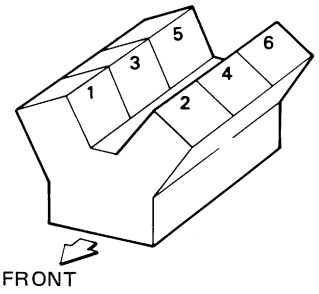
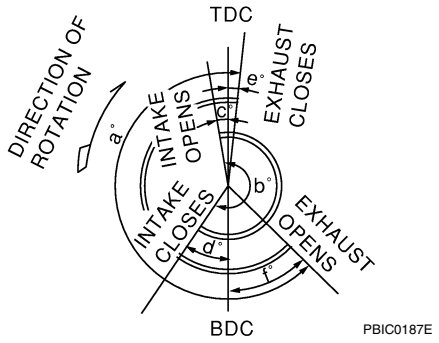
Cylinder number	 SEM713A
Valve timing (Valve timing control - “OFF”)	 PBIC0187E

Unit: degree

a	b	c	d	e	f
240	240	−10 (-35) ATDC	70(25) ABDC	10	50

Drive Belt

INFOID:0000000010112420

DRIVE BELT

Tension of drive belt	Belt tension is not necessary, as it is automatically adjusted by drive belt auto-tensioner.

Spark Plug

INFOID:0000000010112421

SPARK PLUG

Unit: mm (in)

Make		DENSO
Standard type*		FXE22HR11
Gap	Standard	1.1 (0.043)

*: Always check with the Parts Department for the latest parts information.

Front Wheel Alignment (Unladen*1)

INFOID:0000000010112418

UNITED STATES

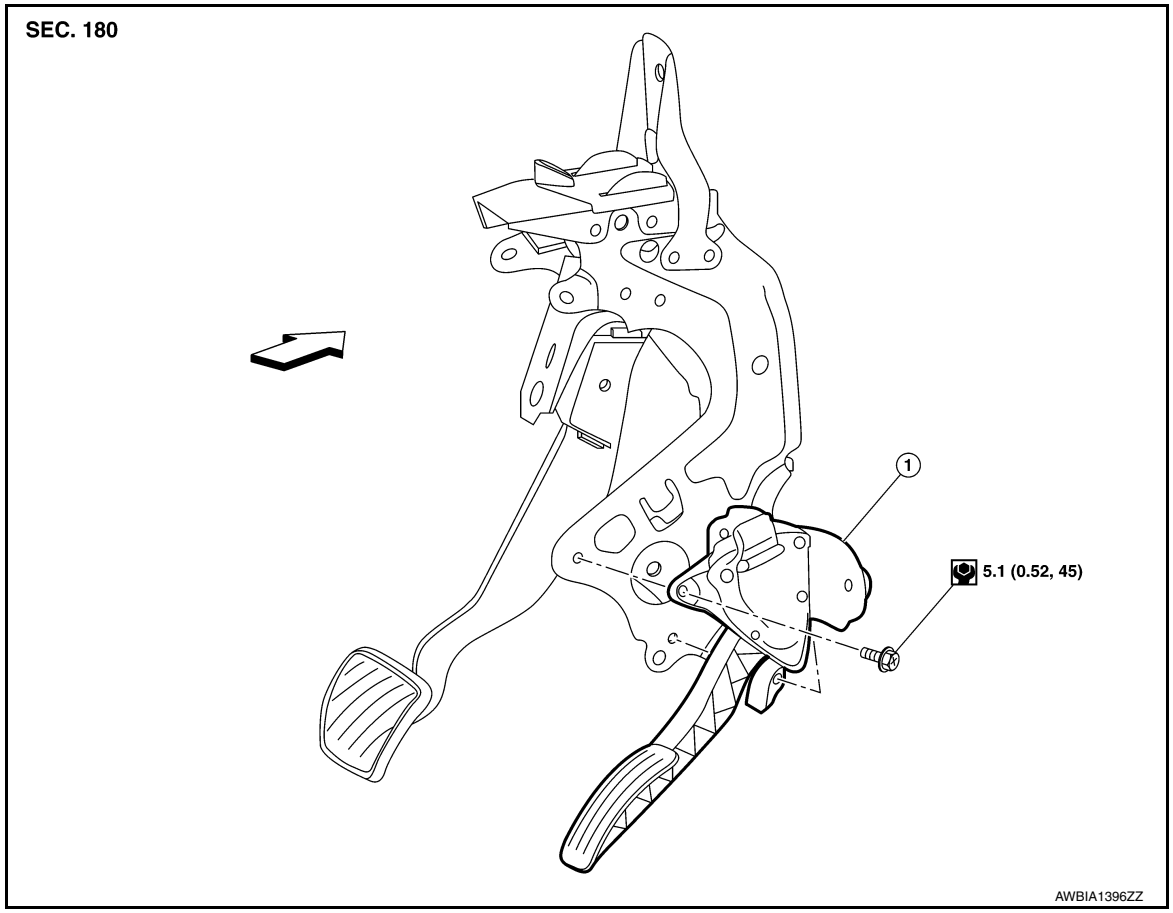
Engine type	QR25DE		VQ35DE
Tire size	215/60R16	215/55R17	235/45R18

