch ON. Select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE". 		
6. Check that "EVAP LEAK DIAG" indication.		_
Which is displayed on CONSULT?		E
CMPLT>> GO TO 4.		
YET >> 1. Perform DTC CONFIRMATION PROCEDURE again.		F
2. GO TO 1.		I
4.PERFORM DTC CONFIRMATION PROCEDURE-3		
		G
Check 1st trip DTC.		
Is 1st trip DTC detected?		Н
YES >> Proceed to <u>EC-341, "Diagnosis Procedure"</u> . NO >> INSPECTION END		
5.PERFORM DTC CONFIRMATION PROCEDURE-4		
With GST		I
1. Start engine and let it idle for least 40 seconds.		
NOTE: Do not depress accelerator pedal even slightly.		J
2. Check 1st trip DTC.		
Is 1st trip DTC detected?		
YES >> Proceed to EC-341, "Diagnosis Procedure".		Κ
NO >> GO TO 6.		
6. PERFORM DTC CONFIRMATION PROCEDURE-5		I
With GST		
1. Let it idle for at least 2 hours.		
 Turn ignition switch OFF and wait at least 90 minutes. NOTE: 		M
Never turn ignition switch ON during 90 minutes.		
3. Turn ignition switch ON.		
4. Check 1st trip DTC.		Ν
Is 1st trip DTC detected?		
YES >> Proceed to <u>EC-341, "Diagnosis Procedure"</u> . NO >> INSPECTION END		0
Diagnosis Procedure	INFOID:000000009361047	
1. CHECK GROUND CONNECTION		Ρ
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-48, "Circuit Inspection"</u>. 		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

< DTC/CIRCUIT DIAGNOSIS >

$2. {\sf check evap control system pressure sensor connector for water}$

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

	trol system e sensor	Ground	Voltage (V)	
Connector Terminal				
B30	3	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
F101	45	Brake booster pressure sensor	E48	1	
46	CKP sensor (POS)	F2	1		
F102	74	Gear lever position sensor	57	3	
	103	APP sensor	E112	6	
M107	107	EVAP control system pressure sensor	B30	3	
	107	Refrigerant pressure sensor	E172	3	

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 EC-309. "Component Inspection".)

- Gear lever position sensor (Refer to EC-399, "Component Inspection".)
- Brake booster pressure sensor (Refer to EC-386, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-527, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-483, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

< DTC/CIRCUIT DIAGNOSIS >

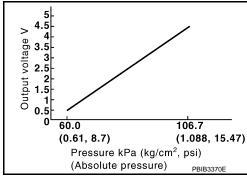
	celerator p	edal asser	mbly. Refer to <u>ACC-4, "Explode</u>	<u>d View"</u> .	0
					A
•			STEM PRESSURE SENSOR		
Refer to EC					EC
Is the inspe					
	GO TO 9				С
NO >> 9.CHECK	•		rol system pressure sensor.		
Refer to GI					D
	<u>40, Inton</u>		uone.		
>>	INSPECT	ION END			E
Compon	ent Inspe	ection		INF0ID:00000000	9361048
1.снеск	EVAP CO	NTROL SY	STEM PRESSURE SENSOR		F
	nition swite				
			m pressure sensor with its hari h a new one.	ness connector.	G
3. Install	a vacuum j	oump to E	/AP control system pressure se		
	nition swit		I check output voltage betweer	A EC C C C C D E VNFOID:00000009361048 F SS Connector. G Sor. CCM harness connector terminals under the H Voltage (V) 1 1.8 - 4.8 J 2.1 to 2.5 lower than above value	
	0				
	ECM		Condition		
Connector	+	-	[Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)	I
	Terminal	Terminal			
			Not applied	18-48	
M107	102	112	Not applied -26.7 (-0.272, -3.87)	1.8 - 4.8 2.1 to 2.5 lower than above value	J
CAUTI	ON:		-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value	J
CAUTI • Alwa	<mark>ON:</mark> lys calibra	te the vac	-26.7 (-0.272, -3.87) uum pump gauge when usin	2.1 to 2.5 lower than above value	J 2 K
CAUTI • Alwa • Neve	<mark>ON:</mark> lys calibra	te the vac	-26.7 (-0.272, -3.87) uum pump gauge when usin	2.1 to 2.5 lower than above value	J K
CAUTI • Alwa • Neve 14.69	ON: lys calibra er apply be o psi). ection resul	te the vac elow -93.3 It normal?	-26.7 (-0.272, -3.87) uum pump gauge when usin	2.1 to 2.5 lower than above value	J cm², ^K L
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin kPa (-0.952 kg/cm ² , -13.53 ps	2.1 to 2.5 lower than above value	J : m², L
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin	2.1 to 2.5 lower than above value	cm², ∟
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin kPa (-0.952 kg/cm ² , -13.53 ps	2.1 to 2.5 lower than above value	cm², ∟
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin kPa (-0.952 kg/cm ² , -13.53 ps	2.1 to 2.5 lower than above value	cm², ∟ ∟
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin kPa (-0.952 kg/cm ² , -13.53 ps	2.1 to 2.5 lower than above value	cm², ∟ ∟
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin kPa (-0.952 kg/cm ² , -13.53 ps	2.1 to 2.5 lower than above value	cm², ∟ ∟
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin kPa (-0.952 kg/cm ² , -13.53 ps	2.1 to 2.5 lower than above value	sm², L M N
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin kPa (-0.952 kg/cm ² , -13.53 ps	2.1 to 2.5 lower than above value	sm², L M N
CAUTI • Alwa • Neve 14.69 Is the inspe YES >>	ON: ys calibra r apply be psi). ection resul INSPECT	te the vac elow -93.3 It normal? TON END	-26.7 (-0.272, -3.87) uum pump gauge when usin kPa (-0.952 kg/cm ² , -13.53 ps	2.1 to 2.5 lower than above value	cm², L M N

< DTC/CIRCUIT DIAGNOSIS >

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

INFOID:000000009361050

[VQ37VHR]

INFOID:000000009361049

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low in- put	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) (Gear lever position sensor) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Brake booster pressure sensor Gear lever position sensor Gear lever position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT.
- 7. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).

< DTC/CIF	P U4 RCUIT DIAC			OL SYSTEM PRESSURE SENSOR	[VQ37VHR]	
8. Start e 9. Check	ngine and w 1st trip DTC ST	vait at lea C.	ast 20 seconds			A
				erating temperature. nnector terminals as per the following.		EC
			ECM			
Connector		+		_		С
		Termina	l	Terminal		
M107	(Fuel tank te	106 mperature	sensor signal)	128		D
 Turn ig Turn ig Turn ig Turn ig Start e 	nition switcl nition switcl nition switcl	h OFF ai h ON. h OFF ai /ait at lea	is less than 4. nd wait at least nd wait at least ast 20 seconds	10 seconds.		Е
	TSt thp DTC					F
YES >: NO >:	> Go to <u>EC-:</u> > INSPECTI	<u>345, "Dia</u> ON END	agnosis Procec)	lure".		G
Diagnosi	is Proced	ure			INFOID:000000009361051	
1.снеск	GROUND	CONNE	CTION			Н
2. Check Is the inspe YES >:	ection result > GO TO 2.	nection l normal?	<u>.</u>	Ground Inspection in <u>GI-48, "Circuit Inspection"</u> .		I
-	> Repair or r		pround connect	tion.		J
1. Discor	nect EVAP	control s	ystem pressur nector for wate	e sensor harness connector. er.		K
Wa	ter should	not exis	t.			
•	<u>ection result</u> > GO TO 3.	normal?	<u>.</u>			L
-		eplace h	arness conneo	ctor.		
3. CHECK	EVAP CON	ITROL S	YSTEM PRES	SURE SENSOR POWER SUPPLY CIRCUIT-I		Μ
	nition switcl the voltage		EVAP control	system pressure sensor harness connector and	ground.	Ν
EVAP cor	ntrol system			-		
·	re sensor	Ground	Voltage (V)			0
Connector	Terminal	Crowned	Acator 5	_		
B30	3	Ground	Approx. 5	-		P
•	<u>ection result</u> > GO TO 10					Ρ
	> GO TO 10 > GO TO 4.	•				
4. CHECK	EVAP CON	ITROL S	YSTEM PRES	SURE SENSOR POWER SUPPLY CIRCUIT-II		

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

 Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B30	3	M107	107	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M7, B1

Harness for open between ECM and EVAP control system pressure sensor

>> Repair open circuit.

6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F101	45	Brake booster pressure sensor	E48	1		
FIUI	46	CKP sensor (POS)	F2	1		
F102	74	Gear lever position sensor	F57	3		
M107	103	APP sensor	E112	6		
	107	EVAP control system pressure sensor	B30	3		
	111	Refrigerant pressure sensor	E77	3		

Is the inspection result normal?

YES >> GO TO 7.

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

7.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-309. "Component Inspection".)
- Gear lever position sensor (Refer to <u>EC-399, "Component Inspection"</u>)
- Brake booster pressure sensor (Refer to EC-386, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-527, "Diagnosis Procedure")

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to EC-483, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 9.

9.replace accelerator pedal assembly

Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	CK EVAP	CONTRO	OL SYSTE	M PRESS	SURE SENSOR GROUND CIRCUIT FOR OPEN AND	А
 Discor Check 		I harness of			vstem pressure sensor harness connector and ECM har-	EC
EVAP cont pressure	rol system	EC	CM	Continuity		С
Connector	Terminal	Connector	Terminal	Continuity		
B30	1	M107	112	Existed		D
4. Also c	heck harn	ess for sho	ort to grou	nd and sho	rt to power.	
YES >	<u>ection res</u> > GO TO > GO TO		<u>></u>			E
11. DETE	CT MALF	UNCTION	ING PAR	Г		F
Check the • Harness • Harness	connecto		tween EV/	AP control :	system pressure sensor and ECM	G
	•	•	-	•	short to power in harness or connectors. RE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND	Н
	the conti connector.	nuity betw	een EVAF	ontrol sy	stem pressure sensor harness connector and ECM har-	Ι
EVAP cont pressure	rol system e sensor	EC		Continuity		J
Connector	Terminal	Connector	Terminal			IZ.
B30	2	M107	102	Existed		Κ
Is the insp YES > NO >	<u>ection res</u> > GO TO > GO TO	ult normal? 14. 13.	2		rt to power.	L
13.dete	ECT MALF	UNCTION	IING PAR	Г		M
Check the • Harness • Harness	connecto	,	tween EV/	AP control :	system pressure sensor and ECM	Ν
	•	•		-	short to power in harness or connectors. RE SENSOR	0
Refer to E	C-348, "C	omponent	Inspectior	<u>ı"</u> .		
Is the insp	ection res	ult normal?	-			Р
NO >		EVAP cor	-	m pressure	e sensor.	
15.CHE	CK INTER	MITTENT	INCIDEN	Г		
Refer to G	I-45, "Inte	rmittent Inc	cident".			

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

[VQ37VHR]

INFOID:000000009361052

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector.
- Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.

	ECM		Condition			
Connector	+	_	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)		
Connector	Terminal	Terminal				
M107	M107 102		Not applied	1.8 - 4.8		
M107	102	112	-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value		

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

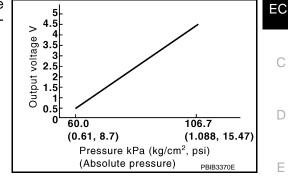
- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor

< DTC/CIRCUIT DIAGNOSIS >

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high in- put	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Brake booster pressure sensor EVAP control system pressure sensor Crankshaft position sensor Refrigerant pressure sensor Brake booster pressure sensor EVAP canister vent control valve EVAP canister Rubber hose from EVAP canister vent control valve to vehicle frame

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT.

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< DTC/CIRCUIT DIAGNOSIS >

- 7. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 8. Start engine and wait at least 20 seconds.
- 9. Check 1st trip DTC.

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector terminals as per the following.

	ECM	
Connector	+	-
Connector	Terminal	Terminal
M107	106 (Fuel tank temperature sensor signal)	128

- 3. Make sure that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Start engine and wait at least 20 seconds.
- 8. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-350, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

 ${f 3.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system	EVAP control system pressure sensor		
Connector	Terminal		Voltage (V)
B30	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 4.

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

EC-350

INFOID:000000009361055

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control syster	EC	Continuity		
Connector	Terminal	Connector	Terminal	Continuity
B30	3	M107	107	Existed

Is the inspection result normal?

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

-100 >> 00105.

5.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M7, B1

• Harness for open between ECM and EVAP control system pressure sensor

>> Repair open circuit.

6. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

_						(
EC	M	Sensor				
Connector	Terminal	Name	Connector	Terminal		
F101	45	Brake booster pressure sensor	E48	1		ŀ
FIUI	46	CKP sensor (POS)	F2	1		
	103	APP sensor	E112	6		
M107	107	EVAP control system pressure sensor	B30	3		
	111	Refrigerant pressure sensor	E77	3		
Is the insp	ection res	sult normal?				
	> GO TO					
NO >	> Repair	short to ground or short to power	in harnes	s or conn	ctors.	
7.CHECK		DNENTS				
Check the	following	1				
 Crankshaft position sensor (POS) (Refer to <u>EC-309, "Component Inspection"</u>.) 						
		essure sensor (Refer to <u>EC-386, '</u>			<u>on"</u> .)	
-	•	ure sensor (Refer to <u>EC-527, "Dia</u>	agnosis Pr	<u>ocedure"</u>		
-		sult normal?				ľ
-	> GO TO > Replac	e malfunctioning component.				
8.CHECK	•	o 1				
		Component Inspection".				
•		sult normal?				
	> GO TO					(
^	> GO TO	-				
9. REPLA	CE ACCI	ELERATOR PEDAL ASSEMBLY				
Replace a	ccelerato	r pedal assembly. Refer to ACC	4, "Explode	ed View".		

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and short

1. Turn ignition switch OFF.

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< DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	ECM		Continuity		
Connector	Terminal	Connector	Terminal	Continuity	
B30	1	M107	112	Existed	

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

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

• Harness for open or short between EVAP control system pressure sensor and ECM

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

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	n pressure sensor	ECM			
Connector	Terminal	Connector	Terminal	Continuity	
B30	2	M107	102	Existed	

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

Is the inspection result normal?

YES >> GO TO 14.

13. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

• Harness for open or short between EVAP control system pressure sensor and ECM

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

14.CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

15.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-334, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP canister vent control valve.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-353, "Component Inspection".

Is the inspection result normal?

[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS > >> GO TO 17.

YES

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NO >> Replace EVAP control system pressure sensor. 17.CHECK IF EVAP CANISTER IS SATURATED WITH WATER 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. 2. Check if water will drain from the EVAP canister (1). Λc 2 : EVAP canister vent control valve Does water drain from EVAP canister? ᠬ YES >> GO TO 18. NO >> GO TO 20. PBIB2731E 18. CHECK EVAP CANISTER Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached. The weight should be less than 2.2 kg (4.9 lb). Is the inspection result normal? YES >> GO TO 20. NO >> GO TO 19. 19.DETECT MALFUNCTIONING PART Check the following. EVAP canister for damage EVAP hose between EVAP canister and vehicle frame for clogging or poor connection >> Repair hose or replace EVAP canister. 20. CHECK INTERMITTENT INCIDENT Refer to GI-45, "Intermittent Incident". >> INSPECTION END **Component Inspection** INFOID:000000009361056 1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Turn ignition switch OFF. 1. 2. Remove EVAP control system pressure sensor with its harness connector. Always replace O-ring with a new one. 3. Install a vacuum pump to EVAP control system pressure sensor. 4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.

	ECM			Condition			
	Connector	+	-	[Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)	e (V)	
	Connector	Terminal	Terminal			Γ	
_	M107	102	112	Not applied	1.8 - 4.8		
	WITO?	102	112	-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value		

CAUTION:

· Always calibrate the vacuum pump gauge when using it.

< DTC/CIRCUIT DIAGNOSIS >

Do not apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor.

< DTC/CIRCUIT DIAGNOSIS >

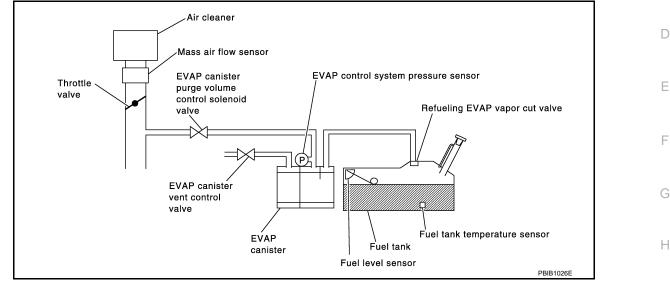
P0456 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No. Trouble diagnosis name	DTC detecting condition	Possible cause
P0456 Evaporative emission control system leak	 EVAP system has a leak. EVAP system does not operate properly. 	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control valve and the circuit EVAP canister vent control valve and the circuit EVAP canister is saturated with water EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the Ρ MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

- Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT.
- 2. Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON".
- NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

3. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**

Never turn ignition switch ON during 90 minutes.

- 4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode with CONSULT.
- 5. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT>> GO TO 3.

YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-356, "Diagnosis Procedure".

NO >> INSPECTION END.

4.PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Start engine and wait engine idle for at least 2 hours.
- 2. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**

Never turn ignition switch ON during 90 minutes.

- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-356</u>, "Diagnosis Procedure". NO >> INSPECTION END.

Diagnosis Procedure

1.CHECK FUEL FILLER CAP DESIGN

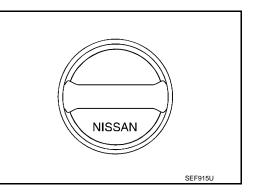
1. Turn ignition switch OFF.

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



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2. CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.	
Is the inspection result normal?	
YES $>>$ GO TO 3.	
NO >> Open fuel filler cap, then clean cap and fuel filler neck threads usir	ng air blower. Then retighten
until ratcheting sound is heard.	
${f 3.}$ CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.	
Is the inspection result normal?	
YES >> GO TO 5.	
NO $>>$ GO TO 4.	
4. CHECK FUEL TANK VACUUM RELIEF VALVE	
Refer to EC-523, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 5. NO >> Replace fuel filler cap with a genuine one.	
5. CHECK FOR EVAP LEAK	
Refer to <u>EC-629, "Inspection"</u> .	
Is there any leak in EVAP line?	
YES >> Repair or replace.	
NO $>>$ GO TO 6.	
6. CHECK EVAP CANISTER VENT CONTROL VALVE	
Check the following.	
 EVAP canister vent control valve is installed properly. 	
Refer to <u>FL-16</u> , "Removal and Installation".	
 EVAP canister vent control valve. Refer to <u>EC-334</u>, "Component Inspection". 	
Is the inspection result normal?	
YES >> GO TO 7.	
NO >> Repair or replace EVAP canister vent control valve and O-ring.	
7. CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister (1) with EVAP canister vent control	
valve (2) and EVAP control system pressure sensor attached. 2. Check if water will drain from the EVAP canister.	
Does water drain from EVAP canister?	
$\frac{\text{Does water drawning EVAL cansier:}}{\text{YES} >> \text{GO TO 8.}}$	
NO-1 >> With CONSULT: GO TO 10.	
NO-2 >> Without CONSULT: GO TO 11.	
2	
8.CHECK EVAP CANISTER	PBIB2731E
Weigh the EVAP canister assembly with the EVAP canister vent control valve an sure sensor attached.	d EVAP control system pres-
sure sensor attached. The weight should be less than 2.2 kg (4.9 lb).	
Is the inspection result normal?	

YES-1 >> With CONSULT: GO TO 10.

YES-2 >> Without CONSULT: GO TO 11.

NO >> GO TO 9.

< DTC/CIRCUIT DIAGNOSIS >

9. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12.CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-98, "System Diagram".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

13.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-328, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve.

14.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-283, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel level sensor unit.

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-343, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 16.
- NO >> Replace EVAP control system pressure sensor.

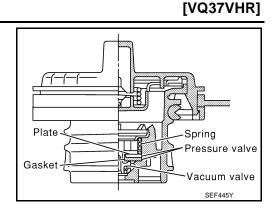
< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

16. CHECK EVAP PURGE LINE
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>EC-98, "System Description"</u> .
Is the inspection result normal?
YES >> GO TO 17.
NO >> Repair or reconnect the hose.
17.CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.
>> GO TO 18.
18. CHECK EVAP/ORVR LINE
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper con-
Is the inspection result normal?
YES >> GO TO 19.
NO >> Repair or replace hoses and tubes.
19. CHECK RECIRCULATION LINE
Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.
Is the inspection result normal?
YES >> GO TO 20.
NO >> Repair or replace hose, tube or fuel filler tube.
20. CHECK REFUELING EVAP VAPOR CUT VALVE
Refer to EC-523, "Component Inspection".
Is the inspection result normal?
YES >> GO TO 21.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.
21.CHECK FUEL LEVEL SENSOR
Refer to <u>MWI-50, "Component Inspection"</u> .
Is the inspection result normal?
YES >> GO TO 22.
22.CHECK INTERMITTENT INCIDENT
Refer to <u>GI-45, "Intermittent Incident"</u> .
>> INSPECTION END
N
Component Inspection
1.CHECK FUEL TANK VACUUM RELIEF VALVE
 Turn ignition switch OFF. Remove fuel filler cap.
2. Remove rue mier cap.

< DTC/CIRCUIT DIAGNOSIS >

3. Wipe clean valve housing.



-Vacuum/Pressure gauge

One-way valve

- Fuel filler cap

Fuel filler cap adapter

ī

-Vacuum/

Pressure

pump

SEF943S

4. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

>> INSPECTION END

P0460 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0460 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000009361061

DTC DETECTION LOGIC

NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-392, "DTC Logic"</u>.

When the vehicle is parked, the fuel level in the fuel tank is naturally stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunc-

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal be- ing varied is sent from the fuel level sensor to ECM.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor 	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE M Start engine and wait maximum of 2 consecutive minutes. 1. 2. Check 1st trip DTC. Is 1st trip DTC detected? Ν >> Go to EC-361, "Diagnosis Procedure". YES NO >> INSPECTION END Diagnosis Procedure INFOID:000000009361062 CHECK DTC WITH COMBINATION METER Refer to MWI-34, "CONSULT Function (METER/M&A)". P Is the inspection result normal? YES >> GO TO 2. NO >> Go to MWI-48, "Component Function Check". 2.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

[VQ37VHR]

INFOID:000000009361060

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P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0461 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000009361064

DTC DETECTION LOGIC

NOTE:

- If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- Ε If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-392, "DTC Logic".

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has F been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long dis- tance.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor 	Η

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-363, "Component Function Check". Use component function check to check the overall function of the fuel level sensor. During this check, a 1st Κ trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-364, "Diagnosis Procedure".

Component Function Check

INFOID:000000009361065

1.PRECONDITIONING

WARNING:

Ν When performing the following procedure, always observe the handling of the fuel. Refer to FL-6, "Removal and Installation".

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required. Do you have CONSULT?

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

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/ 8 Imp gal) in advance.

Prepare a fuel container and a spare hose.

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P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 2. Release fuel pressure from fuel line, refer to <u>EC-628, "Inspection"</u>.
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
- 6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT.
- 7. Check "FUEL LEVEL SE" output voltage and note it.
- 8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT.
- 9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10. Check "FUEL LEVEL SE" output voltage and note it.
- 11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 12. Check "FUEL LEVEL SE" output voltage and note it.

13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-364, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

NOTE:

Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1. Prepare a fuel container and a spare hose.
- 2. Release fuel pressure from fuel line. Refer to EC-628, "Inspection".
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch ON.
- 6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 7. Confirm that the fuel gauge indication varies.
- 8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-364, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009361066

[VQ37VHR]

1.CHECK DTC WITH COMBINATION METER

Refer to MWI-34, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-48</u>, "Component Function Check".

2. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

P0462, P0463 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output volt-

age changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000009361068

DTC DETECTION LOGIC

NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607.Refer to <u>EC-392, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The CAN communication line is open or
P0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	 shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

2. PERFORM DTC CONFIRMATION PROCEDURE M Turn ignition switch ON and wait at least 5 seconds. 1. Check 1st trip DTC. 2. Ν Is 1st trip DTC detected? YES >> Go to EC-365, "Diagnosis Procedure". NO >> INSPECTION END C Diagnosis Procedure INFOID:000000009361069 1. CHECK DTC WITH COMBINATION METER P Refer to MWI-34, "CONSULT Function (METER/M&A)". Is the inspection result normal? YES >> GO TO 2. NO >> Go to MWI-48, "Component Function Check". 2 . CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

INFOID:000000009361067

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P0500 VSS A/T MODELS

A/T MODELS : 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.

A/T MODELS : DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-392, "DTC Logic"</u>.

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause	F
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h (13 MPH), ECM detects the follow- ing status continuously for 5 seconds or more: The difference between a vehicle speed cal- culated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the com- bination meter exceeds 15km/h (10 MPH).	 Harness or connector (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM Output speed sensor 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

L >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE M 1. Start engine. Shift the selector lever to D range and wait at least for 2 seconds. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more. **CAUTION:** Ν 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. 4. Check 1st trip DTC. Is 1st trip DTC detected? Ρ YES >> Proceed to EC-367, "A/T MODELS : Diagnosis Procedure" NO >> INSPECTION END A/T MODELS : Diagnosis Procedure INFOID:000000009361072 1. CHECK DTC WITH TCM Check DTC with TCM. Refer to TM-205, "CONSULT Function".

[VQ37VHR]

INFOID:000000009361070

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YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-22, "CONSULT Function"</u>. Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated.

 ${f 3.}$ CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-34, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble shooting relevant to DTC indicated.

CHECK OUTPUT SPEED SENSOR

Check output speed sensor. Refer to <u>TM-345, "Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace or replace error-detected parts.

5.CHECK WHEEL SENSOR

Check wheel sensor. Refer to <u>BRC-109</u>, "FRONT WHEEL SENSOR : Removal and Installation" (Front), <u>BRC-110</u>, "REAR WHEEL SENSOR : Removal and Installation" (Rear).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-45, "Intermittent Incident"</u>.

NO >> Replace or replace error-detected parts.

M/T MODELS

M/T MODELS : Description

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" via the CAN communication line. The combination meter then sends a signal to the ECM via the CAN communication line.

M/T MODELS : DTC Logic

INFOID:000000009361074

INFOID:000000009361073

[VQ37VHR]

DTC DETECTION LOGIC

NOTE:

• If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

 If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-392, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The vehicle speed signal circuit is open or shorted) Wheel sensor Combination meter ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT? Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 5.		A
2.PRECONDITIONING		
before conducting the ne	OFF and wait at least 10 seconds.	EC
	OFF and wait at least 10 seconds.	С
>> GO TO 3.		
3.CHECK VEHICLE SP		D
NOTE:		-
This procedure may be	e conducted with the drive wheels lifted in the shop or by driving the vehicle. If a o be easier, it is unnecessary to lift the vehicle.	a E
should exceed 10 kr	D SE" in "DATA MONITOR" mode with CONSULT. The vehicle speed on CONSULT m/h (6 MPH) when rotating wheels with suitable gear position.	FF
Is the inspection result no YES >> GO TO 4. NO >> Go to EC-37	<u>iormal?</u> 70, "M/T MODELS : Diagnosis Procedure".	G
4.PERFORM DTC CON	NFIRMATION PROCEDURE	Н
2. Warm engine up to r	TOR" mode with CONSULT. normal operating temperature. ng conditions for at least 50 consecutive seconds. :le at a safe speed.	
ENG SPEED	1,800 - 6,000 rpm	J
COOLAN TEMP/S	More than 70°C (158°F)	
B/FUEL SCHDL	5.0 - 31.8 msec	K
Selector lever	Except Neutral position	IX.
PW/ST SIGNAL	OFF	
4. Check 1st trip DTC.		L
NO >> INSPECTIO	70, "M/T MODELS : Diagnosis Procedure".	Μ
Use component function check, a 1st trip DTC mig Is the inspection result no YES >> INSPECTIO	iormal?	- N 6 0
M/T MODELS : Cor	mponent Function Check	5 P
1.PERFORM COMPON	NENT FUNCTION CHECK	_
With GST		

- Lift up drive wheels.
 Start engine.
- 3. Read vehicle speed signal in Service \$01 with GST.

P0500 VSS

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

The vehicle speed signal 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 EC-370, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Diagnosis Procedure

INFOID:000000009361076

1. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to <u>BRC-22, "CONSULT Function"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-34, "CONSULT Function (METER/M&A)".

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0506 ISC SYSTEM

Description

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000009361078

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

P0506 Idle speed control system RPM lower than expected The idle speed by 100 rpm of by 100 rpm		ectric throttle control actuator ake air leak
1.preconditioning		
 before conducting the next test. 1. Turn ignition switch OFF and wait at leas 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at leas If the idle speed is out of the specified val Repair Requirement", before conducting E TESTING CONDITION: Before performing the following procedu Always perform the test at a temperature >> GO TO 2. 	10 seconds. 10 seconds. Ie, perform <u>EC-21, "IDLE AIR V</u> TC Confirmation Procedure. re, confirm that battery voltage	OLUME LEARNING : Special
2. PERFORM DTC CONFIRMATION PROC	DURE	
1. Start engine and warm it up to normal op		
 Turn ignition switch OFF and wait at leas Turn ignition switch ON. Turn ignition switch OFF and wait at leas Restart engine and run it for at least 1 mi Check 1st trip DTC. 	10 seconds.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at leas Restart engine and run it for at least 1 mi Check 1st trip DTC. 	10 seconds.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at leas Restart engine and run it for at least 1 mi Check 1st trip DTC. 	10 seconds. nute at idle speed.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at leas Restart engine and run it for at least 1 mi Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-371, "Diagnosis Proceed 	10 seconds. nute at idle speed.	INFOID:000000009361075

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

Is intake air leak detected?

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YES >> Discover air leak location and repair. NO >> GO TO 2.

2.REPLACE ECM

- 1. Stop engine.
- 2. Replace ECM.
- 3. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0507 ISC SYSTEM

Description

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The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000009361081

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control sys- tem RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	 Electric throttle control actuator Intake air leak PCV system
DTC CON	FIRMATION PROC	EDURE	
1. PRECO	NDITIONING		
before cond 1. Turn ig 2. Turn ig 3. Turn ig If the idle s Repair Red TESTING (• Before p	ducting the next test. nition switch OFF and nition switch ON. speed is out of the s <u>quirement"</u> , before c CONDITION: erforming the follow	has been previously conducted, alwa I wait at least 10 seconds. I wait at least 10 seconds. pecified value, perform <u>EC-21, "IDLE</u> onducting DTC Confirmation Proced ing procedure, confirm that battery v temperature above –10°C (14°F).	AIR VOLUME LEARNING : Special ure.
2.PERFO		TION PROCEDURE to normal operating temperature. I wait at least 10 seconds.	
3. Turn ig 4. Turn ig 5. Start ei	nition switch ON. nition switch OFF and	l wait at least 10 seconds. least 1 minute at idle speed.	
YES >>) <u>TC detected?</u> ⊳ Go to <u>EC-373, "Diag</u> ⊳ INSPECTION END	nosis Procedure".	
Diagnosi	s Procedure		INFOID:000000009361082
1.снеск	PCV HOSE CONNEC	CTION	
Confirm that	at PCV hose is connec	cted correctly.	
Is the inspe	ection result normal?		

YES >> GO TO 2.

P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace. 2.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.

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

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 3.

3.REPLACE ECM

- 1. Stop engine.
- 2. Replace ECM.
- 3. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

P050A, P050E COLD START CONTROL

Description

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

DTC DETECTION LOGIC

NOTE: If DTC P050A or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.	Fuel injection system
P050E	Cold start engine exhaust temperature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	 ECM Lack of intake air volume
DTC CON	FIRMATION PROCED	JRE	
1.PRECO	NDITIONING		
before conc 1. Turn ign 2. Turn ign 3. Turn ign TESTING C	Jucting the next test. nition switch OFF and wa nition switch ON. nition switch OFF and wa CONDITION:		
>>	GO TO 2.		
2.PERFOR	RM DTC CONFIRMATIO	N PROCEDURE-I	
 Turn igi Select ' Check to the part of the select ' With GS' Follow the part of the select ' Sthe value 'YES >> NO-1 [If it 'NO-2 [If it 'S.PERFOF'] 	nition switch OFF and wa nition switch ON. 'DATA MONITOR" mode the indication of "COOLA T procedure "With CONSUI of "COOLAN TEMP/S" to GO TO 3. is below 4°C (39°F)]>>W (39°F) or more. Retry fro is above 36°C (97°F)]>>0 RM DTC CONFIRMATIO	with CONSULT. N TEMP/S". LT" above. Detween 4°C (39°F) and 36°C (97°F)? Carm up the engine until the value of "COOL form step 1. Cool engine down to less than 36°C (97°F). R	
 Start th 40°C (1 Check Check With GS Follow the p 	select lever in N range. e engine and warm up i 04°F) for more than 15 s 1st trip DTC.		between –10°C (14°F) and

- YES >> Go to EC-376, "Diagnosis Procedure".
- NO >> INSPECTION END

EC-375

INFOID:000000009361083

INFOID:000000009361084

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EC

P050A, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:000000009361085

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-21, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 2.

NO >> Follow the instruction of Idle Air Volume Learning.

2. CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage
- Intake air passage clogging

Clogging of throttle body

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part

 $\mathbf{3}$. CHECK FUEL INJECTION SYSTEM FUNCTION

Perform DTC Confirmation Procedure for DTC P0171, P0174. Refer to EC-272, "DTC Logic".

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Go to <u>EC-273. "Diagnosis Procedure"</u> for DTC P0171, P0174.

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-375, "DTC Logic"</u>.

Is the 1st trip DTC P050A or P050E displayed again?

- YES >> GO TO 5.
- NO >> INSPECTION END

5.REPLACE ECM

1. Replace ECM.

^{2.} Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

P0524 ENGINE OIL PRESSURE

Trouble diagnosis

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC No.

If DTC P0524 is displayed with DTC P0075 or P0081, first perform the trouble diagnosis for DTC P0075, P0081. Refer to EC-194, "DTC Logic"

Detecting condition

DIC NO.	name	Detecting condition	Possible cause
P0524	Engine oil pressure too low	Engine oil pressure is low because there is a gap between angle of target and phase-control angle.	 Engine oil pressure or level too low 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
	NFIRMATION PR	OCEDURE	
1. PREC	ONDITIONING-I		
before cor 1. Turn i	nducting the next te	ure has been previously conducted, a st. and wait at least 10 seconds.	lways perform the following procedure
3. Turn i		and wait at least 10 seconds.	
Before pe		wing procedure, confirm that battery	voltage is between 10 V and 16 V at
		owing procedure, confirm that battery	voltage is between 10 V and 16 V at
Before pe idle.		owing procedure, confirm that battery	voltage is between 10 V and 16 V at
Before pe idle.	erforming the follo	owing procedure, confirm that battery	voltage is between 10 V and 16 V at
Before period idle.	erforming the follo >> GO TO 2. ONDITIONING-II	wing procedure, confirm that battery re. Refer to <u>LU-7, "Inspection"</u> .	voltage is between 10 V and 16 V at
Before period idle.	erforming the follo >> GO TO 2. ONDITIONING-II level and oil pressu pection result norma	re. Refer to <u>LU-7, "Inspection"</u> .	voltage is between 10 V and 16 V at
Before periode.	erforming the follo >> GO TO 2. ONDITIONING-II level and oil pressu pection result norma >> GO TO 3.	re. Refer to <u>LU-7, "Inspection"</u> . 1 <u>?</u>	voltage is between 10 V and 16 V at
Before period idle.	erforming the follo >> GO TO 2. ONDITIONING-II level and oil pressu pection result norma >> GO TO 3. >> Go to LU-7, "Insp	re. Refer to <u>LU-7, "Inspection"</u> . <u>al?</u> pection".	voltage is between 10 V and 16 V at
Before period idle.	erforming the follo >> GO TO 2. ONDITIONING-II level and oil pressu <u>pection result norma</u> >> GO TO 3. >> Go to <u>LU-7, "Insp</u> DRM DTC CONFIR	re. Refer to <u>LU-7, "Inspection"</u> . <u>al?</u> <u>bection"</u> . MATION PROCEDURE	voltage is between 10 V and 16 V at
Before periode.	erforming the follo >> GO TO 2. ONDITIONING-II level and oil pressu pection result norma >> GO TO 3. >> Go to LU-7, "Insp ORM DTC CONFIR ot "DATA MONITOR	re. Refer to <u>LU-7, "Inspection"</u> . <u>al?</u> <u>pection"</u> . MATION PROCEDURE ' mode with CONSULT.	
Before periode.	erforming the follo >> GO TO 2. ONDITIONING-II level and oil pressu pection result norma >> GO TO 3. >> Go to LU-7, "Insp ORM DTC CONFIR ot "DATA MONITOR	re. Refer to <u>LU-7, "Inspection"</u> . <u>al?</u> <u>bection"</u> . MATION PROCEDURE	
Before periode.	erforming the follo >> GO TO 2. ONDITIONING-II level and oil pressu pection result norma >> GO TO 3. >> GO TO 3. >> Go to LU-7, "Insp ORM DTC CONFIR pt "DATA MONITOR tain the following co	re. Refer to <u>LU-7, "Inspection"</u> . <u>al?</u> <u>pection"</u> . MATION PROCEDURE ' mode with CONSULT.	
Before periode.	erforming the follo >> GO TO 2. ONDITIONING-II level and oil pressu <u>pection result norma</u> >> GO TO 3. >> Go to <u>LU-7, "Insp</u> ORM DTC CONFIR tain the following co ED More f	re. Refer to <u>LU-7, "Inspection"</u> . <u>al?</u> <u>pection"</u> . MATION PROCEDURE " mode with CONSULT. nditions for at least 20 consecutive second	
Before period idle.	erforming the following >> GO TO 2. ONDITIONING-II level and oil pressurption result normation result normatin result normation result normation result normating	re. Refer to <u>LU-7, "Inspection"</u> . <u>Marion PROCEDURE</u> "mode with CONSULT. nditions for at least 20 consecutive secon	

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-378, "Diagnosis Procedure"

NO >> INSPECTION END INFOID:000000009361086

Possible cause

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Diagnosis Procedure

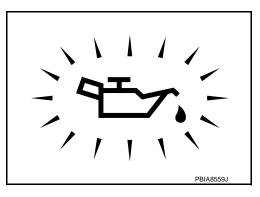
INFOID:000000009361087

[VQ37VHR

- 1.CHECK OIL PRESSURE WARNING LAMP
- 1. Start engine.
- Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

- YES >> Go to LU-7, "Inspection".
- NO >> GO TO 2.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-186, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace malfunctioning intake valve timing control solenoid valve.

 ${f 3.}$ CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-309. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-313, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning camshaft position sensor (PHASE).

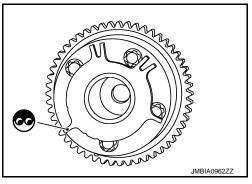
5. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft front end
- Chipping signal plate of camshaft front end

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Remove debris and clean the signal plate of camshaft front 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 EM-56, "Removal and Installation".
- NO >> GO TO 7.

1.CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to <u>EM-100. "Inspection"</u>. <u>Is the inspection result normal?</u>

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT I	DIAGNOSIS >		[VQ37VHR]	
YES >> GO TO				
	lubrication line.			А
8.CHECK INTER	MITTENT INCIDENT			
Refer to GI-45, "In	termittent Incident".			EC
>> INSPE	ECTION END			
Component In	spection		INFOID:00000009361088	С
1.CHECK INTAK	E VALVE TIMING CONTROL	SOLENOID VALVE-I		
1. Turn ignition s	witch OFF.			D
	take valve timing control soler			
3. Check resista	nce between intake valve timi	ng control solenoid va	lve terminals as per the following.	Е
Terminals	Resistance (Ω)			
1 and 2	7.0 - 7.7 [at 20°C (68°F)]			_
1 or 2 and ground	(Continuity should not exist)			F
Is the inspection re	esult normal?			G
YES >> GO TO	-			0
	ce malfunctioning intake valve	0		
Z. CHECK INTAK	E VALVE TIMING CONTROL	SOLENOID VALVE-II		Н
	e valve timing control solenoid			
	DC between intake valve tin s 1 and 2, and then interrupt i			1
	s as shown in the figure.		\frown	1
CAUTION:				
	12 V DC continuously for 5 by result in damage to the			J
	ol solenoid valve.			
NOTE:				1.4
	ace O-ring when intake va ve is removed.	live timing control	0	Κ
Is the inspection re			JMBIA0079ZZ	

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve.

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P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0550 PSP SENSOR

Description

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load.

This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

DTC Logic

INFOID:000000009361090

DTC DETECTION LOGIC

NOTE:

If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-393, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Power steering pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-380, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect power steering pressure (PSP) sensor harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between PSP sensor harness connector and ground.

PSP s	sensor	Ground	Voltage (V)
Connector	Connector Terminal		voltage (v)
F35	3	Ground	Approx. 5

EC-380

INFOID:000000009361089

INFOID:000000009361091

P0550 PSP SENSOR

				PU550 P	SP SENSOR	
< DTC/CIR		<u>AGNOSI</u> S	>			[VQ37VHR]
Is the inspe	ction res	ult normal?				
	GOTO				band da manuna in banna	
-	-	-		-	short to power in harness or connectors.	
J.CHECK	PSP SEI	NSOR GRO		RCUIT FOR	COPEN AND SHORT	
	nition swi					
		1 harness o nuitv betwe			ess connector and ECM harness connector.	
PSP se	ensor	EC	M	0 11 11		
Connector	Terminal	Connector	Terminal	Continuity		
F35	1	F102	96	Existed		
4. Also ch	eck harn	ess for sho	ort to grou	nd and sho	rt to power.	
Is the inspe	ction res	ult normal?) _			
	GOTO		•			
4	•	•		-	rt to power in harness or connectors.	
4.CHECK	PSP SE	NSOR INP	UT SIGN/	AL CIRCUI	FOR OPEN AND SHORT	
1. Check	the contir	nuity betwe	en PSP s	ensor harn	ess connector and ECM harness connector.	
PSP se	ensor	EC	M	Continuity		
Connector	Terminal	Connector	Terminal			
F35	2	F102	87	Existed		
			-	nd and sho	rt to power.	
Is the inspe			-			
	GO TO : Repair c		short to	around or s	short to power in harness or connectors.	
5.снеск			., enere te	ground or e		
			Increation	<u></u>		
Refer to <u>EC</u> Is the inspe				<u>I_</u> .		
YES >>			-			
		PSP sens	or.			
6. CHECK	INTERM	ITTENT IN	CIDENT			
Refer to GI	-45. "Inte	rmittent Inc	cident".			
>>	INSPEC)			
Compone	ent Insc	pection				INFOID:000000009361092
1.	-	_	_			

 $1. {\sf CHECK \ POWER \ STEERING \ PRESSURE \ SENSOR}$

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

3. Start engine and let it idle.

4. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+	-	Condition		Voltage (V)
Connector	Terminal	Terminal			
F102	87	96	Steering wheel	Being turned	0.5 - 4.5
1102	07	90	Steering wheel	Not being turned	0.4 - 0.8

Is the inspection result normal?

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P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- YES >> INSPECTION END
- NO >> Replace power steering pressure sensor.

< DTC/CIRCUIT DIAGNOSIS >

P0555 BRAKE BOOSTER PRESSURE SENSOR

Description

Brake booster pressure sensor is connected to brake booster by a hose. It detects brake booster pressure and sends the voltage signal to the ECM. The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0555	Brake booster pressure sensor circuit	 An excessively low voltage from the sensor is sent to ECM. An excessively high voltage from the sensor is sent to ECM. 	 Harness or connectors (The sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Gear lever position sensor circuit is shorted.) Brake booster pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor EVAP control system pressure sensor Refrigerant pressure sensor Refrigerant pressure sensor Gear lever position sensor Gear lever position sensor
	IRMATION PROCEDURE		·
1.PRECON	IDITIONING		

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 10 seconds.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-383, "Diagnosis Procedure". >> INSPECTION END

NO

Diagnosis Procedure

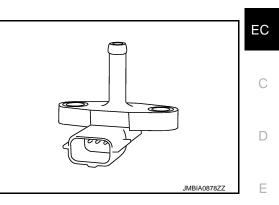
1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

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INFOID:000000009361094

INFOID:000000009361095

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

2. Check ground connection M95. Refer to Ground Inspection in GI-48. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK BRAKE BOOSTER PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect brake booster pressure sensor harness connector.

2. Turn ignition switch ON.

3. Check the voltage between brake booster pressure sensor harness connector and ground.

Brake booster	pressure sensor	Ground	Voltage (V)
Connector	Connector Terminal		voltage (v)
E48	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

3.CHECK BRAKE BOOSTER PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between Brake booster pressure sensor harness connector and ECM harness connector.

Brake booster pres- sure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E48	1	F101	45	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

· Harness for open between ECM and brake booster pressure sensor

>> Repair open circuit.

5. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F101	45	Brake booster pressure sensor	E48	1		
FIUI	46	CKP sensor (POS)	F2	1		
F102	74	Gear lever position sensor	F57	3		
	103	APP sensor	E112	6		
M107	107	EVAP control system pressure sensor	B30	3		
	107	Refrigerant pressure sensor	E172	3		

Is the inspection result normal?

YES >> GO TO 6.

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

< DTC/CIRCL	JT DIAGNOS	15 >			[VQ37VHR]
6. снеск со	OMPONENTS				
Gear lever p EVAP contro	osition sensor osition sensor ol system press	(Refer to <u>EC-3</u> sure sensor (R	399, "Compon tefer to <u>EC-343</u>	omponent Inspection".) ent Inspection") 3. "Component Inspection".) nent Function Check".)	
• •	on result norma	•		· ·	
	O TO 7. eplace malfunc	rtioning comp	nent		
CHECK AF	-		Jilent.		
efer to EC-48	83, "Componer	nt Inspection".			
	on result norma				
	O TO 14. O TO 8.				
	ACCELERATO	OR PEDAL AS	SEMBLY		
				xploded View".	
				ROUND CIRCUIT FOR OPE	
Turn igniti	on switch OFF ct ECM harnes	s connector.		e sensor harness connecto	
 Turn igniti Disconned Check the nector. 	on switch OFF ct ECM harnes continuity bet	: s connector. ween brake b			
 Turn igniti Disconned Check the nector. 	on switch OFF ct ECM harnes	: s connector. ween brake b	ooster pressur		
 Turn igniti Disconned Check the nector. 	on switch OFF ct ECM harnes e continuity bet pressure sensor	: s connector. ween brake b	ooster pressur	e sensor harness connecto	
 Turn igniti Disconnect Check the nector. Brake booster Connector E48 Also chect	on switch OFF ct ECM harnes continuity bet pressure sensor Terminal 3 k harness for s	S connector. Sween brake b Connector F101 Short to ground	ooster pressur ECM Terminal 36	e sensor harness connecto	
 Turn igniti Disconnect Check the nector. Brake booster Connector E48 Also chect the inspection YES >> G NO >> G 	on switch OFF ct ECM harnes continuity bet pressure sensor Terminal 3 k harness for s on result norma O TO 11. O TO 10.	S connector. Sween brake b Connector F101 Short to ground al?	ooster pressur ECM Terminal 36	e sensor harness connecto	
 Turn igniti Disconnec Check the nector. Brake booster Connector E48 Also chec the inspection YES >> G NO >> G O.DETECT Check the follow Harness cord 	on switch OFF ct ECM harnes continuity bet pressure sensor Terminal 3 k harness for s on result norma 0 TO 11. 0 TO 5. 10 TO 5. 1	S connector. Sween brake b Connector F101 Short to ground al? DNING PART	ooster pressur	e sensor harness connecto	
 Turn igniti Disconnec Check the nector. Brake booster Connector E48 Also chec the inspection YES >> G NO >> G D.DETECT Check the follow Harness for >> Re 1.CHECK E 	on switch OFF ct ECM harnes e continuity bet pressure sensor Terminal 3 k harness for s on result norma 0 TO 11. 0 TO 11. 0 TO 10. MALFUNCTIO owing. anectors F1, E3 open or short to epair open circo BRAKE BOOS	s connector. ween brake b Connector F101 short to ground al? DNING PART Soetween brake suit, short to gr TER PRESSU	ooster pressur	Continuity Existed Exi	r and ECM harness con-
 Turn igniti Disconnec Check the nector. Brake booster Connector E48 Also chec the inspection YES >> G NO >> G D.DETECT Check the follow Harness for >> Re 1.CHECK E 	on switch OFF ct ECM harnes e continuity bet pressure sensor Terminal 3 k harness for s on result norma 0 TO 11. 0 TO 11. 0 TO 10. MALFUNCTIO owing. anectors F1, E3 open or short to epair open circo BRAKE BOOS	s connector. ween brake b Connector F101 short to ground al? DNING PART Soetween brake suit, short to gr TER PRESSU	ooster pressur	Continuity Existed	r and ECM harness con-
 Turn igniti Disconner Check the nector. Brake booster Connector E48 Also chect s the inspection YES >> G NO >> G O.DETECT Check the follow Harness corr Harness for >> Ref 1.CHECK E Check the follow Check the follow Check the follow Brake booster p 	on switch OFF ct ECM harnes continuity bet pressure sensor Terminal 3 k harness for s on result norma O TO 11. O TO 10. MALFUNCTIO owing. inectors F1, E3 open or short b epair open circo BRAKE BOOS continuity bet	s connector. ween brake b Connector F101 short to ground al? DNING PART Soetween brake suit, short to gr TER PRESSU	e booster pressur	Continuity Existed Exi	r and ECM harness con-
 Turn igniti Disconner Check the nector. Brake booster Connector E48 Also chec a the inspection YES >> G NO >> G O.DETECT Check the folke Harness for >> Ref Check the folke Arness for >> Ref Check the folke Check the folke Check the folke Arness for >> Ref Check the folke 	on switch OFF ct ECM harnes e continuity bet pressure sensor Terminal 3 k harness for s on result norma 0 TO 11. 0 TO 11. 0 TO 10. MALFUNCTIO owing. anectors F1, E3 open or short to epair open circo BRAKE BOOS e continuity bet	s connector. ween brake b Connector F101 short to ground al? DNING PART DNING PART Boetween brake suit, short to gr TER PRESSU	ooster pressur CCM Terminal 36 d and power. e booster press round or short for IRE SENSOR ooster pressur	Continuity Existed Existed Sure sensor and ECM to power in harness or connector INPUT SIGNAL CIRCUIT For re sensor harness connector	r and ECM harness con-

YES >> GO TO 13.