REMOVAL AND INSTALLATION

ACCELERATOR CONTROL SYSTEM

Exploded View

INFOID:0000000009464594



1. Accelerator pedal assembly
⇦ Front

Removal and Installation

INFOID:0000000009464595

REMOVAL

1. Disconnect the harness connector from accelerator pedal assembly.
2. Remove the two accelerator pedal bolts.
3. Remove the accelerator pedal assembly.

CAUTION:
- **Do not disassemble the accelerator pedal assembly.**
- **Do not drop or impact the accelerator pedal assembly.**
- **Do not expose the accelerator pedal assembly to water.**

INSTALLATION

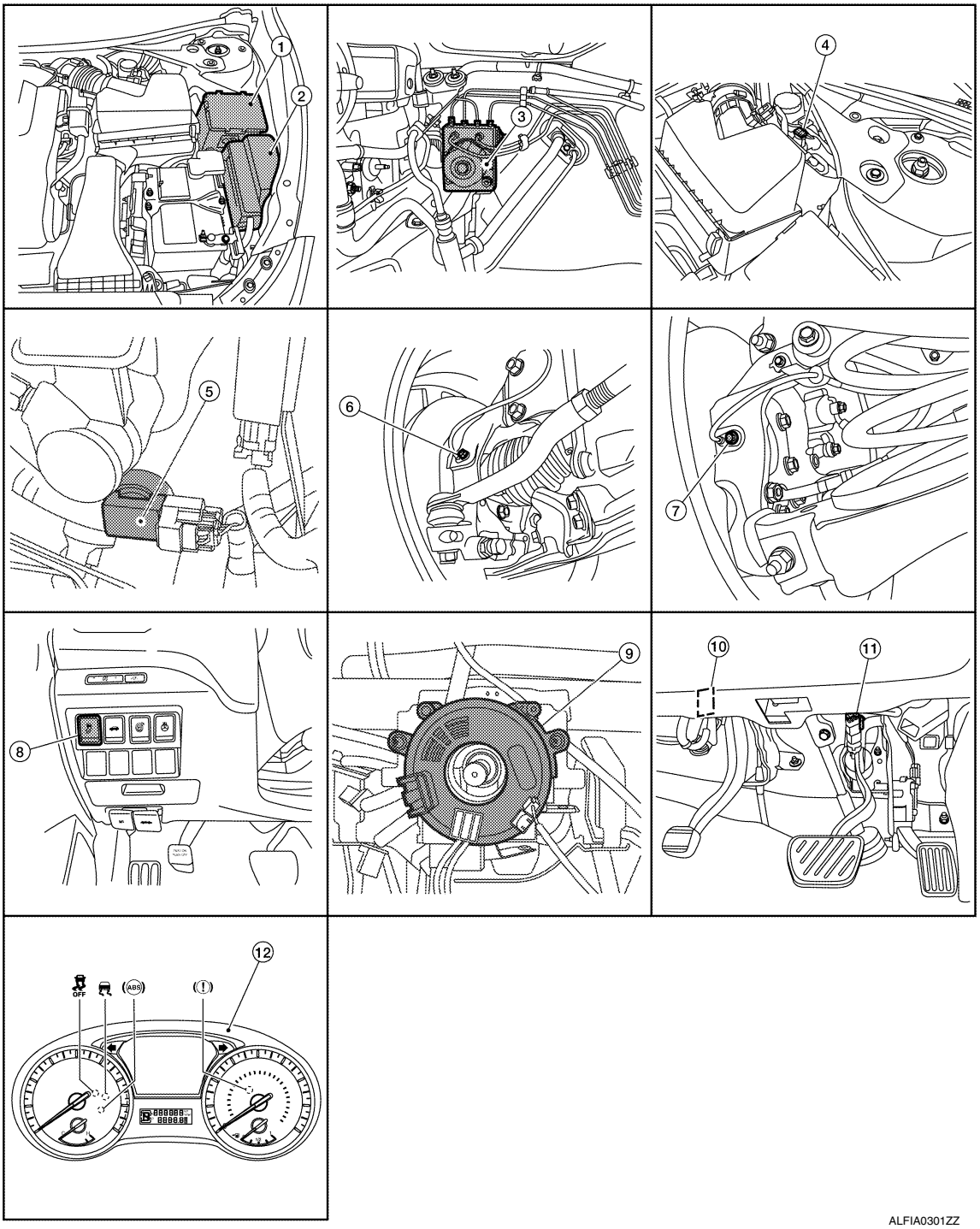
Installation is in the reverse order of removal.

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000009463741



ALFIA0301ZZ

1. IPDM E/R
2. Fuse, fusible link and relay box (stop lamp relay)
3. ABS actuator and electric unit (control unit)
4. Brake fluid level switch
5. Vacuum sensor (attached to lower side of brake booster)
6. Front wheel sensor LH (RH similar)

C1198 VACUUM SENSOR

DTC Logic

INFOID:0000000009463813

DTC DETECTION LOGIC

DTC	Display Item	Malfunction detected condition	Possible causes
C1198	VACUUM SEN CIR	• When an open circuit is detected in vacuum sensor circuit. • When a short circuit is detected in vacuum sensor circuit. • When a malfunction is detected in vacuum sensor noise.	• Harness or connector • Vacuum sensor (brake booster) • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSTIC RESULT

With CONSULT.
1. Turn the ignition switch ON.
2. Perform self-diagnostic result.

Is DTC C1198 detected?

YES >> Proceed to diagnosis procedure. Refer to BRC-100, "Diagnosis Procedure".
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000009463814

Regarding Wiring Diagram information, refer to BRC-47, "Wiring Diagram".

1.CHECK VACUUM SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect vacuum sensor harness connector.
3. Disconnect ABS actuator and electric unit (control unit) harness connector.
4. Check continuity between vacuum sensor harness connector and ABS actuator and electric unit (control unit) harness connector.

Vacuum sensor		ABS actuator and electric unit (control unit)		Continuity
Connector	Terminal	Connector	Terminal	
E27	1	E54	12	Yes
	2		24	
	3		5	

5. Check continuity between vacuum sensor harness connector and ground.

Vacuum sensor		—	Continuity
Connector	Terminal		
E27	1	Ground	No
	2		
	3		

Is the inspection result normal?

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

2.CHECK TERMINAL

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000009951640

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 SR and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- **When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT 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 three minutes before performing any service.**

Precaution for Work

INFOID:0000000009464716

- When removing or disassembling each component, be careful not to damage or deform it. If a component may be subject to interference, be sure to protect it with a shop cloth.
- When removing (disengaging) components with a screwdriver or similar tool, be sure to wrap the component with a shop cloth or vinyl tape to protect it.
- Protect the removed parts with a shop cloth and prevent them from being dropped.
- Replace a deformed or damaged clip.
- If a part is specified as a non-reusable part, always replace it with a new one.
- Be sure to tighten bolts and nuts securely to the specified torque.
- After installation is complete, be sure to check that each part works properly.
- Follow the steps below to clean components:

- Water soluble dirt:

- Dip a soft cloth into lukewarm water, wring the water out of the cloth and wipe the dirty area.
- Then rub with a soft, dry cloth.

- Oily dirt:

- Dip a soft cloth into lukewarm water with mild detergent (concentration: within 2 to 3%) and wipe the dirty area.
- Then dip a cloth into fresh water, wring the water out of the cloth and wipe the detergent off.
- Then rub with a soft, dry cloth.

- Do not use organic solvent such as thinner, benzene, alcohol or gasoline.
- For genuine leather seats, use a genuine leather seat cleaner.

Precautions For Harness Repair

INFOID:0000000009464717

ITS communication uses a twisted pair line. Be careful when repairing it.