NO >> GO TO 12.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

12. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F1, E3

Harness for open or short between brake booster pressure sensor and ECM

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

13.CHECK BRAKE BOOSTER PRESSURE SENSOR

Refer to EC-386. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace brake booster pressure sensor.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000009361096

1.CHECK BRAKE BOOSTER PRESSURE SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 4. Check the voltage between ECM harness connector terminals as per the following.

ECM					
Connector	+	_			
Connector	Terminal	Terminal			
F101	39	36			

NOTE:

- To avoid the influence of intake manifold vacuum, check the voltage 1 or more minutes past after engine is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depends on atmospheric pressure and altitude.
- 5. Measure the atmospheric pressure.

NOTE:

As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the pressure with the following chart.

Altitude (m)	Compensated pressure (hPa)
0	0
200	-24
400	-47
600	-70
800	-92
1000	-114
1500	-168
2000	-218

6. Check the manifold absolute pressure sensor value corresponding to the atmospheric pressure.

(V)

5.0 4.5

3.5 3.0

Voltage 4 0

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

1000 1050 (hPa)

JMBIA0870GB

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Ρ

Atmospheric pressure (hPa)	Voltage (V)
800	3.1 – 3.7
850	3.3 – 3.9
900	3.5 – 4.1
950	3.8 – 4.3
1000	4.0 - 4.6
1050	4.2 - 4.8

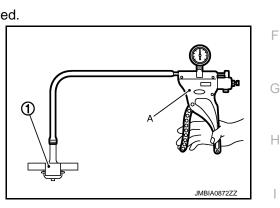
Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace brake booster pressure sensor.

2.CHECK BRAKE BOOSTER PRESSURE SENSOR-II

- 1. Turn ignition switch OFF.
- 2. Remove brake booster pressure sensor with its harness connected.
- Connect the hose of vacuum pump (A) to brake booster pres-3. sure sensor (1).
- 4. Turn ignition switch ON.



950

850

800

900

Atmospheric pressure

Check the voltage between ECM harness connector terminals as per the following. 5.

ECM					
	+		_		
Connector	Terminal	Connector	Terminal		
F101	39	F101	36		

6. Check that the difference of the voltage when engine is stopped and that when negative pressure is L applied with vacuum pump is within the following limits.

Vacuum [kPA (mmHg)]	Voltage difference (V)
-40 (-300)	1.5 – 2.0
-53.3 (-400)	2.0 - 2.6
-66.7 (-500)	2.6 - 3.2
-80 (-600)	3.2 – 3.8

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake booster pressure sensor.

P0603 ECM POWER SUPPLY

Description

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603	ECM power supply circuit	ECM back up RAM system does not function properly.	 Harness or connectors [ECM power supply (back up) circuit is open or shorted.] ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON, wait at least 10 seconds.
- 2. Turn ignition switch OFF and wait at least 5 minutes.
- 3. Turn ignition switch ON, wait at least 10 seconds.
- 4. Repeat steps 2 and 3 for five times.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-388, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

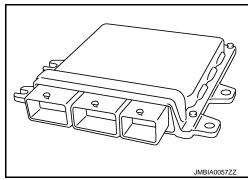
1.CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the voltage between ECM harness connector terminals as per the following.

[VQ37VHR]



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INFOID:000000009361099

P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

ECM				А		
	+	-	-	Voltage		
Connector	Terminal	Connector	Terminal			EC
F102	93	M107	128	Battery voltage		
Is the inspe						
	• GO TO 3. • GO TO 2.					С
-		CTIONING	PART			
						D
 Check the f Harness 		E3, F1				
 15 A fuse 	(No. 50)	-				_
 IPDM E/F Harness f 				nd battery		Е
- Humess		Short betwe		la battery		
>>	Repair or	replace har	ness or con	nectors.		F
3. CHECK	•	•				
Refer to GI	-45, "Intern	nittent Incide	ent".			0
Is the inspe						G
	• GO TO 4.					
4	-	replace har				Н
4.PERFO	RM DTC C	ONFIRMAT	ION PROC	EDURE		
	nition switc	h ON.				I
2. Erase 3. Perfor		nfirmation	Procedure			1
	C-388, "DT(rooodaro	•		
<u>Is the 1st tr</u>	ip DTC P06	603 displaye	ed again?			J
	GO TO 5.					
_		ION END				Κ
5.REPLAC						
1. Replac 2 Go to	e ECM.		SERVICE		<u> CING CONTROL UNIT (ECM) : Special Repair</u>	
	<u>ement"</u> .		OLIVIOL			L
>>	INSPECT	ION END				M
						Ν
						0
						_
						Ρ

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
			ECM calculation function is malfunctioning.	
P0605	P0605 Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON.
- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to EC-391, "Diagnosis Procedure".
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

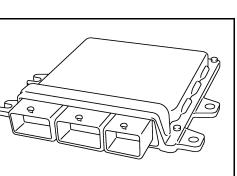
YES >> Go to EC-391, "Diagnosis Procedure".

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON.
- 3. Repeat step 2 for 32 times.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?



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IMBIA005772

INFOID:000000009361101

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
YES >> Go to <u>EC-391, "Diagnosis Procedure"</u> . NO >> INSPECTION END	A
Diagnosis Procedure	INFOID:00000009361102
1.INSPECTION START	EC
 Turn ignition switch ON. Erase DTC. Perform DTC Confirmation Procedure. See EC-390, "DTC Logic". 	C
Is the 1st trip DTC P0605 displayed again?	
YES >> GO TO 2. NO >> INSPECTION END	D
2.REPLACE ECM	E
 Replace ECM. Go to <u>EC-17. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UP</u> 	NIT (ECM) : Special Repair
Requirement".	F
>> INSPECTION END	G
	0
	Н
	J
	K
	L
	-
	M
	Ν
	0
	-

P0607 ECM

Description

INFOID:000000009361103

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:000000009361104

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagno- sis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

2. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-392, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

- **1.**INSPECTION START
- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-392, "DTC Logic"</u>.
- 4. Check DTC.

Is the DTC P0607 displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END

2.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> INSPECTION END

Revision: 2013 May

INFOID:000000009361105

DTC detecting condition

< DTC/CIRCUIT DIAGNOSIS >

P0643 SENSOR POWER SUPPLY

Trouble diagnosis

name

DTC Logic

DTC No.

DTC DETECTION LOGIC

P0643	Sensor power supply circuit short	ECM detects that the voltage of power source for sensor is excessively low or high.	 Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [CMP sensor (PHASE) (bank 1) circuit is shorted.] [Manifold absolute pressure (MAP) sensor circuit is shorted.] (PSP sensor circuit is shorted.) [CMP sensor (PHASE) (bank 2) circuit is shorted.] Accelerator pedal position sensor Throttle position sensor Camshaft position sensor (PHASE) (bank 1) Manifold absolute pressure (MAP) sensor Power steering pressure sensor Camshaft position sensor (PHASE) (bank 2)
DTC CON	FIRMATION PRO	CEDURE	
1.PRECO	NDITIONING		
before cond 1. Turn ig 2. Turn ig 3. Turn ig TESTING C Before per >> 2.PERFOR	ducting the next test nition switch OFF ar nition switch ON. nition switch OFF ar CONDITION: forming the follow GO TO 2. RM DTC CONFIRM.	nd wait at least 10 seconds. Ind wait at least 10 seconds. Ing procedure, confirm that ATION PROCEDURE	ucted, always perform the following procedure battery voltage is more than 10 V at idle.
 Start er Check 	ngine and let it idle f DTC.	or 1 second.	
<u>Is DTC dete</u> YES >>			
	s Procedure		INFCID:00000009361107
1. CHECK	GROUND CONNEC	CTION	
2. Check Is the inspe YES >>	nition switch OFF. ground connection I ection result normal? GO TO 2. Repair or replace g	· ·	on in <u>GI-48. "Circuit Inspection"</u> .
2. CHECK	ACCELERATOR PE	EDAL POSITION SENSOR 1 F	POWER SUPPLY CIRCUIT
2. Turn ig	nition switch ON.	dal position (APP) sensor harn n APP sensor harness connect	

А

EC

С

INFOID:000000009361106

Possible cause

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

APP	sensor	Ground	Voltage (V)	
Connector	Terminal	Giouna	voltage (v)	
E112	5	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
E101	43	Electric throttle control actuator (bank 2)	F27	1
F101 44		Electric throttle control actuator (bank 1)	F6	6
F102	60	CMP sensor (PHASE) (bank 1)	F5	1
		Manifold absolute pressure (MAP) sen- sor	F50	1
		PSP sensor	F35	3
	64	CMP sensor (PHASE) (bank 2)	F18	1
M107	99	APP sensor	E112	5

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK COMPONENTS

Check the following.

- Camshaft position sensor (PHASE) (bank 1) (Refer to EC-313, "Component Inspection".)
- Manifold absolute pressure (MAP) sensor (Refer to EC-210, "Component Inspection".)
- Power steering pressure sensor (Refer to <u>EC-381, "Component Inspection".</u>)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-313, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning component.

5.CHECK TP SENSOR

Refer to EC-226, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to EC-483, "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. Refer to ACC-4, "Exploded View".

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
>> INSPECTION END 9.CHECK INTERMITTENT INCIDENT		А
Refer to <u>GI-45. "Intermittent Incident"</u> .		EC
>> INSPECTION END	•	С
		D
		Е
		F
		G
		Η
		I
		J
		K
		L
		Μ
		Ν
		O P
		Γ

P0820 GEAR LEVER POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0820 GEAR LEVER POSITION SENSOR

Description

Gear lever position sensor is installed in transmission and detects the gear position. When shift lever is shifted, position sensor magnet on striking rod in transmission moves and changes magnetic field of the coil in gear lever position sensor. Gear lever position sensor converts the changes in magnetic field to voltage signals and transmits them to ECM. ECM detects the gear position by these voltage signal changes.

JMBIA2050ZZ

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0820 is displayed with DTC P0335, P0340 or P0345, first perform the trouble diagnosis for DTC P0335, P0340 or P0345. Refer to <u>EC-306, "DTC Logic"</u> or <u>EC-310, "DTC Logic"</u>.
- If DTC P0820 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-368</u>, "M/T MODELS : DTC Logic".

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	
		A	 An excessively low voltage from the sensor is sent to ECM. An excessively high voltage from the sensor is sent to ECM. 	Harness or connectors (Gear lever position sensor circuit is open or short- ed.) [CKP sensor (POS) circuit is shorted.]	
P0820	Gear lever position sen- sor circuit	В	 There is a difference between target engine speed calculated by ECM and actual engine speed. 	 (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted.) Gear lever position sensor Crankshaft position sensor (POS) Accelerator pedal position sensor EVAP control system pressure Refrigerant pressure sensor Brake booster pressure sensor Transmission 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

2. Check DTC.

Is DTC detected?

EC-396

INFOID:000000009361108

	JIT DIAGNOS					[VQ37VHR]
YES >> G NO >> G	o to <u>EC-397, '</u> O TO 3.	<u>"Diagnosis Pro</u>	<u>cedure"</u> .			
		RMATION PRO				
I. Start engi						
2. Drive the		ry gear positio	n from 1st to	6th gear for 1	0 seconds each	at 20 km/h or more.
NOTE: Fully dep	ress clutch r	oedal when sh	nifting and f	ullv release c	lutch pedal afte	er gear shifting is com-
plete.	•				p	. goai eg ie ee
CAUTION Alwavs d		at a safe spee	d.			
3. Check DT	C.					
s DTC detecte						
	o to <u>EC-397.</u> SPECTION E	<u>"Diagnosis Pro</u> חוא	<u>cedure"</u> .			
-						
Diagnosis F	rocedure					INFOID:00000009361110
1. CHECK GF		NECTION				
I. Turn igniti	on switch OF	F.				
-			to Ground Ir	spection in <u>GI</u>	-48, "Circuit Insp	<u>pection"</u> .
s the inspection		<u>nal?</u>				
VEC	O TO 2					
YES >> G(ce around conr	nection			
NO >> Re	epair or replac	ce ground conr POSITION SEN		ER SUPPLY C	IRCUIT-I	
NO >> R0 2.CHECK GE	epair or replace AR LEVER F	POSITION SEN	ISOR POWE		IRCUIT-I	
NO >> Ro 2.CHECK GE 1. Disconneo 2. Turn igniti	epair or replace AR LEVER F	POSITION SEN	ISOR POWE		IRCUIT-I	<u>.</u>
NO >> Ro 2.CHECK GE 1. Disconnec 2. Turn igniti	epair or replac AR LEVER F ct gear lever p on switch ON	POSITION SEN	ISOR POWE harness cor	nector.	IRCUIT-I	ound.
NO >> Re 2.CHECK GE 1. Disconnec 2. Turn igniti 3. Check the	epair or replac AR LEVER F ot gear lever p on switch ON voltage betw	POSITION SEN position sensor	ISOR POWE harness cor	nector.		ound.
NO >> Re 2.CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve	epair or replace AR LEVER F on switch ON voltage betw	POSITION SEN	ISOR POWE harness cor	nector.		ound.
NO >> Re 2.CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor	POSITION SEN position sensor een gear lever	ISOR POWE harness cor position ser	nector. nsor harness c Voltage (V)		ound.
NO >> Re 2.CHECK GE 1. Disconned 2. Turn igniti 3. Check the Gear leve Connector F57	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3	POSITION SEN position sensor een gear lever al Gro	ISOR POWE harness cor position ser	nector. nsor harness c		ound.
NO >> Re 2.CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 s the inspection	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3 on result norm	POSITION SEN position sensor een gear lever al Gro	ISOR POWE harness cor position ser	nector. nsor harness c Voltage (V)		ound.
NO >> Re 2.CHECK GE . Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 s the inspection YES >> Geometry	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3	POSITION SEN position sensor een gear lever al Gro	ISOR POWE harness cor position ser	nector. nsor harness c Voltage (V)		ound.
NO >> Re 2.CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 s the inspection YES >> Gen NO >> Gen	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3 on result norm O TO 8. O TO 3.	POSITION SEN position sensor een gear lever al Gro	ISOR POWE harness cor position ser	nector. Isor harness c Voltage (V) Approx. 5	onnector and gr	ound.
NO $>> Re$ 2.CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 s the inspection YES $>> GeometryYES >> GeometryNO >> GeometryB.CHECK GE$	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3 on result norm O TO 8. O TO 3.	POSITION SEN position sensor een gear lever al Gro nal?	ISOR POWE harness cor position ser	nector. Isor harness c Voltage (V) Approx. 5	onnector and gr	ound.
NO >> Re 2.CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 5 the inspection YES >> Ge NO >> Ge 3.CHECK GE 1. Turn igniti 2. Disconnector	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3 on result norm O TO 8. O TO 8. O TO 3. AR LEVER F on switch OF ct ECM harne	POSITION SEN position sensor een gear lever al Gro al? POSITION SEN F. ss connector.	ISOR POWE harness cor position ser ound	nector. Isor harness c Voltage (V) Approx. 5 ER SUPPLY C	onnector and gr	<u>_</u>
NO $>> Re$ 2.CHECK GE 2. Disconnector 3. Check the Gear leve Connector F57 5 the inspection YES $>> Gear Gear Gear Gear Gear Gear Gear Gear$	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3 on result norm O TO 8. O TO 8. O TO 3. AR LEVER F on switch OF ct ECM harne	POSITION SEN position sensor een gear lever al Gro al? POSITION SEN F. ss connector.	ISOR POWE harness cor position ser ound	nector. Isor harness c Voltage (V) Approx. 5 ER SUPPLY C	onnector and gr	ound. ECM harness connector.
NO $>> Re$ 2. CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 S the inspection YES $>> Gr NO >> Gr3. CHECK GE1. Turn igniti2. Disconnec3. Check the$	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3 on result norm O TO 8. O TO 3. AR LEVER F on switch OFf ct ECM harne continuity be	POSITION SEN position sensor een gear lever al Gro al? POSITION SEN F. ss connector.	ISOR POWE harness cor position ser ound NSOR POWE	nector. Isor harness c Voltage (V) Approx. 5 ER SUPPLY C ensor harness	onnector and gr	<u>_</u>
NO >> Re 2.CHECK GE . Disconnector 2. Turn igniti 3. Check the Gear leve Connector F57 5 the inspection YES >> Ge NO >> Ge 3. CHECK GE . Turn igniti 2. Disconnector	AR LEVER F AR LEVER F on switch ON voltage betw r position sensor Termin 3 on result norm O TO 8. O TO 3. AR LEVER F on switch OFf ct ECM harne continuity be	POSITION SEN position sensor een gear lever al Gro hal? POSITION SEN F. ss connector. tween gear lever	ISOR POWE harness cor position ser ound NSOR POWE	nector. Isor harness c Voltage (V) Approx. 5 ER SUPPLY C	onnector and gr	<u>_</u>
NO $>> Re$ 2. CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 s the inspection YES $>> Gear Reversed NO >> Gear Reversed 3. CHECK GE 1. Turn igniti 3. Check the Gear Reversed Gear Reversed Gear Reversed Gear Reversed Connector$	AR LEVER F ct gear lever p on switch ON voltage betw r position sensor Termin 3 on result norm O TO 8. O TO 8. O TO 3. AR LEVER F on switch OF ct ECM harne continuity be	POSITION SEN position sensor een gear lever al Gro nal? POSITION SEN F. ss connector. tween gear leve	ISOR POWE harness cor position ser ound ound ISOR POWE ver position s	nector. Isor harness c Voltage (V) Approx. 5 ER SUPPLY C ensor harness	onnector and gr	<u>_</u>
$\begin{array}{rrr} NO &>> Re \\ \textbf{2.CHECK GE} \\ \textbf{1. Disconnec} \\ \textbf{2. Turn igniti} \\ \textbf{3. Check the} \\ \hline \textbf{Gear leve} \\ \hline \textbf{Connector} \\ \textbf{757} \\ \textbf{s the inspectie} \\ \textbf{YES} &>> Ge \\ \textbf{NO} &>> Ge \\ \textbf{3. CHECK GE} \\ \textbf{1. Turn igniti} \\ \textbf{2. Disconnec} \\ \textbf{3. Check the} \\ \hline \textbf{Gear lever pc} \\ \hline \textbf{Connector} \\ \hline \textbf{F57} \\ \end{array}$	AR LEVER F ct gear lever p on switch ON voltage betw r position sensor Termin O TO 8. O TO 8. O TO 3. AR LEVER F on switch OF ct ECM harne continuity be osition sensor Terminal 3	POSITION SEN position sensor een gear lever al Gro al Gro hal? POSITION SEN F. ss connector. tween gear lev EC Connector F102	ISOR POWE harness cor position ser ound ound ISOR POWE ver position s CM Terminal	Inector. Isor harness c Voltage (V) Approx. 5 ER SUPPLY C Iensor harness Continuity	onnector and gr	<u>_</u>
NO $>> Re$ 2. CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 S the inspection 3. CHECK GE 1. Turn igniti 2. Disconnector 3. Check the Gear lever por Connector F57 S the inspection	AR LEVER F ct gear lever p on switch ON voltage betw r position sensor Termin O TO 8. O TO 8. O TO 3. AR LEVER F on switch OF ct ECM harne continuity be osition sensor Terminal 3	POSITION SEN position sensor een gear lever al Gro al Gro hal? POSITION SEN F. ss connector. tween gear lev EC Connector F102	ISOR POWE harness cor position ser ound ound ISOR POWE ver position s CM Terminal	Inector. Isor harness c Voltage (V) Approx. 5 ER SUPPLY C Iensor harness Continuity	onnector and gr	<u>_</u>
NO $>>$ Re 2.CHECK GE 1. Disconnec 2. Turn igniti 3. Check the Gear leve Connector F57 s the inspection NO $>>$ Gear CHECK GE 1. Turn igniti 2. Disconnec 3. Check the Gear lever por Connector F57 s the inspection YES $>>$ Gear lever por Connector F57	AR LEVER F ct gear lever p on switch ON voltage betw r position sensor Termin O TO 8. O TO 3. EAR LEVER F on switch OF ct ECM harne continuity be osition sensor Terminal 3 on result norm	POSITION SEN position sensor een gear lever al Gro al? POSITION SEN F. ss connector. tween gear lever EC Connector F102 bal?	ISOR POWE harness cor position ser ound ound ISOR POWE ver position s CM Terminal	Inector. Isor harness c Voltage (V) Approx. 5 ER SUPPLY C Iensor harness Continuity	onnector and gr	<u>_</u>

P0820 GEAR LEVER POSITION SENSOR

EC	CM	Sensor			
Connector	Terminal	Name	Connector	Terminal	
F101	45	Brake booster pressure sensor	E48	1	
1 101	46	CKP sensor (POS)	F2	I	
F102	74	Gear lever position sensor	F57	3	
	103	APP sensor	E112	6	
M107	107	EVAP control system pressure sensor	B30	3	
	107	Refrigerant pressure sensor	E172	3	

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 EC-309, "Component Inspection".)
- Brake booster pressure sensor (Refer to EC-386, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-343, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>HAC-57</u>, "<u>Diagnosis Procedure</u>".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-483, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

>> INSPECTION END

$\mathbf{8}$. CHECK GEAR LEVER POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

3. Check the continuity between gear lever position sensor harness connector and ECM harness connector.

Gear lever p	osition sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F57	1	F102	88	Existed

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, short to ground or short to power in harness or connectors.

 ${f 9.}$ CHECK GEAR LEVER POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between gear lever position sensor harness connector and ECM harness connector.

P0820 GEAR LEVER POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Gear lever po	sition sensor	EC	M		
Connector	Terminal	Connector	Terminal	Continuity	
F57	2	F101	26	Existed	E
107	4	1101	27	Existed	
		short to ground	and short to	power.	
Is the inspection YES >> GO	on result norm O TO 10.	<u>ial?</u>			
		cuit, short to gr	ound or short	to power in hai	rness or connectors.
		POSITION SE			
Refer to EC-39	9, "Compone	nt Inspection".			
Is the inspection	on result norm	al?			
	O TO 12. O TO 11.				
		ER POSITION	SENSOR		
Replace gear l				ploded View"	
Teplace year i			0 <u>1101-30, LX</u>	pidded view.	
>> IN	SPECTION E	ND			
12.CHECK 1	RANSMISSI	ON SHIFT COM	NTROL		
Refer to TM-27	7. "Inspection'				
Is the inspection		al?			
	O TO 13. epair or replac	` A			
13.снески	•				
Refer to GI-45					
<u></u>					
>> IN	SPECTION E	ND			
Component	Inspection	ר			INFOID:00000009361111
1. СНЕСК GE	AR LEVER P	OSITION SEN	SOR-I		
	on switch OFF				
		osition sensor			
		er to <u>TM-36, "E</u> or for chipping.		 _	
Is the inspectio					
	O TO 2. O TO 3.				
NO >> G(5103.				
					JMBIA2061ZZ
2.CHECK GE	AR LEVER P	OSITION SEN	SOR-II		

Check resistance between gear lever position sensor terminals as per the following items.

Terminals (Polarity)

P0820 GEAR LEVER POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

1 (+) - 2 (-)	
1 (+) - 3 (-)	
1 (+) - 4 (-)	Except 0 or ∞ [at 25°C (77°F)]
2 (+) - 3 (-)	
2 (+) - 4 (-)	
3 (+) - 4 (-)	

Is the inspection result normal?

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

 $\mathbf{3}$.Replace gear lever position sensor

Replace gear lever position sensor. Refer to TM-36, "Exploded View".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0830 CLUTCH INTERLOCK SWITCH

Description

When the clutch pedal is depressed, clutch interlock switch turns ON and clutch pedal position switch turns OFF. ECM detects the state of the clutch pedal by those two types of input (ON/OFF signal).

DTC Logic

INFOID:000000009361113

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	[
P0830	Clutch interlock switch	A)	ON signals from the clutch interlock switch and the clutch pedal position switch are sent to the ECM at the same time.	 Harness or connectors (Clutch interlock switch circuit is open or shorted.) (Clutch pedal position switch circuit is open or shorted.) 	I
	circuit	B)	Clutch interlock switch ON signal is not sent to ECM for extremely long time.	 Clutch interlock switch Clutch pedal position switch Incorrect clutch interlock switch installation Incorrect clutch pedal position switch installation 	
DTC CO	NFIRMATION PROC	CED	DURE		
1.PRECO	ONDITIONING				
before cor 1. Turn i	nducting the next test.		as been previously conducted vait at least 10 seconds.	l, always perform the following procedure	I
3. Turn i TESTING	gnition switch OFF ar CONDITION:		ait at least 10 seconds.	wy voltoge is more than 10 V at idle	
Before pe	erforming the follow	ng	procedure, confirm that batte	ry voltage is more than 10 V at idle.	
>	> GO TO 2.				
2.PERFC	ORM DTC CONFIRM	ATIC	ON PROCEDURE FOR MALFU	NCTION A	
2. Fully 3. Fully	gnition switch ON. depress clutch pedal. release clutch pedal.				
	at steps 2 and 3 for fiv	/e ti	mes.		
<u>ls DTC de</u>					
	> Go to <u>EC-402, "Dia</u> > GO TO 3.	gno	<u>sis Procedure"</u> .		
~		ATIC	ON PROCEDURE FOR MALFU	NCTION B	
Perform c			. Refer to EC-401, "Componen		
NOTE:	popent function che	ck	to check the overall function	of the clutch switch circuit. During this	
	DTC might not be co			or the clutch switch chould burning this	(
	ection result normal?				
	> INSPECTION END > Go to EC-402, "Dia		sis Procedure".		
	nent Function Ch			INFOID:000000009361114	
			CTION CHECK FOR MALFUN	CTION B	
(P) With C	ONSULT				

With CONSULT1. Turn ignition switch ON.

2. Select "CPP SW" and "CLUTCH INTLCK SW" in "DATA MONITOR" mode with CONSULT.

EC-401

INFOID:000000009361112

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P0830 CLUTCH INTERLOCK SWITCH

< DTC/CIRCUIT DIAGNOSIS >

3. Check "CPP SW" and "CLUTCH INTLCK SW" indication under the following conditions.

Monitor item	C	Indication	
CPP SW		Fully released	
CFF SW	Clutch pedal	Fully depressed	OFF
CLUTCH INTLCK SW	Ciuton pedai	Fully released	OFF
GEOTOITINTECK SW		Fully depressed	ON

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM						
+		_		Condition		Voltage (V)
Connector	Terminal	Connector	Terminal			
	41				Fully released	Approx. 0
F101	(Clutch pedal position switch signal)	M107	128	Clutch pedal	Fully depressed	Battery voltage
	42				Fully released	Approx. 0
	(Clutch interlock switch signal)				Fully depressed	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-402</u>, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009361115

1.CHECK OVERALL FUNCTION-I

(I) With CONSULT

1. Turn ignition switch ON.

2. Select "CPP SW" in "DATA MONITOR" mode with CONSULT.

3. Check "CPP SW" indication under the following conditions.

Monitor item	Co	ondition	Indication
CPP SW	Clutch pedal	Fully released	ON
OFF SW	Clutch pedal	Fully depressed	OFF

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM						
+		-		Condition		Voltage (V)
Connector	Terminal	Connector	Terminal			
=	41			.	Fully released	Approx. 0
F101	(Clutch pedal position switch signal)	M107	128	Clutch pedal	Fully depressed	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

(I) With CONSULT

Select "CLUTCH INTLCK SW" and check indication under the following conditions.

EC-402

P0830 CLUTCH INTERLOCK SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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EC

Monitor item	Cor	ndition	Indication
CLUTCH INTLCK SW		Fully released	OFF
CLUTCH INTLOK SW	Ciucon pedal	Fully depressed	ON

Without CONSU

Check the voltage between ECM harness connector terminals under the following conditions.

	ECM						
				Con	dition	λ	
Connector	+ Terminal	Connector	- Terminal		anon	Voltage (V)	
	42	Connector	Terminar	<u> </u>	Fully released	Approx. 0	
F101	(Clutch interlock switch signal)	M107	128	Clutch pedal	Fully depressed	Battery voltage	
	ection result nor	mal?					
	> GO TO 12. > GO TO 7.						
СНЕСК	CLUTCH PED	AL POSITI	ON SWITC	CH GROUND C	IRCUIT FOR O	PEN AND SHO	RT
	nition switch O						
	nect clutch ped the continuity b				harness connec	tor and ground	
Clutch Connec	tor Term		Ground	Continuit	у		
E108			Ground	Existed			
	heck harness fo	or short to p					
	ection result nor	•					
′ES >:	> GO TO 4.						
	> Repair open c		-				
.CHECK	CLUTCH PED	AL POSITI	ON SWIT	CH INPUT SIGN	NAL CIRCUIT F	OR OPEN AND) SHORT
	nect ECM harn						
Check tor.	the continuity t	between clu	itch pedal	position switch	harness conne	ctor and ECM	narness connec-
Clutch peo	dal position switch						
			ECM	Contin	uity		
Connecto	r Terminal	Connecto		ninal	uity		
Connecto E108	r Terminal 1	Connecto F101	or Terr	ninal Continu 1 Existe			
E108		F101	or Terr	ninal 1 Existe	ed		
E108 Also c the inspe	1 heck harness fo ection result nor	F101 or short to g	or Terr	ninal 1 Existe	ed		
E108 Also c the insp ES >:	1 heck harness fo ection result nor > GO TO 6.	F101 or short to g	or Terr	ninal 1 Existe	ed		
E108 Also c the inspe 'ES >: IO >:	1 heck harness fo ection result nor > GO TO 6. > GO TO 5.	F101 r short to g mal?	or Terr 4 round and	ninal 1 Existe	ed		
E108 Also c the insp ES >: IO >: .DETEC	1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIO	F101 r short to g mal?	or Terr 4 round and	ninal 1 Existe	ed		
E108 Also c the insp (ES >: IO >: DETEC neck the	1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIO following.	F101 r short to g mal? ONING PAI	or Terr 4 round and	ninal 1 Existe	ed		
E108 Also c the insp (ES >: VO >: .DETEC neck the Harness	1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIO following. connectors E3,	F101 r short to g mal? ONING PAI	or Terr 4 Iround and RT	ninal 1 Existe short to power.	ed		
E108 Also c the insp (ES >: NO >: .DETEC heck the Harness	1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIO following.	F101 r short to g mal? ONING PAI	or Terr 4 Iround and RT	ninal 1 Existe short to power.	ed		
E108 Also c the insp /ES >: /O >: .DETEC neck the Harness Harness	1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIO following. connectors E3, for open or sho	F101 rr short to g rmal? ONING PAI F1 rt between	or Terr 4 round and RT clutch peo	ninal 1 Existe short to power.	ed	r connectors.	
E108 Also c the insp (ES >: IO >: IO >: DETEC Deck the Harness Harness	1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIO following. connectors E3, for open or sho	F101 r short to g mal? DNING PAI F1 rt between ircuit, shor	or Terr 4 Iround and RT clutch peo	ninal 1 Existe Short to power. lal position swite l or short to pow	ch and ECM	r connectors.	

Refer to <u>EC-405</u>, "Component Inspection (Clutch Pedal Position Switch)". Is the inspection result normal?

P0830 CLUTCH INTERLOCK SWITCH

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 12.

NO >> Replace clutch pedal position switch.

7. CHECK CLUTCH INTERLOCK SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch interlock switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between clutch interlock switch harness connector and ground.

Clutch inte	rlock switch	Ground	Voltage (V)	
Connector	Terminal	Ground	voltage (v)	
E111	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- Fuse block (J/B) connector M1
- 10 A fuse (No. 9)
- Harness for open or short between clutch interlock switch and fuse

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

9. Check clutch interlock switch input signal circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

3. Check the continuity between clutch interlock switch harness connector and ECM harness connector.

Clutch interlock switch		E	Continuity	
Connector	Terminal	Connector	Connector Terminal	
E111	2	F101	42	Existed

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

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors E3, F1

• Harness for open or short between clutch interlock switch and ECM

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

11.CHECK CLUTCH INTERLOCK SWITCH

Refer to EC-405. "Component Inspection (Clutch Interlock Switch)".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace clutch interlock switch.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

P0830 CLUTCH INTERLOCK SWITCH < DTC/CIRCUIT DIAGNOSIS > Component Inspection (Clutch Pedal Position Switch)

1. CHECK CLUTCH PEDAL POSITION SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Clutch podal	Fully released	Existed
i ailu z	Clutch pedal	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK CLUTCH PEDAL POSITION SWITCH-II

- 1. Adjust clutch pedal position switch installation. Refer to CL-7, "Inspection and Adjustment".
- 2. Check the continuity between clutch pedal position switch terminals under the following conditions.

		,		5
Terminals	(Condition	Continuity	-
1 and 0		Fully released	Existed	-
1 and 2	Clutch pedal	Fully depressed	Not existed	_
s the inspe	ction result i	normal?		-
	INSPECTIC	ON END utch pedal positio	on switch.	
Compone	ent Inspec	ction (Clutch	Interlock Swi	ch) INF0ID:00000009361117
	CLUTCH IN	TERLOCK SWI	ГСН-І	
2. Discon	nect clutch i	nterlock switch h	arness connecton interlock switch	: terminals under the following conditions.
Terminals	Co	ndition	Continuity	
1 and 2	Clutch pedal	Fully released	Not existed	
T and Z		Fully depressed	Existed	
Is the inspe	ection result i	normal?		
	INSPECTIO	ON END		
2.снеск	CLUTCH IN	TERLOCK SWI	TCH-II	
				-

- 1. Adjust clutch interlock switch installation. Refer to <u>CL-7, "Inspection and Adjustment"</u>.
- 2. Check the continuity between clutch interlock switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Clutch pedal	Fully released	Not existed
		Fully depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch interlock switch.

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INFOID:000000009361116

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< DTC/CIRCUIT DIAGNOSIS >

P0833 CPP SWITCH

Description

INFOID:000000009361118

[VQ37VHR]

When the clutch pedal is depressed, clutch interlock switch turns ON and clutch pedal position switch turns OFF. ECM detects the state of the clutch pedal by those two types of input (ON/OFF signal).

DTC Logic

INFOID:000000009361119

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause	
P0833	Clutch pedal position switch circuit	A) B)	ON signals from the clutch pedal po- sition switch and the clutch interlock switch are sent to the ECM at the same time. Clutch pedal position switch ON sig- nal is not sent to ECM for extremely long time.	 Harness or connectors (Clutch pedal position switch circuit is open or shorted.) (Clutch interlock switch circuit is open or shorted.) Clutch pedal position switch Clutch interlock switch Incorrect clutch pedal position switch installation Incorrect clutch interlock switch installation 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON.
- 2. Fully depress clutch pedal.
- 3. Fully release clutch pedal.
- 4. Repeat steps 2 and 3 for five times.
- 5. Check DTC.

Is DTC detected?

YES >> Go to EC-407, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

Perform component function check. Refer to <u>EC-406, "Component Function Check"</u>.

NOTE:

Use component function check to check the overall function of the clutch switch circuit. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-407, "Diagnosis Procedure".

Component Function Check

INFOID:000000009361120

1.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

With CONSULT

1. Turn ignition switch ON.

2. Select "CPP SW" and "CLUTCH INTLCK SW" in "DATA MONITOR" mode with CONSULT.

EC-406

< DTC/CIRCUIT DIAGNOSIS >

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INFOID:000000009361121

3. Check "CPP SW" and "CLUTCH INTLCK SW" indication under the following conditions.

Monitor item	C	Indication	
CPP SW		Fully released	ON
CFF SW	Clutch pedal	Fully depressed	OFF
CLUTCH INTLCK SW		Fully released	OFF
		Fully depressed	ON

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM							
+		-		Condition		Voltage (V)		
Connector	Terminal	Connector	Terminal					
	41				Fully released	Approx. 0		
F101	(Clutch pedal position switch signal) M107 128 Clutch pedal 42 42 42 42 43	M107 128	signal)	128	128	Clutch pedal	Fully depressed	Battery voltage
					Fully released	Approx. 0		
	(Clutch interlock switch signal)				Fully depressed	Battery voltage		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-407, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK OVERALL FUNCTION-I

() With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "CPP SW" in "DATA MONITOR" mode with CONSULT.
- 3. Check "CPP SW" indication under the following conditions.

Monitor item	Co	Indication	
CPP SW	Clutch pedal	Fully released	ON
	Ciuton pedal	Fully depressed	OFF

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM						
	+	-	-	Co	ndition	Voltage (V)	
Connector	Terminal	Connector	Terminal				
_	41				Fully released	Approx. 0	
F101	(Clutch pedal position switch signal)	M107	128	Clutch pedal	Fully depressed	Battery voltage	
s the insp	ection result normal	2					

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT

Select "CLUTCH INTLCK SW" and check indication under the following conditions.

EC-407

< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Cor	ndition	Indication
CLUTCH INTLCK SW	Clutch pedal	Fully released	OFF
	Ciuton pedal	Fully depressed	ON

Without CONSULT

Check the voltage between ECM harness connector terminals under the following conditions.

	ECM						
+		-	-	Condition		Voltage (V)	
Connector	Terminal	Connector	Terminal				
	42				Fully released	Approx. 0	
F101	(Clutch interlock M10 switch signal)	M107	128	Clutch pedal	Fully depressed	Battery voltage	

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

${f 3.}$ CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Check the continuity between clutch pedal position switch harness connector and ground.

Clutch pedal	oosition switch	Ground	Continuity
Connector	Terminal	Ground	Continuity
E108	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal	position switch	E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E108	1	F101	41	Existed

3. 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 E3, F1

Harness for open or short between clutch pedal position switch and ECM

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

6.CHECK CLUTCH PEDAL POSITION SWITCH

Refer to <u>EC-405</u>, "Component Inspection (Clutch Pedal Position Switch)". Is the inspection result normal?

Revision: 2013 May

EC-408

2014 370Z

DTC/CIRCUIT		SIS >	1 0000 ([VQ37VHR]
YES >> GO					
		pedal positio			
.CHECK CLUT	CH INTER	RLOCK SWIT	CH POWE	R SUPPLY CIF	RCUIT
Turn ignition					
Disconnect on Turn ignition			arness con	nector.	
			terlock swi	tch harness cor	nnector and ground.
					_
Clutch inte	rlock switch		Ground	Voltage (V)	
Connector	Termin			(1)	_
E111	1	Ģ	Ground	Battery voltage	_
the inspection	result norn	nal?			
'ES >> GO					
10 >> GO -					
DETECT MAL	FUNCTIO	NING PART			
eck the followi					
larness conne					
Fuse block (J/E 0 A fuse (No.		ו ועו וכ			
		between clu	tch interloc	k switch and fu	se
>> Repa	air open cir	cuit. short to	around or	short to power i	n harness or connectors.
•	-		-	•	UIT FOR OPEN AND SHORT
				SIGNAL CIRC	
Turn ignition Disconnect E					
				witch harness o	connector and ECM harness connector.
	, ,				
Clutch interlock	switch	E	СМ		-
Connector	Terminal	Connector	Terminal	Continuity	
E111	2	F101	42	Existed	_
					_
Also check h the inspection		-	inu anu shi	on to power.	
ES >> GO ⁻					
0 >> GO					
D.DETECT M			т		
eck the followi		- 4			
larness conne			tch interloc	k switch and E	<u>∽</u> M
		between ciu			
>> Pon	air onen cir	cuit short to	around or	short to power i	n harness or connectors
	-		-		n harness or connectors.
.CHECK CLU	JICHINTE	ERLOCK SW	TICH		
efer to <u>EC-410,</u>	"Compone	ont Incraction			
the inspection		ent inspection	n (Clutch Ir	nterlock Switch)	"
'ES >> GO ⁻	result norn		<u>n (Clutch Ir</u>	<u>iterlock Switch)</u>	<u>_</u> .
	TO 12.	nal?	·	nterlock Switch)	<u>"</u>
IO >> Repl	TO 12. ace clutch	nal? interlock swit	tch.	nterlock Switch)	<u>"</u> .
	TO 12. ace clutch	nal? interlock swit	tch.	<u>iterlock Switch)</u>	<u>"</u>

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Clutch Pedal Position Switch)

[VQ37VHR]

1. CHECK CLUTCH PEDAL POSITION SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Clutch pedal	Fully released	Existed
	Cluten pedai	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK CLUTCH PEDAL POSITION SWITCH-II

- 1. Adjust clutch pedal position switch installation. Refer to CL-7, "Inspection and Adjustment".
- 2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Clutch pedal	Fully released	Existed
T and 2	Ciulch pedal	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch pedal position switch.

Component Inspection (Clutch Interlock Switch)

INFOID:000000009361123

1.CHECK CLUTCH INTERLOCK SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch interlock switch harness connector.
- 3. Check the continuity between clutch interlock switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Clutch pedal	Fully released	Not existed
		Fully depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK CLUTCH INTERLOCK SWITCH-II

- 1. Adjust clutch interlock switch installation. Refer to <u>CL-7</u>, "Inspection and Adjustment".
- 2. Check the continuity between clutch interlock switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Clutch pedal	Fully released	Not existed
T and Z		Fully depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch interlock switch.

< DTC/CIRCUIT DIAGNOSIS >

P0850 PNP SWITCH

Description

When the selector lever position is P or N, park/neutral position (PNP) signal from the TCM is sent to ECM.(A/ T models)

When the selector lever position is Neutral position, park/neutral position (PNP) switch is ON.(M/T models) ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:000000009361125

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause				
P0850	P0850Park/neutral position switchThe signal of the park/neutral position (PNP) signal does not change during driving after the engine is started.• Harness or connectors [The park/neutral position (PNP) circuit is open or shorted.]• Park/neutral position (PNP) signal does not change during driving after the engine is started.• Harness or connectors [The park/neutral position (PNP) circuit is open or shorted.]• Park/neutral position (PNP) signal does not change during driving after the engine is started.• TCM (A/T models)						
DTC CON	FIRMATION PROCI	EDURE	(
1.INSPEC	TION START						
Do you hav	e CONSULT?						
-	e CONSULT?		Г				
	• GO TO 2. • GO TO 5.						
	NDITIONING						
		has been previously conducted, alwa	avs perform the following procedure				
before cond	ducting the next test.						
	nition switch OFF and	wait at least 10 seconds.					
3. Turn ig	nition switch OFF and	wait at least 10 seconds.	ł				
>>	GO TO 3.						
•	PNP SWITCH SIGNA	AL.					
2. Select	nition switch ON.	ATA MONITOR" mode with CONSULT. 7 s.	Then check the "P/N POSI SW" signal				
Posi	ition (Selector lever)	Known-good signal	1				
N or P positi Neutral posi	. ,	ON					
Except abov	e position	OFF	C				
•	ection result normal?						
	 GO TO 4. Go to <u>EC-412, "Diag</u> 	nosis Procedure".	F				
4	RM DTC CONFIRMAT						
 Start er Mainta CAUTI 	in the following condit	o normal operating temperature. ions for at least 50 consecutive seconds	S.				

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ENG SPEED	1,400 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-412, "Diagnosis Procedure".

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-412, "Component Function Check".

NOTE:

Use component function check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-412, "Diagnosis Procedure".

Component Function Check

INFOID:000000009361126

1.PERFORM COMPONENT FUNCTION CHECK

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
M107	109	128	Selector lever P or N (A/T) Neutral (M/T)		Battery voltage
				Except above	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-412, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009361127

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

Which type of transmission?

A/T >> GO TO 2. M/T >> GO TO 7. **2.**CHECK DTC WITH TCM

Refer to TM-204, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START. Does starter motor operate?

< DTC/CIR	RCUIT DIA	GNOSIS	>		[VQ37VHR]
	> GO TO 4 > Check D <u>MON ITE</u>	TC with B	CM. Refe	r to <u>BCS-2</u>	1, "COMMON ITEM : CONSULT Function (BCM - COM- A
4.CHECK	PNP INP	UT SIGNA	L CIRCU	T FOR OP	EN AND SHORT
 Discon Discon 	nect ECM	assembly h harness o	connector.		rness connector and ECM harness connector.
	o mala lu d		N 4		
A/T ass Connector	sembly Terminal	EC Connector	Terminal	Continuity	D
F51	9	M107	109	Existed	
	-				rt to power.
Is the inspe			•		
	> GO TO 6				
_	> GO TO 5		_		F
5.DETEC	T MALFUI	NCTIONIN	IG PART		
Check the • Harness		o E1 E2			G
 Harness Harness 			6		
 Harness 				assembly	
	. .	,			Η
>> 6.снеск		•		ground or s	hort to power in harness or connectors.
Refer to GI	-45, "Inter	mittent Inc	<u>sident"</u> .		
)		J
7.снеск					
	nition swit				
			sition (PN	P) switch h	arness connector.
	nition swit			tob bornoor	s connector and ground.
4. Check	the voltag	e betweet	I FINF SWI	ICH Hames:	
PNP	switch				
Connector	Terminal	- Ground	Voltag	e	N
F55	2	Ground	Battery vo	ltage	IV
Is the inspe	ection resu	It normal?	-		
-	> GO TO 9				Ν
•	> GO TO 8				
8.DETEC			IG PAR I		0
Check theHarness		s E3. F1			
• 10 A fuse	e (No. 43)				_
 IPDM E/F Harness 				P switch an	nd fuse
1011633	or open o			Switch an	
>>	> Repair o	pen circuit	, short to	ground or s	hort to power in harness or connectors.
9. CHECK	PNP INP	UT SIGNA	L CIRCU	T FOR OP	EN AND SHORT

1.

Turn ignition switch OFF. Disconnect ECM harness connector. 2.

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP s	witch	EC	Continuity	
Connector	Terminal	Connector	Continuity	
F55	1	M107	109	Existed

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

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F103, M116

• Harness for open or short between PNP switch and ECM

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

11.CHECK PNP SWITCH

Refer to TM-18, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace PNP switch.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace.

P100A, P100B VVEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P100A, P100B VVEL SYSTEM

DTC Logic

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[VQ37VHR]

DTC DETECTION LOGIC

NOTE:

- If DTC P100A or P100B is displayed with DTC P1090 or P1093, first perform the trouble diagnosis for DTC P1090 or P1093. Refer to <u>EC-427, "DTC Logic"</u>.
- If DTC P100A or P100B is displayed with DTC P0101 or P010B, first perform the trouble diagnosis for DTC P0101 or P010B. Refer to <u>EC-197, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	D
P100A	VVEL response malfunction (bank 1)		Harness or connectors (VVEL actuator motor circuit is open or shorted.)	_
P100B	VVEL response malfunction (bank 2)	Actual event response to target is poor.	 VVEL actuator motor VVEL actuator sub assembly VVEL ladder assembly VVEL control module 	E

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1.	Start engine.
~	D 11

2. Depress the accelerator pedal rapidly half or more under no load conditions, and then release it.

- 3. Wait at idle for 5 seconds or more.
- 4. Repeat steps 2 to 3 for three times.
- 5. Check 1st trip DTC.

Is DTC detected?

YES >> Go to EC-415, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

Turn ignition switch OFF.
 Check ground connection M95. Refer to Ground Inspection in <u>GI-48, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.vvel actuator motor output signal circuit for open and short

1. Disconnect VVEL control module harness connector.

- 2. Disconnect VVEL actuator motor harness connector.
- 3. Check the continuity between VVEL control module harness connector and VVEL actuator motor harness connector.

P100A, P100B VVEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

DTC No.	VVEL control module			VVEL actuator motor		Continuity
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
		E15	12		1	Existed
P100A	1			F48	2	Not existed
PTUUA			25	140	1	Not existed
					2	Existed
		2	2	F49	1	Existed
P100B					2	Not existed
	2		15	Г49	1	Not existed
			15		2	Existed

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

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

• Harness for open or short between VVEL actuator motor and VVEL control module

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

4.CHECK VVEL ACTUATOR MOTOR

Refer to EC-417, "Component Inspection (VVEL ACTUATOR MOTOR)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.REPLACE VVEL ACTUATOR SUB ASSEMBLY

Replace VVEL actuator sub assembly. Refer to EM-90, "Exploded View".

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace.

7.REPLACE VVEL CONTROL MODULE

Replace VVEL control module. Refer to <u>EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL</u> <u>UNIT (VVEL CONTROL MODULE) : Special Repair Requirement"</u>.

>> GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-415, "DTC Logic"</u>.

Is the DTC P100A or P100B displayed again?

YES >> GO TO 9.

NO >> INSPECTION END

P100A, P100B VVEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]
9. CHECK VVEL ACTUATOR SUB ASSEMBLY
Refer to EC-417, "Component Inspection (VVEL ACTUATOR SUB ASSEMBLY)".
Is the inspection result normal?
YES >> GO TO 11. NO >> GO TO 10.
10. REPLACE VVEL ACTUATOR SUB ASSEMBLY
Replace VVEL actuator sub assembly. Refer to EM-90, "Exploded View".
>> INSPECTION END
11.CHECK VVEL LADDER ASSEMBLY
Refer to <u>EM-100, "Inspection"</u> .
<u>Is the inspection result normal?</u> YES >> GO TO 13.
NO >> GO TO 12.
12. REPLACE CYLINDER HEAD, VVEL LADDER ASSEMBLY AND VVEL ACTUATOR SUB ASSEMBLY
Replace cylinder head, VVEL ladder assembly and VVEL actuator sub assembly. Refer to <u>EM-107, "Exploded</u> <u>View"</u> and <u>EM-90, "Exploded View"</u> .
view and <u>Livi-30</u> , <u>Exploded view</u> .
>> INSPECTION END
13. CHECK INTERMITTENT INCIDENT
Refer to GI-45, "Intermittent Incident".
>> INSPECTION END
Component Inspection (VVEL ACTUATOR MOTOR)
1.CHECK VVEL ACTUATOR MOTOR
1. Turn ignition switch OFF.
 Disconnect VVEL actuator motor harness connector. Check resistance between VVEL actuator motor terminals as follows.
VVEL actuator motor Resistance
Terminal 16 Ω or less
Is the inspection result normal?
YES >> INSPECTION END
NO $>>$ GO TO 2.
2.REPLACE VVEL ACTUATOR SUB ASSEMBLY
Replace VVEL actuator sub assembly. Refer to <u>EM-90, "Exploded View"</u> .
Replace VVEL actuator sub assembly. Refer to <u>EM-90, "Exploded View"</u> .
>> INSPECTION END

3. Turn the ball screw shaft to check that it works smoothly.

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END NO >> GO TO 2.

2.REPLACE VVEL ACTUATOR SUB ASSEMBLY

Replace VVEL actuator sub assembly. Refer to EM-90, "Exploded View".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P1087, P1088 VVEL SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

-

If DTC P1087 or P1088 is displayed with DTC P1090 or P1093. Perform the trouble diagnosis for DTC P1090 or P1093. Refer to <u>EC-423, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1087	VVEL small event angle malfunction (bank 1)		Harness or connectors (VVEL actuator motor circuit is	D
P1088	VVEL small event angle malfunction (bank 2)	The event angle of VVEL control shaft is always small.	open or shorted.) • VVEL actuator motor • VVEL actuator sub assembly • VVEL ladder assembly • VVEL control module	E

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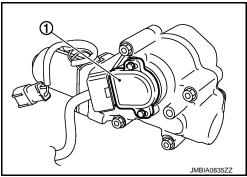
P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

Description

VVEL control shaft position sensor (1) is placed on VVEL actuator sub assembly and detects the control shaft position angle. A magnet is pressed into the arm on the edge of control shaft. The magnetic field changes as the magnet rotates together with the arm resulting in the output voltage change of the sensor. VVEL control module detects the actual position angle through the voltage change and sends the signal to ECM.



[VQ37VHR]

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DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1089 or P1092 is displayed with DTC P1608, first perform the trouble diagnosis for DTC P1608. Refer to <u>EC-471, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1089	VVEL control shaft position sensor (bank 1) circuit	• An excessively low voltage from the sensor is sent to VVEL control module.	
P1092	VVEL control shaft position sensor (bank 2) circuit	 An excessively high voltage from the sensor is sent to VVEL control module. Rationally incorrect voltage is sent to VVEL control module compared with the signals from VVEL control shaft po- sition sensor 1 and VVEL control shaft position sensor 2. 	 Harness or connectors (VVEL control shaft position sensor circuit is open or shorted.) VVEL control shaft position sensor VVEL control module

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V 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?

- YES >> Go to EC-420, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

EC-420

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P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

DTC/CIRCL		1092 VVEL SIS >	CONTRO	DL SHAFT	POSITION	I SENSOR [VQ37V	HR]
s the inspection	on result nori	mal?					
	O TO 2.						
	•	ice ground cor					
.VVEL CON	ITROL SHAF	T POSITION	SENSOR PO	WER SUPPLY	CIRCUIT		
. Disconne	ct VVEL cont	rol shaft positi	on sensor ha	rness connect	or.		
. Turn igniti	on switch ON	۱.					
. Check the	e voltage betw	veen VVEL co	ntrol shaft po	sition sensor h	narness conn	ector and ground.	
	VVEL o	control shaft positi	on sensor			_	
DTC No.	Bank	Connector	Terminal	- Ground	Voltage (V))	
			3				
P1089	1	F46	6	_			
			3	Ground	Approx. 5		
P1092	2	F47	6	_			
the inspection	on result nori	mal?					
	0 TO 4.						
	O TO 3.						
DETECT N	IALFUNCTIC	NING PART					
neck the follo	wing						
Disconnee Check the		rol module har between VVEL			sor harness	connector and VVEL co	ntrol
	VVEL co	ontrol shaft positio	n sensor	VVEL cont	rol module		
DTC No.	Bank	Connector	Terminal	Connector	Terminal	Continuity	
	-		2		4		
P1089	1	F46	5	_	17		
			2	E15	6	Existed	
P1092	2	F47	5		19		
Also chec	k harness for	short to grour	nd and power	:			
	on result nori	-					
′ES >> G	O TO 6.						
	O TO 5.						
DETECT N	IALFUNCTIC	NING PART					
heck the follo							
	nectors F1, I		El control ch	oft position co-	pear and \/\/F	l control modulo	
namess for	open or snor			an position ser	ISUI AND VVE	EL control module	
~~ P/	enair onen ci	rcuit, short to g	around or she	ort to nower in	harness or c	o o o o o to ro	
	opun open o					onneciois	
			-	•		R OPEN AND SHORT	

1. Check the continuity between VVEL control shaft position sensor harness connector and VVEL control module harness connector.

P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

DTC No.	VVEL control shaft position sensor			VVEL control module		Continuity	
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P1089	1	F46	1		3		
F 1009	I	140	4	E15	16	Existed	
P1092	2	2 F47	1		5		
F1092	2	F47	4		18	-	

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

Is the inspection result normal?

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

NO >> GO 107.

7. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

Harness for open or short between VVEL control shaft position sensor and VVEL control module

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

8.CHECK INTERMITTENT INCIDENT

Refer to GI-45. "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace.

9.REPLACE VVEL CONTROL MODULE

Replace VVEL control module. Refer to <u>EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL</u> UNIT (VVEL CONTROL MODULE) : Special Repair Requirement".

>> GO TO 10.

10.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-420, "DTC Logic"</u>.

Is the DTC P1089 or P1092 displayed again?

YES >> GO TO 11.

NO >> INSPECTION END

11.REPLACE VVEL ACTUATOR SUB ASSEMBLY

Replace VVEL actuator sub assembly. Refer to EM-90, "Exploded View".

>> INSPECTION END

P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

P1090, P1093 VVEL ACTUATOR MOTOR

Description

The VVEL actuator motor rotates the control shaft according to the control signal from the VVEL control module. The VVEL control module judges whether the VVEL actuator motor controls the angle properly by the VVEL control shaft position sensor signal.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1090 or P1093 is displayed with DTC P1091, first perform the trouble diagnosis for DTC P1091. Refer to <u>EC-427, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1090	VVEL system performance (bank 1)		Harness or connectors	
P1093	VVEL system performance (bank 2)	 Event angle difference between the actual and the target is detected. Abnormal current is sent to VVEL actuator motor. 	 (VVEL actuator motor circuit is open or shorted.) VVEL actuator motor VVEL actuator sub assembly VVEL ladder assembly VVEL control module 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 10 second.

- 2. Keep the engine speed at about 3,500 rpm for at least 10 seconds under no load.
- Check DTC.

Is DTC detected?

YES >> Go to <u>EC-423, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in <u>GI-48, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.VVEL ACTUATOR MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect VVEL control module harness connector.

- 2. Disconnect VVEL actuator motor harness connector.
- 3. Check the continuity between VVEL control module harness connector and VVEL actuator motor harness connector.

EC-423

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P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

DTC No.	VVEL control module			VVEL actuator motor		Continuity
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
		E15	12		1	Existed
P1090	2			F48	2	Not existed
P1090			25	1 40	1	Not existed
					2	Existed
			2	– F49	1	Existed
P1093					2	Not existed
	2		15	Г49	1	Not existed
					2	Existed

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

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

Harness for open or short between VVEL actuator motor and VVEL control module

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

4.CHECK VVEL ACTUATOR MOTOR

Refer to EC-425, "Component Inspection (VVEL ACTUATOR MOTOR)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.REPLACE VVEL ACTUATOR SUB ASSEMBLY

Replace VVEL actuator sub assembly. Refer to EM-90, "Exploded View".

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace.

7.REPLACE VVEL CONTROL MODULE

Replace VVEL control module. Refer to <u>EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL</u> <u>UNIT (VVEL CONTROL MODULE) : Special Repair Requirement"</u>.

>> GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-423, "DTC Logic"</u>.

Is the DTC P1090 or P1093 displayed again?

YES >> GO TO 9.

NO >> INSPECTION END

P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGN	OSIS >	[VQ37VHR]
9. CHECK VVEL ACTUA	TOR SUB ASSEMBLY	
Refer to EC-425, "Compo	onent Inspection (VVEL ACTUAT	OR SUB ASSEMBLY)".
s the inspection result no	ormal?	
YES >> GO TO 11.		
NO >> GO TO 10.		
	CTUATOR SUB ASSEMBLY	
eplace VVEL actuator s	ub assembly. Refer to <u>EM-90, "E</u>	xploded View".
>> INSPECTIO	N END	
1. CHECK VVEL LAD	DER ASSEMBLY	
Refer to <u>EM-100, "Inspec</u>		
s the inspection result no	<u>prmal?</u>	
YES >> GO TO 13. NO >> GO TO 12.		
	ER HEAD, VVEL LADDER ASS	EMBLY AND VVEL ACTUATOR SUB ASSEMBLY
		actuator sub assembly. Refer to EM-107, "Exploded
iew" and EM-90, "Explo		· · · · · ·
>> INSPECTIO		
3.CHECK INTERMIT		
efer to <u>GI-45, "Intermitte</u>	ant incident.	
>> INSPECTIO	N END	
Component Inspect	ion (VVEL ACTUATOR M	IOTOR) INFOID:000000003361139
CHECK VVEL ACTU		,
. Turn ignition switch (
2. Disconnect VVEL ac	tuator motor harness connector.	
. Check resistance be	tween VVEL actuator motor term	inals as follows.
VVEL actuator motor		
Terminal	Resistance (Ω)	
1 and 2	16 or less	
the inspection result no		
YES >> INSPECTIO		
NO >> GO TO 2.		
REPLACE VVEL ACT	UATOR SUB ASSEMBLY	
eplace VVEL actuator s	sub assembly. Refer to <u>EM-90, "E</u>	xploded View"
>> INSPECTIOI		
component Inspect	ion (VVEL ACTUATOR S	UBASSEMBLY) INFOID:00000009361140
CHECK VVEL ACTUA	TOR SUB ASSEMBLY	
I. Turn ignition switch (
Remove VVEL actual	tor sub assembly. Refer to <u>EM-9</u>	1. "Disassembly and Assembly".

3. Turn the ball screw shaft to check that it works smoothly.

Is the inspection result normal?

[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

Replace VVEL actuator sub assembly. Refer to EM-90, "Exploded View".

>> INSPECTION END

P1091 VVEL ACTUATOR MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P1091 VVEL ACTUATOR MOTOR RELAY

Description

Power supply for the VVEL actuator motor is provided to the VVEL control module via VVEL actuator motor relay. VVEL actuator motor relay is ON/OFF controlled by the VVEL control module. In addition, when the VVEL actuator motor relay cannot be controlled by the VVEL control module for some reason, it ON/OFF controlled by ECM.

DTC Logic

INFOID:000000009361142

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1091	VVEL actuator motor relay circuit	 VVEL control module detects the VVEL actuator motor relay is stuck OFF. VVEL control module detects the VVEL actuator motor relay is stuck ON. 	 Harness or connectors (VVEL actuator motor relay circuit is open or shorted.) (Abort circuit is open or shorted.) VVEL actuator motor relay VVEL control module ECM 	E
				0

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure H before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 1 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON and wait at least 1 seconds.
- 4. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-427, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.VVEL ACTUATOR MOTOR RELAY POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect VVEL actuator motor relay.
- 3. Check the voltage between VVEL actuator motor relay harness connector and ground.

VVEL actuator motor relay		Ground	Voltage	
Connector	Terminal	Ground	voltage	
E16	1	Ground	Battery voltage	
LIU	5	Ground	Dattery Voltage	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

INFOID:000000009361143

INFOID:000000009361141

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P1091 VVEL ACTUATOR MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

2. DETECT MALFUNCTIONING PART

Check the following.

• 50 A fusible link (letter M)

• Harness for open or short between VVEL actuator motor relay and battery

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

3.VVEL ACTUATOR MOTOR RELAY POWER SUPPLY CIRCUIT-II

- 1. Disconnect VVEL control module harness connector.
- 2. Disconnect VVEL actuator motor relay harness connector.
- 3. Check the continuity between VVEL actuator motor relay harness connector and VVEL control module harness connector.

VVEL control module		VVEL actuator motor relay		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E15	23	E16	2	Existed	

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

Is the inspection result normal?

YES >> GO TO 4.

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

4.VVEL ACTUATOR MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between VVEL actuator motor relay harness connector and VVEL control module harness connector.

VVEL control module			VVEL actuator motor relay		Continuity
Bank	Connector	Terminal	Connector	Terminal	Continuity
1	E15	13	E16	з	Existed
2		1		5	LXISIEU

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

Is the inspection result normal?

YES >> GO TO 5.

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

 ${f 5.}$ CHECK VVEL ACTUATOR MOTOR RELAY

Refer to EC-429, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace VVEL actuator motor relay.

 ${f 6}.$ CHECK ABORT CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between VVEL control module harness connector and ECM harness connector.

VVEL control module		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E15	21	F101	28	Existed	

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

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

ANDA VIVEL ACTUATOR MOTOR RELAV

P1091 VVEL ACTUATOR MOTOR RELAY	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
Check the following.Harness connector E3, F1Harness for open or short between ECM and VVEL control module	А
>> Repair open circuit, short to ground or short to power in harness or connecto 8 .CHECK INTERMITTENT INCIDENT	ers. EC
Refer to GI-45, "Intermittent Incident".	
Is the inspection result normal? YES >> GO TO 9.	С
NO >> Repair or replace.	D
9.REPLACE VVEL CONTROL MODULE	
 Replace VVEL control module. Go to <u>EC-18</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVI <u>ULE) : Special Repair Requirement"</u>. 	EL CONTROL MOD- E
>> GO TO 10.	F
10.PERFORM DTC CONFIRMATION PROCEDURE	
 Turn ignition switch ON. Erase DTC. 	G
3. Perform DTC Confirmation Procedure.	
See <u>EC-427, "DTC Logic"</u> .	Н
Is the DTC P1091 displayed again?	
YES >> GO TO 11. NO >> INSPECTION END	
11.REPLACE ECM	I
 Replace ECM. Go to <u>EC-17</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (EC <u>Requirement</u>". 	<u>CM) : Special Repair</u> J
>> INSPECTION END	K
Component Inspection	INFOID:00000009361144
1.CHECK VVEL ACTUATOR MOTOR RELAY	L
1. Turn ignition switch OFF.	
 Remove VVEL actuator motor relay. Check the continuity between VVEL actuator motor relay termi- 	M
nals under the following conditions.	
②	5) [70] N
Terminal Condition Continuity	
3 and 5 Existed	
No current supply Not existed	
Is the inspection result normal?	
YES >> INSPECTION END NO >> Replace VVEL actuator motor relay.	JMBIA0876ZZ

NO >> Replace VVEL actuator motor relay.

P1148, P1168 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

P1148, P1168 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC P1148 or P1168 is displayed with another DTC for A/F sensor 1. When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148	Closed loop control function (bank 1)	The closed loop control function for bank 1 does not operate even when vehicle is being driven in the specified condition.	 Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
P1168	Closed loop control function (bank 2)	The closed loop control function for bank 2 does not operate even when vehicle is being driven in the specified condition.	 A/F sensor 1 A/F sensor 1 heater

INFOID:000000009361145

[VQ37VHR]

DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING

TCS control unit

Trouble diagnosis name

< DTC/CIRCUIT DIAGNOSIS >

Description

DTC Logic

DTC No.

P1211

DTC DETECTION LOGIC

P1211 TCS CONTROL UNIT

Freeze frame data is not stored in the ECM for this self-diagnosis.

TESTING CONDITION.

DTC detecting condition

ECM receives malfunction information from

"ABS actuator and electric unit (control unit)".

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.		
>> GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE		
 Start engine and let it idle for at least 60 seconds. Check 1st trip DTC. 		
<u>Is 1st trip DTC detected?</u> YES >> <u>EC-431. "Diagnosis Procedure"</u> NO >> INSPECTION END	J	
Diagnosis Procedure	K	
Go to <u>BRC-4, "Work Flow"</u> .	L	

P1211 TCS CONTROL UNIT

INFOID:000000009361146

[VQ37VHR]

The malfunction information related to TCS is transferred via 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.

Possible cause

· ABS actuator and electric unit (control

unit)

· TCS related parts

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< DTC/CIRCUIT DIAGNOSIS >

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:000000009361150

DTC DETECTION LOGIC

NOTE:

- If DTC P1212 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-392, "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 cannot 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 10.5 V 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>EC-432</u>, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to BRC-4, "Work Flow".

INFOID:000000009361149

P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

P1217 ENGINE OVER TEMPERATURE

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607. first perform the trouble diagnosis for DTC P0607. Refer С to EC-392, "DTC Logic".

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

D 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 control module Cooling fan motor Radiator hose Radiator Radiator cap Water pump Thermostat
	alfunction is indicat	ed, always replace the coolant. Refengine oil. Refer to <u>LU-8, "Draining"</u> ar	
 Fill rad coolan <u>ant Mix</u> After re 	diator with coolant up at with the proper mi <u>xture Ratio"</u> . efilling coolant, run o	o to specified level with a filling speed xture ratio. Refer to <u>MA-17, "FOR NO</u> engine to ensure that no water-flow n	d of 2 liters per minute. Always use RTH AMERICA : Anti-Freeze Cool-
	FIRMATION PROC		
		ck. Refer to <u>EC-433, "Component Funct</u>	tion Check"
NOTE:	onent function check to	o check the overall function of the cooling	
YES >>	ection result normal? > INSPECTION END > Go to <u>EC-434, "Diag</u>	nosis Procedure".	
Compone	ent Function Che	ck	INFOID:00000009361153
compone		INCTION CHECK-I	

INFOID:000000009361152

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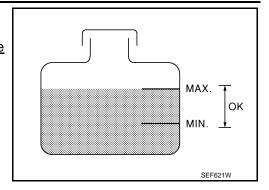
P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Check the coolant level in the reservoir tank and radiator. **Allow engine to cool before checking coolant level.** <u>Is the coolant level in the reservoir tank and/or radiator below the</u> <u>proper range?</u>

YES >> Go to <u>EC-434</u>, "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 EC-434, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-10, "Diagnosis</u> <u>Description"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-434, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009361154

1.CHECK COOLING FAN OPERATION

(I) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-10</u>, "<u>Diagnosis</u> <u>Description</u>".
- 2. Make sure that cooling fan operates.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Go to <u>EC-502</u>, "Diagnosis Procedure".

2. CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-10, "Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose
- Radiator
- Water pump

P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
>> Repair or replace malfunctioning part.	
4. CHECK RADIATOR CAP	A
Check radiator cap. Refer to CO-14, "RESERVOIR TANK CAP : Inspection".	
Is the inspection result normal?	EC
YES >> GO TO 5. NO >> Replace radiator cap.	
5.CHECK THERMOSTAT	С
Check thermostat. Refer to CO-26, "Inspection".	
<u>Is the inspection result normal?</u> YES >> GO TO 6. NO >> Replace thermostat	D
6. CHECK ENGINE COOLANT TEMPERATURE SENSOR	E
Refer to EC-223, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 7. NO >> Replace engine coolant temperature sensor.	F
7.CHECK MAIN 12 CAUSES	G
If the serves segment he isolated sheal, the following	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	MA-17, "FOR NORTH AME ant Mixture Ratio"	ERICA : Anti-Freeze Cool
-	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-10, "Inspection"
-	4	Radiator cap	Pressure tester	107 kPa (1.1 kg/cm ² , 16 psi) (Limit)	CO-14, "RESERVOIR TANK CAP : Inspection
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-26, "Inspection"
ON* ¹	7	Cooling fan	CONSULT	Operating	EC-502, "Component Function Check"
OFF	8	Combustion gas leak	Color checker chemical tester 4 Gas analyzer	Negative	
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	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maxi- mum distortion (warping)	EM-113, "Inspection"
-	12	Cylinder block and pis- tons	• Visual	No scuffing on cylinder walls or piston	EM-127, "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 <u>CO-5, "Troubleshooting Chart"</u>.

>> INSPECTION END

P1225, P1234 TP SENSOR

Description

DTC Logic

DTC DETECTION LOGIC

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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.

DTC No. DTC detecting condition Possible cause Trouble diagnosis name Closed throttle position learning P1225 performance (bank 1) Closed throttle position learning value is Electric throttle control actuator excessively low. (TP sensor 1 and 2) Closed throttle position learning P1234 performance (bank 2) DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. **TESTING CONDITION:** Before performing the following procedure, confirm that battery voltage is more than 10 V at idle. >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Turn ignition switch OFF and wait at least 10 seconds.

3. Turn ignition switch ON.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-437, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

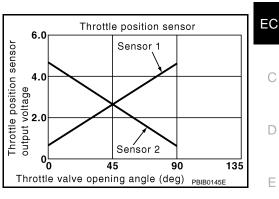
1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.

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[VQ37VHR]

INFOID:000000009361155



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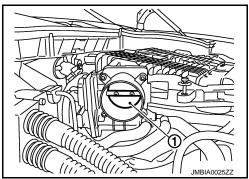
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3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to <u>EC-20</u>, "<u>THROTTLE</u> <u>VALVE CLOSED POSITION LEARNING</u> : <u>Special Repair Requirement</u>".



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

[VQ37VHR]

P1226, P1235 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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.

Throttle position sensor

DTC Logic

DTC DETECTION LOGIC

DTC No. DTC detecting condition Possible cause Trouble diagnosis name Closed throttle position learning P1226 performance (bank 1) Closed throttle position learning is not performed Electric throttle control actuator successfully, repeatedly. (TP sensor 1 and 2) Closed throttle position learning P1235 Н performance (bank 2) DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. **TESTING CONDITION:** Before performing the following procedure, confirm that battery voltage is more than 10 V at idle. >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. M 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON. Repeat steps 2 and 3 for 32 times. 4. Check 1st trip DTC. Ν 5 Is 1st trip DTC detected? YES >> Go to EC-439, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:000000009361160 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY 1. Turn ignition switch OFF.

2. Remove the intake air duct.

INFOID:000000009361158

INFOID:000000009361159

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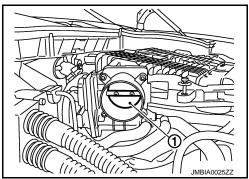
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3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to <u>EC-20</u>, "<u>THROTTLE</u> <u>VALVE CLOSED POSITION LEARNING</u> : <u>Special Repair Requirement</u>".



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

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:000000009361162

DTC DETECTION LOGIC

NOTE: If DTC P1233 or P2101 is displayed with DTC P1238, P1290, P2100 or 2119, first perform the trouble diagnosis for DTC P1238, P2119 or P1290, P2100. Refer to <u>EC-447, "DTC Logic"</u> or <u>EC-452, "DTC</u> <u>Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
	Electric throttle control		
P1233	performance (bank 2)	Electric throttle control function does not	Harness or connectors (Throttle control motor circuit is open or shorted)
P2101	Electric throttle control performance (bank 1)	operate properly.	Electric throttle control actuator
DTC CO	NFIRMATION PRO	CEDURE	
1 .PREC	ONDITIONING		
	Confirmation Procedu		I, always perform the following procedure
1. Turn	ignition switch OFF a	ind wait at least 10 seconds.	
	ignition switch ON.	nd wait at least 10 seconds.	
TESTING	G CONDITION:		
	performing the follo s running.	wing procedure, confirm that ba	attery voltage is more than 11 V when
engine	s running.		
	>> GO TO 2.		
2.PERF	ORM DTC CONFIRM	IATION PROCEDURE	
1. Turn	ignition switch ON an	nd wait at least 2 seconds.	
	engine and let it idle ck DTC.	for 5 seconds.	
s. Chec Is DTC d			
	>> Go to <u>EC-441, "Di</u>	agnosis Procedure".	
	>> INSPECTION END		
Diagno	sis Procedure		INFOID:00000009361163
1.снес	K GROUND CONNE	CTION	
	ignition switch OFF.		
	-	M95. Refer to Ground Inspection in	<u>GI-48, "Circuit Inspection"</u> .
is the ins	pection result normal	<u> </u>	
YES	>> GO TO 2. >> Repair or replace (ground connection.	

Check the voltage between ECM harness connector terminals as per the following.

EC-441

[VQ37VHR]

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< DTC/CIRCUIT DIAGNOSIS >

DTC		EC	CM						
	+		_		Condition		Voltage (V)		
	Connector	Terminal	Connector	Terminal					
P1233	F102	52	M107 128			OFF	Approx. 0		
1 1200	1102	52		Ignition switch	ON	Battery voltage			
P2101	F101	3		101107	101	WITO7	120	Ignition switch	OFF
12101	1 101	5				ON	Battery voltage		

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

$\mathbf{3.}$ Check throttle control motor relay power supply circuit

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect IPDM E/R harness connector E7.

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

IPD	M E/R	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E7	70	F101	25	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

4.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

Harness connectors F104, F105

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

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

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

DTC	IPDM	E/R	ECM		Continuity
DIC	Connector	Terminal	Connector	Terminal	Continuity
P1233	F7	54	F102	52	Existed
P2101		54	F101	3	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 E3, F1

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

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

EC-442

[VQ37VHR]

7.CHECK FUSE	Δ
 Disconnect 15 A fuse (No. 51) from IPDM E/R. Check 15 A fuse for blown. 	\square
Is the inspection result normal?	EC
YES >> GO TO 8. NO >> Replace 15A fuse.	
8. CHECK INTERMITTENT INCIDENT	С
Refer to GI-45, "Intermittent Incident".	
Is the inspection result normal?	D
YES >> Replace IPDM E/R. NO >> Repair or replace harness or connectors.	D
9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT	Е
1. Turn ignition switch OFF.	
 Disconnect electric throttle control actuator harness connector. Disconnect ECM harness connector. 	
 Check the continuity between electric throttle control actuator harness connector and ECM harness connector. 	F
	G

DTC Bank Conne P1233 2 F27	27	F102	49 50	Continuity Existed Not existed	
P1233 2 F27	27	— F102	50		
P1233 2 F27	27	F102		Not existed	
F 1233 2 127		1102			
			49	Not existed	
	0	6	0	50	Existed
	1		2	Existed	
P2101 1 F6	e	F101	4	Not existed	
	2		2	Not existed	
	2		4	Existed	

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

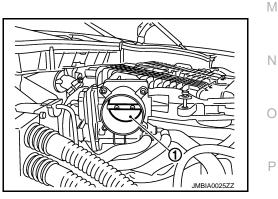
1. Remove the intake air duct.

2. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to <u>EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"</u>.



11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-444, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 13. < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

12. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace harness or connectors.

 $13. {\tt replace electric throttle control actuator}$

Replace malfunction electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

Component Inspection

INFOID:000000009361164

1. CHECK THROTTLE CONTROL MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Check resistance between electric throttle control actuator terminals as per the following.

Electric th	rottle control actuator	Resistance (Ω)	
Bank Terminals			
1	1 and 2	Approx. 1 - 15 [at 25°C (77°F)]	
2	5 and 6	Approx. 1 = 10 [ar 20 0 (77 +)]	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

P1236, P2118 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:000000009361166

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1236	Throttle control motor (bank 2) circuit short	ECM detects short in both circuits between	Harness or connectors (Throttle control motor circuit is shorted.)
P2118 Throttle control motor (bank 1) circuit short		ECM and throttle control motor.	Electric throttle control actuator (Throttle control motor)
DTC CON	FIRMATION PROCI	EDURE	
1. PRECO	NDITIONING		
		has been previously conducted, always	ays perform the following procedure
	ducting the next test. Inition switch OFF and	l wait at least 10 seconds.	
	nition switch ON.	l wait at least 10 seconds.	
o. Turrig			
•	GO TO 2.		
2.PERFO	RM DTC CONFIRMAT	TION PROCEDURE	
		wait at least 2 seconds.	
3. Check	ngine and let it idle for DTC.	5 seconds.	
Is DTC det			
	Go to <u>EC-445, "Diag</u> INSPECTION END	nosis Procedure".	
-	s Procedure		INFOID:00000009361167
			INFOID.00000009361167
	GROUND CONNECT		
	nition switch OFF.	95. Refer to Ground Inspection in <u>GI-48</u> ,	"Circuit Inspection"
	ection result normal?		<u>onour moporton</u> .
	• GO TO 2.		
•	 Repair or replace gro 		
		DL MOTOR OUTPUT SIGNAL CIRCUIT	FOR OPEN AND SHORT
	nect electric throttle connect ECM harness co	ontrol actuator harness connector. nnector.	
		n electric throttle control actuator harne	ss connector and ECM harness con-

[VQ37VHR]

INFOID:000000009361165

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DTC	Electri	c throttle cont	rol actuator	EC	M	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
	5		5		49	Existed	
P1236	2	F27	5	F102	50	Not existed	
1 1230	11230 2		6	6	1102	49	Not existed
					50	Existed	
		F6	1		2	Existed	
P2118	1			F101	4	Not existed	
F2110	I		2	1101	2	Not existed	
					4	Existed	

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.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-446. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

Component Inspection

INFOID:000000009361168

1. CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.

2. Disconnect electric throttle control actuator harness connector.

3. Check resistance between electric throttle control actuator terminals as per the following.

Electric th	rottle control actuator	Resistance (Ω)	
Bank Terminals			
1	1 and 2	Approx. 1 - 15 [at 25°C (77°F)]	
2	5 and 6		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

EC-446

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

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. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.

DTC Logic

INFOID:000000009361170

INFOID:000000009361169

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	E		
		A)	Electric throttle control actuator does not function properly due to the return spring malfunction.				
P1238	B8 Electric throttle control actuator (bank 2)				Throttle valve opening angle in fail-safe mode is not in specified range.		F
		C) ECM detect the throttle valve is stuck open.		Electric throttle control actuator			
		A)	Electric throttle control actuator does not function properly due to the return spring malfunction.		G		
P2119	Electric throttle control actuator (bank 1)	B)	Throttle valve opening angle in fail-safe mode is not in specified range.		Н		
		C)	ECM detect the throttle valve is stuck open.				

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

>> 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. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
- 3. Shift selector lever to P position (A/T) or Neutral position (M/T).
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and wait at least 1 second.
- 6. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
- 7. Shift selector lever to P position (A/T) or Neutral position (M/T).
- 8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 9. Check DTC.

Is DTC detected?

YES >> Go to EC-448, "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. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
- 3. Shift selector lever to P position (A/T) or Neutral position (M/T).
- 4. Start engine and let it idle for 3 seconds.
- 5. Check DTC.

Is DTC detected?

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P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> Go to <u>EC-448, "Diagnosis Procedure"</u>. NO >> INSPECTION END

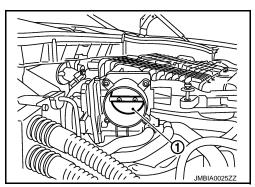
Diagnosis Procedure

 $1. {\sf check\ electric\ throttle\ control\ actuator\ visually}$

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.
- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to <u>EC-20</u>, <u>"THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"</u>.



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END

[VQ37VHR]

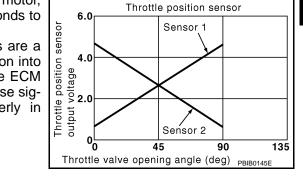
INFOID:000000009361171

P1239, 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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1239 or P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-393, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
P1239	Throttle position sensor (bank 2) circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1	 Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) 		
P2135	Throttle position sensor (bank 1) circuit range/ performance	and TP sensor 2.	 Electric throttle control actuator (TP sensor 1 and 2) 		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure k before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

Before performing the following procedure, confirm that battery voltage is more than 10 V 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?

YES >> Go to EC-449, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

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P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between electric throttle control actuator harness connector and ground.

DTC	Electr	ic throttle cont	Ground	Voltage (V)		
DIC	Bank Connector Termina		Terminal		Ground	
P1239	2	F27	1	Ground	Approx. 5	
P2135	1	F6	6	Giouna		

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK THROTTLE POSITION SENSOR 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.

DTC	Electri	c throttle cont	EC	Continuity			
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P1239	2	F27	4	F101	48	Existed	
P2135	1	F6	3	FIUI	40	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, short to ground or short to power in harness or connectors.

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

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

DTC	Electri	c throttle cont	rol actuator	EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1239	2	F27	2	F101	31	Existed
F 1239	2	Γ21	3		35	
P2135	1	F6	4		30	
P2133	I	ΓO	5		34	

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, short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-451, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-33, "Exploded View".

>> INSPECTION END 7.CHECK INTERMITTENT INCIDENT							A
	I-45, "Intermittent Incide						С
	> INSPECTION END ent Inspection					INFOID:00000000361175	С
1.CHECK		SENSOR					
 Turn ig Record Perford Turn ig Set set 	gnition switch OFF. Inect all harness connect m <u>EC-20. "THROTTLE"</u> gnition switch ON. elector lever to D (A/T) o the voltage between EC	ctors disconne VALVE CLOS r 1st (M/T) po	ED POSITION L	-		uirement".	D
	ECM						
Connector	Connector + Terminal		Cond	ition	Voltage (V)		~
Connector						(G
	30 [TP sensor 1 (bank 1)]	40		Fully released Fully depressed	More than 0.36 Less than 4.75	I	Н
F101	31 [TP sensor 1 (bank 2)]	48		Fully released Fully depressed	More than 0.36 Less than 4.75		
F101	34 [TP sensor 2 (bank 1)]	40	Accelerator pedal	Fully released Fully depressed	Less than 4.75 More than 0.36		
	35 [TP sensor 2 (bank 2)]	48		Fully released Fully depressed	Less than 4.75 More than 0.36		J
YES > NO > 2.REPLA	ection result normal? > INSPECTION END > GO TO 2. CE ELECTRIC THROT			EM 22 "Evelo	and View"		K
Replace m	nalfunctioning electric the	rottle control a	actuator. Refer to	<u>EIVI-33, "EXPIO</u>	<u>ded view"</u> .		
>	> INSPECTION END					P	M
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P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

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[VQ37VHR]

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:000000009361177

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1290	Throttle control motor relay circuit open (bank 2)	ECM detects a voltage of power source for	Harness or connectors (Throttle control motor relay circuit is	
P2100	Throttle control motor relay circuit open (bank 1)	throttle control motor is excessively low.	open) Throttle control motor relay 	
P2103	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 perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Which DTC is detected?

P1290, P2100>>GO TO 2.

P2103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1290 AND P2100

- 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 EC-452. "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

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

Is DTC detected?

- YES >> Go to EC-452, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

EC-452

INFOID:000000009361178

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

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

					-
	/IE/R		СМ	Continuity	
Connector	Terminal	Connector	Terminal	,	_
E7	70	F101	25	Existed	_
			0	nd and sho	ort to power.
	ection resu		<u>?</u>		
	> GO TO 3 > GO TO 2				
-	T MALFU				
			NG PART		
	following. connector	° F3 F1			
	connector		105		
	for open c			M and IPD	IM E/R
>	> Repair o	pen circui	t, short to	ground or :	short to power in harness or connectors.
			ROL MOT	OR RELA	Y INPUT SIGNAL CIRCUIT
					or harness connector and ECM harness connector.
. Oneor		fully betwe			
DTO	IPDN	ME/R E		СМ	
DTC	Connector	Terminal	Connector	Terminal	Continuity
P1290			F102	52	
P2100		54	F101	3	
	E7	54	F101	3	Existed
P2103			F102	52	
2. Also c	heck harn	ess for she	ort to groui	nd and sho	ort to power.
	ection resu		0		'
	> GO TO 5		_		
NO >	> GO TO 4	4.			
4.DETEC	T MALFU	NCTIONIN	NG PART		
Check the	following.				
	connector	s E3, F1			

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

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

5.CHECK FUSE

1.	Disconnect 15 A fuse (No. 51) from IPDM E/R.
-	

2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace 15A fuse.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

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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>EC-78, "System Description"</u> 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>EC-390, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 10 seconds.
- 2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Check DTC.
- Is DTC detected?
- YES >> Go to EC-454, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-48. "Circuit Inspection".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

INFOID:000000009361181

INFOID:000000009361179

INFOID:000000009361180

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch ON.

- 2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with A CONSULT.
- 3. Check each item indication under the following conditions.

Monitor item	Condition	1	Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW	MAIN SWICH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW	CANCEL SWICH	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ed ON
RESUME/ACC SW	ERATE switch	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
3E1 3W	SET/COAST SWICH	Released	OFF

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as per the following.

	ECM				
Connector	+	_	Condition	Voltage (V)	
Connector	Terminal	Terminal			
			MAIN switch: Pressed	Approx. 0	
		CANCEL switch: Pressed	Approx. 1		
M107	101 (ASCD steering switch signal)	108	SET/COAST switch: Pressed	Approx. 2	
		RESUME/ACCELERATE switch: Pressed	Approx. 3		
			All ASCD steering switches: Released	Approx. 4	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

${f 3.}$ 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.

4. Check the continuity between combination switch and ECM harness connector.

Combination switch	EC	M	Continuity
Terminal	Connector	Terminal	Continuity
16	M107	108	Existed
5. Also check ha	rness for a	short to gr	ound and s
Is the inspection re	<u>əsult norm</u>	<u>al?</u>	
YES >> GO TO			
NO >> GO TO			
4.DETECT MALF	UNCTION	JING PAR	Т

Check the following.

Combination switch (spiral cable)

Harness for open and short between ECM and combination switch

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

EC-455

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5.check ascd steering switch input signal circuit for open and short

1. Check the continuity between combination switch and ECM harness connector.

Combination switch	EC	CM	Continuity
Terminal	Connector	Terminal	Continuity
13	M107	101	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.

Combination switch (spiral cable)

· Harness for open and short between ECM and combination switch

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

7. CHECK ASCD STEERING SWITCH

Refer to EC-456, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ASCD STEERING SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect combination switch (spiral cable) harness connector.
- 3. Check resistance between combination switch harness connector terminals under the following conditions.

Combinat	ion switch	Condition	Resistance (Ω)
Connector	Terminals	Condition	
		MAIN switch: Pressed	Approx. 0
		CANCEL switch: Pressed	Approx. 250
M303	13 and 16	SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch

INFOID:000000009361182

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 those two types of input (ON/OFF signal). Refer to EC-78, "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>EC-390, "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 is turned 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.	(The stop lamp switch circuit is shorted.)Harness or connectors (The ASCD brake switch circuit is shorted.)	G
P1572	ASCD brake switch	B)	ASCD brake switch signal is not sent to ECM for extremely long time while the ve- hicle is being driven.	 Stop lamp switch ASCD brake switch Incorrect stop lamp switch installation Incorrect ASCD brake switch installation ECM 	I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine (VDC switch OFF).
- 2. Press MAIN switch and make sure that CRUISE lamp illuminates.
- 3. 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.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

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Is 1st trip DTC detected?

YES >> Go to EC-458, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. 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.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to <u>EC-458, "Diagnosis Procedure"</u>. NO >> INSPECTION END
- Diagnosis Procedure

INFOID:000000009361185

1.CHECK OVERALL FUNCTION-I

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (A/T models or M/T and synchrorev match mode) Brake pedal and clutch pedal (M/T models without synchrorev match mode)	Slightly depressed	OFF
BRARE SWI	Brake pedal (A/T models or M/T and synchrorev match mode) Brake pedal or clutch pedal (M/T models without synchrorev match mode)	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as per the following.

	ECM				
Connector	+	-	Condition		Voltage (V)
Connector	Terminal	Terminal			
M107	126 (ASCD brake switch signal)	128	Brake pedal (A/T models or M/T and synchrorev match mode) Brake pedal and clutch pedal (M/T models without synchrorev match mode)	Slightly depressed	Approx. 0
	(AGOD DIAKE SWICH SIGNAL)		Brake pedal (A/T models or M/T and synchrorev match mode) Brake pedal or clutch pedal (M/T mod- els without synchrorev match mode)	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO-1 >> A/T models or M/T and synchrorev match mode: GO TO 3.

NO-2 >> M/T models without synchrorev match mode: GO TO 8.

EC-458

< DTC/CIRCUIT DIAGNOSIS >

2. CHECK OVERALL FUNCTION-II

(I) With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	(Condition	Indication
BRAKE SW2	Brako podal	Slightly depressed	ON
BRARE SWZ	Diake pedai	Fully released	OFF

Without CONSULT

Check the voltage between ECM harness connector terminals as per the following.

		ECM					
Connector		+		-	Condition		Voltage (V)
Connector	-	Terminal	-	Terminal			
M107		122		128	Brake pedal	Slightly depressed	Battery voltage
WITO/	(Stop lan	np switch sig	inal)	120	Diake pedal	Fully released	Approx. 0
s the inspe			<u>?</u>				
	GO TO 2 GO TO 2						
		-			PLY CIRCUI	F	
			TICH POV	VER SUPI			
	nition swi		witch harr	ness conne	octor		
	nition swi		Witch nan				
. Check	the voltag	ge betwee	n ASCD b	rake switc	h harness co	nnector and grou	nd.
4000							
ASCD bra		Ground	Voltage				
Connector E109	Terminal 1	Ground	Battery volta				
s the inspe				aye			
•	GO TO		<u>r</u>				
-	GOTO						
1.DETECT	Г MALFU	NCTIONIN	NG PART				
Check the f	ollowing.						
Fuse bloc		onnector E	103				
10 A fuse Harness f		or short be	tween AS	CD brake	switch and fu	ISE	
Tiamooo	or open c			ob blaite			
>>	Repair c	pen circui	t or short t	to ground i	n harness or	connectors.	
.CHECK	ASCD BI	RAKE SW	ITCH INP	UT SIGNA	L CIRCUIT F	OR OPEN AND	SHORT
	nition swi						
2. Discon	nect ECN	1 harness					
B. Check	the contir	nuity betwe	een ASCD) brake swi	itch harness	connector and E	CM harness connector.
					-		
ASCD brak	ke switch Terminal	E	CM Terminal	Continuity	-		

E109 2 M107 126 Existed

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

Is the inspection result normal?

YES >> GO TO 7.

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< DTC/CIRCUIT DIAGNOSIS >

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NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E106, M6

• Harness for open or short between ECM and ASCD brake switch

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

7.CHECK ASCD BRAKE SWITCH

Refer to EC-462, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace ASCD brake switch.

8.CHECK ASCD BRAKE SWITCH 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 brake switch		Ground	und Condition		Voltage (V)	
Connector	Terminal	Ciouna			voltage (v)	
E109	1	Ground	Brake pedal	Slightly depressed	Approx. 0	
L103	I	Ciouna	Diake pedal	Fully released	Battery voltage	

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 9.

9.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between clutch pedal position switch harness connector and ground.

Clutch pedal p	osition switch	Ground	Voltage	
Connector Terminal		Ground	Voltage	
E108	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

• Fuse block (J/B) connector E103

• 10 A fuse (No. 3)

• Harness for open or short between clutch pedal position switch and fuse

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

11. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.

2. Check the continuity between clutch pedal position switch harness connector and ASCD brake switch harness connector.

EC-460

< DTC/CIRCUIT DIAGNOSIS >

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Connector Connector <thcon< th=""> Con Connector<</thcon<>							Δ
$ \begin{array}{ c c c c c } \hline Connector Terminal Connector Connector Connectors. Connector Connectors Connectors Connectors Connectors Connector Conne$	Clutch pedal		ASCD bra	ke switch	Continuity		A
3. Also check harness for short to ground and short to power. E3 Is the inspection result normal? C VES >> 60 T0 12. C NO >> Repair open circuit, short to ground or short to power in harness or connectors. C 12. CHECK CLUTCH PEDAL POSITION SWITCH D Is the inspection result normal? D Refer to EC-463. "Component Inspection (Clutch Pedal Position Switch)". Is the inspection result normal? D YES >> 60 T0 21. D D Is the inspection result normal? D INO >> Replace clutch pedal position switch. E E D D D 1. Turn ignition switch OFF. E D <td< td=""><td>Connector</td><td>Terminal</td><td>Connector</td><td>Terminal</td><td></td><td></td><td></td></td<>	Connector	Terminal	Connector	Terminal			
Is the inspection result normal? C YES >> GO TO 12. C NO >> Repair open circuit, short to ground or short to power in harness or connectors. D 12.CHECK CLUTCH PEDAL POSITION SWITCH D Refer to EC-463. "Component Inspection (Clutch Pedal Position Switch)". D Is the inspection result normal? F YES >> GO TO 21. D NO >> Replace clutch pedal position switch. F 13.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II F 1. Turn ignition switch OFF. F 2. Disconnect ECM harness connector. F 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G Connector Terminal Continuity Connector Terminal Continuity G Connector Terminal Continuity F List hainspection result normal? H 4. Also check harness for short to ground and short to power. Ist hainspection result normal? YES >> GO TO 14. 14 D 14.DETECT MALFUNCTIONING PART J Check the following. H • H							EC
YES >> GO TO 12. C NO >>> Repair open circuit, short to ground or short to power in harness or connectors. 12.CHECK CLUTCH PEDAL POSITION SWITCH Refer to EC-463. "Component Inspection (Clutch Pedal Position Switch)". D Is the inspection result normal? YES YES >> GO TO 21. NO >> Replace clutch pedal position switch. 13.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II F 1. Turn ignition switch OFF. F 2. Disconnect ECM harness connector. F 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G Connector Terminal Continuity <u>Connector</u> So O TO 15. NO NO >> Replair open orishort between ECM and ASCD brake switch			-	ground an	d short to p	ower.	
NO >> Repair open circuit, short to ground or short to power in harness or connectors. 12.CHECK CLUTCH PEDAL POSITION SWITCH □ Refer to EC-463. "Component Inspection (Clutch Pedal Position Switch)". □ Is the inspection result normal? F YES >> GO TO 21. F NO >> Replace clutch pedal position switch. F 13.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II F 1. Turn ignition switch OFF. F 2. Disconnect ECM harness connector. S 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G Connector Terminal Continuity E109 2 M107 128 Existed H H 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 15. NO NO >> Repair open circuit, short to ground or short to power in harness or connectors. I S.CHECK ASCD BRAKE SWITCH L Refer to EC-462, "Component Inspection (ASCD brake switch) YES >> GO TO 14. N YES >> GO TO 21. NO >> Repair open circuit,			<u>rmal?</u>				
12. CHECK CLUTCH PEDAL POSITION SWITCH □ Refer to EC-463. "Component Inspection (Clutch Pedal Position Switch)". □ Is the inspection result normal? YES >> 60 T0 21. NO >> Replace clutch pedal position switch. □ 13. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II □ 1. Turn ignition switch OFF. □ 2. Disconnect ECM harness connector. □ 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. □ 4. Also check harness for short to ground and short to power. □ Is the inspection result normal? □ YES >> GO T0 15. □ NO >> GO TO 14. □ 14.DETECT MALFUNCTIONING PART □ Veck the following. • • Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. 15.CHECK ASCD BRAKE SWITCH I NO >> Replair open circuit, short to ground or short to power in harness or connectors. 15.CHECK ASCD BRAKE SWITCH □ Refer to EC-462. "Component Inspection (ASCD Brake Switch)". □ Is the inspection result normal? M <			irouit chor	tto arous	d or obort t	n nouver in hornoon or connectors	С
Refer to EC-463. "Component Inspection (Clutch Pedal Position Switch)". D Is the inspection result normal? YES ⇒ GO TO 21. NO ⇒> Replace clutch pedal position switch. 13. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II 1. Turn ignition switch OFF. F 2. Disconnect ECM harness connector. F 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G ^{ASCD brake switch ECM Continuity Etween ASCD brake switch harness connector and ECM harness connector. G ^{ASCD brake switch normal?} F ^{It 109} 2 M107 126 Existed H ^{It 109} 1 A MOT 128 Existed ^{It 109} 2 M107 128 Existed H ^{It 109} 1 Connector Terminal Connector Terminal Context Inspection result normal? H ^{It 109} 2 NO T 14. H H ^{It 110} 1 Context Inspection result normal? J ^{It 11}}				-		b power in namess of connectors.	
Refer to EC-463. "Component Inspection (Clutch Pedal Position Switch)". E Is the inspection result normal? YES $>>$ GO TO 21. NO $>>$ Replace clutch pedal position switch. F 13. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II F Disconnect ECM harness connector. F Connect Terminal Connector Terminal Continuity F Connect Terminal Connector Terminal Continuity F Connector Terminal Connector Terminal Continuity F Connector Terminal Connector Terminal Connector F 4. Also check harness for short to ground and short to power. F Is the inspection result normal? YES $>>$ GO TO 14. 14. DETECT MALFUNCTIONING PART J Check the following. I + Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. 15. 15. CHECK ASCD BRAKE SWITCH L Refer to EC-462. "Component Inspection (ASCD Brake Switch)". M Is the inspection result normal? YES $>>$ GO TO 21. M NO $>>$ Replace ASCD brake switch. 16. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 15. Check the v	-						- D
YES ⇒ GO TO 21. NO >> Replace clutch pedal position switch. III III IIII in ginition switch OFF. F 2. Disconnect ECM harness connector. S Check the continuity between ASCD brake switch harness connector and ECM harness connector. G 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G 4. Also check harness for short to ground and short to power. Is the inspection result normal? H 4. Also check harness for short to ground and short to power. Is the inspection result normal? H 14. DETECT MALFUNCTIONING PART J J Check the following. H H • Harness for open or short between ECM and ASCD brake switch K * Bepair open circuit, short to ground or short to power in harness or connectors. I 5. CHECK ASCD BRAKE SWITCH L Refer to EC-462. "Component Inspection (ASCD Brake Switch)". K Is the inspection result normal? M YES ⇒ GO TO 21. N NO > Replace ASCD brake switch. 16. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. Stop lamp switch harness connector. O 2. Check the voltage bet				ction (Clut	<u>ch Pedal P</u>	<u>osition Switch)"</u> .	D
NO >> Replace clutch pedal position switch. Image: CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G ^{ASCD brake switch} ECM Continuity E108 2 M107 128 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? If YES >> GO TO 15. NO >> GO TO 15. NO >> GO TO 15. J J Check the following. Image: Connectors E106, M6 Image: Connectors E106, M6 Image: Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. Image: Context State Switch Image: State inspection result normal? M YES >> GO TO 21. M >> Repair open circuit, short to ground or short to power in harness or connectors. Image: Context State Switch Image: State inspection result normal? M YES >> GO TO 21. M NO >> Replace ASCD brak			<u>rmal?</u>				
13. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G ASCD brake switch ECM Connector Terminal Continuity Eros 2 M107 126 Existed 4. 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 15. NO >> GO TO 14. 14.DETECT MALFUNCTIONING PART J Check the following. - + Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. L 15. CHECK ASCD BRAKE SWITCH L Refer to EC-462. "Component Inspection (ASCD Brake Switch)". M Is the inspection result normal? M YES >> GO TO 21. M NO >> Replace ASCD brake switch. M 16. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 17. Turn ignition switch OFF. Disconnect stop lamp switch harness connecto	-		h nodal no	sition swit	ch		E
1. Turn ignition switch OFF. P 2. Disconnect ECM harness connector. F 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G ASCD brake switch ECM Continuity <u>Connector Terminal Connector Terminal Continuity</u> Existed H 4. Also check harness for short to ground and short to power. Is the inspection result normal? H YES > GO TO 15. NO >> GO TO 14. H 14.DETECT MALFUNCTIONING PART J J Check the following. J • Harness connectors E106, M6 • Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. L L Refer to EC-462. "Component Inspection (ASCD Brake Switch)". L L Is the inspection result normal? M M YES > GO TO 21. M M NO >> Replace ASCD brake switch. I M 10. Check the voltage between stop lamp switch harness connector and ground. O I 11. Turn ignition switch OFF. 2. Disconnect stop lamp switch harness connector. <td< td=""><td></td><td>•</td><td>• •</td><td></td><td></td><td></td><td></td></td<>		•	• •				
2. Disconnect ECM harness connector. 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. ASCD brake switch ECM <u>Connector</u> Terminal <u>E109</u> 2 4. Also check harness for short to ground and short to power. III Is the inspection result normal? I YES > GO TO 15. 14.DETECT MALFUNCTIONING PART J Check the following. I • Harness connectors E106, M6 I • Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. 15.CHECK ASCD BRAKE SWITCH Refer to EC-462. "Component Inspection (ASCD Brake Switch)". I Is the inspection result normal? M YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 17. Turn ignition switch OFF. 2 2. Disconnect stop lamp switch harness connector and ground. O Turn ignition switch OFF. 2 2. Disconnect stop lamp switch harness connector. 0 Stop lamp switch <td< td=""><td></td><td></td><td></td><td></td><td>SIGNAL CI</td><td>RCUIT FOR OPEN AND SHORT-II</td><td>_</td></td<>					SIGNAL CI	RCUIT FOR OPEN AND SHORT-II	_
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector. G ASCD brake switch ECM Continuity Eitige 2 M107 126 Existed H 4. Also check harness for short to ground and short to power. Is the inspection result normal? I H 14. Also check harness for short to ground and short to power. Is the inspection result normal? I YES >> GO TO 15. I I NO >> GO TO 14. I I 14.DETECT MALFUNCTIONING PART J J Check the following. I I • Harness connectors E106, M6 I I • Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. L Refer to EC-462. "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? M YES >> GO TO 21. NO >> Replace ASCD brake switch. I 10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N N 11. Turn ignition switch OFF: 2. Disconnect stop lamp switch harness connector and ground. O <td></td> <td></td> <td></td> <td>atar</td> <td></td> <td></td> <td>F</td>				atar			F
ASCD brake switch ECM Connector Terminal Terminal Connector Ter					e switch ha	mess connector and ECM harness connector.	
$\begin{array}{ c c c c c c } \hline \hline ASCD brake switch & ECM & Continuity \\ \hline \hline Connector & Terminal & Existed & A. Also check harness for short to ground and short to power. \\ \hline \hline \hline I & 126 & Existed & I \\ \hline \hline I & Also check harness for short normal? \\ \hline YES & >> GO TO 15. & NO & >> GO TO 15. & NO & >> GO TO 14. & I \\ \hline \hline \hline I & ADETECT MALFUNCTIONING PART & J \\ \hline \hline Check the following. & & & & & & & & & & & & & & & & & & &$							G
$\begin{array}{ c c c c c } \hline Connector & Terminal & Connector & Terminal & Existed & H \\ \hline \hline E109 & 2 & M107 & 126 & Existed & H \\ \hline \hline \hline E109 & 2 & M107 & 126 & Existed & H \\ \hline \hline \hline \hline \hline E109 & 2 & M107 & 126 & Existed & H \\ \hline \hline$	ASCD brake	switch	ECM				0
ETUG 2 MT0 ² 126 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? I YES >> GO TO 15. NO >> GO TO 14. 14. DETECT MALFUNCTIONING PART J Check the following. I • Harness connectors E106, M6 • • Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. L Refer to EC-462, "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? YES >> GO TO 21. M NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect stop lamp switch harness connector. 0 I Stop lamp switch Ground Voltage P Is the inspection result normal? YES >> GO TO 18. P VES >> GO TO 18. NO >> GO TO 18. P	Connector	Terminal Conn	ector Term	Cont inal	inuity		
$\begin{array}{rcl} \begin{array}{lllllllllllllllllllllllllllllllllll$	E109	2 M1	07 12	6 Exis	sted		Н
$\begin{array}{rcl} \begin{array}{lllllllllllllllllllllllllllllllllll$	4. Also che	ck harness fo	or short to c	around an	d short to p	ower.	
YES >> GO TO 15. NO >> GO TO 14. 14.DETECT MALFUNCTIONING PART J Check the following. • Harness connectors E106, M6 • Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. Image: Connector Inspection (ASCD Brake Switch) Refer to EC-462, "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. 2. 2. Disconnect stop lamp switch harness connector. 3. Check the voltage between stop lamp switch harness connector and ground. Image: Stop lamp switch Image: Stop lamp switch harness connector and ground. P Is the inspection result normal? YES >> GO TO 18. YES >> GO TO 18. NO >> GO TO 17.			-				
14.DETECT MALFUNCTIONING PART J Check the following. • Harness connectors E106, M6 • Harness connectors E106, M6 • • Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. L 15.CHECK ASCD BRAKE SWITCH L Refer to EC-462, "Component Inspection (ASCD Brake Switch)". L Is the inspection result normal? M YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. 2. 2. Disconnect stop lamp switch harness connector. 0 1. Turn ignition switch OFF. 0 2. Disconnect stop lamp switch harness connector. 0 1. Turn ignition switch OFF. 0 2. Disconnect stop lamp switch harness connector. 0 1. Turn ignition result normal? P Is the inspection result normal? P Is the inspection result normal? P YES >> GO TO 18. NO >> GO TO 17.							I
Check the following. • Harness connectors E106, M6 • Harness for open or short between ECM and ASCD brake switch K >> Repair open circuit, short to ground or short to power in harness or connectors. L 15. CHECK ASCD BRAKE SWITCH Refer to EC-462. "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? M YES >> GO TO 21. NO >> Replace ASCD brake switch. 16. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. 2. Disconnect stop lamp switch harness connector. 3. Check the voltage between stop lamp switch harness connector and ground. O Stop lamp switch Ground Voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 18. NO >> GO TO 17.	NO >> (GO TO 14.					
 Harness connectors E106, M6 Harness for open or short between ECM and ASCD brake switch >> Repair open circuit, short to ground or short to power in harness or connectors. 15.CHECK ASCD BRAKE SWITCH Refer to EC-462, "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT NI Turn ignition switch OFF. Disconnect stop lamp switch harness connector. Check the voltage between stop lamp switch harness connector and ground. O Stop lamp switch Ground Voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 18. NO >> GO TO 17. 	14.DETEC	T MALFUNC	TIONING F	PART			J
 Harness for open or short between ECM and ASCD brake switch >> Repair open circuit, short to ground or short to power in harness or connectors. 15.CHECK ASCD BRAKE SWITCH Refer to EC-462, "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N Stop lamp switch harness connector. Check the voltage between stop lamp switch harness connector and ground. O Stop lamp switch Ground Voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17. 	Check the fo	llowing.					—
>> Repair open circuit, short to ground or short to power in harness or connectors. L 15.CHECK ASCD BRAKE SWITCH Refer to EC-462, "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? M YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. 2. 2. Disconnect stop lamp switch harness connector. 0 3. Check the voltage between stop lamp switch harness connector and ground. 0 Xonnector Yottage E110 1 Is the inspection result normal? Yes YES >> GO TO 18. NO >> GO TO 17.							
15.CHECK ASCD BRAKE SWITCH L Refer to EC-462, "Component Inspection (ASCD Brake Switch)". L Is the inspection result normal? M YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. . 2. Disconnect stop lamp switch harness connector. . 3. Check the voltage between stop lamp switch harness connector and ground. O X Stop lamp switch Ground Voltage . . E110 1 Ground Voltage Is the inspection result normal? . . YES >> GO TO 18. . NO >> GO TO 17. .	 Harness to 	r open or sho	ort between	ECM and	ASCD bra	ke switch	K
15.CHECK ASCD BRAKE SWITCH Refer to EC-462, "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? M YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. N 2. Disconnect stop lamp switch harness connector. O 3. Check the voltage between stop lamp switch harness connector and ground. O Iso p lamp switch Ground Voltage E110 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17. N			ineit else a				
Refer to EC-462, "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. 2. 2. Disconnect stop lamp switch harness connector. 0 3. Check the voltage between stop lamp switch harness connector and ground. 0 Stop lamp switch Ground Voltage E110 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17. N				-	a or short t	b power in namess or connectors.	L
Is the inspection result normal? M YES >> GO TO 21. NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. 2. 2. Disconnect stop lamp switch harness connector. 0 3. Check the voltage between stop lamp switch harness connector and ground. 0 Stop lamp switch Ground Voltage E110 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17. >							_
$\begin{array}{r llllllllllllllllllllllllllllllllllll$	Refer to EC-	<u>462, "Compo</u>	nent Inspec	ction (ASC	<u>CD Brake S</u>	<u>witch)"</u> .	
NO >> Replace ASCD brake switch. 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. 2. Disconnect stop lamp switch harness connector. 3. Check the voltage between stop lamp switch harness connector and ground. O Image: Stop lamp switch in the stop lamp switch harness connector and ground. O Image: Stop lamp switch in the stop lamp switch harness connector and ground. O Image: Stop lamp switch in the stop lamp switch harness connector and ground. O Image: Stop lamp switch in the stop lamp switch harness connector and ground. O Image: Stop lamp switch in the stop lamp switch in the stop lamp switch harness connector and ground. O Image: Stop lamp switch in the stop lamp switch is the inspection result normal? P Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17.			rmal?				M
16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT N 1. Turn ignition switch OFF. 2. Disconnect stop lamp switch harness connector. 3. Check the voltage between stop lamp switch harness connector and ground. 0 Image: Stop lamp switch Ground Voltage P Image: Elito 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17.			D broko ov	itab			
1. Turn ignition switch OFF. 2. Disconnect stop lamp switch harness connector. 0 3. Check the voltage between stop lamp switch harness connector and ground. 0 Stop lamp switch Ground Voltage <u>Connector</u> Terminal Ground Voltage <u>E110</u> 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17.		•					NI
 2. Disconnect stop lamp switch harness connector. 3. Check the voltage between stop lamp switch harness connector and ground. Stop lamp switch Ground Voltage P E110 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17. O				POWER	SUPPLY C	RCUII	IN
3. Check the voltage between stop lamp switch harness connector and ground. O Stop lamp switch Ground Voltage Connector Terminal Voltage E110 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17.				n	aatar		
Stop lamp switch Ground Voltage Connector Terminal Ground Voltage E110 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17.						connector and ground.	0
Connector Terminal Ground Voltage E110 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17.							
Connector Terminal Ground Voltage E110 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17.	Stop lamp	switch					
E1101GroundBattery voltageIs the inspection result normal?YES>> GO TO 18.NO>> GO TO 17.		Gro	ound Vol	tage			Ρ
Is the inspection result normal? YES >> GO TO 18. NO >> GO TO 17.	E110	1 Gro	ound Batterv	voltage			
YES >> GO TO 18. NO >> GO TO 17.			,	- 5 -			
NO >> GO TO 17.	· · · ·						
	NO >> (

17. DETECT MALFUNCTIONING PART

< DTC/CIRCUIT DIAGNOSIS >

Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 7)
- Harness for open or short between stop lamp switch and battery

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

18. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E110	2	M107	122	Existed

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

Is the inspection result normal?

YES >> GO TO 20.

NO >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.

• Fuse block (J/B) connectors E103, M2

• Harness for open or short between ECM and stop lamp switch

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

20. CHECK STOP LAMP SWITCH

Refer to EC-463. "Component Inspection (Stop Lamp Switch)"

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace stop lamp switch.

21. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:000000009361186

1.CHECK ASCD BRAKE SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
T and Z	Diake pedai	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8. "Inspection and Adjustment".

2. Check the continuity between ASCD brake switch terminals under the following conditions.

EC-462

< DTC/CIRCUIT DIAGNOSIS >

Terminals	C	ondition	Continuity		
		Fully released	Existed		
1 and 2	Brake pedal	Slightly depressed	Not existed		_
Is the inspe	ection result	normal?			
	INSPECTI Replace A	ON END SCD brake switc	h.		
Compon	ent Inspe	ction (Clutch	Pedal Positio	on Switch)	
	•	EDAL POSITION		,	
2. Discon		pedal position sw		nnector. switch terminals under the following conditions.	
Terminals		Condition	Continuity	—	
		Fully released	Existed	—	
1 and 2	Clutch peda	Fully depressed	Not existed		
s the inspe	ection result			—	
	> INSPECTI				
	• GO TO 2.				
CHECK	CLUTCH P	EDAL POSITION	I SWITCH-II		
2. Check Terminals	the continui	ty between clutcl	n pedal position	switch terminals under the following conditions.	
		Fully released	Existed	—	
1 and 2	Clutch peda	Fully depressed	Not existed		
s the inspe	ection result	, ,		—	
	> INSPECTI				
NO >>	Replace cl	utch pedal positi	on switch.		
Compon	ent Inspe	ction (Stop La	amp Switch)	INFOID:00000000361188	
	-		• •		
I.CHECK	STOP LAM	P SWITCH-I			
	nition switch		_		
		mp switch harnes		inals under the following conditions.	
. Oneon		ty between stop			
Terminals	C	ondition	Continuity		
		Fully released	Not existed		
1 and 2	Brake pedal	Slightly depressed	Existed		
Is the inspe	ection result				
	> INSPECTI				
	• GO TO 2.				
2.снеск	STOP LAM	P SWITCH-II			
Adjust	stop Jamp s	witch installation	Defer to PD 9	Inspection and Adjustment"	

1. Adjust stop lamp switch installation. Refer to <u>BR-8, "Inspection and Adjustment"</u>.

2. Check the continuity between stop lamp switch terminals under the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

Terminals	С	Condition	Continuity
1 and 2	Brake pedal	Fully released	Not existed
i anu z	blake pedal	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1574 ASCD VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed signals via the 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 EC-78, "System Description" for ASCD functions.

DTC Logic

DTC DETECTION LOGIC NOTE:

- If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC U1XXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-368, "M/T MODELS : DTC Logic".
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-390, "DTC Logic".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-392, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1574	ASCD vehicle speed sensor	The difference between the two vehicle speed signals is out of the specified range.	 Harness or connectors (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM ECM 	-

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Start engine (VDC switch OFF). Drive the vehicle at more than 40 km/h (25 MPH). 2. **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. 3. Check DTC. Is DTC detected? YFS >> Go to EC-465, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:000000009361191 1. CHECK DTC WITH TCM Check DTC with TCM. Refer to TM-204, "Diagnosis Description".

Is the inspection result normal?

[VQ37VHR]

INFOID:000000009361189

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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.check dtc with "abs actuator and electric unit (control unit)"

Refer to <u>BRC-22, "CONSULT Function"</u>.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3. CHECK DTC WITH COMBINATION METER

Refer to MWI-34, "CONSULT Function (METER/M&A)".

>> INSPECTION END

P1606 VVEL CONTROL MODULE

Description

The VVEL control module consists of a microcomputer and connectors for signal input and output and for power supply. The VVEL control module controls VVEL system.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1606	VVEL control module	 VVEL control module calculation function is malfunctioning. VVEL EEP-ROM system is malfunc- tioning. 	VVEL control module	G
DTC CON	FIRMATION PROCEDURE			-

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previou	usly conducted, always perform the following procedure
before conducting the next test.	

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 1 second. 2. Check DTC. Is DTC detected? >> Go to EC-467, "Diagnosis Procedure". YES >> INSPECTION END NO **Diagnosis** Procedure INFOID:000000009361194 1.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. Perform DTC Confirmation Procedure. 3. See EC-467, "DTC Logic". Is the DTC P1606 displayed again? YES >> GO TO 2.
- NO >> INSPECTION END

2.REPLACE VVEL CONTROL MODULE

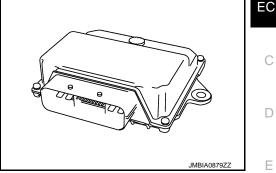
1. Replace VVEL control module.

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P1606 VVEL CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

2. Go to <u>EC-18</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> INSPECTION END

P1607 VVEL CONTROL MODULE

Description

The VVEL control module consists of a microcomputer and connectors for signal input and output and for power supply. The VVEL control module controls VVEL system.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1607	VVEL control module circuit	• The internal circuit of the VVEL con- trol module is malfunctioning.	VVEL control module
DTC CONF	FIRMATION PROCEDURE		
1.PRECON	DITIONING		
before cond 1. Turn igr 2. Turn igr 3. Turn igr TESTING C	ucting the next test. nition switch OFF and wait at nition switch ON. nition switch OFF and wait at ONDITION:	least 10 seconds.	
Before perf	orming the following proce	dure, confirm that battery voltag	e is more than 10 V at idle.
>>	GO TO 2.		
^	RM DTC CONFIRMATION PR	OCEDURE	
1. Start en 2. Check I	gine and let it idle for at least DTC.	1 second.	
Is DTC dete	cted?		
	Go to <u>EC-469, "Diagnosis Pr</u> INSPECTION END	ocedure".	
	s Procedure		INFOID:00000009361197
	M DTC CONFIRMATION PR	OCEDURE	
	nition switch ON.		
2. Erase D	DTC.	_	
	DTC Confirmation Procedure	е.	
	P1607 displayed again?		
YES >>	GO TO 2.		
~	INSPECTION END		
∠.REPLAC	E VVEL CONTROL MODULE	Ξ	

1. Replace VVEL control module.

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P1607 VVEL CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

2. Go to EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> INSPECTION END

P1608 VVEL SENSOR POWER SUPPLY

DTC Logic

INFOID:000000009361198

[VQ37VHR]

DTC DETECTION LOGIC EC DTC No. Trouble diagnosis name DTC detecting condition Possible cause · Harness or connectors VVEL control module detects a voltage (VVEL control shaft position sensor P1608 VVEL sensor power supply circuit of power source for sensor is excessively power supply circuit is open or shorted.) low or high. VVEL control shaft position sensor D VVEL control module DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING Е If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test. F 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. **TESTING CONDITION:** Before performing the following procedure, confirm that battery voltage is more than 10 V at idle. >> GO TO 2. Н 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON and wait at least 1 second. Check DTC. Is DTC detected? YES >> Go to EC-471, "Diagnosis Procedure". NO >> INSPECTION END **Diagnosis** Procedure INFOID:000000009361199 Κ 1. CHECK GROUND CONNECTION Turn ignition switch OFF. 1. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection". 2. L Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. Μ 2.CHECK VVEL CONTROL SHAFT POSITION SENSOR POWER SUPPLY CIRCUIT Disconnect VVEL control shaft position sensor harness connector. 1. Ν Turn ignition switch ON. 2. Check the voltage between VVEL control shaft position sensor harness connector and ground. 3.

VVEL	control shaft positior	Ground	Voltage (V)	
Bank	Connector	Terminal	Giodila	voltage (v)
1	F46	3		
I	F40	6	Ground	Approx. 5
2	F47	3		Αρριολ. 5
2	Г4/	6	1	

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3. Ρ

P1608 VVEL SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

3.CHECK VVEL CONTROL SHAFT POSITION SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect VVEL control module harness connector.
- 3. Check the continuity between VVEL control shaft position sensor harness connector and VVEL control module harness connector.

VVEL co	VVEL control shaft position sensor			VVEL control module		
Bank	Connector	Terminal	Connector	Terminal	Continuity	
1	F46	3		9		
I	F40	140	6	E15	22	Existed
2	E 47	3	E15	7	EXISIEU	
2	F47 6		20			

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F1, E3
- Harness for open or short between VVEL control shaft position sensor and VVEL control module

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace.

6.REPLACE VVEL CONTROL MODULE

- 1. Replace VVEL control module.
- Go to <u>EC-18</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace.

8.REPLACE VVEL ACTUATOR SUB ASSEMBLY

Replace VVEL actuator sub assembly. Refer to EM-90, "Exploded View".

>> 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 being driven.

DTC Logic

INFOID:000000009361201

DTC DETECTION LOGIC

DTC No. Tro	ouble diagnosis nar	ne D	TC detecting condition	Possible cause
P1805 Bra	rake switch		h signal is not sent to ECM for ex- ime while the vehicle is being driv-	 Harness or connectors (Stop lamp switch circuit is open or short- ed.) Stop lamp switch
DTC CONFIR	RMATION PRO	CEDURE		
1.PERFORM	DTC CONFIRM	IATION PROC	EDURE	
 Fully depression Erase the Check 1st 	trip DTC.	edal for at leas	t 5 seconds.	
	<u>; detected?</u> o to <u>EC-473, "Di</u> ISPECTION ENI		dure".	
Diagnosis F	Procedure			INFOID:00000009361202
	OP LAMP SWIT	CH CIRCUIT		
	on switch OFF. stop lamp wher	n depressing a	nd releasing the brake pedal	
Brake peo	dal	Stop lamp	-	
Fully release	ised No	ot illuminated	-	
Slightly depre	ressed	Illuminated	_	
YES >> G(NO >> G(on result normal O TO 4. O TO 2. OP LAMP SWIT	_		
1. Disconnec	ct stop lamp swit	ch harness co		ground.
Stop lamp sw	witch	Voltogo		
Connector Te	Ground	Voltage		
E110	1 Ground	Battery voltage		
Is the inspection	on result normal	; ;		
Is the inspection YES >> G0		; ;		
Is the inspection YES >> GC NO >> GC	on result normal O TO 4.	?		

• Fuse block (J/B) connector E103

• 10 A fuse (No. 7)

INFOID:000000009361200

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P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

· Harness for open or short between stop lamp switch and battery

>> Repair open circuit, 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 stop lamp switch harness connector.

2. Disconnect ECM harness connector.

3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lam	p switch	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E110	2	M107	122	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.

• Fuse block (J/B) connector E103, M2

• Harness for open or short between ECM and stop lamp switch

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

6.CHECK STOP LAMP SWITCH

Refer to EC-474, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace stop lamp switch.

I.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

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	С	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
1 and 2	Diake pedai	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 BR-8, "Inspection and Adjustment".

2. Check the continuity between stop lamp switch terminals under the following conditions.

INFOID:000000009361203

EC-474

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Terminals Condition Continuity 1 and 2 Brake pedal Fully released Not existed Sightly depressed Existed Existed Existed	· · ·			0
1 and 2 Brake pedal Slightly depressed Existed Is the inspection result normal? YES >> INSPECTION END	Ierminals	C		
Is the inspection result normal? YES >> INSPECTION END	1 and 2	Brake pedal		
YES >> INSPECTION END	la tha incr	ontion manuf		EXISTED
NO >> Replace stop lamp switch.				
	NO >	> INSPECT > Replace s	top lamp switch.	

< DTC/CIRCUIT DIAGNOSIS >

P2096, P2097, P2098, P2099 A/F SENSOR 1

Description

bon density in rich.

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the

Ine sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocar-

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about $800^{\circ}C$ (1,472°F).

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2096	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too lean bank 1)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.	 A/F sensor 1 (bank 1) A/F sensor 1 heater Heated oxygen sensor 2 (bank 1)
P2097	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too rich bank 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period.	 Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks
P2098	POST CAT FUEL TRIM SYS B2 (Post catalyst fuel trim system too lean bank 2)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.	 A/F sensor 1 (bank 2) A/F sensor 1 heater Heated oxygen sensor 2 (bank 2)
P2099	POST CAT FUEL TRIM SYS B2 (Post catalyst fuel trim system too rich bank 2)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period.	 Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

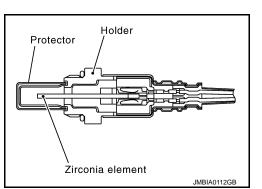
2. Turn ignition switch ON.

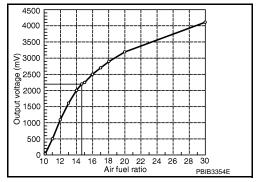
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

EC-476





INFOID:000000009361205

INFOID:000000009361204

F2090, F2097, F2090, F2099 A/F JENJOK I	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
>> GO TO 2.	А
2.PERFORM DTC CONFIRMATION PROCEDURE	
 Clear the mixture ratio self-learning value. Refer to <u>EC-24, "MIXTURE RATIO SELF-LE.</u> <u>CLEAR : Special Repair Requirement"</u>. 	
2. Turn ignition switch OFF and wait at least 10 seconds.	EC
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	
 Turn ignition switch OFF and wait at least 10 seconds. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under 	er no load.
6. Let engine idle for 1 minute.	
 Keep engine speed between 2,500 and 3,000 rpm for 20 minutes. Check 1st trip DTC. 	-
Is 1st trip DTC detected?	D
YES >> Go to EC-477, "Diagnosis Procedure".	
NO >> INSPECTION END	E
Diagnosis Procedure	INFOID:000000009361206
1. CHECK GROUND CONNECTION	F
1. Turn ignition switch OFF.	'
 Check ground connection M95. Refer to Ground Inspection in <u>GI-48. "Circuit Inspection"</u>. 	
Is the inspection result normal?	G
YES >> GO TO 2. NO >> Repair or replace ground connection.	
NO >> Repair or replace ground connection. 2.RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2	F
Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to EM-38, "Remotion".	<u>ovai and Instalia-</u>
	1
>> GO TO 3.	
3. CHECK FOR EXHAUST GAS LEAK	J
1. Start engine and run it at idle.	
 Listen for an exhaust gas leak before the three way catalyst 2. Is exhaust gas detected? 	K
<u>Is exhaust gas detected?</u> YES >> Repair or replace.	
NO $>>$ GO TO 4.	1
4.CHECK FOR INTAKE AIR LEAK	L
1. Start engine and run it at idle.	
2. Listen for an intake air leak after the mass air flow sensor.	N
Is intake air leak detected?	
YES >> Repair or replace. NO >> GO TO 5.	Ν
5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	
1. Clear the mixture ratio self-learning value. Refer to EC-24, "MIXTURE RATIO SELF-LE	
CLEAR : Special Repair Requirement"	C
2. Run engine for at least 10 minutes at idle speed.	
<u>Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?</u> YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC</u>	-273 "Diagnosis
Procedure" or <u>EC-277, "Diagnosis Procedure"</u> . NO >> GO TO 6.	<u>בוס, טומעווטטט</u>
6. CHECK HARNESS CONNECTOR	
 Turn ignition switch OFF. Disconnect A/F sensor 1 harness connector. 	
3 Check barness connector for water	

Check harness connector for water.

3.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Water should not exit.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace harness connector.

7. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

2. Check the voltage between A/F sensor 1 harness connector and ground.

DTC 	Bank	Connector	Terminal	Ground	Voltage
	1	504			
F2097	I	F61	4	Ground	Battery voltage
P2098 P2099	2	F62	4	Ground	Dattery Voltage

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- IPDM E/R harness connector E7
- 15 A fuse (No. 46)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

$9. {\sf CHECK} \ {\sf A/F} \ {\sf SENSOR} \ 1 \ {\sf INPUT} \ {\sf SIGNAL} \ {\sf CIRCUIT} \ {\sf FOR} \ {\sf OPEN} \ {\sf AND} \ {\sf SHORT}$

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC		A/F sensor	[.] 1	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P2096	1	F61	1		57	
P2097	1	101	2 F102	61	Existed	
P2098	2	F62	1	FIUZ	65	Existed
P2099	2	F02	2		66	

 Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P2096	1	F61	1		
P2097	1	FUI	2	Ground	Not existed
P2098	2	F62	1	Giouna	NUL EXISTED
P2099	2	F02	2		

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

		ECM				-											ŀ
DTC	Bank	Connector	Terminal	Ground	Continuity												
P2096			57			-											
P2097	1		61														E
P2098		F102	65	Ground	Not existed												
P2099	2		66														(
5. Also c	heck h	arness for	short to po	ower.	<u> </u>	-											
Is the insp	ection	result norm	nal?														Γ
	> GO 1		ouit chort	to around	or obort to r				. h.c				o oto				L
	-	SENSOR		-	or short to p	pow	ver	I III	па	ame	55 01	CONIN	lecto	5.			
																	E
		<u>"Compone</u> result norm		<u>lion"</u> .													
	> GO 1		<u>iai :</u>														F
-	> GO T	-															
11.снес		ATED OXY	GEN SEN	ISOR 2													
Refer to <u>E</u>	C-249,	"Compone	ent Inspect	tion".													(
ls the insp	ection	result norm	nal?														
	> GO T		otioning h	acted aver	non oonoor (. ე											ŀ
	•	ERMITTE	•		gen sensor 2	Ζ.											
																	<u> </u>
		<u>ntermittent</u> result norm															
	> GO 1																
-		air or replac	ce.														
13.repi		AIR FUEL F	RATIO (A/I	F) SENSO	R 1												
Replace a	ir fuel r	atio (A/F) s	sensor 1.														ŀ
	-	/E concor	which ha	e boon di	ropped fror		a h	hoi	iahi	t of	mor	a tha	n 0 6	. m (107;	in) ont	0.0
					a new one.		11	iei	gni		mor	e ina	n 0.5	, (19.7 1	n) onu	Ua
Before	installi	ng new A	A/F senso	or, clean	exhaust sy	syste											
		nercial se ervice too		01 (J-4389	7-18 or J-4	438	97.	′=1∡	∠)]	and	a ap	prove	ea A	nti-se	e i	LUDIIC	ant
<u>Do you ha</u>																	Ν
	> GO 1																
	> GO 1																Ν
14.CON	FIRM A	VF ADJUS	STMENT D	ATA													
		switch ON \DJ-B1" an		J-B2" in "E		ITOF	R"	' me	iode	e wit	th CO	ONSU	LT.				C
3. Make	sure th	at "0.000"			ISULT scree												
<u>s "0.000"</u>																	F
	> INSP > GO 1	ECTION E	:ND														
·			E RATIO S	ELF-LEA	RNING VAL	LUE	:										
					fer to EC-2				XTI	JRE	RA			LEAF		G VAL	UE
<u>CLEAR : S</u>	<u>pecial</u>	<u>Repair Re</u>															
<u>Do you ha</u>	ve COl	NSULT?															

YES \Rightarrow GO TO 16. NO \Rightarrow INSPECTION END 16.CONFIRM A/F ADJUSTMENT DATA

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

>> INSPECTION END

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 potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal 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 engine operations such as fuel cut.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-393, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	ŀ
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) 	I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Κ If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- Check DTC. 2.

Is DTC detected?

YES >> Go to EC-481, "Diagnosis Procedure". >> INSPECTION END NO

Diagnosis Procedure

1.CHECK GROUND CONNECTION

Turn ignition switch OFF. 1.

Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection". 2.

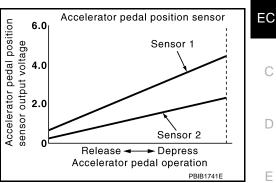
Is the inspection result normal?

EC-481

INFOID:000000009361209



INFOID:000000009361208



L

M

Ν

А

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- 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 (V)	
Connector	Terminal	Ciouna	Venage (V)	
E112	5	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

Harness for open or short between ECM and accelerator pedal position sensor

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

4.CHECK APP SENSOR 1 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.

APP s	ensor	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E112	4	M107	100	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 M6, E106

• Harness for open or short between ECM and accelerator pedal position sensor

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

${f 6}.$ CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

APP s	ensor	EC	Continuity	
Connector	Terminal	Connector Termina		Continuity
E112	3	M107	97	Existed

2. 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** DEFECT MALEUNCT

I.DETECT MALFUNCTIONING PART

P2122, P2123 APP SENSOR

DTO/OU			22, P2123 A	PP SENSOR	K	[VQ37VHR]	
		515 >					
Check theHarness	connectors M6, E	106					А
	for open or short		M and accelerat	or pedal position	n sensor		
•		cuit, short to	ground or short	to power in harn	ess or connectors.		EC
	K APP SENSOR						
	C-483, "Compone	-	<u>n"</u> .				С
•	ection result norm -> GO TO 10.						
	> GO TO 9.						D
9.REPLA	CE ACCELERAT	OR PEDAL	ASSEMBLY				D
Replace a	ccelerator pedal a	ssembly. Re	efer to <u>ACC-4, "E</u>	xploded View".			
							E
	> INSPECTION E						
1 0. CHE	CK INTERMITTEI	NT INCIDEN	T				F
Refer to G	I-45, "Intermittent	Incident".					
							G
_	> INSPECTION E						0
Compor	nent Inspection	ר				INFOID:000000009361210	
1.CHECH	KACCELERATOR	PEDAL PC	SITION SENSO	R			Η
1. Turn i	gnition switch OFI						
	nnect all harness of gnition switch ON		lisconnected.				I
	k the voltage ECM		nnector terminals	s as per the follo	wing.		
				-			J
	ECM		_				
Connector	+	-	Con	dition	Voltage (V)		
	Terminal	Terminal		– – – –	0.45 4.0		K
	97 (APP sensor 1)	100		Fully released Fully depressed	0.45 - 1.0		
M107			Accelerator pedal	Fully released	0.22 - 0.50		L
	98 (APP sensor 2)	104		Fully depressed	2.1 - 2.5		
Is the insp	ection result norm	al?	1	, , , , , , , , , , , , , , , , , , ,			M
YES >	> INSPECTION E						
•	> GO TO 2.						
Z.REPLA	CE ACCELERAT	OR PEDAL	ASSEMBLY				Ν
Replace a	ccelerator pedal a	ssembly. Re	efer to <u>ACC-4, "E</u>	xploded View".			
							0
>	> INSPECTION E	ND					
							Р
							P

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 potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal 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 engine operations such as fuel cut.

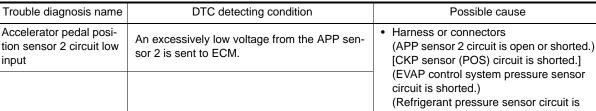
DTC Logic

DTC No.

P2127

DTC DETECTION LOGIC

input



P2128Accelerator pedal position sensor 2 circuit high inputAn excessively high voltage from the APP sensor 2 is sent to ECM.Circuit is shorted.) (Refrigerant pressure sensor sensor 2) (Brake booster pressure sensor shorted)P2128An excessively high voltage from the APP sensor 2 is sent to ECM.An excessively high voltage from the APP sensor 2 is sent to ECM.Accelerator pedal position sensor 2) (Brake booster pressure sensor) Brake booster pressure sensor Brake booster pressure sensor Brake booster pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Turn ignition switch OFF and wait at least 10 seconds. 1.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

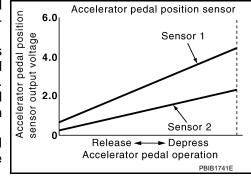
>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 1 second. 1.
- Check DTC. 2

Is DTC detected?

- YES >> Go to EC-485, "Diagnosis Procedure".
- NO >> INSPECTION END



INFOID:000000009361212

INFOID:000000009361211

			P21	27, P2128		NSOR		
< DTC/CIF	RCUIT DI	AGNOSIS	>				[VQ37VHR]	
Diagnos	is Proce	dure					INFOID:00000009361213	Δ
1.снеск			CTION					A
	-	onnection		er to Ground In	spection in	<u>GI-48, "Circuit Ir</u>	nspection".	EC
NO >	> GO TO 2 > Repair o	r replace g						С
				JPPLY CIRCU				
2. Turn iç	gnition swi	tch ON.		n (APP) senso nsor harness c				D
								Ε
	sensor	Ground	Voltage	(V)				
Connector E112	Terminal 6	Ground	Approx	5				F
Is the insp								
YES > NO >	> GO TO 7 > GO TO 3	7. 3.	_		. 			G
	gnition swi		JWER SU	JPPLY CIRCU	-			Н
2. Discor	nnect ECN	I harness of			s connector	and ECM harnes	ss connector.	
APP s	sensor	EC	CM	Orationity				1
Connector	Terminal	Connector	Terminal	Continuity				
E112	6	M107	103	Existed				J
	<u>ection rest</u> > GO TO १ > GO TO 4	5.	2					K
4.DETEC	T MALFU	NCTIONIN	IG PART					
Check the • Harness • Harness	connector			M and acceler	ator pedal p	osition sensor		L
>	> Repair o	pen circuit	t.					Μ
5. CHECK	K SENSOR	POWER	SUPPLY	CIRCUIT-III				p. 7
Check har	ness for sł	nort to pow	ver and sh	ort to ground,	between the	e following termi	nals.	Ν
EC	СМ			Sensor				0
Connector	Terminal		Name	!	Connector	Terminal		0
F101	45	Brake boos	ster pressure	esensor	E48	1		~
	46	CKP sense	or (POS)		F2	1		Ρ

74

103

107

Gear lever position sensor

Refrigerant pressure sensor

EVAP control system pressure sensor

APP sensor

F102

M107

Revision: 2013 May

F57

E112

B30

E172

3

6

3

3

- YES >> GO TO 6.
- NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-309, "Component Inspection".)
- Gear lever position sensor (Refer to EC-399, "Component Inspection".)
- Brake booster pressure sensor (Refer to <u>EC-386, "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to EC-343. "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-527, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning component.

I.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.

APP s	ensor	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E112	2	M107	104	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 M6, E106

Harness for open or short between ECM and accelerator pedal position sensor

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

9.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 s	ensor	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E112	1	M107	98	Existed

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

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M6, E106

• Harness for open or short between ECM and accelerator pedal position sensor

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

11.CHECK APP SENSOR

Refer to <u>EC-487</u>, "Component Inspection". Is the inspection result normal?

P2127, P2128 APP SENSOR

< DTC/CI	RCUIT DIAGNOS		I27, P2128 A	PP SENSO	R	[VQ37VHR]	
	>> GO TO 13. >> GO TO 12.						٨
	LACE ACCELERA	TOR PEDA	L ASSEMBLY				A
-	accelerator pedal a			xploded View".			
	·	,					EC
	> INSPECTION E						
			IT				С
Refer to C	GI-45, "Intermittent	Incident".					
>	> INSPECTION E	ND					D
	nent Inspectior					INFOID:000000009361214	
	•					## 0.2.0000000000.2.1	Ε
	K ACCELERATOR		SITION SENSO	R			
	gnition switch OFF		lisconnected.				F
3. Turn i	gnition switch ON.						
4. Checl	k the voltage ECM	harness co	nnector terminals	s as per the follo	wing.		
	ECM						G
	+	_	Con	dition	Voltage (V)		
Connector	Terminal	Terminal					Н
	97 (APP sensor 1)	100		Fully released	0.45 - 1.0		
M107			Accelerator pedal	Fully depressed	4.2 - 4.8		
	98 (APP sensor 2)	104		Fully released	0.22 - 0.50		
le the iner	pection result norm	2012		Fully depressed	2.1 - 2.5		J
	> INSPECTION E						
	>> GO TO 2.						V
	ACE ACCELERAT						K
Replace a	accelerator pedal a	issembly. Re	efer to <u>ACC-4, "E</u>	<u>xploded View"</u> .			
	> INSPECTION E						L
		IND					
							M
							Ν
							0
							0
							Ρ

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 potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal 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 engine operations such as fuel cut.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-393, "DTC Logic"</u>.

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 connectors (APP sensor 2 circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 2) (Brake booster pressure sensor circuit is shorted) Crankshaft position sensor (POS) EVAP control system pressure sensor Brake booster pressure sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

EC-488

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

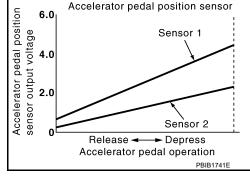
2. Check DTC.

Is DTC detected?

Revision: 2013 May

YES >> Go to EC-489, "Diagnosis Procedure".

NO >> INSPECTION END



INFOID:000000009361216

INFOID:000000009361215

< DTC/CIRCUIT DIA	GNOSIS >	>		[[VQ37VHR]
Diagnosis Proced	Jure			IN	VFOID:000000009361217
1.CHECK GROUND	CONNEC	TION			
I. Turn ignition switc Check ground cor		95. Refe	to Ground Inspect	ion in <u>GI-48, "Circuit Inspection"</u> .	
s the inspection result			-		
YES >> GO TO 2. NO >> Repair or			aatian		
NO >> Repair or 2.CHECK APP SENS					
			(APP) sensor harr	and a second sec	
2. Turn ignition switc		ai positioi	(AFF) Selisor hall		
 Check the voltage 	between A	APP sens	or harness connec	tor and ground.	
APP sensor					
Connector Terminal	Ground	Voltage (V)		
E112 5	Ground	Approx.	5		
s the inspection result	t normal?				
YES >> GO TO 4.					
NO >> GO TO 3.					
DETECT MALFUN	CTIONING	3 PART			
heck the following.					
Harness for open or	short betw	veen ECN			
Harness for open or >> Repair op CHECK APP SENS	short betw pen circuit, SOR 2 PO	veen ECN short to g	round or short to p	edal position sensor ower in harness or connectors.	
Harness for open or >> Repair op CHECK APP SENS . Turn ignition switc	short betw pen circuit, SOR 2 POV	veen ECN short to g WER SU	round or short to p PPLY CIRCUIT-I	ower in harness or connectors.	
Harness for open or >> Repair op CHECK APP SENS . Turn ignition switc	short betw pen circuit, SOR 2 POV	veen ECN short to g WER SU	round or short to p	ower in harness or connectors.	
Harness for open or >> Repair op CHECK APP SENS . Turn ignition switc	short betw ben circuit, s SOR 2 PO ch ON. between /	veen ECN short to g WER SU APP sens	round or short to p PPLY CIRCUIT-I or harness connec	ower in harness or connectors.	
Harness for open or >> Repair op CHECK APP SENS . Turn ignition switc . Check the voltage	short betw pen circuit, SOR 2 POV	veen ECN short to g WER SU	round or short to p PPLY CIRCUIT-I or harness connec	ower in harness or connectors.	
Harness for open or >> Repair op .CHECK APP SENS . Turn ignition switc . Check the voltage APP sensor	short betw ben circuit, s SOR 2 PO ch ON. between /	veen ECN short to g WER SU APP sens	round or short to p PPLY CIRCUIT-I sor harness connec	ower in harness or connectors.	
Harness for open or >> Repair op CHECK APP SENS . Turn ignition switc . Check the voltage APP sensor Connector Terminal E112 6 s the inspection result	short betw ben circuit, s SOR 2 PO ch ON. between / Ground Ground t normal?	veen ECN short to g WER SU APP sens Voltage (round or short to p PPLY CIRCUIT-I sor harness connec	ower in harness or connectors.	
Harness for open or >> Repair op CHECK APP SENS Turn ignition switc Check the voltage APP sensor Connector Terminal E112 6 S the inspection result YES >> GO TO 9.	short betw en circuit, s SOR 2 PO ch ON. between / Ground t normal?	veen ECN short to g WER SU APP sens Voltage (round or short to p PPLY CIRCUIT-I sor harness connec	ower in harness or connectors.	
Harness for open or >> Repair op ACHECK APP SENS . Turn ignition switc . Check the voltage APP sensor Connector Terminal E112 6 s the inspection result YES >> GO TO 9. NO >> GO TO 5.	short betw ben circuit, s SOR 2 POV ch ON. between <i>i</i> Ground Ground	veen ECN short to g WER SU APP sens Voltage (Approx.	round or short to p PPLY CIRCUIT-I sor harness connect	ower in harness or connectors.	
Harness for open or >> Repair op .CHECK APP SENS . Turn ignition switc . Check the voltage APP sensor Connector Terminal E112 6 s the inspection result YES >> GO TO 9. NO >> GO TO 5. .CHECK APP SENS	short betw ben circuit, s SOR 2 PON ch ON. between <i>i</i> Ground Ground t normal?	veen ECN short to g WER SU APP sens Voltage (Approx.	round or short to p PPLY CIRCUIT-I sor harness connect	ower in harness or connectors.	
Harness for open or >> Repair op .CHECK APP SENS . Turn ignition switc . Check the voltage APP sensor Connector Terminal E112 6 s the inspection result YES >> GO TO 9. NO >> GO TO 5. .CHECK APP SENS . Turn ignition switc . Disconnect ECM H	short betw ben circuit, s SOR 2 POV ch ON. between a Ground Ground t normal? SOR 2 POV ch OFF. harness co	veen ECN short to g WER SU APP sens Voltage (Approx.	round or short to p PPLY CIRCUIT-I or harness connector v) 5 5 PPLY CIRCUIT-II	ower in harness or connectors.	
Harness for open or >> Repair op .CHECK APP SENS . Turn ignition switc . Check the voltage APP sensor Connector Terminal E112 6 s the inspection result YES >> GO TO 9. NO >> GO TO 5. .CHECK APP SENS . Turn ignition switc . Disconnect ECM H	short betw ben circuit, s SOR 2 POV ch ON. between a Ground Ground t normal? SOR 2 POV ch OFF. harness co	veen ECN short to g WER SU APP sens Voltage (Approx.	round or short to p PPLY CIRCUIT-I or harness connector v) 5 5 PPLY CIRCUIT-II	ower in harness or connectors.	
Harness for open or >> Repair op CHECK APP SENS Turn ignition switc Check the voltage APP sensor Connector Terminal E112 6 S the inspection result YES >> GO TO 9. NO >> GO TO 9. NO >> GO TO 5. CHECK APP SENS Turn ignition switc Disconnect ECM H Check the continu	short betw een circuit, s SOR 2 PON ch ON. between a between a Ground Ground t normal? SOR 2 PON ch OFF. harness couity betwee	veen ECN short to g WER SU APP sens Voltage (Approx. WER SU onnector. en APP se	round or short to p PPLY CIRCUIT-I or harness connector v) 5 5 PPLY CIRCUIT-II	ower in harness or connectors.	
Harness for open or >> Repair op .CHECK APP SENS . Turn ignition switc . Check the voltage APP sensor Connector Terminal E112 6 s the inspection result YES >> GO TO 9. NO >> GO TO 5. .CHECK APP SENS . Turn ignition switc . Disconnect ECM H . Check the continu	short betw ben circuit, s SOR 2 POV ch ON. between / between / Ground Ground t normal? SOR 2 POV ch OFF. harness co uity betwee ECM	veen ECN short to g WER SU APP sens Voltage (Approx. WER SU onnector. en APP se	round or short to p PPLY CIRCUIT-I or harness connector v) 5 5 PPLY CIRCUIT-II	ower in harness or connectors.	
Harness for open or >> Repair op ACHECK APP SENS Turn ignition switc Check the voltage APP sensor Connector Terminal E112 6 S the inspection result YES >> GO TO 9. NO >> GO TO 9. NO >> GO TO 5. CHECK APP SENS Turn ignition switc Connect ECM H Check the continue APP sensor Connector Terminal C	short betw ben circuit, s SOR 2 POV ch ON. between a Ground Ground Ground t normal? SOR 2 POV ch OFF. harness couity betwee ECW Connector	veen ECN short to g WER SU APP sens Voltage (Approx. WER SU onnector. en APP se	round or short to p PPLY CIRCUIT-I for harness connect v) 5 PPLY CIRCUIT-II ensor harness conn Continuity	ower in harness or connectors.	
4.CHECK APP SENS 1. Turn ignition switc 2. Check the voltage APP sensor Connector Terminal E112 6 s the inspection result YES > GO TO 9. NO D.CHECK APP SENS 1. Turn ignition switc 2. Disconnect ECM H 3. Check the continu APP sensor Connector Terminal APP sensor Connector Terminal APP sensor Connector Terminal APP sensor Connector Terminal G E112 6	short betw ben circuit, s SOR 2 POV ch ON. between / between / Ground Ground t normal? SOR 2 POV ch OFF. harness couity betwee ECW Connector M107	veen ECN short to g WER SU APP sens Voltage (Approx. WER SU onnector. en APP se	PPLY CIRCUIT-I	ower in harness or connectors.	
APP sensor ACHECK APP SENS Connector Terminal E112 6 S the inspection result YES >> GO TO 9. NO >> GO TO 9. NO >> GO TO 5. CHECK APP SENS CHECK APP SENS CHECK APP SENS CHECK APP SENS CHECK the continue APP sensor Connector Terminal C E112 6 S the inspection result	short betw ben circuit, s SOR 2 POV ch ON. between a between a Ground Ground Ground t normal? SOR 2 POV ch OFF. harness co uity betwee ECW Connector M107	veen ECN short to g WER SU APP sens Voltage (Approx. WER SU onnector. en APP se	round or short to p PPLY CIRCUIT-I for harness connect v) 5 PPLY CIRCUIT-II ensor harness conn Continuity	ower in harness or connectors.	
APP sensor ACHECK APP SENS APP sensor Connector Terminal E112 6 S the inspection result YES >> GO TO 9. NO >> GO TO 5. D.CHECK APP SENS APP sensor Connect ECM 1 Connect Terminal C APP sensor Connect Terminal C APP sensor Connect Terminal C APP sensor Connect Terminal C Connect C	short betw ben circuit, s SOR 2 POV ch ON. between a Ground Ground Ground t normal? SOR 2 POV ch OFF. harness couity betwee ECW Connector M107 t normal?	veen ECN short to g WER SU APP sens Voltage (Approx. WER SU onnector. en APP se	round or short to p PPLY CIRCUIT-I for harness connect v) 5 PPLY CIRCUIT-II ensor harness conn Continuity	ower in harness or connectors.	

Check the following. • Harness connectors M6, E106

< DTC/CIRCUIT DIAGNOSIS >

· Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit.

7. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
F101	45	Brake booster pressure sensor	E48	1	
FIUI	46	CKP sensor (POS)	F2	1	
F102	74	Gear lever position sensor	F57	3	
	103	APP sensor	E112	6	
M107	107	EVAP control system pressure sensor	B30	3	
	107	Refrigerant pressure sensor	E172	3	

Is the inspection result normal?

>> GO TO 8. YES

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

8. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-309, "Component Inspection"</u>.)
 Gear lever position sensor (Refer to <u>EC-399, "Component Inspection"</u>.)
- Brake booster pressure sensor (Refer to EC-386, "Component Inspection".)
- EVAP control system pressure sensor (Refer to <u>EC-343, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-527, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace malfunctioning component.

${f 9.}$ CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- Disconnect ECM harness connector. 2.
- Check the continuity between APP sensor harness connector and ECM harness connector. 3.

APP sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F112	4	M107	100	Existed
LIIZ	2	WITO7	104	LAISIEU

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

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

· Harness for open or short between ECM and accelerator pedal position sensor

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

11. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between APP sensor harness connector and ECM harness connector.

EC-490

< DTC/CIRCUIT DIAGNOSIS >

APP s	ensor	E	СМ				
Connector	Terminal	Connector	Terminal	Continuity			_
E112	3	M107	97	Existed			
2112	1		98	Existed			
			-	nd and short to	power.		
		<u>ult normal</u>	<u>?</u>				
	> GO TO > GO TO						
_				т			
	following.		_				
Harness	connecto	rs M6, E1	06				
Harness	for open of	or short be	etween EC	M and accelerat	or pedal positior	n sensor	
~	- Renair c	nen circu	it short to	around or short	to nower in harn	ess or connectors.	
~	CK APP S	-		ground of short			
			Inspectior) "			
		ult normal		<u></u> .			
	> GO TO		-				
-	> GO TO						
4. REPL	ACE ACC	CELERAT	OR PEDAI	ASSEMBLY			
eplace a	ccelerator	pedal ass	embly. Re	fer to <u>ACC-4, "E</u>	<u>xploded View"</u> .		
			-				
		TION EN	d ' INCIDEN'	-			
efer to <u>G</u>	<u>1-45, "Inte</u>	rmittent In	<u>cident"</u> .				
>	> INSPEC	TION EN	D				
	ent Insp	_	_				
ompon		Jection					INFOID:000000009361218
.CHECK	ACCELE	RATOR F	PEDAL PO	SITION SENSO	R		
	gnition swi						
	nect all ha		nnectors d	isconnected.			
. Check	the voltage	ge ECM h	arness cor	nector terminals	s as per the follo	wing.	
	EC	CM					
Connector	+		_	Con	dition	Voltage (V)	
	Termi	inal	Terminal				
	97 (APP s	ensor 1)	100		Fully released	0.45 - 1.0	
M107				Accelerator pedal	Fully depressed	4.2 - 4.8	
	98 (APP s	ensor 2)	104		Fully released	0.22 - 0.50	
			0		Fully depressed	2.1 - 2.5	
		ult normal					
	> INSPEC > GO TO :	TION EN 2.					

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

>> INSPECTION END

P2765 INPUT SPEED SENSOR

Description

Input speed sensor is installed in transmission and detects transmission input shaft speed. ECM receives input speed signal and performs SynchroRev Match mode (S-MODE) control according to input speed signal.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2765 is displayed with DTC P0335, P0340 or P0345, first perform the trouble diagnosis for DTC P0335, P0340 or P0345. Refer to EC-306, "DTC Logic" or EC-310, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2765	Input speed sensor circuit	There is a difference between engine speed signal calculated by ECM and input shaft speed sensor signal.	 Harness or connectors (Input speed sensor circuit is open or shorted.) Input speed sensor
DTC CO	NFIRMATION PROC	EDURE	
1.PREC	ONDITIONING		
before con 1. Turn i 2. Turn i 3. Turn i TESTING	nducting the next test. ignition switch OFF and ignition switch ON. ignition switch OFF and CONDITION:	wait at least 10 seconds.	always perform the following procedure

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.

2. Drive the vehicle for at least 10 consecutive seconds under the following conditions.

Is DTC detected?

YES >> Go to EC-494, "Diagnosis Procedure".

>> INSPECTION END NO

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P2765 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000009361221

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK INPUT SPEED SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect input speed sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between input speed sensor harness connector and ground.

Input spe	ed sensor	Ground	Voltage (V)	
Connector	Terminal	Ground	voltage (v)	
F58	1	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 F103, M116

Harness for open or short between input speed sensor and IPDM E/R

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

${f 4.}$ CHECK INPUT SPEED SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between input speed sensor harness connector and ECM harness connector.

Input spe	Input speed sensor		ECM		
Connector	Terminal	Connector Terminal		Continuity	
F58	2	F102	84	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, short to ground or short to power in harness or connectors.

 ${f b.}$ CHECK INPUT SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between input speed sensor harness connector and ECM harness connector.

Input speed sensor		E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F58	3	F102	75	Existed

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, short to ground or short to power in harness or connectors.

Ó.CHECK INPUT SPEED SENSOR

P2765 INPUT SPEED SENSOR

	P2765 INPUT SPEED	SENSOR
< DTC/CIRCUIT DIA	GNOSIS >	[VQ37VHR]
Refer to EC-495, "Con	mponent Inspection".	
Is the inspection resul		A
YES >> GO TO 7 NO >> Replace i	nput speed sensor.	
7.CHECK INTERMIT		EC
Refer to <u>GI-45, "Interr</u>		
	indent incident.	C.
>> INSPECT	ION END	0
Component Inspe	ection	INF0ID:00000009361222
1.CHECK INPUT SP	EED SENSOR-I	D
1. Turn ignition swite		
2. Disconnect input	speed sensor harness connector.	E
	or. Refer to <u>TM-36, "Exploded View"</u> .	I
Is the inspection result		F.
YES >> GO TO 2		
NO >> Replace i	nput speed sensor.	G C
		H
		JMBIA2060ZZ
2. CHECK INPUT SP	PED SENSOR-II	- JMBIA206022
	ween input speed sensor terminals as per	the following items.
		J
Terminals (Polarity)	Resistance	
1 (+) - 2 (-)		
1 (+) - 3 (-)	Except 0 or $\infty \Omega$ [at 25°C (77°F)]	K
2 (+) - 3 (-)		
Is the inspection result		L
YES >> INSPECT NO >> Replace i	ION END nput speed sensor.	
·		Μ
		Ν
		0
		Р
		1

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 those two types of input (ON/OFF signal). Refer to <u>EC-78, "System Description"</u> for the ASCD function.

Component Function Check

1. CHECK ASCD BRAKE SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		
BRAKE SW1	Brake pedal (A/T or M/T models and synchrorev match mode) Brake pedal and clutch pedal (M/T models without synchror- ev match mode)	Slightly depressed	OFF
	Brake pedal (A/T or M/T models and synchrorev match mode) Brake pedal or clutch pedal (M/T models without synchrorev match mode)	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as per the following.

ECM					
Connector	+	-	Condition		Voltage (V)
Connector	Terminal	Terminal			
126	126	128	Brake pedal (A/T or M/T models and synchrorev match mode) Brake pedal and clutch pedal (M/T mod- els without synchrorev match mode)	Slightly depressed	Approx. 0
M107	(ASCD brake switch signal)	120	Brake pedal (A/T or M/T models and synchrorev match mode) Brake pedal or clutch pedal (M/T models without synchrorev match mode)	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-496, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

Which type of transmission?

A/T models or M/T models and synchrorev match mode>>GO TO 2. M/T models without synchrorev match mode>>GO TO 7.

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.

INFOID:000000009361224

< DTC/CIR(CUIT DIA	GNOSI	S >		[VQ37VHR]
4. Check t	he voltage	e betwee	en ASCD brake	switch harn	ess connector and ground.
		1			
ASCD brak	ke switch	Ground	Voltage		
Connector	Terminal				
E109	1	Ground	Battery voltage		
s the inspec			<u> ?</u>		
	GO TO 4 GO TO 3				
B. DETECT			NG PART		
Check the fo					
Fuse block		nnector	E103		
10 A fuse				nalka avvitala	and fue
Harness to	or open o	r snort de	etween ASCD b	rake switch	and fuse
~~	Repair or	oon circu	it or short to are	und in harn	ess or connectors.
4			0		CUIT FOR OPEN AND SHORT
			ITCHINFUT 3		
	nition swite nect ECM		connector.		
				ke switch ha	rness connector and ECM harness connector.
ASCD brak	e switch	E	CM	itinuity	
Connector	Terminal	Connecto	Terminal	linitity	
E109	2	M107	126 Ex	isted	
. Also ch	eck harne	ess for sh	ort to ground a	nd short to p	oower.
s the inspec			<u>?</u>		
	GO TO 6 GO TO 5				
DETECT					
heck the fo Harness c	•	s E106 I	<i>M</i> 6		
			etween ECM ar	d ASCD bra	ake switch
			•	nd or short t	o power in harness or connectors.
CHECK	ASCD BR	AKE SV	/ITCH		
efer to EC	-499, "Co	mponen	Inspection (AS	CD Brake S	Switch)"
s the inspec	ction resu	lt norma	<u> ?</u>		
	GO TO 1				
-	•		ake switch.		
.CHECK	ASCD BR	AKE SV	ITCH CIRCUIT		
	nition swit				
	nect ASCI		switch harness	connector.	
			en ASCD brake	switch harn	ess connector and ground.
	0				-
ASCD brak	ke switch	Ground	Cond	tion	Voltage (V)
Connector	Terminal	Giouna	Cond		
		1			

Is the inspection result normal?

1

Ground

Brake pedal

E109

Approx. 0

Battery voltage

Slightly depressed

Fully released

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 12.

NO >> GO TO 8.

8.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between clutch pedal position switch harness connector and ground.

Clutch pedal p	osition switch	Ground	Voltage	
Connector	Terminal	Ground		
E108	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 3)
- Harness for open or short between clutch pedal position switch and fuse

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

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between clutch position switch harness connector and ASCD brake switch harness connector.

Clutch pedal p	position switch	ASCD bra	Continuity	
Connector	Connector Terminal		Terminal	
E108	2	E109	1	Existed

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, short to ground or short to power in harness or connectors.

11. CHECK CLUTCH PEDAL POSITION SWITCH

Refer to EC-499, "Component Inspection (Clutch Pedal Position Switch)".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace clutch pedal position 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 ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ke switch	EC	Continuity	
Connector Terminal		Connector	Terminal	Continuity
E109	2	M107	126	Existed

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

Is the inspection result normal?

YES >> GO TO 14.

< DTC/CII				
		JNOSIS >		[VQ37VHR]
NO >	> GO TO 13	8.		
13. дети	ECT MALFU	INCTIONING PAF	RT	
	following.			
 Harness 	connectors			
 Harness 	for open or	short between E0	CM and ASCD brake switch	
	> Poppir op	on circuit chart to	around or short to power in h	arnass or connectors
		RAKE SWITCH	ground or short to power in h	
			n (ASCD Brake Switch)".	
	ection result > GO TO 15			
		SCD brake switc	٦.	
·		ITTENT INCIDE		
		nittent Incident".		
>	> INSPECT	ION END		
		-	Brake Switch)	
Somboi	ient inspe		Diake Switch)	INFOID:00000000361226
1.CHECK	ASCD BR	AKE SWITCH-I		
1. Turn i	gnition switc	h OFF.		
2. Disco	nnect ASCD	brake switch har		
3. Check	the continu	ity between ASC	D brake switch terminals unde	r the following conditions.
Terminals	C	Condition	Continuity	
Terminais	L L	onation	Continuity	
		Eully released	Evictod	
1 and 2	Brake pedal	Fully released	Existed	
	-	Slightly depressed	Existed Not existed	
s the insp	ection result	Slightly depressed		
<u>s the insp</u> YES >	-	Slightly depressed		
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< DTC/CIRCUIT DIAGNOSIS >

Terminals	C	Continuity	
1 and 2	Clutch pedal	Fully released	Existed
T and Z	Clutch pedal	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH-II

- 1. Adjust clutch pedal position switch installation. Refer to CL-7, "Inspection and Adjustment".
- 2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Clutch pedal	Fully released	Existed
T and Z		Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch pedal position switch.

ASCD INDICATOR

< DTC/CIRCUIT 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 the 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 the ASCD setting.

SET lamp remains lit during ASCD control.

Refer to EC-78, "System Description" for the ASCD function.

Component Function Check

1.CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR CONDITION SPECIFICATION · MAIN switch: Pressed at the CRUISE LAMP · Ignition switch: ON $\mathsf{ON} \to \mathsf{OFF}$ 1st time \rightarrow at the 2nd time · MAIN switch: ON · ASCD: Operating ON Н · When vehicle speed is be-SET LAMP tween 40 km/h (25 MPH) and ASCD: Not operating OFF 144 km/h (89 MPH) Is the inspection result normal? YES >> INSPECTION END >> Go to EC-501, "Diagnosis Procedure". NO Diagnosis Procedure INFOID:000000009361230 1.CHECK DTC Κ Check that DTC UXXXX is not displayed. Is the inspection result normal? L YES >> GO TO 2. NO >> Perform trouble diagnosis for DTC UXXXX. 2.CHECK DTC WITH COMBINATION METER M Refer to MWI-34, "CONSULT Function (METER/M&A)". Is the inspection result normal? YES Ν >> GO TO 3. NO >> Repair or replace. ${
m 3.}$ CHECK INTERMITTENT INCIDENT Refer to GI-45, "Intermittent Incident", Is the inspection result normal? YES >> Replace combination meter. Ρ >> Repair or replace. NO

INFOID:00000009361228

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COOLING FAN

Description

COOLING FAN CONTROL MODULE

Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

COOLING FAN MOTOR

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

Component Function Check

INFOID:000000009361232

1.CHECK COOLING FAN FUNCTION

(I) With CONSULT

1. Turn ignition switch ON.

- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

- 1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-10, "Diagnosis</u> <u>Description"</u>.
- 2. Make sure that cooling fan operates.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-502, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000009361233

1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan control module harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connector and ground.

Cooling fan c	ontrol module	Ground	Voltage
Connector	Terminal	Clound	voltage
E37	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between cooling fan control module harness connector and ground.

Cooling fan co	ontrol module	Ground	Continuity	
Connector	Terminal	Ciouna	Continuity	
E37	1	Ground	Existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

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

EC-502

INFOID:000000009361231

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

2: Check the continuity between IPDM E/R harness connector and ground. EG IPDM E/R Ground Continuity Connector Terminal Ground Continuity E5 12 Ground Existed Control <	2 01/50/10						
2. Check the continuity between IPDM E/R harness connector and ground. IPDM E/R Connector Terminal Ground Continuity E5 12 Ground Existed C C 3. Also check harness for short to power. Is the inspection result normal? D C YES >> GO TO 4. No >> Repair open circuit or short to power in harness or connectors. E 4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT Isisconnect IPDM E/R harness connector. E 2. Check the continuity between IPDM E/R harness connector and cooling fan control module harness connector. F 2. Check the continuity between IPDM E/R harness connector and cooling fan control module harness connector. F 3. Also check harness for short to ground and short to power. F is the inspection result normal? YES YES >> GO TO 5. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 5. CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT H 1. Reconnect all harness connectors disconnected. J 2. Disconnect cooling fan control module harness connectors. I 3. Turi grintion switch ON. R 4. Ground Ground </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>А</td>							А
IPDM E/R Ground Continuity E5 12 Ground Existed C 3. Also check harness for short to power. D D D D St be inspection result normal? YES > GO TO 4. D D YES >> GO TO 4. NO >> Repair open circuit or short to power in harness or connectors. E 4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT D biconnect IPDM E/R harness connector. E 2. Check the continuity between IPDM E/R harness connector and cooling fan control module harness connector. F 2. Check tharness for short to ground and short to power. Existed 3. Also check harness for short to ground and short to power. E 15 the inspection result normal? YES YES >> GO TO 5. I NO >> Repair open circuit, short to ground or short to power. I 16. Octocate and harness connectors. I I 2. Octocate and harness connectors disconnected. I I 3. Also check harness for contor module harness connectors. I I 4. Check the voltage between cooling fan control module harness connectors. I I						appactor and ground	
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E6 41 Ground Existed 3. Also check harness for short to power. Is the inspection result normal? YES >> Repair open circuit or short to power in harness or connectors. Image: Connect IPDM E/R harness connector. 4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT Image: Connect IPDM E/R harness connector. Image: Cooling fan control module 1. Disconnect IPDM E/R harness connector. Image: Cooling fan control module Continuity 2. Check the continuity between IPDM E/R harness connector and cooling fan control module harness connector. Image: Cooling fan control module Connector Terminal Continuity Cooling fan control module 2. Check the continuity between IPDM E/R harness connector and cooling fan control module harness connector. Image: Cooling fan control module 3. Also check harness for short to ground and short to power. Image: Cooling fan control module harness connectors. Image: Cooling fan control module harness connectors. 5. CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT Image: Cooling fan control module harness connectors. Image: Cooling fan control module harness connectors. 3. Turn ignition switch ON. Image: Cooling fan control module. Image: Cooling fan control module. Image: Cooling fan control module. YES > GO TO 6. Image: Cooling fan control module.<	Connector	Terminal	Ground	Continuity			
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 2. Disconnect cooling fan control module harness connectors. 3. Turn ignition switch ON. 4. Check the voltage between cooling fan control module harness connector and ground. Cooling fan control module Connector Terminal Ground Voltage Voltage Ground Battery voltage Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. Check COOLING FAN MOTORS -1 AND -2 Refer to EC-504. "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11.							C.
4. Check the voltage between cooling fan control module harness connector and ground. Image: Cooling fan control module Cooling fan control module Ground Voltage Image: Imag	2. Discon	nect cool	ing fan cor			nectors.	
Cooling fan control module Ground Voltage Connector Terminal Ground Battery voltage — 4 Ground Battery voltage — 6 Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. 6 .CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-504. "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11.				n cooling fan c	ontrol mod	ule barness connector and dround	L
Ground Voltage Connector Terminal Ground Battery voltage - 4 Ground Battery voltage - 6 Battery voltage No Is the inspection result normal? YES >> GO TO 6. NO NO >> Replace cooling fan control module. No 6 CHECK COOLING FAN MOTORS -1 AND -2 No Refer to EC-504. "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11. YES	H. OHECK		je betweet			die namess connector and ground.	r
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- 6 N Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. N 6 .CHECK COOLING FAN MOTORS -1 AND -2 N Refer to EC-504. "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11. YES >> GO TO 11.		4					
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NO >> Replace cooling fan control module. O.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-504. "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11.	Is the inspe	ction res	ult normal?)			1
6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to <u>EC-504, "Component Inspection (Cooling Fan Motor)"</u> . Is the inspection result normal? YES >> GO TO 11.							
Refer to <u>EC-504, "Component Inspection (Cooling Fan Motor)"</u> . Is the inspection result normal? YES >> GO TO 11.	•	•	•				1
Is the inspection result normal? YES >> GO TO 11.	D. CHECK	COOLIN	G FAN MC	TORS -1 ANE	D -2		
<u>s the inspection result normal?</u> YES >> GO TO 11.	Refer to <u>EC</u>	<u>2-504, "Co</u>	omponent	Inspection (Co	ooling Fan	<u>Motor)"</u> .	(
				-			
	-			n motor			
7.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-II	_	•	0				F
				av.			

2. Disconnect cooling fan relay.

3. Turn ignition switch ON.

4. Check the voltage between cooling fan relay harness connector and ground.

EC-503

Cooling	fan relay	Ground	Voltage Battery voltage	
Connector	Terminal	Ground		
F17	1	Ground		
	3	Ground	Dattery voltage	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

10A fuse (No. 42)

- IPDM E/R harness connector E7
- 50A fusible link (letter F)

• Harness for open or short between cooling fan relay and fuse

· Harness for open or short between cooling fan relay and battery

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

$9. {\sf CHECK} \ {\sf COOLING} \ {\sf FAN} \ {\sf CONTROL} \ {\sf MODULE} \ {\sf POWER} \ {\sf SUPPLY} \ {\sf CIRCUIT-III}$

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between cooling fan relay harness connector and IPDM E/R harness connector.

Cooling f	an relay	IPDN	Continuity	
Connector Terminal		Connector		Terminal
E17	2	E6	74	Existed

4. Check the continuity between cooling fan relay harness connector and cooling fan control module harness connector.

Cooling fan relay		Cooling fan control module		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E17	5	E37	3	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

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

10.CHECK COOLING FAN RELAY

Refer to EC-505, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace cooling fan relay.

11.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R.
- NO >> Repair or replace harness connectors.

Component Inspection (Cooling Fan Motor)

1. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.

INFOID:000000009361234

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect cooling fan control module harness connectors E301, E302.
- 3. Supply cooling fan control module terminals with battery voltage and check operation.

Coo	ling fan contre			
Motor	Connector	Terminal		Operation
WOU	Connector	(+)	(-)	
1	E301	4	5	Cooling fan operates.
2	E302	6	7	Cooling fan operates.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace cooling fan motor.

Component Inspection (Cooling Fan Relay)

1.CHECK COOLING FAN RELAY

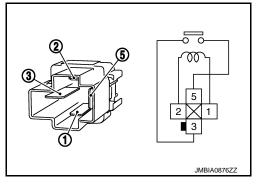
- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay.
- 3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V 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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INFOID:000000009361235

ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

ELECTRICAL LOAD SIGNAL

Description

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Connect CONSULT and select "DATA MONITOR" mode.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Monitor item Condition		
	Rear window defogger switch	ON	ON
LOAD SIGNAL	Iteal window delogger switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-506, "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 EC-506, "Diagnosis Procedure".

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 FAILOW	Theater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-506, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-506, "Compo-nent 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-95, "Work Flow".

EC-506

INFOID:000000009361238

INFOID-000000009361237

INFOID:000000009361236

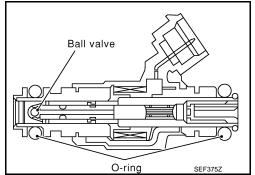
ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
>> INSPECTION END	
3.CHECK HEADLAMP SYSTEM	A
Refer to EXL-71, "Work Flow".	
	EC
>> INSPECTION END 4.CHECK HEATER FAN CONTROL SYSTEM	
Refer to <u>HAC-5, "Work Flow"</u> .	С
>> INSPECTION END	D
	_
	Е
	E
	F
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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

INFOID:000000009361240

1.INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

YES >> GO TO 2.

NO >> Go to EC-508, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

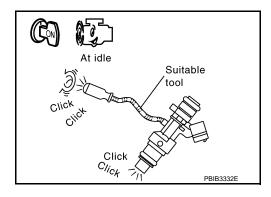
- 1. Start engine.
- 2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-508, "Diagnosis Procedure".



INFOID:000000009361241

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

Diagnosis Procedure

- 2. Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

INFOID:000000009361239

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

	Fuel injecto)r				А
Cylinder	Connector	Terminal	Ground	Voltag	je	
1	F121	1				
2	F122	1	_			EC
3	F123	1				
4	F124	1	- Ground	Battery vo	bltage	С
5	F125	1				
6	F126	1				_
Is the ins	pection res	ult norma	l?			D
	>> GO TO					
~	>> GO TO					E
Z.DETE	CT MALFU	INCTION	NG PART			
	e following					_
	s connecto s connecto		120			F
• IPDM E	E/R harnes	s connecto				
	se (No. 44)		- 4	al inia atau	and from	G
 Harnes 	s for open	or short d	etween tu	el injector	and fuse	
	>> Repair	onen circi	it short to	around o	or short to power in harness or connectors.	
•	•	•		-	CIRCUIT FOR OPEN AND SHORT	Н
			0011 01	SIGNAL (_
	ignition sw onnect ECI		connecto	or.		
					rness connector and ECM harness connector.	
				•		
				-		
	Fuel injector			CM	Continuity	J
Cylinder	Connector	Terminal	EC	CM Terminal	Continuity	J
1	Connector F121	Terminal 2		CM Terminal 89	- Continuity	J
1	Connector F121 F122	Terminal 2 2		CM Terminal 89 85	Continuity	J
1 2 3	Connector F121 F122 F123	Terminal 2 2 2 2		CM Terminal 89 85 81	- Continuity Existed	J K
1 2 3 4	Connector F121 F122 F123 F124	Terminal 2 2 2 2 2	Connector	CM Terminal 89 85 81 90		J K L
1 2 3 4 5	Connector F121 F122 F123 F124 F125	Terminal 2 2 2 2 2 2 2 2	Connector	CM Terminal 89 85 81 90 86		J K L
1 2 3 4 5 6	Connector F121 F122 F123 F124 F125 F126	Terminal 2 2 2 2 2 2 2 2 2	F102	CM Terminal 89 85 81 90 86 82	Existed	J K L
1 2 3 4 5 6 4. Also	Connector F121 F122 F123 F124 F125 F125 F126 check harr	Terminal 2 2 2 2 2 2 2 2 2 ess for st	F102	CM Terminal 89 85 81 90 86 82		L
1 2 3 4 5 6 4. Also Is the ins	Connector F121 F122 F123 F124 F125 F126 check harr pection res	Terminal 2 2 2 2 2 2 2 ness for sh sult norma	F102	CM Terminal 89 85 81 90 86 82	Existed	L
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1 2 3 4 5 6 4. Also Is the ins YES NO	Connector F121 F122 F123 F124 F125 F126 check harr pection res >> GO TO >> GO TO	Terminal 2 2 2 2 2 2 2 2 2 2 5. 4	F102	CM Terminal 89 85 81 90 86 82 und and s	Existed	L
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1 2 3 4 5 6 4. Also <u>Is the ins</u> YES NO 4.DETE Check th	Connector F121 F122 F123 F124 F125 F126 check harr pection res >> GO TO >> GO TO CT MALFL e following	Terminal 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 5 5. 4 3 NCTIONI	F102 F102 NG PART	CM Terminal 89 85 81 90 86 82 und and s	Existed	L
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1 2 3 4 5 6 4. Also <u>Is the ins</u> YES NO 4.DETE Check th • Harnes • Harnes	Connector F121 F122 F123 F124 F125 F126 check harr pection res >> GO TO >> GO TO >> GO TO CT MALFL e following s connecto s connecto s for open	Terminal 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	F102 F102 NG PART F107 F107 F107 F107 F107 F107 F107 F107	CM Terminal 89 85 81 90 86 82 und and s	Existed hort to power.	L M N O
1 2 3 4 5 6 4. Also Is the ins YES NO 4. DETE Check th • Harnes • Harnes	Connector F121 F122 F123 F124 F125 F126 check harr pection res >> GO TO >> GO TO >> GO TO CT MALFL e following ss connecto ss connecto ss for open >> Repair	Terminal 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	F102 F102 NG PART F107 F107 F107 F107 F107 F107 F107 F107	CM Terminal 89 85 81 90 86 82 und and s	Existed hort to power.	L M N O
1 2 3 4 5 6 4. Also Is the ins YES NO 4.DETE Check th • Harnes • Harnes • Harnes	Connector F121 F122 F123 F124 F125 F126 Check harr pection res >> GO TO >> GO TO CT MALFL e following s connector s connector s for open >> Repair CK FUEL IN	Terminal 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	F102 F102 NG PART F107 F107 F107 F107 F107 F107 F107 F107	CM Terminal 89 85 81 90 86 82 und and s el injector	Existed hort to power.	L M N O
1 2 3 4 5 6 4. Also <u>Is the ins</u> YES NO 4.DETE Check th • Harnes • Harnes • Harnes	Connector F121 F122 F123 F124 F125 F126 check harr pection res >> GO TO >> GO TO >> GO TO CT MALFL e following ss connecto ss connecto ss for open >> Repair	Terminal 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	F102 F102 F102 NG PART F107 I20 etween fue it, short to	CM Terminal 89 85 81 90 86 82 und and s el injector	Existed hort to power.	L M N O

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 6.

NO >> Replace malfunctioning fuel injector.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

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

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.

Terminals	Resistance (Ω)		
1 and 2	11.1 - 14.3 [at 10 - 60°C (60 - 140°F)]		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.

INFOID:000000009361242

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS > FUEL PUMP

Description

INFOID:000000009361243

				EC
Sensor	Input signal to ECM	ECM Function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓	С
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 D 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, Е 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	F
Ignition switch is turned to ON.	Operates for 1 second.	
Engine running and cranking	Operates.	
When engine is stopped	Stops in 1.5 seconds.	G
Except as shown above	Stops.	

Component Function Check

1. CHECK FUEL PUMP FUNCTION

- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

I	S	<u>the</u>	insp	<u>ectior</u>	<u>resul</u>	t norm	<u>al?</u>

YES >> INSPECTION END

>> EC-511, "Diagnosis Procedure". NO

Diagnosis Procedure

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Turn ignition switch ON. 3.
- Check the voltage between ECM harness connector and ground. 4.

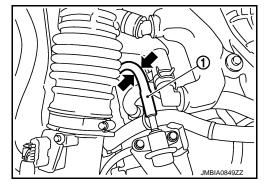
E	CM	Ground	Voltage	
Connector	Connector Terminal		voltage	
F101	22	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II



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INFOID:000000009361244

А

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

Check the voltage between IPDM E/R harness connector and ground.

IPDN	/IE/R	Ground	Voltage	
Connector	Terminal	Giouna	vollage	
E7	77	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 10.

3.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

• Harness connectors F104, F105

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

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

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage	
Connector	Terminal			
B22 1		Ground	Battery voltage should exist for 1 second after ignition switch is turned ON.	
La Ala a Sua ana a	<i>c</i> 14	10	N	

Is the inspection result normal?

YES	>> GO TO 8.
NO	>> GO TO 5.

5.CHECK 15 A FUSE

- 1. Turn ignition switch OFF.
- 2. Disconnect 15 A fuse (No. 41) from IPDM E/R.
- 3. Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuse.

6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

- 1. Disconnect IPDM E/R harness connector E5.
- Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump" harness connector.

IPDM	E/R	Fuel level and fue	Continuity	
Connector	Terminal	Connector	Terminal	
E5	13	B22	1	Existed

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

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

7.DETECT MALFUNCTIONING PART	
Check the following. • Harness connectors E117, B9	A
 IPDM E/R harness connector E5 Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump" 	EC
>> Repair open circuit, short to ground or short to power in harness or connectors. 8. CHECK FUEL PUMP GROUND CIRCUIT	С
 Turn ignition switch OFF. Disconnect dropping resistor harness connector. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ground. 	D
Fuel level sensor unit and fuel pump Ground Continuity Connector Terminal	E
B22 3 Ground Existed	F
4. Also check harness for short to power.	
Is the inspection result normal?	G
YES >> GO TO 9. NO >> Repair open circuit or short to power in harness or connectors.	
9. CHECK FUEL PUMP	Н
Refer to EC-513, "Component Inspection".	11
Is the inspection result normal?	
YES >> GO TO 10.	
NO >> Replace fuel pump. 10.CHECK INTERMITTENT INCIDENT	
Refer to <u>GI-45, "Intermittent Incident"</u> .	J
Is the inspection result normal?	
YES >> Replace IPDM E/R.	Κ
NO >> Repair or replace harness or connectors.	
Component Inspection	L
1.CHECK FUEL PUMP	
 Turn ignition switch OFF. Disconnect "fuel level sensor unit and fuel pump" harness connector. Check resistance between "fuel level sensor unit and fuel pump" terminals as follows. 	Μ
Terminals Resistance (Ω)	Ν
1 and 3 0.2 - 5.0 [at 25°C (77°F)]	
Is the inspection result normal?	0
YES >> INSPECTION END	
NO >> Replace "fuel level sensor unit and fuel pump"	D
	Ρ

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

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

No >> Go to <u>EC-514</u>, "Diagnosis Procedure".

2.CHECK IGNITION SIGNAL FUNCTION

With CONSULT

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

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-514, "Diagnosis Procedure".

3.CHECK IGNITION SIGNAL FUNCTION

Without CONSULT

- 1. Let engine idle.
- 2. Read the voltage signal between ECM harness connector terminals under the following conditions with an oscilloscope.

1	E	СМ		
+		-	_	Voltage signal
Connector	Terminal	Connector	Terminal	*
	11	M107	128	
	12			50mSec/div
E101	15			
F101	16			÷
	19			
	20			2V/div JMBIA0035GB

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-514, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.

2. Check the voltage between ECM harness connector terminals as per the following.

EC-514

INFOID:000000009361247

INFOID:000000009361248

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	_	Voltage	
Connector	Terminal	Termina	1	
M107	125	128	Battery voltage	
•	ection result	normal?		
	GO TO 2.	170 "Die	anopio Dropoduro"	
			WER SUPPLY CIRCUIT-II	
	nition switch		ness connector.	
	nition switch			
I. Check	the voltage	between	condenser harness connector and ground.	
	enser	Ground	Voltage	
Connector	Terminal	Oracial	Detterroughan	
F8	1	Ground	Battery voltage	
•	ction result GO TO 5.	normal?		
	• GO TO 5. • GO TO 3.			
•			WER SUPPLY CIRCUIT-III	
	nition switch			
2. Discon			ess connector.	
3. Check	the continui	ty betwe	en IPDM E/R harness connector and condenser harness connector	
	E/D	Conde	apport.	
IPDM Connector		Conde	Continuity	
Connector	Terminal C	Connector	Terminal Continuity	
Connector E7	Terminal C 53	Connector F8	Continuity Terminal 1 Existed	
Connector E7 I. Also ch	Terminal C 53 heck harnes	F8 F0r sho	Continuity Terminal 1 Existed rt to ground and short to power.	
Connector E7 I. Also ch s the inspe	Terminal C 53 heck harnes ection result	F8 F8 s for sho normal?	Continuity Terminal 1 Existed rt to ground and short to power.	
Connector E7 A. Also ch s the inspe YES >>	Terminal C 53 heck harnes ection result	F8 F8 s for sho normal?	Continuity Terminal 1 Existed rt to ground and short to power.	
Connector E7 I. Also ch s the inspe YES >> NO >>	Terminal C 53 heck harnes ction result Go to EC	F8 F8 s for sho normal? 173, "Dia	Continuity Terminal 1 Existed It to ground and short to power. Ingnosis Procedure".	
Connector E7 4. Also ch <u>s the inspe</u> YES >> NO >> 1. DETECT Check the f	Terminal C 53 heck harnes ection result Go to EC- GO TO 4. MALFUNC following.	F8 F8 s for sho normal? 173, "Dia	Continuity Terminal 1 Existed It to ground and short to power. Ingnosis Procedure".	
Connector E7 Also ch s the inspe YES >> NO >> LDETEC Check the f Harness of	Terminal C 53 heck harnes ection result Go to EC- GO TO 4. MALFUNC following. connectors	F8 5 for sho normal? 173, "Dia CTIONIN E3, F1	Continuity 1 Existed It to ground and short to power. Ingnosis Procedure". G PART	
Connector E7 4. Also ch <u>s the inspe</u> YES >> NO >> 4. DETECT Check the f Harness of	Terminal C 53 heck harnes ection result Go to EC- GO TO 4. MALFUNC following. connectors	F8 5 for sho normal? 173, "Dia CTIONIN E3, F1	Continuity Terminal 1 Existed It to ground and short to power. Ingnosis Procedure".	
Connector E7 4. Also ch <u>s the inspe</u> YES >> NO >> 4. DETECT Check the f Harness f	Terminal C 53 heck harnes ection result Go to EC- GO TO 4. F MALFUNC following. connectors for open or s	F8 s for sho normal? 173, "Dia CTIONIN E3, F1 short bet	Continuity 1 Existed rt to ground and short to power. ignosis Procedure". G PART ween IPDM E/R and condenser	
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Connector E7 4. Also ch <u>s the inspe</u> YES >> NO >> 4.DETECT Check the f Harness f >> D.CHECK 1. Turn ig 2. Check	Terminal C 53 heck harness ection result Go to EC- GO TO 4. MALFUNC following. connectors for open or s Repair ope CONDENS nition switch the continui	F8 s for sho <u>normal?</u> 173, "Dia CTIONIN E3, F1 short bet en circuit. ER GRC n OFF.	Terminal Continuity 1 Existed rt to ground and short to power. ignosis Procedure". G PART ween IPDM E/R and condenser , short to ground or short to power in harness or connectors. DUND CIRCUIT FOR OPEN AND SHORT	
Connector E7 4. Also ch <u>s the inspe</u> YES >> NO >> 4. DETECT Check the f Harness f >> 5. CHECK 1. Turn ig 2. Check	Terminal C 53 53 neck harnes 1 ection result 60 to EC-7 GO to EC-7 60 TO 4. T MALFUNC 1 following. 1 connectors I 1 for open or s 1 Repair open 1 CONDENS 1 nition switch 1 the continuit 1 nser 1 Terminal 1	Eonnector F8 s for sho <u>normal?</u> 173, "Dia CTIONIN E3, F1 short bet en circuit. ER GRC n OFF. ty betwe	Terminal Continuity 1 Existed rt to ground and short to power. ignosis Procedure". G PART ween IPDM E/R and condenser , short to ground or short to power in harness or connectors. DUND CIRCUIT FOR OPEN AND SHORT en condenser harness connector and ground.	

YES >> GO TO 6.

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

EC-515

6.CHECK CONDENSER

Refer to EC-518. "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace condenser.

7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Reconnect all harness connectors disconnected.

- 2. Disconnect ignition coil harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

	Ignition coi	Ground	Voltage	
Cylinder	Connector	Terminal	Giouna	voltage
1	F11	3		
2	F12	3	Ground	
3	F13	3		Battery voltage
4	F14	3		Ballery vollage
5	F15	3		
6	F16	3		

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

Harness connector F1

• Harness for open or short between ignition coil and harness connector F1

>> Repair or replace harness or connectors.

9. Check ignition coil ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Check the continuity between ignition coil harness connector and ground.

	Ignition coi	Ground	Continuity	
Cylinder	Connector	Terminal	Ground	Continuity
1	F11	2		
2	F12	2	Ground	
3	F13	2		Existed
4	F14	2	Ground	EXISIED
5	F15	2		
6	F16	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.

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

10. Check ignition coil output signal circuit for open and short

1. Disconnect ECM harness connector.

2. Check the continuity between ignition coil harness connector and ECM harness connector.

EC-516

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

	Ignition coil		EC	M		А
Cylinder	Connector	Terminal	Connector	Terminal	Continuity	
1	F11	1		20		~
2	F12	1	-	16	E	С
3	F13	1	= 101	12	-	
4	F14	1	F101	11 15 Exist	– Existed	С
5	F15	1	-		-	
6	F16	1	-	19	-	
3. Also	check harr	ness for s	hort to grou	und and s	short to power.	D
Is the ins	pection res	sult norma	al?			
	>> GO TO					Е
	>> GO TO			_		
			NING PAR	T		_
	e following s connecto		E105			F
			r 105 between igr	ition coil a	and ECM	
						G
	>> Repair	open circ	uit, short to	ground o	or short to power in harness or connectors.	
12.сн	ECK IGNIT	ION COIL	_ WITH PO	WER TR	ANSISTOR	
Refer to	EC-517. "C	omponer	nt Inspectio	n (Ianition	n Coil with Power Transistor)".	Н
	pection res		-			
YES		13.				I
	•				with power transistor.	
13.сн	ECK INTER	RMITTEN	T INCIDEN	IT		
Refer to	GI-45, "Inte	ermittent I	ncident".			J
	>> INSPE(CTION EN	١D			Κ
Compo	nent Ins	pection	(Ignition	Coil wi	ith Power Transistor) INFOID:00000009361250	
					NSISTOR-I	
					NSISTOR-I	L
	ignition sw		arness cor	nector		
					nals as per the following.	M
			-	_		
Terminal	s Resistar	nce (Ω) [at 2	25°C (77°F)]			
1 and 2		Except 0 o	r∞	-		Ν
1 and 3		Except (า	-		
2 and 3			, 			0
Is the ins	pection res	sult norma	al?			
	>> GO TO					
•	•					Ρ
			WITH POW	ER TRAN	NSISTOR-II	
CAUTIO	N:					

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.
 NOTE:

Do not use CONSULT 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:

- During the operation, always stay 50 cm (19.7 in) or more away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

1.CHECK CONDENSER

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.

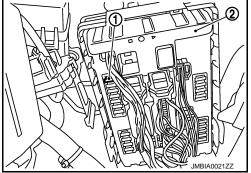
3. Check resistance between condenser terminals as per the following.

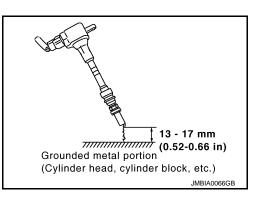
Terminals	Resistance (M Ω)
1 and 2	Above 1 [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser.





INFOID:000000009361251

MALFUNCTION INDICATOR LAMP

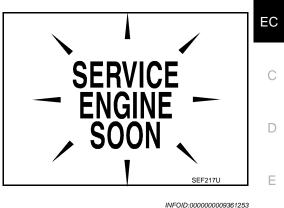
Description

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should turn off. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.

For details, refer to <u>EC-151, "DIAGNOSIS DESCRIPTION : Malfunc-</u> tion Indicator Lamp (MIL)".



Component Function Check

1. CHECK MIL FUNCTION	F
 Turn ignition switch ON. Make sure that MIL illuminates. <u>Is the inspection result normal?</u> YES >> INSPECTION END NO >> Go to <u>EC-519. "Diagnosis Procedure"</u>. 	G
Diagnosis Procedure	Н
1.снеск отс	
Check that DTC UXXXX is not displayed. <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Perform trouble diagnosis for DTC UXXXX. 2.CHECK DTC WITH COMBINATION METER	J
Refer to <u>MWI-34, "CONSULT Function (METER/M&A)"</u> .	K
Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace.	L
3.CHECK INTERMITTENT INCIDENT	Μ
Refer to <u>GI-45, "Intermittent Incident"</u> .	IVI
Is the inspection result normal? YES >> Replace combination meter. NO >> Repair or replace.	Ν
	0

[VQ37VHR]

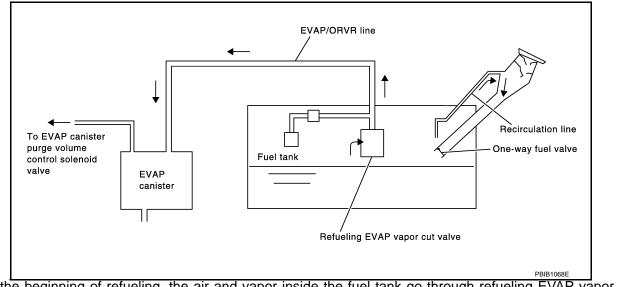
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< DTC/CIRCUIT DIAGNOSIS >

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Description



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Never smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Always furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
- Put drained fuel in an explosion-proof container and put lid on securely.
- Release fuel pressure from fuel line. Refer to EC-628, "Inspection".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Never kink or twist hose and tube when they are installed.
- Never tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connections.
- Never attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

Component Function Check

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[VQ37VHR]

INFOID:000000009361255

1.CHECK ORVR FUNCTION

Check whether the following symptoms are present.

- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Are any symptoms present?

YES >> Go to <u>EC-520, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Check whether the following symptoms are present. A: Fuel odor from EVAP canister is strong.

EC-520

INFOID:00000009361257

ON BOARD REFUELING VAPOR RECOVERY (ORV < DTC/CIRCUIT DIAGNOSIS >	/R) [VQ37VHR]
B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling. Which symptom is present?	A
A >> GO TO 2. B >> GO TO 7.	
2. CHECK EVAP CANISTER	EC
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control sy	stem pressure sensor
 attached. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control sy attached. 	vstem pressure sensor C
The weight should be less than 2.2 kg (4.9 lb). <u>Is the inspection result normal?</u>	D
YES >> GO TO 3. NO >> GO TO 4.	
3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER	E
Check if water will drain from EVAP canister (1). • 2: EVAP canister vent control valve	
Does water drain from the EVAP canister?	F
YES >> GO TO 4.	
NO >> GO TO 6.	G
	н
	PBIB2731E
4.REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.	
>> GO TO 5.	J
5. DETECT MALFUNCTIONING PART	
Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor co	onnection. K
>> Repair or replace EVAP hose.	1
6. CHECK REFUELING EVAP VAPOR CUT VALVE	L
Refer to EC-523, "Component Inspection".	
<u>Is the inspection result normal?</u> YES >> INSPECTION END	M
NO >> Replace refueling EVAP vapor cut valve with fuel tank.	
7.CHECK EVAP CANISTER	Ν
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control sy	stem pressure sensor
 attached. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control sy attached. 	vstem pressure sensor
The weight should be less than 2.2 kg (4.9 lb).	Р
Is the inspection result normal? YES >> GO TO 8. NO >> GO TO 9.	
0	

8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

< DTC/CIRCUIT DIAGNOSIS >

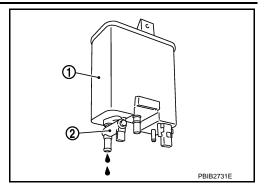
[VQ37VHR]

Check if water will drain from EVAP canister (1).

• 2: EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 9. NO >> GO TO 11.



9.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

11.CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kinks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace hoses and tubes.

12.CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

- YES >> GO TO 13.
- NO >> Replace filler neck tube.

13. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-523, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

14.CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel filler tube.

15.CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace one-way fuel valve with fuel tank.

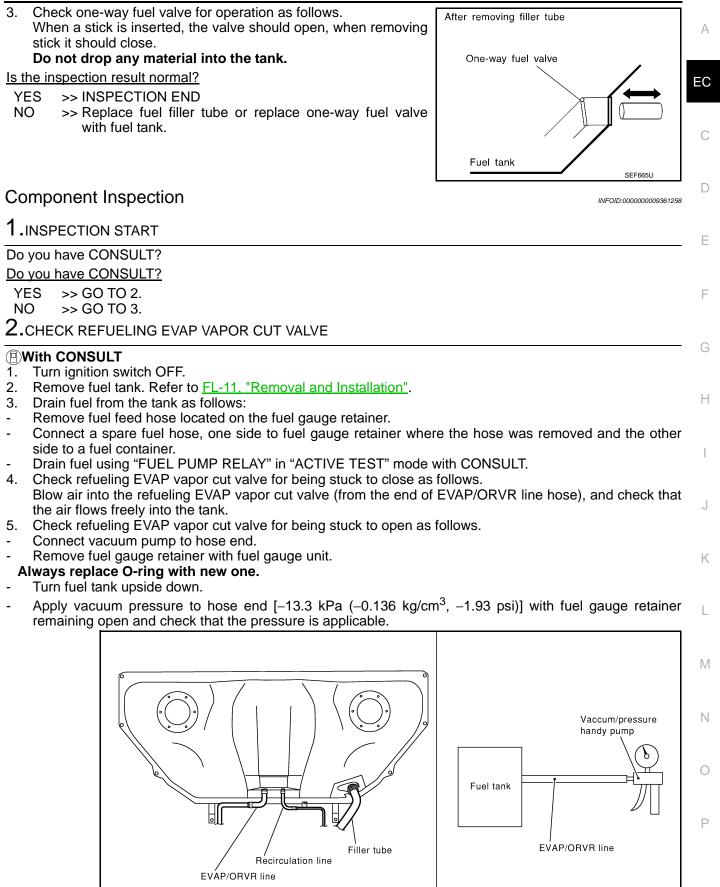
16.CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.

2. Remove fuel filler tube and hose.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]



Is the inspection result normal?

Revision: 2013 May

PBIB1035E

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

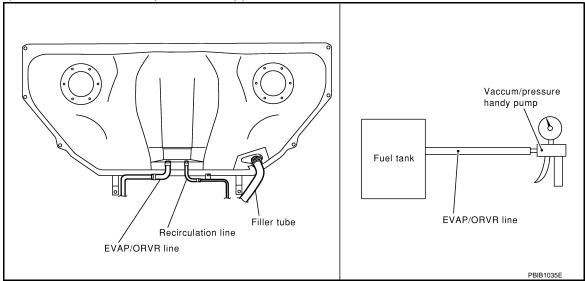
3.CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Remove fuel tank. Refer to FL-11, "Removal and Installation".
- 3. Drain fuel from the tank as follows:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
- 4. Check refueling EVAP vapor cut valve for being stuck to close as follows.
- Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
- 5. Check refueling EVAP vapor cut valve for being stuck to open as follows.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Turn fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



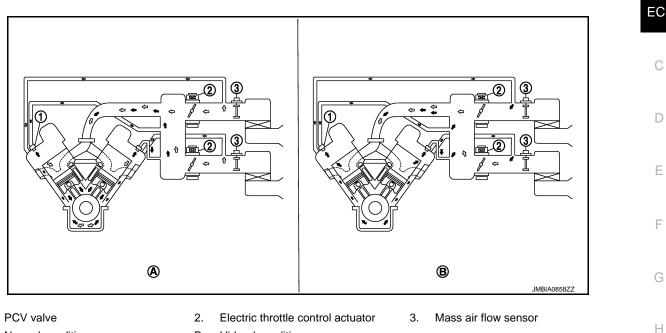
Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

POSITIVE CRANKCASE VENTILATION

Description

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Α Normal condition в Hi-load condition

🗘 : Fresh air

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+ : Blow-by air

This system returns blow-by gas to the intake manifold.

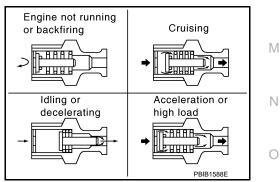
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

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

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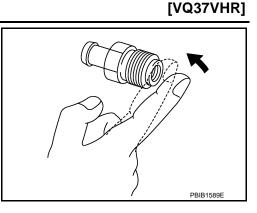
POSITIVE CRANKCASE VENTILATION

< DTC/CIRCUIT DIAGNOSIS >

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?

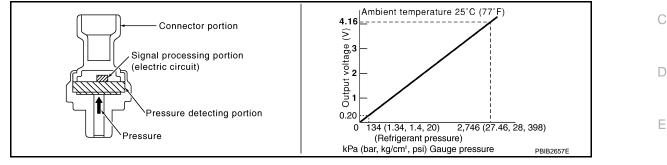
- YES >> INSPECTION END
- NO >> Replace PCV valve.



REFRIGERANT PRESSURE SENSOR

Description

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

1.CHECK REFRIGERANT PRESSURE SENSOR 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 terminals as per the following.

1. CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Turn ignition switch OFF.

3. Check ground connection M95. Refer to Ground Inspection in <u>GI-48, "Circuit Inspection"</u>.

Is the inspection result normal?

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 pressure sensor		Ground	Voltage (V)
Connector	Terminal	Cround	Voltage (V)
E172	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3. INFOID:000000009361261

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REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E171, E177
- Harness connectors E106, M6
- Harness for open or short between ECM and refrigerant pressure sensor

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

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E172	1	M107	112	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 E171, E177
- Harness connectors E106, M6
- Harness for open or short between ECM and refrigerant pressure sensor

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

$\mathbf{6}.$ CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E172	2	M107	105	Existed

2. 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 E171, E177
- Harness connectors E106, M6
- · Harness for open or short between ECM and refrigerant pressure sensor

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace.

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SHIFT POSITION INDICATOR

< DTC/CIRCUIT DIAGNOSIS >

SHIFT POSITION INDICATOR

Description

The shift lever position is indicated by shift position indicator on combination meter. ECM receives gear position signal from gear lever position sensor and transmits the signal to combination meter via CAN communication.

Component Function Check

1. CHECK SHIFT POSITION INDICATOR

1. Turn ignition switch ON.

Check that shift position indicator turns ON. 2.

Is the inspection result normal?

>> INSPECTION END YES

>> Go to EC-530, "Diagnosis Procedure". NO

Diagnosis Procedure

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

2.CHECK DTC WITH "COMBINATION METER"

Refer to MWI-34, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis relevant to DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair or replace.

INFOID:000000009361265

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S-MODE SWITCH

Description

When S-MODE switch is pressed (less than 1 second), S-MODE indicator illuminates, combination meter sends S-MODE switch signal to ECM via the CAN communication, and then SynchroRev Match mode (S-MODE) is activated. When S-MODE is pressed and held (1 second or more), S-MODE indicator turns OFF and S-MODE is cancelled, and then returns to normal M/T.

Component Function Check

1.CHECK S-MODE SWITCH FUNCTION-I

NOTE:

If DTC UXXXX are displayed, first perform the trouble diagnosis for DTC UXXXX.

- 1. Turn ignition switch ON.
- 2. Select "M/T SYNCHRO SW" in "DATA MONITOR" mode with CONSULT.
- 3. Check "M/T SYNCHRO SW" indication under the following conditions.

Monitor item	Con	dition	Indication			
	CON					
M/T SYNCHRO SW	S-MODE switch	Pressed	ON			
		Released	OFF			
the inspection i						
YES >> GO T	-					
	EC-531, "Diagno					
CHECK S-MO	DE SWITCH FUI	NCTION-II				
heck the S-MO	DE indicator unde	er the following c	ondition.			
C	condition	S-MOD	E indicator			
S-MODE switch	Press (less than 1 sec	ond) Illur	ninated			
F F	Press (1 second or mo	ore) Not ill	uminated			
the inspection	result normal?	·				
	ECTION END					
NO >> Go to	EC-531, "Diagno	osis Procedure".				
Diagnosis Pro	ocedure				INFOID:000000009361269	
.CHECK DTC \	WITH "COMBINA	TION METER"				
efer to <u>MWI-34,</u>	"CONSULT Fund	ction (METER/M	<u>&A)"</u> .			
the inspection i	esult normal?					
YES >> GO 1						
	orm trouble diagno					
CHECK S-MO	DE SWITCH PO	WER SUPPLY (CIRCUIT			
. Turn ignition						
	-MODE switch ha	arness connecto	or.			
0	switch ON. Itage between S-	MODE switch b	arness connect	or and around		
	lage between 0-			or and ground.		
S-MODE	E switch	_		_		
Connector	Terminal	Ground	Voltage			

M255	2
Is the inspection	result normal?

YES >> GO TO 4.

Battery voltage

Ground

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INFOID:000000009361268

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NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M98, M252
- Fuse block (J/B) connector M1
- 10 A fuse (No. 3)
- Harness for open or short between S-MODE switch and fuse

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

4.CHECK S-MODE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect combination meter harness connector.
- Check the continuity between S-MODE switch harness connector and combination meter harness connector.

S-MOD	E switch	Combina	tion meter	Continuity
Connector	Terminal	Connector	Terminal	Continuity
M255	1	M53	12	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 M98, M252

· Harness for open or short between S-MODE switch and combination meter

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

6.CHECK S-MODE SWITCH

Refer to EC-532, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace S-MODE switch.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000009361270

1.CHECK S-MODE SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect S-MODE switch harness connector.
- 3. Check the continuity between S-MODE switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2		Pressed	Existed
T and 2	S-MODE switch	Released	Not Existed

Is the inspection result normal?

YES >> INSPECTION END

S-MODE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace S-MODE switch.

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ECU DIAGNOSIS INFORMATION ECM

Reference Value

INFOID:000000009361271

[VQ37VHR]

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations. Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor.

This occurs because the timing light shows a value calculated by ECM according to signals received from the camshaft position sensor and other sensors related to ignition timing.

For outlines of following items, refer to <u>EC-155, "CONSULT Function"</u>.

CONSULT MONITOR ITEM

Monitor Item	C	Values/Status		
ENG SPEED	Run engine and compare CONSUL	Almost the same speed as the tachometer indication		
MAS A/F SE-B1	See EC-165, "Description".	1		
MAS A/F SE-B2	See EC-165, "Description".	See <u>EC-165. "Description"</u> .		
B/FUEL SCHDL	See EC-165, "Description".			
A/F ALPHA-B1	See EC-165, "Description".			
A/F ALPHA-B2	See EC-165, "Description".			
COOLAN TEMP/S	Ignition switch: ON		Indicates engine coolant temperature	
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V	
HO2S2 (B1)	- Endine' $\Delta \pi er Warmind IIn$		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V	
HO2S2 (B2)	 Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V	
HO2S2 MNTR (B1)	 Revving engine from idle up to 3,00 are met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load 	$LEAN \leftarrow \rightarrow RICH$		
HO2S2 MNTR (B2)	 Revving engine from idle up to 3,00 are met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load 	$LEAN \leftarrow \rightarrow RICH$		
VHCL SPEED SE	• Turn drive wheels and compare CONSULT value with the speedometer indica- tion.		Almost the same speed as speedometer indication	
BATTERY VOLT	Ignition switch: ON (Engine stopped)	d)	11 - 14 V	
ACCEL SEN 4	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.00 V	
ACCEL SEN 1	(Engine stopped)	Accelerator pedal: Fully depressed	4.4 - 4.8 V	

< ECU DIAGNOSIS INFORMATION >

Monitor Item	Co	ondition	Values/Status
ACCEL SEN 2* ¹	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.00 V
	(Engine stopped)	Accelerator pedal: Fully depressed	4.3 - 4.8 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
ΓΡ SEN 1-B1	(Engine stopped) • Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B1* ¹ (Engine stopped) • Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V	
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank tempera- ture
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow OI$	N	$OFF \rightarrow ON \rightarrow OFF$
CLSD THL POS	Ignition switch: ON	Accelerator pedal: Fully released	ON
	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF
	Engine: After warming up, idle the	Air conditioner switch: OFF	OFF
AIR COND SIG	COND SIG	Air conditioner switch: ON (Compressor operates.)	ON
PW/ST SIGNAL	• Engine: After warming up, idle the	Steering wheel: Not being turned	OFF
W/ST SIGNAL	engine	Steering wheel: Being turned	ON
LOAD SIGNAL • Ignition switch: ON	and/or	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
GNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$	1	$ON \rightarrow OFF \rightarrow ON$
	Engine: After warming up, idle the	Heater fan switch: ON	ON
HEATER FAN SW	engine	Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
	 Engine: After warming up Selector lever: P or N (A/T), Neu- 	Idle	2.0 - 3.0 msec
NJ PULSE-B1	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	2.0 - 3.0 msec
NJ PULSE-B2	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	7° BTDC
GN TIMING	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	25° - 45° BTDC
	Engine: After warming up	Idle	5 - 35%
CAL/LD VALUE	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,500 rpm	5 - 35%

< ECU DIAGNOSIS INFORMATION >

Monitor Item	Co	ondition	Values/Status
	Engine: After warming up	Idle	2.0 - 6.0 g/s
MASS AIRFLOW	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,500 rpm	7.0 - 20.0 g/s
PURG VOL C/V	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	—
INT/V SOL (B1)	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	Idle 2,000 rpm	0 - 2% Approx. 0 - 50%
	Engine: After warming up	Idle	0 - 2%
INT/V SOL (B2)	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0 - 50%
	• Engine: After warming up idle the	Air conditioner switch: OFF	OFF
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	For 1 second after turning ignition sEngine running or cranking	ON	
	Except above	OFF	
VENT CONT/V	Ignition switch: ON		OFF
THRTL RELAY	Ignition switch: ON	ON	
A/F S1 HTR (B2)	Engine: After warming up, idle the e (More than 140 seconds after starti	4 - 100%	
HO2S2 HTR (B1)	 Engine speed: Below 3,600 rpm aft Engine: After warming up Keeping the engine speed between idle for 1 minute under no load 	er the following conditions are met. a 3,500 and 4,000 rpm for 1 minute and at	ON
	Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B2)	 Engine speed: Below 3,600 rpm aft Engine: After warming up Keeping the engine speed between idle for 1 minute under no load 	er the following conditions are met. a 3,500 and 4,000 rpm for 1 minute and at	ON
	Engine speed: Above 3,600 rpm		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h	(12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indica- tion.		Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been per- formed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illumi- nated.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	Engine: After warming up	More than 70°C (158°F)	
A/F S1 HTR (B1)	Engine: After warming up, idle the e (More than 140 seconds after starti	4 - 100%	
VHCL SPEED SE	• Turn drive wheels and compare CC tion.	NSULT value with the speedometer indica-	Almost the same speed as the speedometer indication

< ECU DIAGNOSIS INFORMATION >

Monitor Item	Condition		Values/Status	_
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed	-
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON	
		MAIN switch: Released	OFF	
		CANCEL switch: Pressed	ON	-
CANCEL SW	Ignition switch: ON	CANCEL switch: Released	OFF	-
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON	-
		RESUME/ACCELERATE switch: Re- leased	OFF	-
SET SW	- Ignition quitch: ON	SET/COAST switch: Pressed	ON	-
SET 3W	Ignition switch: ON	SET/COAST switch: Released	OFF	-
BRAKE SW1		Brake pedal: Fully released	ON	-
(ASCD brake switch)	Ignition switch: ON	Brake pedal: Slightly depressed	OFF	-
BRAKE SW2	a Impition quitche ON	Brake pedal: Fully released	OFF	-
(Stop lamp switch)	Ignition switch: ON	Brake pedal: Slightly depressed	ON	-
HCL 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			-
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \rightarrow OFF$	-
	 MAIN switch: ON When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH) 	ASCD: Operating	ON	-
SET LAMP		ASCD: Not operating	OFF	-
FAN DUTY	Engine: Running		0 - 100%	-
AC EVA TEMP	 Engine: Idle Both A/C switch and blower fan switch: ON (Compressor operates) 		Changes according to in- structed value from combi- nation meter	-
AC EVA TARGET	 Engine: Idle Both A/C switch and blower fan switch: ON (Compressor operates) 		Changes according to in- structed value from combi- nation meter	-
A/F ADJ-B1	Engine: Running		-0.330 - 0.330	-
A/F ADJ-B2	Engine: Running		-0.330 - 0.330	-
TP SEN 1-B2	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V	-
	(Engine stopped) • Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V	-
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V	
TP SEN 2-B2* ¹	(Engine stopped)Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V	_
P/N POSI SW	Ignition switch: ON	Selector lever: P or N (A/T), Neutral (M/T)	ON	_
		Selector lever: Except above	OFF	_
NT/A TEMP SE	Ignition switch: ON		Indicates intake air temper- ature	
AC PRESS SEN	Engine: Idle Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V	-
A/F SEN1 (B2)	Engine: After warming up Maintaining engine speed at 2,000 rpm		Fluctuates around 2.2 V	-
ATOM PRES SEN	 This item is displayed but is not appreciately 	blicable to this model.		-

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	ondition	Values/Status
BRAKE BST PRES SE	This item is displayed but is not applied but is not applied but is not applied but is not applied by the second sec		
INT/V TIM (B1)	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	Idle	–5 - 5°CA
		2,000 rpm	Approx. 0 - 30°CA
	Engine: After warming up	Idle	–5 - 5°CA
INT/V TIM (B2)	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0 - 30°CA
MAP SENSOR	This item is displayed but is not applied but is not applied.	plicable to this model.	
EVAP LEAK DIAG	Ignition switch: ON		Depending on condition of EVAP leak diagnosis
EVAP DIAG READY	Ignition switch: ON (READY)		Depending on ready condi- tion of EVAP leak diagnosis
	• Ignition switch: OFF \rightarrow ON	VVEL learning has not been performed yet.	YET
VVEL LEARN	(After warming up)	VVEL learning has already been per- formed successfully.	DONE
VVEL SEN LEARN- B1	VVEL learning has already been performed successfully		Approx. 0.30 - 0.80 V
VVEL SEN LEARN- B2	VVEL learning has already been performed successfully		Approx. 0.30 - 0.80 V
	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	Idle	Approx. 0.25 - 1.40 V
VVEL POSITION SEN-B1		When revving engine up to 2,000 rpm quickly	Approx. 0.25 - 4.75 V
VVEL POSITION SEN-B2	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	Idle	Approx. 0.25 - 1.40 V
		When revving engine up to 2,000 rpm quickly	Approx. 0.25 - 4.75 V
	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	Idle	Approx. 0 - 20 deg
VVEL TIM-B1		When revving engine up to 2,000 rpm quickly	Approx. 0 - 90 deg
	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	Idle	Approx. 0 - 20 deg
VVEL TIM-B2		When revving engine up to 2,000 rpm quickly	Approx. 0 - 90 deg
ALT DUTY	Engine: Idle		0 - 80%
ALT DUTY SIG	Power generation voltage variable control: Operating		ON
ALI DUTY SIG	Power generation voltage variable control: Not operating		OFF
GEAR POSITION	Ignition switch: ON	Shift position: N \rightarrow 1st \rightarrow 2nd \rightarrow 3rd \rightarrow 4th \rightarrow 5th \rightarrow 6th \rightarrow R	$N \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow R$
M/T SYN REV STAT	Ignition switch: ON	S-MODE switch: Pressed (less than 1 second)	ACTIVE
		S-MODE switch: Pressed (1 second or more)	INACT
	i	1	1

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

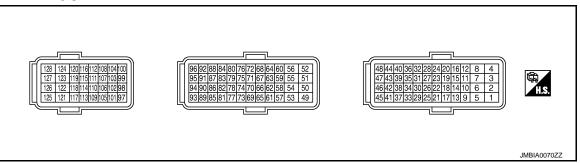
Monitor Item	C	Values/Status		
M/T SYNCHRO SW	Ignition switch: ON	S-MODE switch: Pressed	ON	1
		S-MODE switch: Released	OFF	_
CPP SW		Clutch pedal: Fully released	ON	Е
CFF SW	Ignition switch: ON	Clutch pedal: Fully depressed	OFF	
CLUTCH INTLCK	Ignition switch: ON	Clutch pedal: Fully released	OFF	
SW		Clutch pedal: Fully depressed	ON	
M/T N POS LEARN	Ignition switch: ON	M/T neutral position learning is success- fully complete.	DONE	
		M/T neutral position learning is not com- plete yet.	YET	
THRTL STK CNT B1	This item is displayed but is not ap			
	• DTC P0139 self-diagnosis (delayed response) has not been performed yet.		INCMP	
HO2 S2 DIAG1(B1)	DTC P0139 self-diagnosis (delayed response) has already been performed successfully.		CMPLT	
	DTC P0159 self-diagnosis (delaye	d response) has not been performed yet.	INCMP	
HO2 S2 DIAG2(B1)	 DTC P0159 self-diagnosis (delayed response) has already been performed successfully. 		CMPLT	
	DTC P0139 self-diagnosis (slow response) has not been performed yet.		INCMP	
HO2 S2 DIAG1(B2)	DTC P0139 self-diagnosis (slow response) has already been performed successfully.		CMPLT	
	DTC P0159 self-diagnosis (slow response) has not been performed yet.		INCMP	
HO2 S2 DIAG2(B2)	AG2(B2) • DTC P0159 self-diagnosis (slow response) has already been performed successfully.		CMPLT	
A/F SEN1	DTC P015A and P015B self-diagnosis incomplete.		INCMP	
DIAG1(B1)	DTC P015A and P015B self-diagnosis is complete.		CMPLT	
A/F SEN1 DIAG1	DTC P015C and P015D self-diagnosis incomplete.		INCMP	
(B2)	DTC P015C and P015D self-diagnosis is complete.		CMPLT	
A/F SEN1	DTC P014C and P014D self-diagnos	is incomplete.	INCMP	
DIAG2(B1)	DTC P014C and P014D self-diagnosis is complete.		CMPLT	
A/F SEN1	DTC P014E and P014F self-diagnosis incomplete.		INCMP	
DIAG2(B2)	DTC P014E and P014F self-diagnosis is complete.		CMPLT	
A/F SEN1 DIAG3(B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT	
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT	
A/F SEN1 DIAG3(B2)	The vehicle condition is not within the diagnosis range of DTC P014E, P014F, P015C or P015D.		ABSNT	
	The vehicle condition is within the dia or P015D.	gnosis range of DTC P014E, P014F, P015C	PRSNT	

*1: 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.

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< ECU DIAGNOSIS INFORMATION >

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- ECM is located behind the instrument assist lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description		Condition	Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
1 (O)	128 (B)	A/F sensor 1 heater (bank 1)	Output	 [Engine is running] Warm-up condition Idle speed (More than 140 seconds after starting engine) 	2.9 - 8.8 V★ 50mSec/div 50mSec/div 50mSec/div 50mSec/div 50mSec/div	
2 (G)	128	Throttle control motor (Open) (bank 1)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully depressed 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0031GB	
	(B)			 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully released 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0032GB	
3 (R)	128 (B)	Throttle control motor re- lay power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
4 (BR)	128 (B)	Throttle control motor (Close) (bank 1)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div	

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
5 (W)	128 (B)	A/F sensor 1 heater (bank 2)	Output	 [Engine is running] Warm-up condition Idle speed (More than 140 seconds after starting engine) 	2.9 - 8.8 V★ 50mSec/div 	C D
8 (B)		ECM ground	_	_	_	Е
11 (GR) 12 (L)		Ignition signal No. 4 Ignition signal No. 3		 [Engine is running] Warm-up condition Idle speed NOTE: 	0 - 0.2 V★ 50mSec/div	F
15 (V)	128	Ignition signal No. 5	0.1.1	The pulse cycle changes depending on rpm at idle	2V/div JMBIA0035GB	G
16 (G)	(B)	Ignition signal No. 2	Output		0.1 - 0.4 V★ 50mSec/div	Н
19 (SB) 20 (Y)		Ignition signal No. 6 Ignition signal No. 1		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	2V/div JMBIA0036GB	I
17 (P)	128 (B)	Heated oxygen sensor 2 heater (bank 1)	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 	10 V★ 50mSec/div 50mSec/div 50mSec/div 50mSec/div JMBIA0037GB	J K L
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)	Μ
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)	Ν
18 (W)	128 (B)	Intake valve timing control solenoid valve (bank 1)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000rpm	7 - 12 V★	O

< ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
21	128	EVAP canister purge vol- ume control solenoid	0.451	 [Engine is running] Idle speed Accelerator pedal: Not depressed even slightly, after engine starting 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 10V/div JMBIA0039GB
(GR)	(B)	valve	Output	 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 10V/div JMBIA0040GB
22 (R)	128 (B)	Fuel pump relay	Output		0 - 1.5 V
()				[Ignition switch: ON]More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
24 (P)	128 (B)		Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.5 V
(Г)	(6)	(Self shut-off)		[Ignition switch: OFF]More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
25 (O)	128 (B)	Throttle control motor re- lay	Output	[Ignition switch: $ON \rightarrow OFF$]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
				[Ignition switch: ON]	0 - 1.0 V
26 (W)	128 (B)	Gear lever position sen- sor X-axis	Input	[Ignition switch: ON] • Engine stopped • Shift lever: N→1st→2nd→3rd→4th→5th→6th→R	N: 1.45 - 2.35 V 1st: 0.90 - 1.40 V 2nd: 0.90 - 1.35 V 3rd: 1.70 - 2.15 V 4th: 1.65 - 2.10 V 5th: 2.70 - 3.15 V 6th: 2.65 - 3.10 V R: 3.50 - 4.05 V
27 (G)	128 (B)	Gear lever position sen- sor Y-axis	Input	[Ignition switch: ON] • Engine stopped • Shift lever: N→1st→2nd→3rd→4th→5th→6th→R	N: 2.15 - 3.00 V 1st: 1.10 - 1.60 V 2nd: 3.40 - 3.90 V 3rd: 1.10 - 1.65 V 4th: 3.40 - 3.90 V 5th: 1.10 - 1.60 V 6th: 3.40 - 3.90 V R: 3.40 - 3.90 V

< ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
28 (BR)	128 (B)	VVEL actuator motor re- lay abort signal (VVEL control module)	Output	[Engine is running]Warm-up conditionIdle speed	0 V	EC
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)	С
29 (G)	128 (B)	Intake valve timing control solenoid valve (bank 2)	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 12 V★	D E F
30	40	Throttle position sensor 1	Input	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully released 	More than 0.36 V	G
(Y)	(R)	(bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V	Н
31	48	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V	I
(R)	(B)	(bank 2)	mput	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V	J
33 (SB)	128 (B)	Heated oxygen sensor 2 heater (bank 2)	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 	10 V★ 50mSec/div 50mSec/div 50mSec/div 50mSec/div 50mSec/div JMBIA0037GB	K L M
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)	Ν
34	40	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V	0
(B)	(R)	(bank 1)	input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V	Ρ

< ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
35	48	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
(W)	(B)	(bank 2)		 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully depressed 	More than 0.36 V
36 (O)		Sensor ground [Brake booster pressure sensor]	_	_	_
37	128	Crankshaft position sen-	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 - 5.0 V★ 1mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
(W)	(B)	sor (POS)	input	[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★ 1mSec/div 2V/div JMBIA0042GB
38	96	Manifold absolute pres-	Input	[Engine is running]Warm-up conditionIdle speed	1.2 V
(O)	(P)	sure (MAP) sensor	input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	1.5 V
39	36	Brake booster pressure	Input	[Engine is running]Warm-up conditionIdle speedBrake pedal: Fully released	1.2 V
(P)	(O)	sensor	input	[Engine is running]Warm-up conditionIdle speedBrake pedal: Fully depressed	3.0 V
40 (R)	_	Sensor ground [Throttle position sensor (bank 1)]	_	_	_
41 (SB)	128 (B)		Input	[Ignition switch: ON] • Engine stopped • Clutch pedal: Fully released [Ignition switch: ON]	0 V
-	(SB) (B) switch			Engine stoppedClutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value	A
+		Signal name	Input/ Output	Condition	(Approx.)	
42	128 (P)	Clutch interlock switch	Input	[Ignition switch: ON]Engine stoppedClutch pedal: Fully released	0 V	EC
(GR)	(B)			[Ignition switch: ON]Engine stoppedClutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)	С
43 (G)	48 (B)	Sensor power supply [Throttle position sensor (bank 2)]		[Ignition switch: ON]	5 V	D
44 (L)	40 (R)	Sensor power supply [Throttle position sensor (bank 1)]	_	[Ignition switch: ON]	5 V	E
45 (LG)	36 (O)	Sensor power supply [Brake booster pressure sensor]	_	[Ignition switch: ON]	5 V	F
46 (R)	128 (B)	Sensor power supply [Crankshaft position sen- sor (POS)]	_	[Ignition switch: ON]	5 V	G
47 (Y)	—	Sensor ground [Crankshaft position sen- sor (POS)]	_	_	_	Н
48 (B)	_	Sensor ground [Throttle position sensor (bank 2)]	_	_	_	Ι
49 (GR)	128 (B)	Throttle control motor (Close) (bank 2)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500µSec/div	J
50 (V)	128 (B)	Throttle control motor (Open) (bank 2)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully depressed 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div JMBIA0031GB 0 - 14 V★	L M N
				 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully released 	500µSec/div	O P
52 (R)	128 (B)	Throttle control motor re- lay power supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
53 (W)	128 (B)	Ignition switch	Input	[Ignition switch: OFF] [Ignition switch: ON]	0 V BATTERY VOLTAGE (11 - 14 V)	

< ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
54 (Y)	_	Engine communication line (VVEL control mod- ule)	Input/ output	_	_
55 (LG)		Engine communication line (VVEL control mod- ule)	Input/ output	_	_
57 (L)	128 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2 V
59	128	Camshaft position sensor	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	3.0 - 5.0 V★ 20mSec/div 20mSec/div 20mSec/div 20mSec/div
(O)	(B)	(PHASE) (bank 1)	input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 5 2V/div JMBIA0046GB
60 (G)	128 (B)	Sensor power supply [Camshaft position sen- sor (PHASE) (bank 1), Manifold absolute pres- sure (MAP) sensor, Pow- er steering pressure sensor]		[Ignition switch: ON]	5 V
61 (R)	128 (B)	A/F sensor 1 (bank 1)	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
63	128	Camshaft position sensor	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	3.0 - 5.0 V★ 20mSec/div 5 20mSec/div 20mSec/div 20mSec/div 20mSec/div 3 20mSec/div 2 20mSec/div
(L)	(B)	(PHASE) (bank 2)	mput	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div E 2V/div JMBIA0046GB
64 (SB)	128 (B)	Sensor power supply [Camshaft position sen- sor (PHASE) (bank 2), Battery current sensor]	_	[Ignition switch: ON]	5 V

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Oraclitica	Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
65 (LG)	128 (B)	A/F sensor 1 (bank 2)	Input	[Ignition switch: ON]	2.2 V	EC
66 (V)	128 (B)	A/F sensor 1 (bank 2)	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.	С
67 (P)	128 (B)	Intake air temperature sensor (bank 1)	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.	D
68 (LG)		Sensor ground [Mass air flow sensor (bank 1), Intake air tem- perature sensor (bank 1)]	_	_	_	E
69 (W)	128 (B)	Knock sensor (bank 2)	Input	[Engine is running] • Idle speed	2.5 V* ¹	F
71 (Y)	128 (B)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.	G
72 (—)	_	Sensor ground (Knock sensor)	_	_	_	
73 (W)	128 (B)	Knock sensor (bank 1)	Input	[Engine is running] • Idle speed	2.5 V* ¹	Н
74 (L)	128 (B)	Sensor power supply (Gear lever position sen- sor)	_	[Ignition switch: ON]	5 V	I
75	128	Input speed sensor	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0.25 V★ 5mSec/div € 2V/div JMBIA2100GB	J
(W)	(B)	input speed sensor	mput	[Engine is running] • Engine speed: 2,000 rpm	0.25 V★ 5mSec/div connanananan connananananan connanananananananananananananananananan	M
76 (W)	128 (B)	Heated oxygen sensor 2 (bank 1)	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 - 1.0 V	O P

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Oraclitica	Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
				[Ignition switch: ON] • Engine stopped	0.4 V	
77 (SB)	68 (LG)	Mass air flow sensor (bank 1)	Input	[Engine is running]Warm-up conditionIdle speed	0.7 - 1.2 V	
				[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.3 - 1.7 V	
78 (G)	84 (B)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.	
79	94	Mass air flow sensor	lasut	[Engine is running] • Warm-up condition • Idle speed	0.7 - 1.2 V	
(BR)	(Y)	(bank 2)	Input	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.3 - 1.7 V	
80 (O)	128 (B)	Heated oxygen sensor 2 (bank 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 - 1.0 V	
81 (R)		Fuel injector No. 3			BATTERY VOLTAGE (11 - 14 V)★	
82 (V)		Fuel injector No. 6		 [Engine is running] Warm-up condition Idle speed NOTE: 	50mSec/div	
85 (BR)	100	Fuel injector No. 2		The pulse cycle changes depending on rpm at idle	10V/div JMBIA0047GB	
86 (W)	128 (B)	Fuel injector No. 5	Output		BATTERY VOLTAGE (11 - 14 V)★	
89 (GR)		Fuel injector No. 1			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	50mSec/div
90 (O)		Fuel injector No. 4			10V/div JMBIA0048GB	
84 (B)	_	Sensor ground (Heated oxygen sensor 2, Engine coolant tempera- ture sensor, Engine oil temperature sensor, Input speed sensor)	_		_	
87 (Y)	96	Power steering pressure	Output	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V	
(Y)	(P)	sensor		[Engine is running] Steering wheel: Not being turned 	0.4 - 0.8 V	

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
88 (R)	_	Sensor ground (Gear lever position sen- sor)		_	_
91 (SB)	95 (G)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged* ² • Idle speed	2.6 - 3.5 V
92 (G)	_	Sensor ground [Camshaft position sen- sor (PHASE) (bank 2)]	_	_	_
93 (P)	128 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
94 (Y)	_	Sensor ground [Mass air flow sensor (bank 2)]	_	_	_
95 (G)	_	Sensor ground [Battery current sensor]	_	_	_
96 (P)	_	Sensor ground [Camshaft position sen- sor (PHASE) (bank 1), Manifold absolute pres- sure (MAP) sensor, Pow- er steering pressure sensor]	_	_	_
97 (R)	100 (W)	Accelerator pedal position sensor 1	Input	 [Ignition switch: ON] Engine stopped Accelerator pedal: Fully released 	0.45 - 1.00 V
(11)	(**)			[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	4.2 - 4.8 V
98	104	Accelerator pedal position	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.22 - 0.50 V
(P)	(GR)	sensor 2	mput	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	2.1 - 2.5 V
99 (L)	100 (W)	Sensor power supply (Accelerator pedal posi- tion sensor 1)	_	[Ignition switch: ON]	5 V
100 (W)	_	Sensor ground (Accelerator pedal posi- tion sensor 1)	_	_	_
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V
101 108 (SB) (Y)				[Ignition switch: ON] • MAIN switch: Pressed	0 V
	108 (Y)	ASCD steering switch (models with ASCD sys- tem)	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V
		un)		[Ignition switch: ON]RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value
+		Signal name Input/ Output		Condition	(Approx.)
102 (GR)	112 (SB)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V
103 (G)	104 (GR)	Sensor power supply (Accelerator pedal posi- tion sensor 2)		[Ignition switch: ON]	5 V
104 (GR)		Sensor ground (Accelerator pedal posi- tion sensor 2)		_	-
105 (L)	112 (SB)	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 - 4.0 V
106 (W)	128 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
107 (BR)	112 (SB)	Sensor power supply (EVAP control system pressure sensor, Refrig- erant pressure sensor)		[Ignition switch: ON]	5 V
108 (Y)	_	Sensor ground (ASCD steering switch)	_	_	-
109 (G)	128 (B)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N (A/T), Neutral (M/ T)	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Selector lever: Except above	0 V
110	128	Engine speed output sig-	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1 V★ 10mSec/div € 2V/div JMBIA0076GB
(R)	(B) nal		Guipur	[Engine is running] • Engine speed is 2,000 rpm	1 V★ 10mSec/div 2V/div JMBIA0077GB
112 (SB)		Sensor ground (EVAP control system pressure sensor, Refrig- erant pressure sensor)		_	_
113 (P)	_	CAN communication line	Input/ Output	_	_
114 (L)	—	CAN communication line	Input/ Output	_	_
117 (Y)	128 (B)	Data link connector	Input/ Output	_	

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

Terminal No. (Wire color)		Description		Condition	Value	А
+		Signal name	Input/ Output		(Approx.)	
121 (LG)	128 (B)	EVAP canister vent con- trol valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	EC
122	128	Stop Jamp quitab	locut	[Ignition switch: OFF] • Brake pedal: Fully released	0 V	С
(P)	(B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)	_
123 (B) 124 (B)		ECM ground	_	_	_	D
125 (R)	128 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
126	128	ASCD brake switch (mod-		[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V	F
(BR)	(B)	els with ASCD system)	Input	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)	
127 (B) 128 (B)		ECM ground	_	_	_	- G H

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: This may vary depending on internal resistance of the tester.

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

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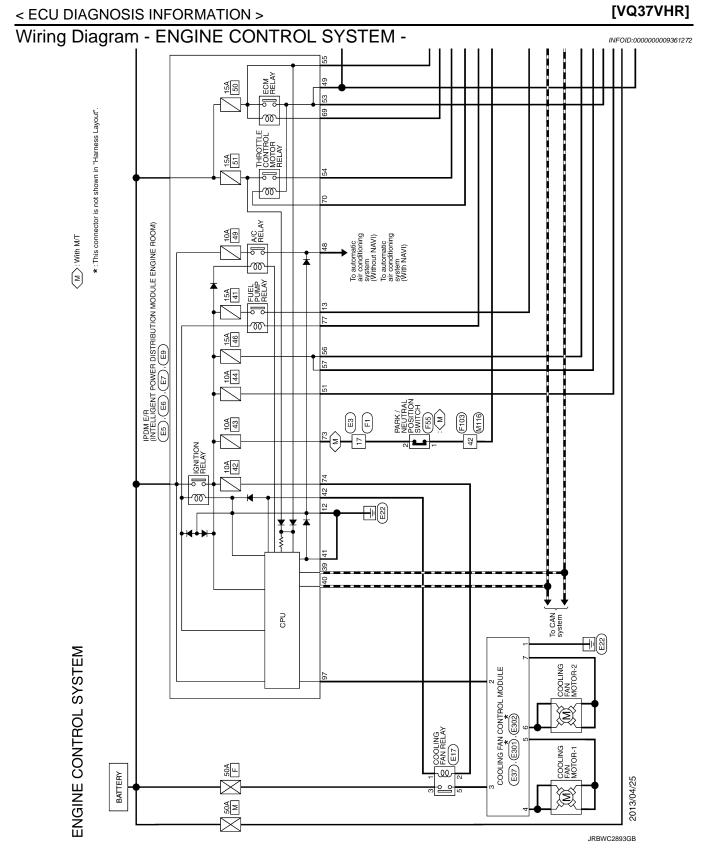
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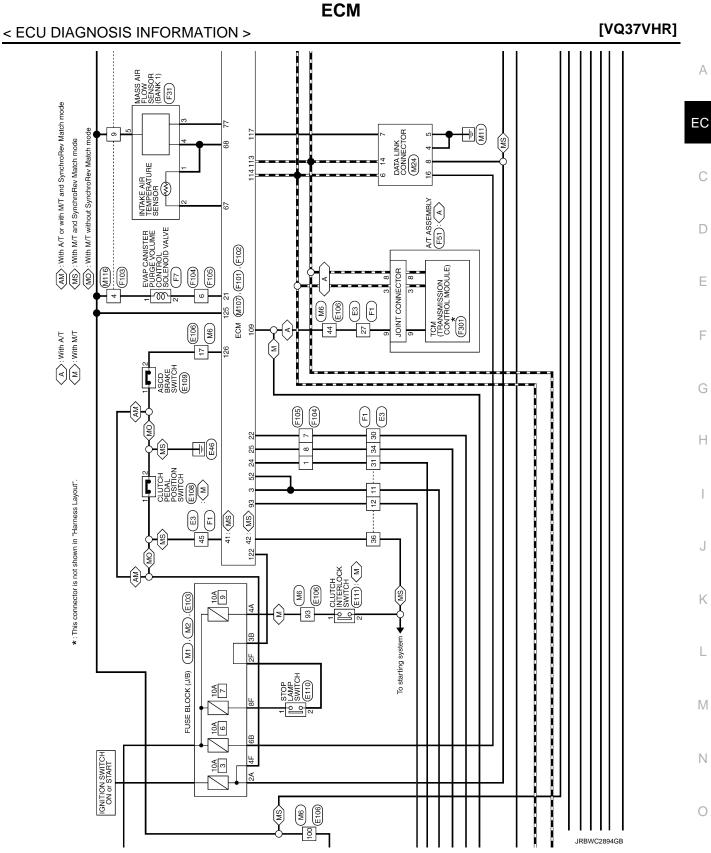
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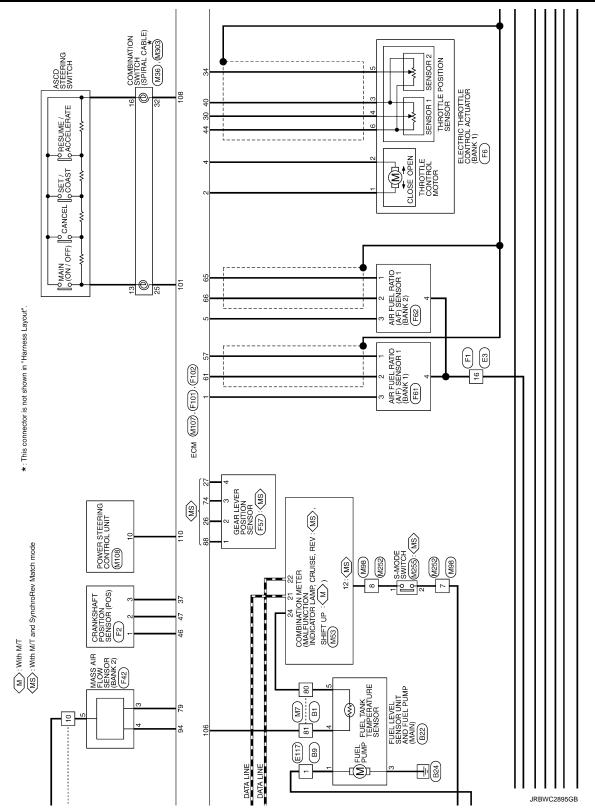
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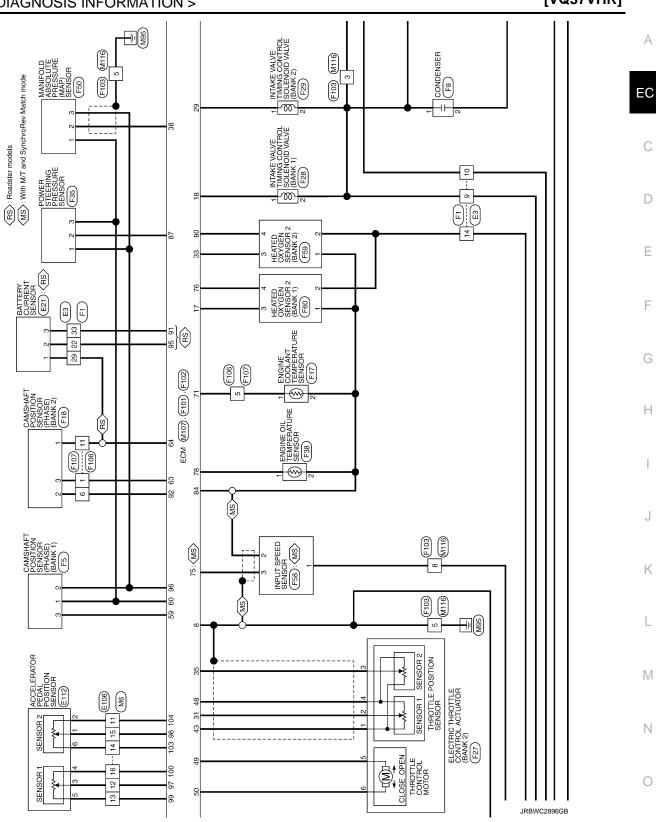


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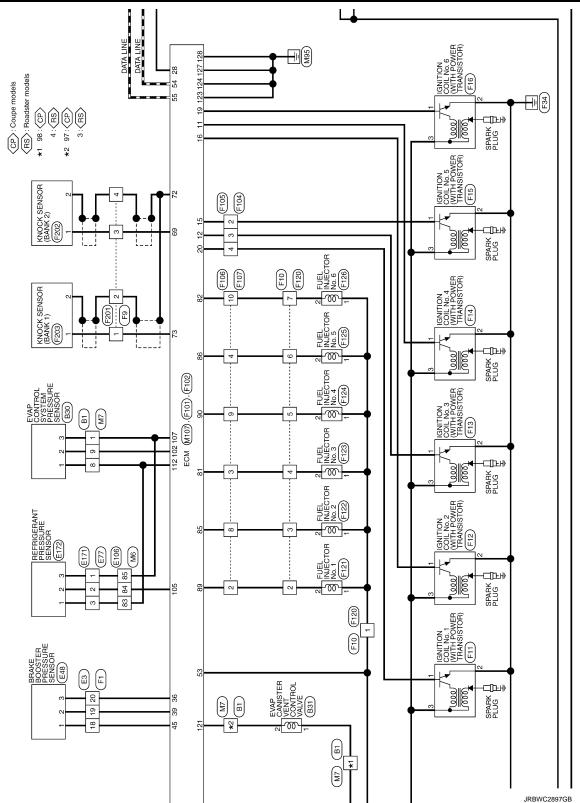
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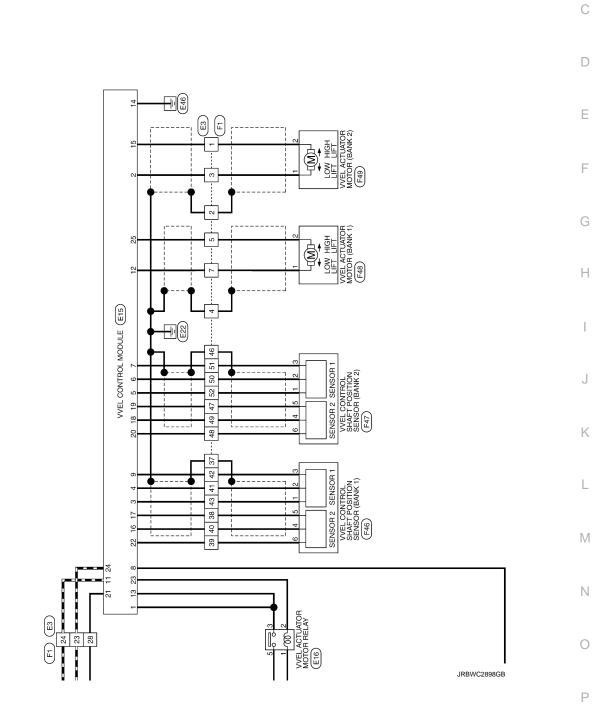




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Revision: 2013 May

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Connector Name AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)	Connector Name	me ECM	48	- a	SENSOR GROLIND	86	j c	FIFT INFECTOR NO. 4
Connector Type RH04FDGY-P	Connector Type	De RH40FB-RZ8-L-LH-Z	P	5		6	8	BATTERY CURRENT SENSOR
						92	J	SENSOR GROUND
E	E		Connector No.	Γ	F102	93	٩	POWER SUPPLY FOR ECM (BACK-UP)
	e E	47 43 39 35 31 27 19 15 11 3	Connector Name		ECM	94	~	SENSOR GROUND
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4321		45[41]37[33]29[25]21[17] 5 1	Connector Type		RH40FBR-RZ8-L-LH-Z	96	٩	SENSOR GROUND
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	ŝ	W A/F SENSOR 1 HEATER (BANK 2)	49	GR 1	THROTTLE CONTROL MOTOR (CLOSE) (BANK 2)]
	8	ECM GROUND	50	V T	THROTTLE CONTROL MOTOR (OPEN) (BANK 2)			
Connector No. F62	11	GR IGNITION SIGNAL NO. 4	52	R	THROTTLE CONTROL MOTOR POWER SUPPLY (BANK 2)			
Connector Name AIR FLIFL RATIO (A/F) SENSOR 1 (BANK 2)	12	L IGNITION SIGNAL NO. 3	53	N	IGNITION SWITCH			
	15	V IGNITION SIGNAL NO. 5	54	~	ENGINE COMMUNICATION LINE	Terminal	_	Signal Name [Snecification]
Connector Type RH04FDGY-P	16		55	ГG	ENGINE COMMUNICATION LINE	No	of Wire	
á	17	-	57	_	A/F SENSOR 1 (BANK 1)	2	J	I
	18	INTAKE VALV	59	0	CAMSHAFT POSITION SENSOR (PHASE) (BANK 1)	9	>	
R	_	SB IGNITION SIGNAL NO. 6	60	σ	SENSOR POWER SUPPLY	4	œ	-
	+		61	œ	A/F SENSOR 1 (BANK 1)	2	•	1
(131211)	+	EVAP CANISTER	63	+	CAMSHAFT POSITION SENSOR (PHASE) (BANK 2)	80		1
	22		64	B	SENSOR POWER SUPPLY	6	>	1
	24	+	65	g	A/F SENSOR 1 (BANK 2)	10	GR	1
	25	┥	99	1	A/F SENSOR 1 (BANK 2)	19	•	-
	26	╉	67	+	INTAKE AIR TEMPERATURE SENSOR (BANK 1)	20	>	1
Terminal Color Signal Name [Specification]	+	+	89	g	SENSOR GROUND	28		1
of Wire -	+	ŕ	69		KNOCK SENSOR (BANK 2)	29	CG	Ţ
	29	G INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)	+	-	ENGINE COOLANT TEMPERATURE SENSOR	8	~	1
+	30	+	+	SHIELD	SENSOR GROUND	31	0	1
3 W -	31	1	73	N	KNOCK SENSOR (BANK 1)	39	>	I
4 Y =	33	-	74	_	SENSOR POWER SUPPLY	42	J	I
	34	+	75	>	INPUT SPEED SENSOR	43	۵.	1
	35	W THROTTLE POSITION SENSOR 2 (BANK 2)	76	N	HEATED OXYGEN SENSOR 2 (BANK 1)	44	-	1
	36	0 SENSOR GROUND	77	SB	MASS AIR FLOW SENSOR (BANK 1)	45	>	-
	37		78	σ	ENGINE OIL TEMPERATURE SENSOR	46	>	
	38	ž	79	BR	MASS AIR FLOW SENSOR (BANK 2)			
	39	BRAKE BC	80	0	HEATED OXYGEN SENSOR 2 (BANK 2)			
	40		81	œ	FUEL INJECTOR NO. 3			
	+	5	82	>	FUEL INJECTOR NO. 6			
	+	ō	84	в	SENSOR GROUND			
	43	G SENSOR POWER SUPPLY	85	BR	FUEL INJECTOR NO. 2			
			86	N	FUEL INJECTOR NO. 5			
	45	LG SENSOR POWER SUPPLY	87	~	POWER STEERING PRESSURE SENSOR			

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ENGINE CONTROL SYSTEM Connector Numo FIEL INLECTOR No. 5 Connector Numo Connector Numo <th>3 W - 4 SHELD - Connector Num KNOCK (EAKNK 2) Connector Num Connector Num KNOCK SENSOR (EAKNK 2) Connector Num Connector Num Connector Num KNOCK SENSOR (EAKNK 2) Connector Num Connector Num KNOCK SENSOR (EAKNK 2) Connector Num Oritic Signal Num 0 0 Wite - - - - Connector Num ROOCK SENSOR (EANK 1) - - - - Connector Num ROOCK SENSOR (EANK 1) - - - - - - - - - - - - - - - - -</th> <th>Terminal Color Signal Name (Specification) 10 W/m Signal Name (Specification) 2 B POWER SUPPLY 3 R CM-H 4 C CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 CM-H CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 CM-H CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 W/m CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 W/m CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 W/m CM-H 0 W/m ENDERY (MENORY PACK-UP) 0 W/m CM-H 0 W/m ENDERY (MENORY PACK-UP) 0 W/m ENDERY (MENORY PACK-UP)</th> <th>8 8 8 8 8 8 8 7 9 9 9 9 9 9 1 1 1 1 1 1 1</th>	3 W - 4 SHELD - Connector Num KNOCK (EAKNK 2) Connector Num Connector Num KNOCK SENSOR (EAKNK 2) Connector Num Connector Num Connector Num KNOCK SENSOR (EAKNK 2) Connector Num Connector Num KNOCK SENSOR (EAKNK 2) Connector Num Oritic Signal Num 0 0 Wite - - - - Connector Num ROOCK SENSOR (EANK 1) - - - - Connector Num ROOCK SENSOR (EANK 1) - - - - - - - - - - - - - - - - -	Terminal Color Signal Name (Specification) 10 W/m Signal Name (Specification) 2 B POWER SUPPLY 3 R CM-H 4 C CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 CM-H CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 CM-H CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 W/m CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 W/m CM-H 0 W/m ENDERY (MENORY BACK-UP) 0 W/m CM-H 0 W/m ENDERY (MENORY PACK-UP) 0 W/m CM-H 0 W/m ENDERY (MENORY PACK-UP) 0 W/m ENDERY (MENORY PACK-UP)	8 8 8 8 8 8 8 7 9 9 9 9 9 9 1 1 1 1 1 1 1
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ł			23	•	GROUND	┡	BR	SENSOR POWER SUPPLY	ľ			
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	4C CC 7C 1C					110	в	ENGINE SPEED OUTPUT SIGNAL				
			Connector No.	tor No.	M98	112	SB	SENSOR GROUND				
			Connec	Connector Name	WIRE TO WIRE	113	٩	CAN COMMUNICATION LINE				
						114	_	CAN COMMUNICATION LINE				
Terminal	Color Simal Name [Specification]	luc	Connec	Connector Type	TH08FW-NH			DATA LINK CONNECTOR	Terminal	_	Signal Name [Snecification]	
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25	- se			v		123		ECM GROUND		B	- [Coupe models]	
26				5	n	124	m	ECM GROUND		0	 [Roadster models] 	
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32	-					126	BR	ASCD BRAKE SWITCH	ŝ	•	I	
33	- -					127	ш	ECM GROUND	80	_	-	
34						128	в	ECM GROUND	6	~	-	
			Terminal		Simal Nama [Cracification]				10	R	-	
			No.	of Wire					19	0	-	
Connector No.	or No. M53		-	в	1	Connector No.		M108	20	G	-	
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			3	GR	1				29	P LG	1	
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Fail safe

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NON DTC RELATED ITEM

Signal Name [Specification] Signal Name [Specification] ENGINE CONTROL SYSTEM 124 S-MODE SWITCH **IRE TO WIRE** LK04EG M255 Color of Wire nector Name S S no.



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Color of Wire
°*
Terminal No. No. 13 13 14 15 15 15 15 15 15 15 15 15 15 15 15 15

Signal Name [Specification	1	-	1	1	1	1	1	1
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Engine operating condition 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 lamp circuit	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM relat- ed diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating the fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the mal- function.	<u>EC-519</u>

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode						
U1003 U1024	Can communication circuit	VVEL actuator motor relay is turned off, and VVEL value is become at a minimum angle. Engine speed will not rise more than 3,500 rpm due to the fuel cut.						
P0011 P0021	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.						
P0101 P0102 P0103 P010B P010C P010D	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.						
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined b CONSULT displays the engine coolant temperat						
		Condition	Engine coolant temperature decided (CONSULT display)					
		Just as ignition switch is turned ON or START	40°C (104°F)					
		Approx 4 minutes or more 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 cooling fan operates while engine is running.						
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 P2135	Throttle position sensor	The ECM controls the electric throttle control acture order for the idle position to be within +10 degree The ECM regulates the opening speed of the thr condition. Therefore, the acceleration will be poor.	es.					
P0500	Vehicle speed sensor	The cooling fan operates (Highest) while engine	is running.					
P0524	Engine oil pressure	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function. Engine speed will not rise more than 2,400 rpm due to the fuel cut.						
P0605	ECM	(When ECM calculation function is malfunctionin ECM stops the electric throttle control actuator c fixed opening (approx. 5 degrees) by the return s ECM deactivates ASCD operation.	ontrol, throttle valve is maintained at a					
P0607	ECM	VVEL actuator motor relay is turned off, and VVE Engine speed will not rise more than 3,500 rpm of						
P0643	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.						



< ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine operating condition	on in fail-safe mode						
P1087 P1088	VVEL control function	VVEL of normal bank is controlled at VVEL ang	VEL of normal bank is controlled at VVEL angle of abnormal bank. ngine speed will not rise more than 3,500 rpm due to the fuel cut.						
P1089 P1092	VVEL control shaft position sensor	VVEL value is maintained at a fixed angle.	VEL value is maintained at a fixed angle. ngine speed will not rise more than 3,500 rpm due to the fuel cut						
P1608	VVEL control shaft position sensor	VVEL actuator motor relay is turned off, and VV Engine speed will not rise more than 3,500 rpm							
P1090 P1093	VVEL actuator motor	VVEL of normal bank is controlled at VVEL ang Engine speed will not rise more than 3,500 rpm							
		VVEL actuator motor relay is turned off, and VVEL value is become at a minimum angle Engine speed will not rise more than 3,500 rpm due to the fuel cut.							
P1091	VVEL actuator motor relay	VVEL actuator motor relay is turned off, and VV Engine speed will not rise more than 3,500 rpm							
P1233 P2101	Electric throttle control function	CM stops the electric throttle control actuator control, throttle valve is maintained at a xed opening (approx. 5 degrees) by the return spring.							
P1236 P2118	Throttle control motor	•	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.						
P1238 P2119	Electric throttle control actuator	 (When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will 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 being driven, it slows down gradually because of fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more. 							
P1290 P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator of fixed opening (approx. 5 degrees) by the return							
P1606	VVEL control module	VVEL actuator motor relay is turned off, and VV Engine speed will not rise more than 3,500 rpm							
P1805	Brake switch	ECM controls the electric throttle control actuato small range. Therefore, acceleration will be poor.	or by regulating the throttle opening to a						
		Vehicle condition	Driving condition						
		When engine is idling	Normal						
		When accelerating	Poor acceleration						
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sen- sor	The ECM controls the electric throttle control act order for the idle position to be within +10 degre The ECM regulates the opening speed of the th condition. Therefore, the acceleration will be poor.	ees.						

DTC Inspection Priority Chart

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

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< ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)
1	U0101 U1001 U1003 CAN communication line
	U1024 VVEL CAN communication line
	P0102 P0103 P010C P010D Mass air flow sensor
	P010A Manifold absolute pressure (MAP) sensor
	P0111 P0112 P0113 P0127 Intake air temperature sensor
	P0116 P0117 P0118 P0125 Engine coolant temperature sensor
	• P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sense
	P0128 Thermostat function
	P0181 P0182 P0183 Fuel tank temperature sensor
	P0196 P0197 P0198 Engine oil temperature sensor
	P0327 P0328 P0332 P0333 Knock sensor
	 P0335 Crankshaft position sensor (POS)
	P0340 P0345 Camshaft position sensor (PHASE)
	P0460 P0461 P0462 P0463 Fuel level sensor
	P0500 Vehicle speed sensor
	P0555 Brake booster pressure sensor
	• P0605 P0607 ECM
	P0643 Sensor power supply
	P0705 Transmission range switch
	P0820 Gear lever position sensor
	P0850 Park/neutral position (PNP) switch
	P1089 P1092 P1608 VVEL control shaft position sensor
	P1606 P1607 VVEL control module
	• P1610 - P1615 NATS
	 P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
	P2765 Input speed sensor

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

Priority	Detected items (DTC)	
2	 P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater 	A
	 P0075 P0081 Intake valve timing control solenoid valve P0130 P0131 P0132 P014C P014D P014E P014F P0150 P0151 P0152 P015A P015B P015C P015D P2096 P2097 P2098 P2099 Air fuel ratio (A/F) sensor 1 	EC
	 P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2 P0441 EVAP control system purge flow monitoring P0443 P0444 P0445 EVAP canister purge volume control solenoid valve P0447 P0448 EVAP canister vent control valve P0451 P0452 P0453 EVAP control system pressure sensor 	С
	 P0550 Power steering pressure sensor P0603 ECM power supply P0710 P0717 P0720 P0729 P0730 P0731 P0732 P0733 P0734 P0735 P0740 P0744 P0745 P0750 P0775 P0780 P0795 P1730 P1734 P2713 P2722 P2731 P2807 A/T related sensors, solenoid valves and switches P0820 Clutch interlack switch 	D
	 P0830 Clutch interlock switch P0833 Clutch pedal position switch P1087 P1088 VVEL system P1090 P1093 VVEL actuator motor 	E
	 P1091 VVEL actuator motor relay P1217 Engine over temperature (OVERHEAT) P1233 P2101 Electric throttle control function P1236 P2118 Throttle control motor 	F
	 P1290 P2100 P2103 Throttle control motor relay P1805 Brake switch 	G
3	 P0011 P0021 Intake valve timing control P0101 P010B Mass air flow sensor P0171 P0172 P0174 P0175 Fuel injection system function P0300 - P0306 Misfire 	Н
	 P0420 P0430 Three way catalyst function P0456 EVAP control system (VERY SMALL LEAK) P0506 P0507 Idle speed control system P050A P050E Cold start control 	I
	 P0524 Engine oil pressure P100A P100B VVEL system P1148 P1168 Closed loop control P1211 TCS control unit 	J
	 P1212 TCS communication line P1238 P2119 Electric throttle control actuator P1564 ASCD steering switch P1572 ASCD brake switch 	К
	P1574 ASCD vehicle speed sensor	L

DTC Index

INFOID:000000009361275

\times :Applicable —: Not applicable \mathbb{M}

DTC*1		ltems	SRT			Permanent	Reference	I
CONSULT GST* ²	ECM* ³	(CONSULT screen terms)	code	Trip	MIL	DTC group* ⁴	page	Ν
U0101	0101* ⁵	CAN COMM CIRCUIT	_	1	×	В	<u>EC-178</u>	
U1001	1001* ⁵	CAN COMM CIRCUIT	_	2	—	—	<u>EC-179</u>	0
U1003	1003	CAN COMM CIRCUIT	_	2	—	_	<u>EC-180</u>	
U1024	1024	VVEL CAN COMM CIRCUIT	_	1	×	В	<u>EC-182</u>	P
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing* ⁸	_	_	P
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	<u>EC-184</u>	
P0021	0021	INT/V TIM CONT-B2	×	2	×	В	<u>EC-184</u>	
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	В	<u>EC-188</u>	

< ECU DIAGNOSIS INFORMATION >

DTC*1			ODT			Dermonent	
CONSULT GST ^{*2}	ECM* ³	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ⁴	Reference page
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	В	<u>EC-188</u>
P0037	0037	HO2S2 HTR (B1)	_	2	×	В	<u>EC-191</u>
P0038	0038	HO2S2 HTR (B1)	_	2	×	В	<u>EC-191</u>
P0051	0051	A/F SEN1 HTR (B2)	_	2	×	В	<u>EC-188</u>
P0052	0052	A/F SEN1 HTR (B2)	_	2	×	В	EC-188
P0057	0057	HO2S2 HTR (B2)		2	×	В	<u>EC-191</u>
P0058	0058	HO2S2 HTR (B2)	_	2	×	В	<u>EC-191</u>
P0075	0075	INT/V TIM V/CIR-B1		2	×	В	EC-194
P0081	0081	INT/V TIM V/CIR-B2		2	×	В	<u>EC-194</u>
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	<u>EC-197</u>
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-203
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-203
P010A	010A	ABSL PRES SEN/CIRC		2	×	В	EC-209
P010B	010B	MAF SEN/CIRCUIT-B2		2	×	В	<u>EC-197</u>
P010C	010C	MAF SEN/CIRCUIT-B2		1	×	В	EC-203
P010D	010D	MAF SEN/CIRCUIT-B2	_	1	×	В	EC-203
P0111	0111	IAT SENSOR 1 B1		2	×	А	EC-213
P0112	0112	IAT SEN/CIRCUIT-B1		2	×	В	EC-215
P0113	0113	IAT SEN/CIRCUIT-B1		2	×	В	EC-215
P0116	0116	ECT SEN/CIRC		2	×	А	EC-218
P0117	0117	ECT SEN/CIRC	_	1	×	В	EC-221
P0118	0118	ECT SEN/CIRC		1	×	В	EC-221
P0122	0122	TP SEN 2/CIRC-B1		1	×	В	<u>EC-224</u>
P0123	0123	TP SEN 2/CIRC-B1		1	×	В	EC-224
P0125	0125	ECT SENSOR		2	×	В	EC-227
P0127	0127	IAT SENSOR-B1	_	2	×	В	<u>EC-230</u>
P0128	0128	THERMSTAT FNCTN		2	×	A	EC-232
P0130	0130	A/F SENSOR1 (B1)		2	×	A	EC-235
P0131	0131	A/F SENSOR1 (B1)		2	×	В	EC-239
P0132	0132	A/F SENSOR1 (B1)		2	×	В	<u>EC-242</u>
P0137	0137	HO2S2 (B1)	×	2	×	А	EC-245
P0138	0138	HO2S2 (B1)	×	2	×	А	EC-251
P0139	0139	HO2S2 (B1)	×	2	×	А	EC-259
P014C	014C	A/F SENSOR1 (B1)	×	2	×	А	<u>EC-266</u>
P014D	014D	A/F SENSOR1 (B1)	×	2	×	А	EC-266
P014E	014E	A/F SENSOR1 (B2)	×	2	×	А	EC-266
P014F	014F	A/F SENSOR1 (B2)	×	2	×	А	EC-266
P0150	0150	A/F SENSOR1 (B2)		2	×	А	EC-235
P0151	0151	A/F SENSOR1 (B2)		2	×	В	EC-239
P0152	0152	A/F SENSOR1 (B2)		2	×	В	EC-242
P0157	0157	HO2S2 (B2)	×	2	×	А	EC-245
P0158	0158	HO2S2 (B2)	×	2	×	А	<u>EC-251</u>

< ECU DIAGNOSIS INFORMATION >

DT	C* ¹	ltana	ODT			Permanent	Deferrere	Λ
CONSULT GST* ²	ECM* ³	Items (CONSULT screen terms)	SRT code	Trip	MIL	DTC group* ⁴	Reference page	A
P0159	0159	HO2S2 (B2)	×	2	×	A	<u>EC-259</u>	EC
P015A	015A	A/F SENSOR1 (B1)	×	2	×	A	<u>EC-266</u>	
P015B	015B	A/F SENSOR1 (B1)	×	2	×	А	<u>EC-266</u>	
P015C	015C	A/F SENSOR1 (B2)	×	2	×	А	<u>EC-266</u>	С
P015D	015D	A/F SENSOR1 (B2)	×	2	×	А	<u>EC-266</u>	
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	В	<u>EC-272</u>	D
P0172	0172	FUEL SYS-RICH-B1	_	2	×	В	<u>EC-276</u>	D
P0174	0174	FUEL SYS-LEAN-B2	—	2	×	В	<u>EC-272</u>	
P0175	0175	FUEL SYS-RICH-B2	_	2	×	В	<u>EC-276</u>	E
P0181	0181	FTT SENSOR	_	2	×	A and B	<u>EC-280</u>	
P0182	0182	FTT SEN/CIRCUIT	—	2	×	В	<u>EC-284</u>	F
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	<u>EC-284</u>	Г
P0196	0196	EOT SENSOR	—	2	×	A and B	<u>EC-287</u>	
P0197	0197	EOT SEN/CIRC	—	2	×	В	<u>EC-291</u>	G
P0198	0198	EOT SEN/CIRC	—	2	×	В	<u>EC-291</u>	
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	В	<u>EC-294</u>	
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	В	<u>EC-294</u>	Н
P0227	0227	TP SEN 2/CIRC-B2	—	1	×	В	<u>EC-224</u>	
P0228	0228	TP SEN 2/CIRC-B2	_	1	×	В	<u>EC-224</u>	
P0300	0300	MULTI CYL MISFIRE	—	2	×	В	<u>EC-297</u>	
P0301	0301	CYL 1 MISFIRE	_	2	×	В	<u>EC-297</u>	
P0302	0302	CYL 2 MISFIRE	—	2	×	В	<u>EC-297</u>	J
P0303	0303	CYL 3 MISFIRE	_	2	×	В	<u>EC-297</u>	
P0304	0304	CYL 4 MISFIRE	—	2	×	В	<u>EC-297</u>	К
P0305	0305	CYL 5 MISFIRE	—	2	×	В	EC-297	
P0306	0306	CYL 6 MISFIRE	—	2	×	В	EC-297	
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	_	<u>EC-303</u>	L
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	_	<u>EC-303</u>	
P0332	0332	KNOCK SEN/CIRC-B2	—	2	—	—	EC-303	M
P0333	0333	KNOCK SEN/CIRC-B2	—	2	—	—	<u>EC-303</u>	1 1 1
P0335	0335	CKP SEN/CIRCUIT	—	2	×	В	<u>EC-306</u>	
P0340	0340	CMP SEN/CIRC-B1	—	2	×	В	<u>EC-310</u>	Ν
P0345	0345	CMP SEN/CIRC-B2	_	2	×	В	<u>EC-310</u>	
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	<u>EC-314</u>	\circ
P0430	0430	TW CATALYST SYS-B2	×	2	×	A	<u>EC-314</u>	0
P0441	0441	EVAP PURG FLOW/MON	×	2	×	А	<u>EC-319</u>	
P0443	0443	PURG VOLUME CONT/V	_	2	×	А	<u>EC-324</u>	Ρ
P0444	0444	PURG VOLUME CONT/V	—	2	×	В	<u>EC-329</u>	
P0445	0445	PURG VOLUME CONT/V	_	2	×	В	<u>EC-329</u>	
P0447	0447	VENT CONTROL VALVE	_	2	×	В	<u>EC-332</u>	
P0448	0448	VENT CONTROL VALVE	_	2	×	В	<u>EC-336</u>	
P0451	0451	EVAP SYS PRES SEN		2	×	А	<u>EC-340</u>	

< ECU DIAGNOSIS INFORMATION >

DT	°C*1		0.0.7			Dormonont	Poforonco	
CONSULT GST* ²	ECM* ³	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ⁴	Reference page	
P0452	0452	EVAP SYS PRES SEN	—	2	×	В	<u>EC-344</u>	
P0453	0453	EVAP SYS PRES SEN	—	2	×	В	<u>EC-349</u>	
P0456	0456	EVAP VERY SML LEAK	×* ⁷	2	×	А	<u>EC-355</u>	
P0460	0460	FUEL LEV SEN SLOSH		2	×	А	<u>EC-361</u>	
P0461	0461	FUEL LEVEL SENSOR	—	2	×	В	EC-363	
P0462	0462	FUEL LEVL SEN/CIRC	—	2	×	В	<u>EC-365</u>	
P0463	0463	FUEL LEVL SEN/CIRC	—	2	×	В	<u>EC-365</u>	
P0500	0500	VEH SPEED SEN/CIRC*6	_	2	×	В	EC-368	
P0506	0506	ISC SYSTEM		2	×	В	<u>EC-371</u>	
P0507	0507	ISC SYSTEM		2	×	В	EC-373	
P050A	050A	COLD START CONTROL		2	×	А	<u>EC-375</u>	
P050E	050E	COLD START CONTROL		2	×	А	<u>EC-375</u>	
P0524	0524	ENGINE OIL PRESSURE	—	2	×	В	<u>EC-377</u>	
P0550	0550	PW ST P SEN/CIRC	—	2	—	_	<u>EC-380</u>	
P0555	0555	BRAKE BSTR PRES SEN/ CIRC	_	2	×	В	<u>EC-383</u>	
P0603	0603	ECM BACK UP/CIRCUIT	—	2	×	В	<u>EC-388</u>	
P0605	0605	ECM	—	1 or 2	× or —	В	<u>EC-390</u>	
P0607	0607	ECM	_	1 (A/T models) or 2 (M/T models)	× (A/T models) or — (M/T models)	В	<u>EC-392</u>	
P0643	0643	SENSOR POWER/CIRC		1	×	В	<u>EC-393</u>	
P0705	0705	T/M RANGE SWITCH A		2	×	В	<u>TM-217</u>	
P0710	0710	FLUID TEMP SENSOR A		2	×	В	<u>TM-219</u>	
P0717	0717	INPUT SPEED SENSOR A		2	×	В	<u>TM-222</u>	
P0720	0720	OUTPUT SPEED SENSOR*6		2	×	В	<u>TM-224</u>	
P0729	0729	6GR INCORRECT RATIO		2	×	В	<u>TM-228</u>	
P0730	0730	INCORRECT GR RATIO	_	2	×	В	<u>TM-230</u>	
P0731	0731	1GR INCORRECT RATIO		2	×	В	TM-232	
P0732	0732	2GR INCORRECT RATIO		2	×	В	<u>TM-234</u>	
P0733	0733	3GR INCORRECT RATIO		2	×	В	<u>TM-236</u>	
P0734	0734	4GR INCORRECT RATIO		2	×	В	<u>TM-238</u>	
P0735	0735	5GR INCORRECT RATIO		2	×	В	<u>TM-240</u>	
P0740	0740	TORQUE CONVERTER		2	×	В	<u>TM-242</u>	
P0744	0744	TORQUE CONVERTER	—	2	×	В	<u>TM-244</u>	
P0745	0745	PC SOLENOID A	—	2	×	В	<u>TM-246</u>	
P0750	0750	SHIFT SOLENOID A	—	2	×	В	<u>TM-247</u>	
P0775	0775	PC SOLENOID B	-	2	×	В	<u>TM-248</u>	
P0780	0780	SHIFT	—	1	×	В	<u>TM-249</u>	
P0795	0795	PC SOLENOID C	_	2	×	В	<u>TM-251</u>	
P0820	0820	GEAR LVR POS SEN/CIRC	_	1	—	_	<u>EC-396</u>	

< ECU DIAGNOSIS INFORMATION >

DT	C* ¹	lteres	CDT			Permanent	Deference	А
CONSULT GST* ²	ECM* ³	Items (CONSULT screen terms)	SRT code	Trip	MIL	DTC group* ⁴	Reference page	A
P0830	0830	CLUTCH INTLCK SW/CIRC		1			<u>EC-401</u>	EC
P0833	0833	CLUTCH P/P SW/CIRC		1	_	_	<u>EC-406</u>	20
P0850	0850	P-N POS SW/CIRCUIT		2	×	В	<u>EC-411</u>	
P100A	100A	VVEL SYSTEM-B1		2	×	В	<u>EC-415</u>	С
P100B	100B	VVEL SYSTEM-B2		2	×	В	<u>EC-415</u>	
P1087	1087	VVEL SYSTEM-B1	_	1	×	В	<u>EC-419</u>	D
P1088	1088	VVEL SYSTEM-B2	_	1	×	В	<u>EC-419</u>	D
P1089	1089	VVEL POS SEN/CIRC-B1		1	×	В	<u>EC-420</u>	
P1090	1090	VVEL ACTR MOT-B1		1	×	В	<u>EC-423</u>	Е
P1091	1091	VVEL ACTR MOT PWR		1 or 2	×	В	<u>EC-427</u>	
P1092	1092	VVEL POS SEN/CIRC-B2	_	1	×	В	<u>EC-420</u>	_
P1093	1093	VVEL ACTR MOT-B2		1	×	В	<u>EC-423</u>	F
P1148	1148	CLOSED LOOP-B1	_	1	×	A	<u>EC-430</u>	
P1168	1168	CLOSED LOOP-B2		1	×	A	<u>EC-430</u>	G
P1211	1211	TCS C/U FUNCTN	_	2		_	<u>EC-431</u>	
P1212	1212	TCS/CIRC		2	_	_	<u>EC-432</u>	
P1217	1217	ENG OVER TEMP	_	1	×	В	<u>EC-433</u>	Н
P1225	1225	CTP LEARNING-B1	_	2		_	<u>EC-437</u>	
P1226	1226	CTP LEARNING-B1		2	_	_	<u>EC-439</u>	
P1233	1233	ETC FNCTN/CIRC-B2	_	1	×	В	<u>EC-441</u>	
P1234	1234	CTP LEARNING-B2		2		_	<u>EC-437</u>	
P1235	1235	CTP LEARNING-B2		2		_	<u>EC-439</u>	J
P1236	1236	ETC MOT-B2	_	1	×	В	<u>EC-445</u>	
P1238	1238	ETC ACTR-B2	_	1	×	В	<u>EC-447</u>	K
P1239	1239	TP SENSOR-B2		1	×	В	<u>EC-449</u>	1.4
P1290	1290	ETC MOT PWR-B2		1	×	В	<u>EC-452</u>	
P1564	1564	ASCD SW		1	—	—	<u>EC-454</u>	L
P1572	1572	ASCD BRAKE SW		1	_	В	<u>EC-457</u>	
P1574	1574	ASCD VHL SPD SEN		1	_	_	<u>EC-465</u>	M
P1606	1606	VVEL CONTROL MODULE		1 or 2	× or —	В	<u>EC-467</u>	IVI
P1607	1607	VVEL CONTROL MODULE		1	×	В	<u>EC-469</u>	
P1608	1608	VVEL SENSOR POWER/CIRC		1	×	В	<u>EC-471</u>	Ν
P1610	1610	LOCK MODE	—	2	—	_	SEC-38	
P1611	1611	ID DISCARD IMM-ECM	—	2	—	_	<u>SEC-39</u>	0
P1612	1612	CHAIN OF ECM-IMMU	_	2	—	—	<u>SEC-41</u>	0
P1614	1614	CHAIN OF IMMU-KEY	_	2	—	—	<u>SEC-42</u>	
P1615	1615	DIFFERENCE OF KEY	—	2	—	—	<u>SEC-45</u>	Р
P1730	1730	INTERLOCK	—	2	×	В	<u>TM-256</u>	
P1734	1734	7GR INCORRECT RATIO	_	2	×	В	<u>TM-258</u>	
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	—	<u>EC-473</u>	
P2096	2096	POST CAT FUEL TRIM SYS B1	_	2	×	A	<u>EC-476</u>	
P2097	2097	POST CAT FUEL TRIM SYS B1	_	2	×	А	<u>EC-476</u>	

< ECU DIAGNOSIS INFORMATION >

DT	°C*1	ltems	SRT			Permanent	Reference
CONSULT GST* ²	ECM* ³	(CONSULT screen terms)	code	Trip	MIL	DTC group* ⁴	page
P2098	2098	POST CAT FUEL TRIM SYS B2		2	×	А	<u>EC-476</u>
P2099	2099	POST CAT FUEL TRIM SYS B2		2	×	А	<u>EC-476</u>
P2100	2100	ETC MOT PWR-B1	_	1	×	В	<u>EC-452</u>
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	В	<u>EC-441</u>
P2103	2103	ETC MOT PWR	_	1	×	В	<u>EC-452</u>
P2118	2118	ETC MOT-B1		1	×	В	<u>EC-445</u>
P2119	2119	ETC ACTR-B1		1	×	В	<u>EC-447</u>
P2122	2122	APP SEN 1/CIRC		1	×	В	<u>EC-481</u>
P2123	2123	APP SEN 1/CIRC		1	×	В	<u>EC-481</u>
P2127	2127	APP SEN 2/CIRC		1	×	В	<u>EC-484</u>
P2128	2128	APP SEN 2/CIRC		1	×	В	<u>EC-484</u>
P2132	2132	TP SEN 1/CIRC-B2	_	1	×	В	<u>EC-294</u>
P2133	2133	TP SEN 1/CIRC-B2		1	×	В	<u>EC-294</u>
P2135	2135	TP SENSOR-B1		1	×	В	<u>EC-449</u>
P2138	2138	APP SENSOR		1	×	В	EC-488
P2713	2713	PC SOLENOID D	_	2	×	В	TM-266
P2722	2722	PC SOLENOID E	—	2	×	В	<u>TM-267</u>
P2731	2731	PC SOLENOID F	—	2	×	В	<u>TM-267</u>
P2765	2765	INPUT SPEED SEN/CIRC	—	1	—	—	<u>EC-493</u>
P2807	2807	PC SOLENOID G	—	2	×	В	<u>TM-269</u>

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012/ISO 15031-6.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: Refer to EC-33. "Description", "PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)".

*5: The troubleshooting for this DTC needs CONSULT.

*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*7: SRT code will not be set if the self-diagnostic result is NG.

*8: When the ECM is in the mode that displays SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

Test Value and Test Limit

INFOID:000000009729313

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

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 On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

ltom	OBD-	Colf diagnostic test item	DTC	li	e and Test mit display)	Description														
ltem	MID	Self-diagnostic test item	Dic	TID	Unitand Scaling ID	Description														
								P0131	83H	0BH	Minimum sensor output voltage for test cycle									
			P0131	84H	0BH	Maximum sensor output voltage for test cycle														
			P0130	85H	0BH	Minimum sensor output voltage for test cycle														
			P0130	86H	0BH	Maximum sensor output voltage for test cycle														
			P0133	87H	04H	Response rate: Response ratio (lean to rich)														
			P0133	88H	04H	Response rate: Response ratio (rich to lean)														
				P2A00 or P2096	89H	84H	The amount of shift in air fuel ratio (too lean)													
																			P2A00 or P2097	8AH
			P0130 8BH 0BH	0BH	Difference in sensor output voltage															
			P0133	8CH	83H	Response gain at the limited frequency														
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)		P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1													
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1														
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1														
			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1														
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1														
								P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1									
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1														
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1														
			P0133	95H	04H	Response rate: Response ratio (lean to rich)														
			P0133	96H	84H	Response rate: Response ratio (rich to lean)														

< ECU DIAGNOSIS INFORMATION >

				li	e and Test mit	
Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description
	MID			TID	Unitand Scaling ID	
			P0138	07H	0CH	Minimum sensor output voltage for test cycle
		Heated oxygen sensor 2	P0137	08H	0CH	Maximum sensor output voltage for test cycle
	02H	(Bank 1)	P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diag- nosis
			P0143	07H	0CH	Minimum sensor output voltage for test cycle
	03H	Heated oxygen sensor 3 (Bank 1)	P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage
			P0151	83H	0BH	Minimum sensor output voltage for test cycle
		Air fuel ratio (A/F) sensor 1	P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
HO2S			P0153	87H	04H	Response rate: Response ratio (lean to rich)
			P0153	88H	04H	Response rate: Response ratio (rich to lean)
			P2A03 or P2098	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A03 or P2099	8AH	84H	The amount of shift in air fuel ratio (too rich)
	05H	(Bank 2)	P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1

< ECU DIAGNOSIS INFORMATION >

	OBD-	. Solf diagnostic tost item	570	li	e and Test mit display)	2	А
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	EC
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1	С
	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0153	95H	04H	Response rate: Response ratio (lean to rich)	
			P0153	96H	84H	Response rate: Response ratio (rich to lean)	D
			P0158	07H	0CH	Minimum sensor output voltage for test cycle	E
		Heated oxygen sensor 2	P0157	08H	0CH	Maximum sensor output voltage for test cycle	
HO2S	06H	(Bank 2)	P0158	80H	0CH	Sensor output voltage	F
			P0159	81H	0CH	Difference in sensor output voltage	
			P0159	82H	11H	Rear O2 sensor delay response diag- nosis	G
			P0163	07H	0CH	Minimum sensor output voltage for test cycle	
	07H	Heated oxygen sensor 3 (Bank2)	P0164	08H	0CH	Maximum sensor output voltage for test cycle	Н
			P0166	80H	0CH	Sensor output voltage	-
			P0165	81H	0CH	Difference in sensor output voltage	I
			P0420	80H	01H	O2 storage index	-
	21H	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust in- dex value	J
	2111	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output voltage	-
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst	K
LYST			P0430	80H	01H	O2 storage index	-
	22H	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust in- dex value	L
	2211	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output voltage	D.4
			P2424	84H	84H	O2 storage index in HC trap catalyst	M
			P0400	80H	96H	Low flow faults: EGR temp change rate (short term)	N
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)	IN
EGR SYSTEM	31H	EGR function	P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition	0
			P0400	83H	96H	Low flow faults: Max EGR temp	Р
			P1402	84H	96H	High Flow Faults: EGR temp increase rate	F

< ECU DIAGNOSIS INFORMATION >

				lir	e and Test mit	
Item	OBD- MID	Self-diagnostic test item	DTC	(GST) TID	display) Unitand Scaling ID	Description
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
	35H	VVT Monitor (Bank1)	P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	5511		P100A	84H	10H	VEL slow response diagnosis
			P1090	85H	10H	VEL servo system diagnosis
			P0011	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)
VVT			Advanced: P052A Retarded: P052B	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock posi- tion check diagnosis)
SYSTEM			P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	0011		P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis
			P0021	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)
			Advanced: P052C Retarded: P052D	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock posi- tion check diagnosis)
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
EVAP			P0456	80H	05H	Leak area index (for more than 0.02 inch)
SYSTEM	3CH	EVAP control system leak (Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

				Test value and Test limit (GST display)			
ltem	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	
	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric cur- rent to voltage	
	42H	Heated oxygen sensor 2 heat- er (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric cur- rent to voltage	
O2 SEN- SOR	43H	Heated oxygen sensor 3 heat- er (Bank 1)	P0043	80H	0CH	Converted value of heater electric cur- rent to voltage	
HEATER	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric cur- rent to voltage	
	46H	Heated oxygen sensor 2 heat- er (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric cur- rent to voltage	
	47H	Heated oxygen sensor 3 heat- er (Bank 2)	P0063	80H	0CH	Converted value of heater electric cur- rent to voltage	
			P0411	80H	01H	Secondary air injection system incor- rect flow detected	
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow	
			P2445	82H	01H	Secondary air injection system pump stuck off	
SEC- OND- ARY AIR	71H	Secondary air system	P2448	83H	01H	Secondary air injection system high airflow	
, ,			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switch- ing valve stuck open	
			P2440	85H	01H	Secondary air injection system switch- ing valve stuck open	
			P2444	86H	01H	Secondary air injection system pump stuck on	
			P0171 or P0172	80H	2FH	Long term fuel trim	
	81H	Fuel injection system function (Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped	
FUEL			P117A	82H	03H	Cylinder A/F imbalance monitoring	
SYSTEM			P0174 or P0175	80H	2FH	Long term fuel trim	
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped	
			P117B	82H	03H	Cylinder A/F imbalance monitoring	

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< ECU DIAGNOSIS INFORMATION >

	OBD-			lir	e and Test mit display)	
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
		Multiple cylinder misfires	P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
MISSIDE			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
MISFIRE	A1H		P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

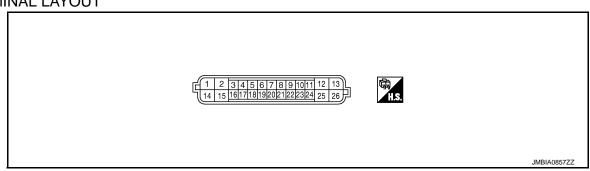
					e and Test mit		ŀ
Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description	
lion	MID			TID	Unitand Scaling ID	Decomption	E
	A2H No. 1 cylinder misfire	No. 1 cylinder misfire	P0301	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	(
			P0301	0CH	24H	Misfire counts for last/current driving cycles	-
	A3H	No. 2 cylinder misfire	P0302	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	[
			P0302	0CH	24H	Misfire counts for last/current driving cycles	E
	A4H	No. 3 cylinder misfire	P0303	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	F
			P0303	0CH	24H	Misfire counts for last/current driving cycles	(
	A5H No. 4 cylinder misfire	No. 4 cylinder misfire	P0304	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	ŀ
MISFIRE			P0304	0CH	24H	Misfire counts for last/current driving cycles	1
MISFIRE	A6H	No. 5 cylinder misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	
			P0305	0CH	24H	Misfire counts for last/current driving cycles	
	A7H	No. 6 cylinder misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	I
			P0306	0CH	24H	Misfire counts for last/current driving cycles	
	A8H	No. 7 cylinder misfire	P0307	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	
			P0307	0CH	24H	Misfire counts for last/current driving cycles	ľ
	A9H	No. 8 cylinder misfire	P0308	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	I
			P0308	0CH	24H	Misfire counts for last/current driving cycles	(

< ECU DIAGNOSIS INFORMATION >

Reference Value

INFOID:000000009361277

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- VVEL control module is located behind the IPDM E/R. For this inspection, remove hoodledge cover (RH).
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Term	inal No.	Description			Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
1 (W)	14 (B/W)	VVEL actuator motor pow- er supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
2	14	VVEL actuator motor	Outout	[Engine is running] • Warm-up condition • Idle speed (11 1+V) 0 - 14 V★ 100μSec/div ↓ ↓ ↓ ↓ ↓ 5V/div JM		
(L/B)	/B) (B/W) (High lift) (bank 2) Output [Engi • Wa • Wh		[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100µSec/div 		
3	4	VVEL control shaft posi-		[Engine is running] • Warm-up condition • Idle speed	Approx.0.25 - 1.40 V	
(G)	(W)	tion sensor 1 (bank 1)	Input	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	Approx.0.25 - 4.75 V	
4 (W)	_	Sensor ground [VVEL control shaft posi- tion sensor 1 (bank 1)]		_	_	

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

Termi	nal No.	Description) (alive	
+		Signal name	Input/ Output	Condition	Value (Approx.)	A
5	6	VVEL control shaft posi-		[Engine is running]Warm-up conditionIdle speed	Approx.0.25 - 1.40 V	EC
(R)	(B)	tion sensor 1 (bank 2)	Input	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	Approx.0.25 - 4.75 V	С
6 (B)	_	Sensor ground [VVEL control shaft posi- tion sensor 1 (bank 2)]	_	_	_	D
7 (SB)	6 (B)	Sensor power supply [VVEL control shaft posi- tion sensor 1 (bank 2)]	_	[Ignition switch: ON]	5 V	E
8 (BG)	14 (B/W)	Power supply for VVEL control module	_	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	F
9 (LG)	4 (W)	Sensor power supply [VVEL control shaft posi- tion sensor 1 (bank 1)]	_	[Ignition switch: ON]	5 V	G
11 (GR)		Engine communication line (ECM)	Input/ Output	_	_	
12	14	VVEL actuator motor	Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	H
(G)	(B/W)	(High lift) (bank 1)		[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100µSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	K
13 (W)	14 (B/W)	VVEL actuator motor pow- er supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	Μ
14 (B/W)		VVEL control module ground		_	_	N

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< ECU DIAGNOSIS INFORMATION >

Termi	inal No.	Description			Value
+		Signal name	Input/ Output	Condition	Value (Approx.)
15	14	VVEL actuator motor (Low	Outout	[Engine is running]Warm-up conditionIdle speed	0 - 14 V★ 100µSec/div € 5V/div JMBIA0854ZZ
(LY)	(B/W)	lift) (bank 2)	Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100µSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
16	17	VVEL control shaft posi-		[Engine is running]Warm-up conditionIdle speed	3.50 - 4.75 V
(R)	(L)	tion sensor 2 (bank 1)	Input	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0.25 - 4.75 V
17 (L)		Sensor ground [VVEL control shaft posi- tion sensor 2 (bank 1)]	_	_	_
18 (G)	19 (W)	VVEL control shaft posi- tion sensor 2 (bank 2)	Input	 [Engine is running] Warm-up condition Idle speed [Engine is running] Warm-up condition When revving engine up to 2,000 rpm quickly 	3.50 - 4.75 ∨ 0.25 - 4.75 ∨
19 (W)		Sensor ground [VVEL control shaft posi- tion sensor 2 (bank 2)]	_		_
20 (BR)	19 (W)	Sensor power supply [VVEL control shaft posi- tion sensor 2 (bank 2)]	_	[Ignition switch: ON]	5 V
21 (V)	14 (B/W)	VVEL actuator motor relay abort signal (ECM)	Input	[Engine is running]Warm-up conditionIdle speed	0 V
22 (P)	17 (L)	Sensor power supply [VVEL control shaft posi- tion sensor 2 (bank 1)]	_	[Ignition switch: ON]	5 V
23 (Y)	14 (B/W)	VVEL control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
24 (SB)	_	Engine communication line (ECM)	Input/ Output	[Ignition switch: ON]	0 - 1.0 V —

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

Term	inal No.	Description			Value	_
+		Signal name	Input/ Output	Condition	(Approx.)	A
25	14	VVEL control motor (Low		[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div € 5V/div JMBIA0854ZZ	EC C D
(BR)	(B/W)	lift) (bank 1)	Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100µSec/div € 5V/div JMBIA0855ZZ	E
★: Avera	age voltage	o for pulse signal (Actual puls	e signal ca	n be confirmed by oscilloscope.)		G

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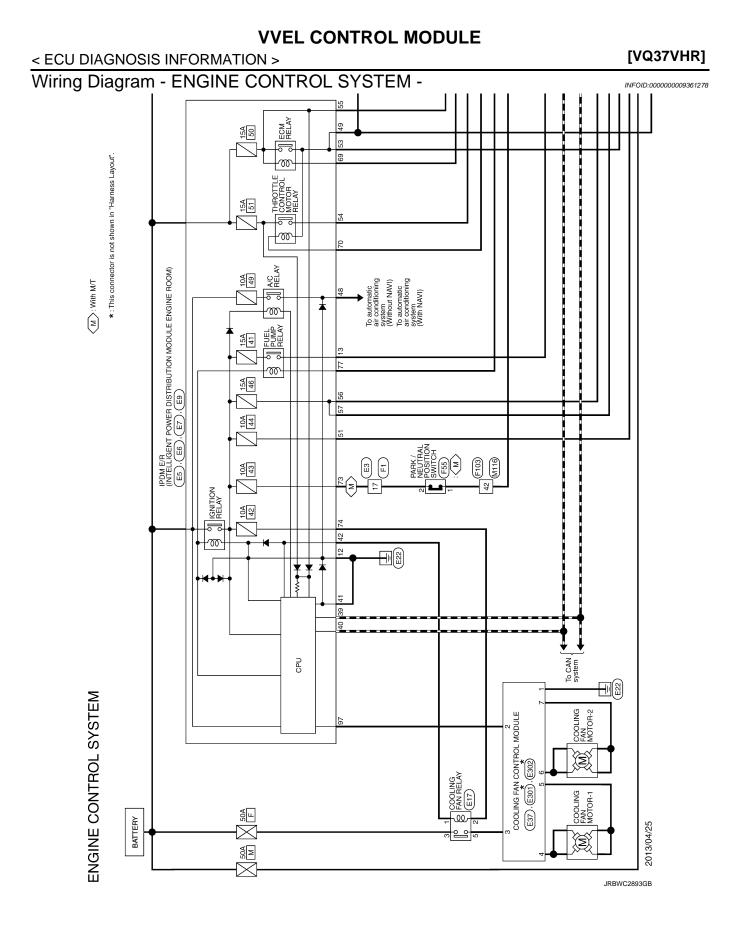
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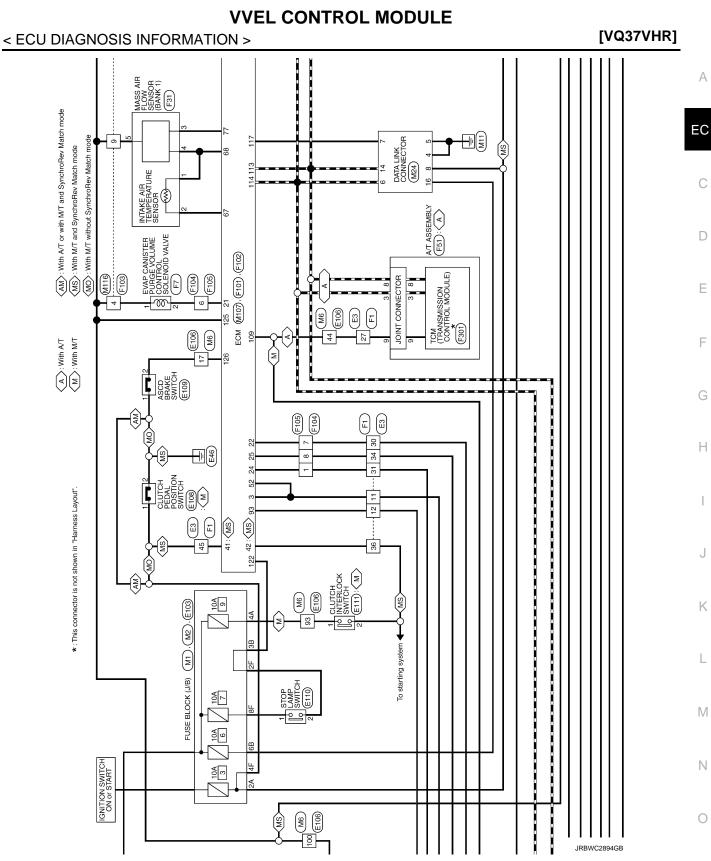
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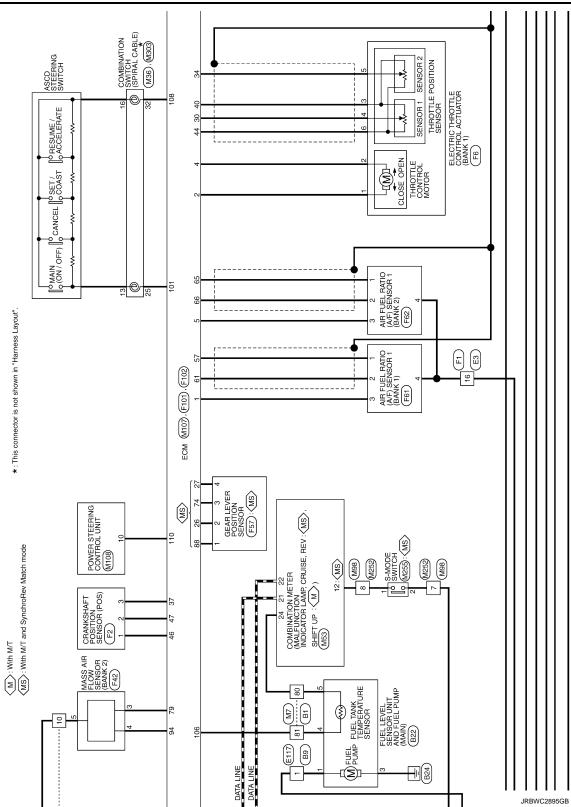
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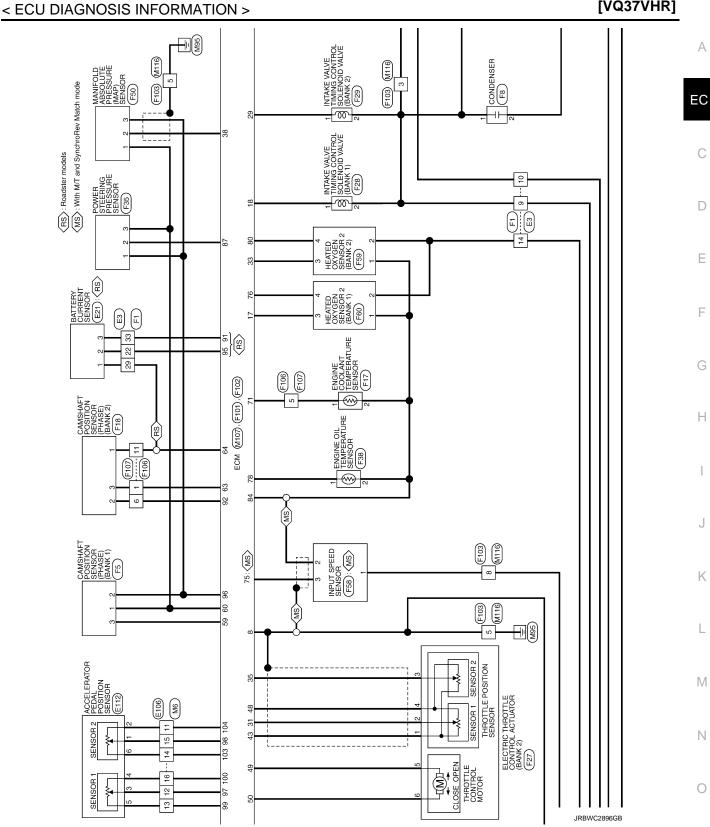


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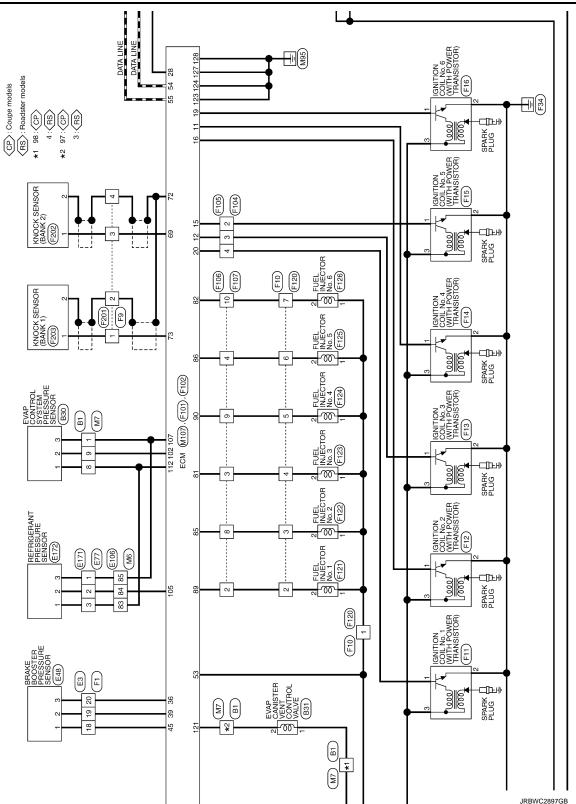




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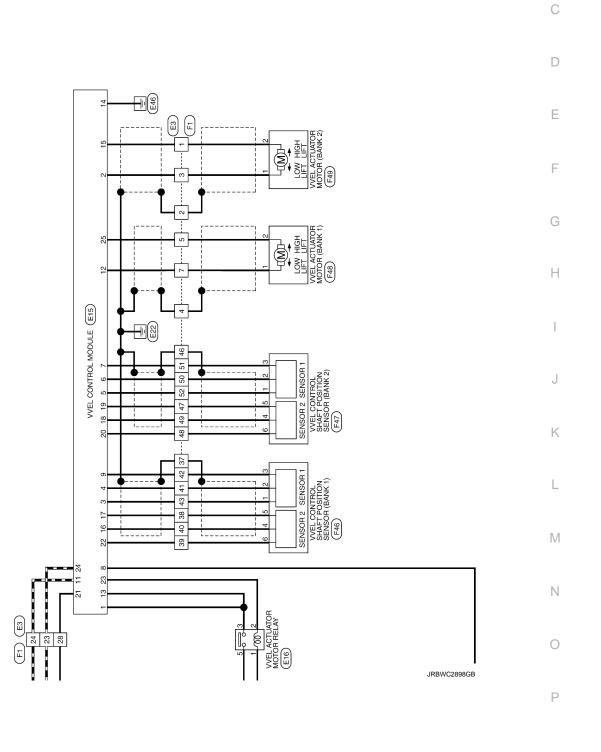
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VVEL CONTROL MODULE

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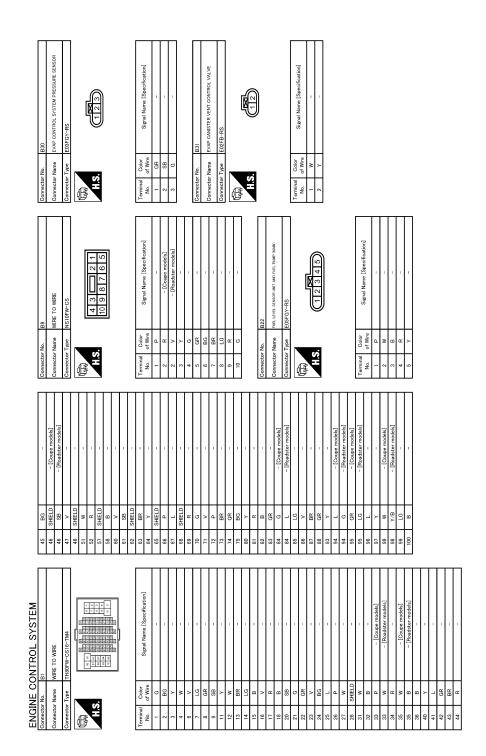
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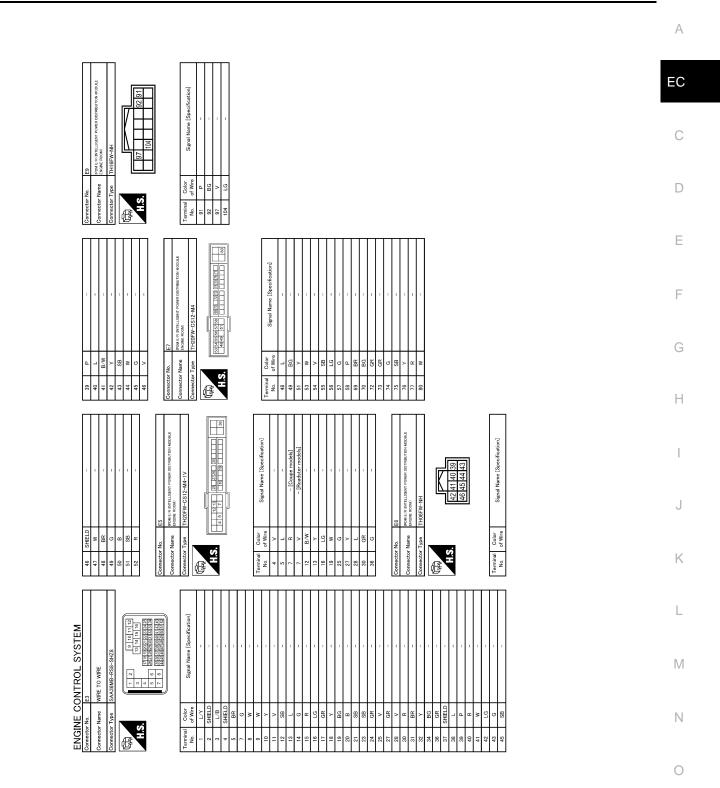
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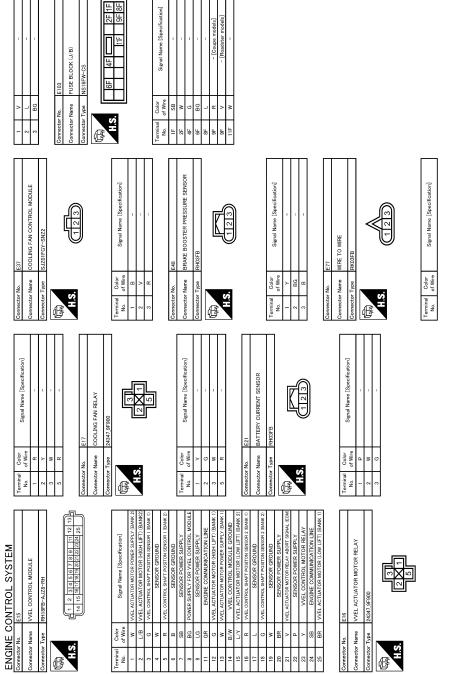


< ECU DIAGNOSIS INFORMATION >



JRBWC2900GB

< ECU DIAGNOSIS INFORMATION >



JRBWC2901GB

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VVEL CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

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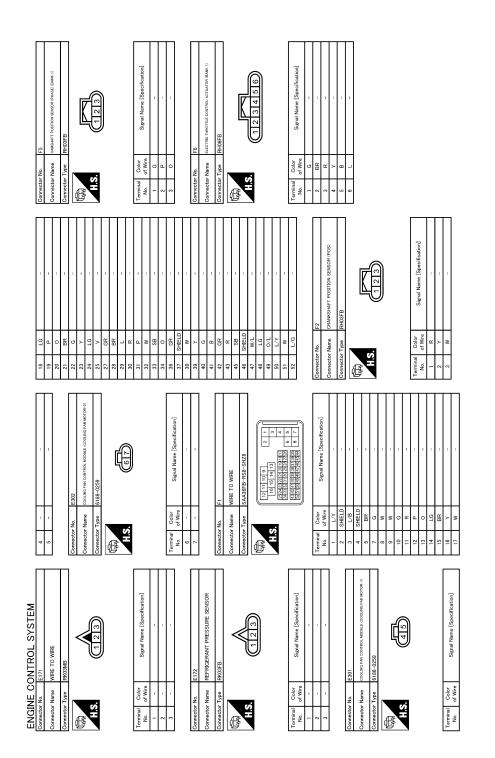
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< ECU DIAGNOSIS INFORMATION >

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MASS AIR FLOW SENSOR (BANK 2) Signal Name [Specification] Signal Name [Specification] Signal Name [Specification] VEL CONTROL SHAFT POSITION SENSOR (BANK 1) 1 2 3 4 5 6 RH06FB F42 Color of Wire Color of Wire Color of Wire BR മ∺്ദ≥> R Connector Name nnector Name nnector No. Connector Type ALS. AHS. erminal No. erminal No. erminal No. F C F35 POWER STEERING PRESSURE SENSOR ENGINE OIL TEMPERATURE SENSOR MASS AIR FLOW SENSOR (BANK 1) Signal Name [Specification] Signal Name [Specification] Ø F31 -38 Color of Wire B nector Name Color of Wire LG 요땅 Connector Name Name Connector No. ector No. H.S. AHS. HIS. Terminal No. erminal No. Ø đ ß 20 200 Signal Name [Specification] Signal Name [Specification] Þ Ø -SH Color of Wire Color of Wire onnector Name Connector Name AHS. ALS. Terminal No. erminal No. C F ENGINE COOLANT TEMPERATURE SENSOR THROTTLE CONTROL ACTUATOR (BANK 2) Signal Name [Specification] Signal Name [Specification] Signal Name [Specification] (BANK 2) ENGINE CONTROL SYSTEM Connector No. 1517 123456 Ø Terminal Color No. of Wire

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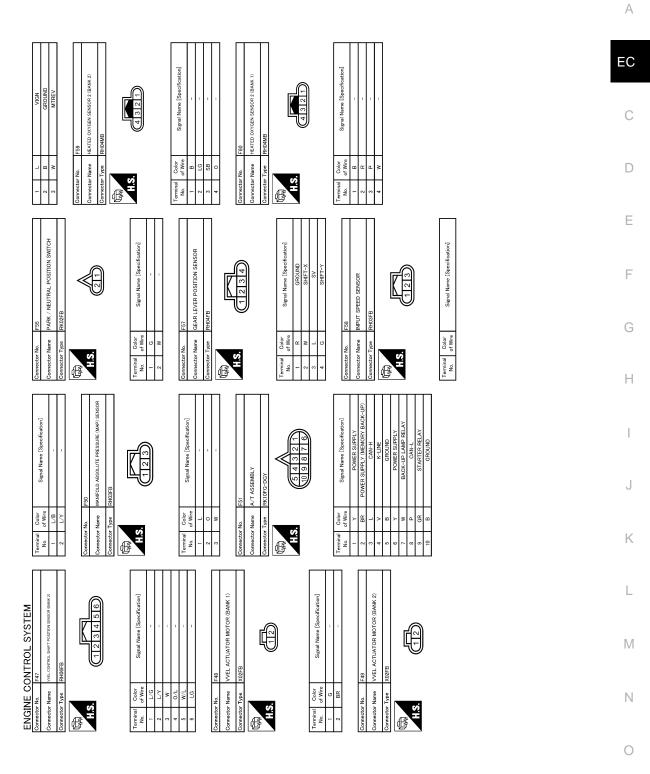
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ENGINE CONTROL SYSTEM	Connector No.	5101	4	•		8	•	
Т		Γ	F	: >	SENSOR GROUND	8	g	FIEL IN FOTOR NO 1
Connector Name AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)	Connector Name	me ECM	48	. a	SENSOR GROUND	8	; c	FIFI INJECTOR NO 4
Connector Type RH04FDGY-P	Connector Type	pe RH40FB-RZ8-L-LH-Z				91	SB	BATTERY CURRENT SENSOR
L						92	σ	SENSOR GROUND
E	E		Connector No.	or No.	F102	69	٩	POWER SUPPLY FOR ECM (BACK-UP)
		48 44 40 30 25 24 20 10 12 8 4 47 43 39 35 31 27 19 15 11 3	, and a	Connector Name	ECM	94	Y	SENSOR GROUND
	0					95	J	SENSOR GROUND
(1321)			Connect	Connector Type	RH40FBR-RZ8-L-LH-Z	96	٩	SENSOR GROUND
)			ą					
			THE P		[96]92]88]84]80]76]72]68]64[60] [52]	Connector No.	r No	E103
				vi	91 87 79 75 71 67 63 59 55			
Terminal Color Simul Name [Smoiffortion]	Terminal C	Color Simul Name [Samifenstian]			94 90 86 82 /8 /4 86 55 53 54 50 93 89 85 81 77 73 69 65 61 57 53 49	Connector Name	r Name	WIRE TO WIRE
	No. of	of Wire		-		Connector Type	r Type	TK36FW-NS10
-	-					ą		
2 R -	2			H				
3 0	+		Terminal	I Color	Signal Name [Specification]	S H		333.128.03.94.03.37.15.130.150.191.94.17.141.151.04.13.12.14.13.22.12 44.04.04.14.54.04.46.00 228.02.27.04.128.02.04.231.25.21 44.04.04.04.04.04.00 228.02.27.04.128.04.021.25.21
4 Y =	+	THRO	ġ.	or wire	to branch the second second second to second in the second s]	
	n	A/F SEN:	44	5	THRUTTLE CONTROL MUTOR (CLUSE) (BANK 2)			
	m		20	>	THROTTLE CONTROL MOTOR (OPEN) (BANK 2)			
Connector No. F62	=	GR IGNITION SIGNAL NO. 4	52	~	THROTTLE CONTROL MOTOR POWER SUPPLY (BANK 2)			
Connector Name AIR FLIFL RATIO (A/F) SENSOR 1 (BANK 2)	12	L IGNITION SIGNAL NO. 3	23	>	IGNITION SWITCH			
	15	V IGNITION SIGNAL NO. 5	54	Y	ENGINE COMMUNICATION LINE	Terminal	Color	Cimrel Mamo [Considention]
Connector Type RH04FDGY-P	16	G IGNITION SIGNAL NO. 2	55	P	ENGINE COMMUNICATION LINE	No	of Wire	
ſ	17	P HEATED OXYGEN SENSOR 2 HEATER (BANK 1)	57	٦	A/F SENSOR 1 (BANK 1)	2	9	-
E	18	W INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)	59	0	CAMSHAFT POSITION SENSOR (PHASE) (BANK 1)	3	M	1
	19	SB IGNITION SIGNAL NO. 6	99	9	SENSOR POWER SUPPLY	4	æ	1
	20	Y IGNITION SIGNAL NO. 1	61	œ	A/F SENSOR 1 (BANK 1)	ۍ	8	1
((4 3 2 1))	21	GR EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	63	-	CAMSHAFT POSITION SENSOR (PHASE) (BANK 2)	8	_	
)	22	R FUEL PUMP RELAY	64	SB	SENSOR POWER SUPPLY	6	٨	1
	24	P ECM RELAY (SELF SHUT-OFF)	65	P	A/F SENSOR 1 (BANK 2)	10	GR	1
	25	0 THROTTLE CONTROL MOTOR RELAY	99	>	A/F SENSOR 1 (BANK 2)	19	0	-
	26	W GEAR LEVER POSITION SENSOR X-AXIS	67	٩	INTAKE AIR TEMPERATURE SENSOR (BANK 1)	20	Y	-
Terminal Color Signal Name [Specification]	-	G GEAR LEVER POSITION SENSOR Y–AXIS	68	ГG	SENSOR GROUND	28	æ	
of Wire	28	BR WEL ADTUATOR MOTOR RELAY ABORT SIGNAL (WEL CONTROL MODULE)	69	M	KNOCK SENSOR (BANK 2)	29	LG	-
1 LG –	29	G INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)	17	۲	ENGINE COOLANT TEMPERATURE SENSOR	30	æ	-
2 V -	30	Y THROTTLE POSITION SENSOR 1 (BANK 1)	72	SHIELD	SENSOR GROUND	31	0	1
3 W -	31	R THROTTLE POSITION SENSOR 1 (BANK 2)	73	W	KNOCK SENSOR (BANK 1)	39	w	-
4 Y -	33	SB HEATED OXYGEN SENSOR 2 HEATER (BANK 2)	74		SENSOR POWER SUPPLY	42	σ	1
	34	B THROTTLE POSITION SENSOR 2 (BANK 1)	75	×	INPUT SPEED SENSOR	43	٩	1
	35	W THROTTLE POSITION SENSOR 2 (BANK 2)	76	2	HEATED OXYGEN SENSOR 2 (BANK 1)	44	-	I
	36	0 SENSOR GROUND	17	SB	MASS AIR FLOW SENSOR (BANK 1)	45	>	-
	37	W CRANKSHAFT POSITION SENSOR (POS)	78	σ	ENGINE OIL TEMPERATURE SENSOR	46	>	1
	38	O MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR	79	BR	MASS AIR FLOW SENSOR (BANK 2)			
	39	P BRAKE BOOSTER PRESSURE SENSOR	80	0	HEATED OXYGEN SENSOR 2 (BANK 2)			
	40		81	æ	FUEL INJECTOR NO. 3			
	41	ы С	82	>	FUEL INJECTOR NO. 6			
	42	GR CLUTCH INTERLOCK SWITCH	84	۵	SENSOR GROUND			



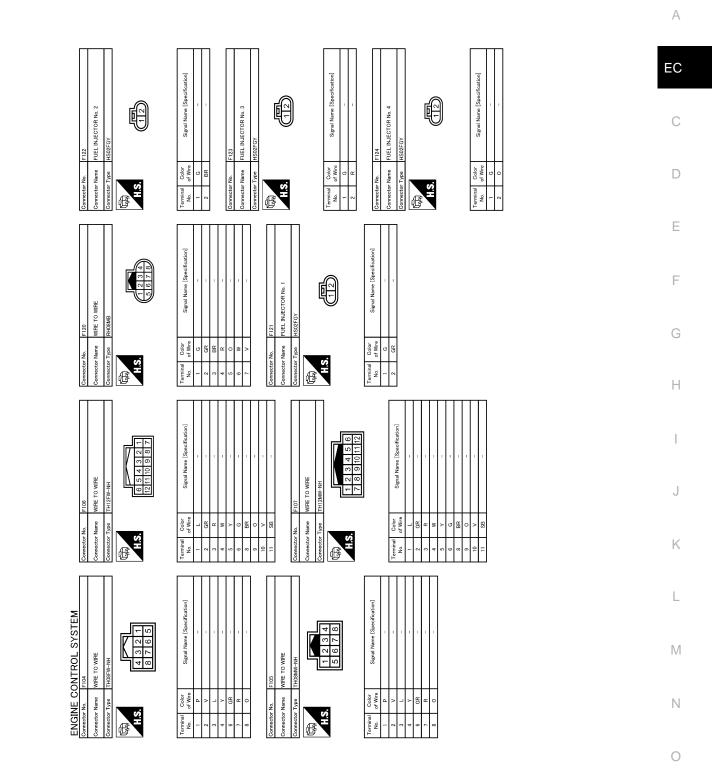
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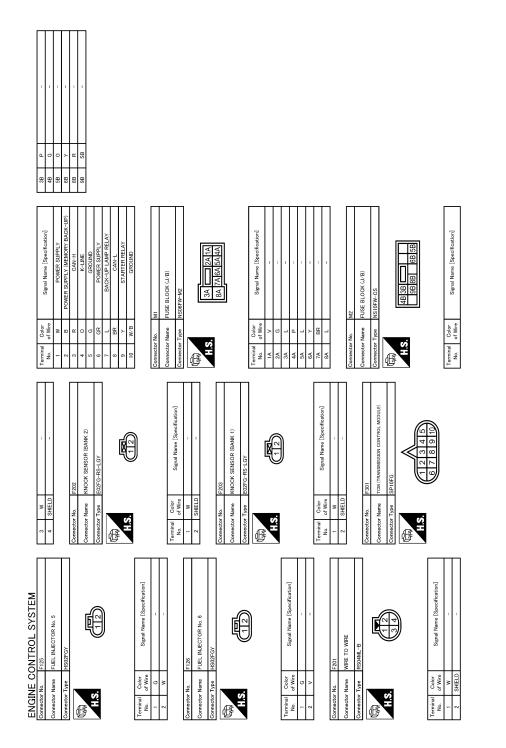
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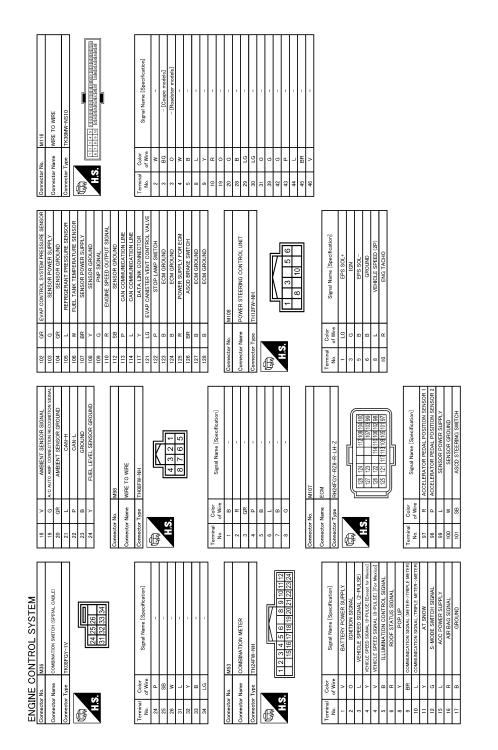
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Signal Name [Specification]

Color of Wire

Ferminal No.

Signal Name [Specification]

Color of Wire

erminal No SOB

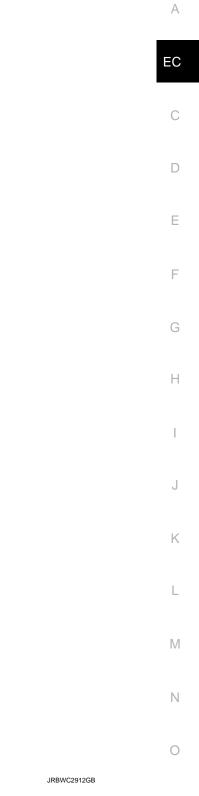
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ENGINE CONTROL SYSTEM

WIRE TO WIRE



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Signal Name [Specification]

Color of Wire

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S-MODE SWITCH

nnector Name

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M255 S-MODE TK04FGY

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ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VQ37VHR]

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

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SYSTEM — BASIC ENGINE CONTROL SYSTEM

							S	YMPT	ОМ						
		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
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	<u>EC-511</u>
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-628</u>
	Fuel injector circuit	1	1	2	3	2		2	2			2			<u>EC-508</u>
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-98</u>
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-525</u>
	Incorrect idle speed adjustment						1	1	1	1		1			<u>EC-14</u>
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<u>EC-441,</u> <u>EC-447</u>
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-14
	Ignition circuit	1	1	2	2	2		2	2			2			<u>EC-514</u>
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-173
Mass air flow sensor circuit		1			2										<u>EC-197,</u> <u>EC-203</u>
Engine o	coolant temperature sensor circuit						3			3					<u>EC-221,</u> <u>EC-227</u>
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			EC-235, EC-239, EC-242, EC-476
Throttle position sensor circuit							2			2					EC-224, EC-294, EC-437, EC-439, EC-449
Accelera	ator pedal position sensor circuit			3	2	1									<u>EC-481,</u> <u>EC-484,</u> <u>EC-488</u>
Knock s	ensor circuit			2								3			EC-303

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VQ37VHR]

						S	YMPT	OM							
	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	A EC C D
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Engine oil temperature sensor			4		1						3			<u>EC-287,</u> <u>EC-291</u>	F
Crankshaft position sensor (POS) circuit	2	2												EC-306	
Camshaft position sensor (PHASE) circuit	3	2												<u>EC-310</u>	G
Vehicle speed signal circuit		2	3		3						3			EC-368	
Power steering pressure sensor circuit		2					3	3						EC-380	Н
ECM	2	2	3	3	3	3	3	3	3	3	3			<u>EC-388,</u> <u>EC-390</u>	
Intake valve timing control solenoid valve cir- cuit		3	2		1	3	2	2	3		3			<u>EC-194</u>	I
Manifold absolute pressure (MAP) sensor											3			EC-209	
Brake booster pressure sensor											3			EC-383	J
VVEL control module	3		4	4	3									<u>EC-</u> <u>467,EC-</u> <u>469</u>	K
VVEL actuator motor	3		4	4	3									<u>EC-423</u>	
VVEL actuator motor relay	3		4	4	3									<u>EC-427</u>	
VVEL actuator shaft position sensor	3		4	4	3									<u>EC-420</u>	L
PNP signal circuit			3		3		3	3			3			<u>EC-411</u>	
Refrigerant pressure sensor circuit		2				3			3		4			<u>EC-527</u>	M
Electrical load signal circuit							3							<u>EC-506</u>	
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	<u>HAC-5</u>	
ABS actuator and electric unit (control unit)			4											<u>BRC-4</u>	Ν

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

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Revision: 2013 May

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

							S	(MPT)	OM											
		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					
Warranty s	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA						
Fuel	Fuel tank	_													<u>FL-12</u>					
	Fuel piping	5		5	5	5		5	5			5	-		<u>FL-4</u>					
	Vapor lock		5												_					
	Valve deposit		5																	
	Poor fuel (Heavy weight gasoline, Low octane)	5			5	5	5		5	5			5			_				
Air	Air duct														EM-32					
	Air cleaner Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														<u>EM-32</u>					
			5	5		5		5	5			5			<u>EM-32</u>					
	Electric throttle control actuator	5	5	5	5	5	5			5		5			5					<u>EM-33</u>
	Air leakage from intake manifold/ Collector/Gasket														<u>EM-37</u>					
Cranking	Battery														<u>PG-80</u>					
	Generator circuit	1	1	1		1		1	1					1	<u>CHG-27,</u> <u>CHG-28</u>					
	Starter circuit	3										1			<u>STR-7</u> (M/ T) <u>STR-9</u> (A/ T)					
	Signal plate	6													<u>EM-127</u>					
	PNP signal circuit	4													<u>TM-18,</u> <u>TM-217</u>					
Engine	Cylinder head	F	F	F	F	F		F	F			F			EM 112					
	Cylinder head gasket	5	5	5	5	5		5	5		4	5	3		<u>EM-113</u>					
	Cylinder block						1			1				1						
	Piston												4							
	Piston ring	6	6	6	6	e		6	_			6			EM 107					
	Connecting rod	0	0	0	0	6		Ø	6			6		1	<u>EM-127</u>					
	Bearing	1																		
	Crankshaft	1																		

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VQ37VHR]

							S١	/MPT	ОМ							^
		(EXCP. HA)		SPOT		LERATION					ATURE HIGH	NOI	z	(GE)	•	A EC
		START/RESTART (E)		HESITATION/SURGING/FLAT S	SPARK KNOCK/DETONATION	POWER/POOR ACCELERATION	W IDLE	HUNTING	TION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	C
		HARD/NO STA	ENGINE STALL	HESITATION/S	SPARK KNOCH	LACK OF POM	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO REI	OVERHEATS/	EXCESSIVE FI	EXCESSIVE O	BATTERY DEA		E
Warranty s	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		_
Valve	Timing chain														<u>EM-69</u>	F
mecha- nism	Camshaft														<u>EM-100</u>	
	Intake valve timing control	5	5	5	5	5		5	5			5		-	<u>EM-69</u>	G
	Intake valve												3		<u>EM-113</u>	
	Exhaust valve															
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EX-4, EX-6</u>	Η
	Three way catalyst															
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>LU-10, LU-</u> <u>13, LU-14</u>	I
	Oil level (Low)/Filthy oil														<u>LU-7</u>	
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-14,</u> <u>CO-14</u>	J
	Thermostat									5	-				<u>CO-26</u>	K
	Water pump	5	5	F	5	5		5	F		4	F			<u>CO-24</u>	L/
	Water gallery	Э	Э	5	Э	э		Э	5		4	5			<u>CO-28</u>	
	Cooling fan														<u>CO-21</u>	L
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-10</u>	
NVIS (NIS NATS)	SAN Vehicle Immobilizer System —	1	1												SEC-5	Μ

1 - 6: The numbers refer to the order of inspection.

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< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,400 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. However, if the engine speed is above 4,000 rpm, fuel will be cut off in a few seconds. Fuel cut will be operated until the engine speed reaches 1,000 rpm, then fuel cut will be cancelled. **NOTE:**

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-49.</u> <u>"System Description"</u>.

TORQUE CUT CONTROL (AT HIGH ENGINE OIL TEMPERATURE)

ECM receives engine oil temperature signal from engine oil temperature sensor.

To avoid VVEL performance, ECM performs the engine torque cut control at high engine oil temperature. If engine oil temperature is too high, engine oil viscosity will change. As a result, engine oil pressure is decreased. This control is to control the VVEL operating angle by operating the VVEL actuator sub assembly. If this control is operated, engine performance will decrease, then maximum engine speed is reduced a little, for example.

NOTE:

If the engine oil temperature sensor is deteriorated, its characteristic will change.

In this case, the operating temperature for engine torque cut control might be decrease.

Perform Component Inspection of the engine oil temperature sensor to check for the deterioration. Refer to EC-290, "Component Inspection".

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< PRECAUTION > PRECAUTION PRECAUTIONS EXCEPT FOR MEXICO

EXCEPT FOR MEXICO : 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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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
 H connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

EXCEPT FOR MEXICO : Precaution for Battery Service

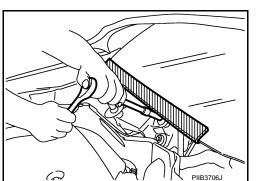
Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

EXCEPT FOR MEXICO : Precaution for Procedure without Cowl Top Cover

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When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



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< PRECAUTION >

EXCEPT FOR MEXICO : Precautions For Xenon Headlamp Service

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WARNING:

Comply with the following warnings to prevent any serious accident.

- Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, 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.)
- 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.).

EXCEPT FOR MEXICO : On Board Diagnostic (OBD) System of Engine and A/T

INFOID:000000009361285

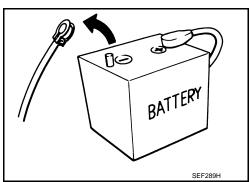
The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Always 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 MIL to illuminate.
- Always connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to illuminate due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- 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 <u>PG-69</u>, "<u>Description</u>".
- Always route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.
- Always connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system, etc.
- Always erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

EXCEPT FOR MEXICO : General Precautions

- Always use a 12 volt battery as power source.
- Never 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 negative battery cable.



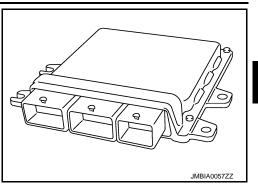
< PRECAUTION >

- Never 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. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be cleared 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 (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 1. ECM
 - C. Loosen

- When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends 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.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-534, "Reference Value"</u>.
- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).



[VQ37VHR]

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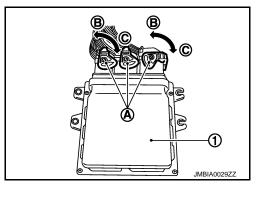
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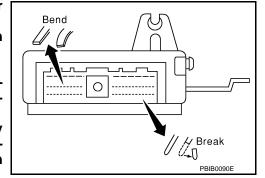
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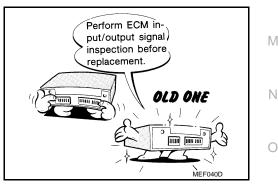
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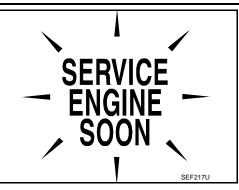


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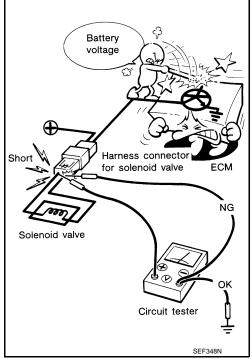
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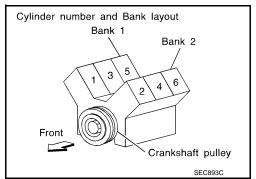
[VQ37VHR]

• 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 damage the ECM power transistor.





- B1 indicates bank 1, B2 indicates bank 2 as shown in the figure.
- Never operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

< PRECAUTION >

- Never depress accelerator pedal when starting.
- Immediately after starting, never rev up engine unnecessarily.
- Never 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. Never 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.

FOR MEXICO

FOR MEXICO : 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 AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

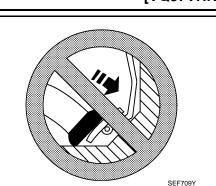
FOR MEXICO : Precaution for Battery Service

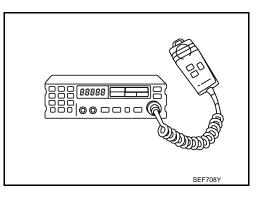
Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

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FOR MEXICO : Precaution for Procedure without Cowl Top Cover

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.

FOR MEXICO : Precautions For Xenon Headlamp Service

WARNING:

Comply with the following warnings to prevent any serious accident.

- Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, 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.)
- 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.

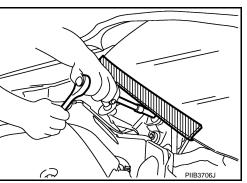
- Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)
- Never perform HID circuit inspection with a tester.
- Never touch the xenon bulb glass with hands. Never put oil and grease on 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.).

FOR MEXICO : On Board Diagnostic (OBD) System of Engine and A/T

The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Always 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 MIL to illuminate.
- Always connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to illuminate due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- 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 <u>PG-69</u>, "<u>Description</u>".
- Always route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.
- Always connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system, etc.
- Always erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.



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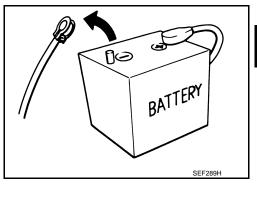
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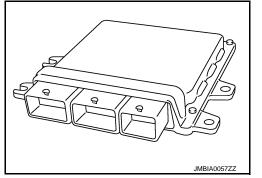
FOR MEXICO : General Precautions

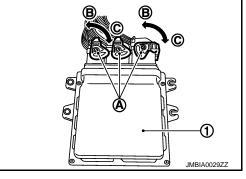
- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.
- Never 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. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.

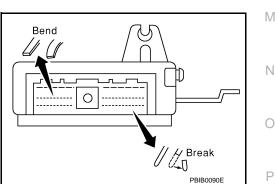
- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 1. ECM
 - C. Loosen







- When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends 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.





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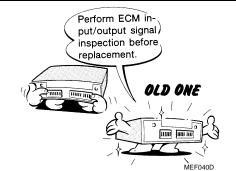
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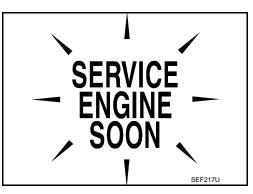
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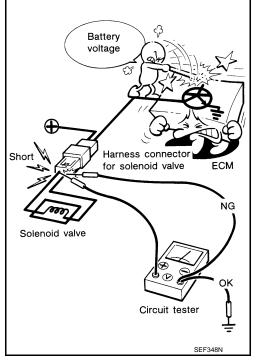
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-534, "Reference Value"</u>.
- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Never 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 damage the ECM power transistor.







- B1 indicates bank 1, B2 indicates bank 2 as shown in the figure.
- Never operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

Never depress accelerator pedal when starting.

• Never rev up engine just prior to shutdown.

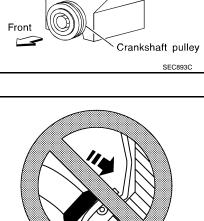
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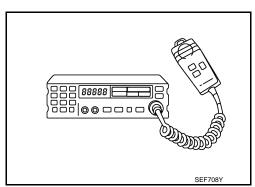
• When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.

Immediately after starting, never rev up engine unnecessarily.

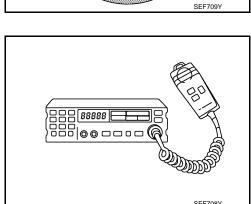
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
- Never let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.

EC-625





Cylinder number and Bank layout Bank 1 Bank 2 6 4



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PREPARATION

Special Service Tools

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[VQ37VHR]

NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
(J-44321) Fuel pressure gauge kit	LEC642	Checks fuel pressure

Commercial Service Tools

Tool name (Kent-Moore No.)		Description
Leak detector i.e.: (J-41416)	S-NT703	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	C D D D D D D D D D D D D D D D D D D D	Applies positive pressure through EVAP service port
	S-NT704	
Fuel filler cap adapter i.e.: (MLR-8382)		Checks fuel tank vacuum relief valve opening pressure
Socket wrench	S-NT815 19 mm (0.75 in) 19 mm 19 mm 19 mm 10 mm 12 mm 12 mm 12 mm 12 mm 12 mm 12 mm 13 mm 13 mm 14 mm 15 mm 15 mm 15 mm 16 mm 17	Removes and installs engine coolant temperature sensor

PREPARATION

< PREPARATION >

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Tool name (Kent-Moore No.)		Description	A
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a Mating surface shave	Reconditions 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-	EC
	Flutes AEM488	nia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Tita- nia Oxygen Sensor	С
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent		Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	D
meeting MIL specifica- tion MIL-A-907)	S-NT779		E
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Revision: 2013 May

PERIODIC MAINTENANCE FUEL PRESSURE

Inspection

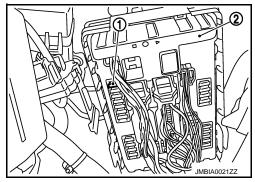
FUEL PRESSURE RELEASE

() With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.

Without CONSULT

- 1. Remove fuel pump fuse (1) located in IPDM E/R (2).
- 2. Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- 5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

CAUTION:

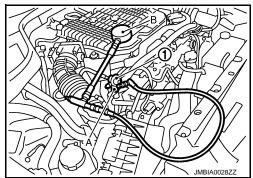
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NOTE:

- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because Z34 models do not have fuel return system.
- Use Fuel Pressure Gauge Kit (J-44321) to check fuel pressure.
- 1. Release fuel pressure to zero.
- Install the inline fuel quick disconnected fitting (A) between fuel damper (1) and injector tube.
- 3. Connect the fuel pressure test gauge (quick connector adapter hose) (B) to the inline fuel quick disconnected fitting.
- 4. Turn ignition switch ON and check for fuel leakage.
- 5. Start engine and check for fuel leakage.
- 6. Read the indication of fuel pressure gauge.

At idling : Approximately 350 kPa (3.57 kg/cm², 51 psi)

7. If result is unsatisfactory, check fuel hoses and fuel tubes for clogging.

If OK, Replace "fuel filter and fuel pump assembly". If NG, Repair or replace.



EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

EVAP LEAK CHECK

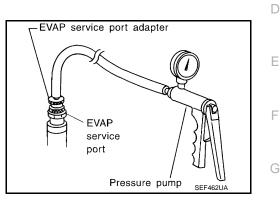
Inspection

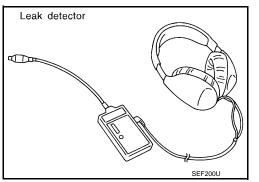
CAUTION:

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system. NOTE:
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT

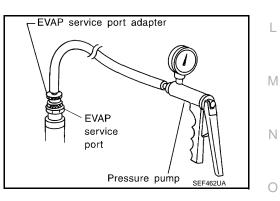
- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- Remove EVAP service port adapter and hose with pressure pump.
- 7. Locate the leak using a leak detector. Refer to <u>EC-98, "System</u> <u>Diagram"</u>.





WITHOUT CONSULT

- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 4. Remove EVAP service port adapter and hose with pressure pump.



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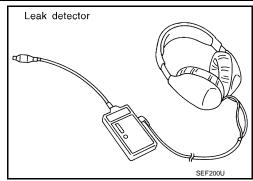
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EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

5. Locate the leak using a leak detector. Refer to <u>EC-98. "System</u> <u>Diagram"</u>.



SERVICE DATA AND SPECIFICATIONS (SDS)

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SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Transmission	Condition	Specification	0
A/T	No load* (in P or N position)	$650\pm50~\text{rpm}$	
M/T	No load* (in Neutral position)	650 ± 50 rpm	
*: Under the following conditions			D

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
A/T	No load* (in P or N position)	10 ± 5° BTDC
M/T	No load* (in Neutral position)	10 ± 5° BTDC
* Under the following conditions		

*: 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

Condition	Specification (Using CONSULT or GST)	
At idle	5 – 35 %	
At 2,500 rpm	5 – 35 %	
		_

Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)	
Output voltage at idle	0.7 – 1.2 V*	_
Mass air flow (Using CONSULT or GST)	2.0 – 6.0 g/s at idle* 7.0 – 20.0 g/s at 2,500 rpm*	M

*: Engine is warmed up to normal operating temperature and running under no load.

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