REMOVAL AND INSTALLATION

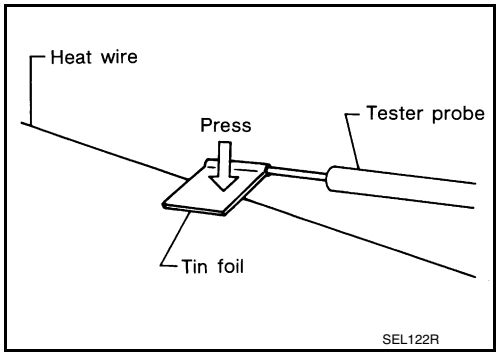
FILAMENT

Inspection and Repair

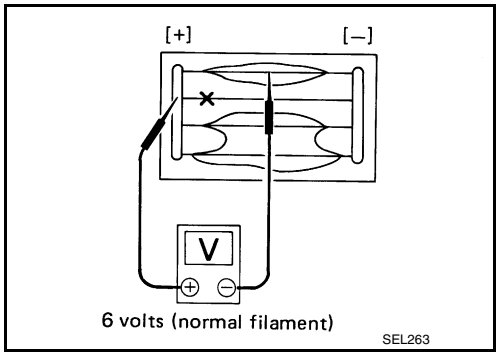
INFOID:0000000009463060

INSPECTION

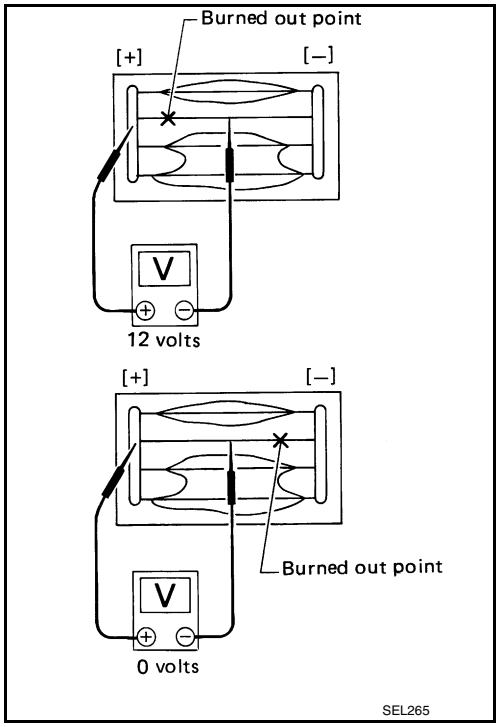
1. When measuring voltage, wrap tin foil around the top of the negative probe. Then press the foil against the wire with your finger.



2. Attach probe circuit tester (in Volt range) to middle portion of each filament.



3. If a filament is burned out, circuit tester registers 0 or battery voltage.
4. To locate burned out point, move probe to left and right along filament. Test needle will swing abruptly when probe passes the point.



REPAIR

REPAIR EQUIPMENT

- Conductive silver composition (Dupont No. 4817 or equivalent)

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*4]	Reference page
CONSULT GST[*2]	ECM[*3]						
P060A	060A	CONTROL MODULE	—	1 or 2	× or —	B	EC-405
P060B	060B	CONTROL MODULE	—	1	×	B	EC-406
P0643	0643	SENSOR POWER/CIRC	—	1	×	B	EC-407
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	B	EC-410
P1078	1078	EXH TIM SEN/CIRC-B1	—	2	×	B	EC-413
P1148	1148	CLOSED LOOP-B1	—	1	×	A	EC-416
P117A	117A	AIR FUEL RATIO B1	—	2	×	A	EC-417
P1212	1212	TCS/CIRC	—	2	—	—	EC-422
P1217	1217	ENG OVER TEMP	—	1	×	B	EC-423
P1225	1225	CTP LEARNING-B1	—	2	—	—	EC-426
P1226	1226	CTP LEARNING-B1	—	2	—	—	EC-427
P1550	1550	BAT CURRENT SENSOR	—	2	—	—	EC-428
P1551	1551	BAT CURRENT SENSOR	—	2	—	—	EC-431
P1552	1552	BAT CURRENT SENSOR	—	2	—	—	EC-431
P1553	1553	BAT CURRENT SENSOR	—	2	—	—	EC-434
P1554	1554	BAT CURRENT SENSOR	—	2	—	—	EC-437
P1556	1556	BAT TMP SEN/CIRC	—	2	—	—	EC-440
P1557	1557	BAT TMP SEN/CIRC	—	2	—	—	EC-440
P1564	1564	ASCD SW	—	1	—	—	EC-442
P1572	1572	ASCD BRAKE SW	—	1	—	—	EC-445
P1574	1574	ASCD VHL SPD SEN	—	1	—	—	EC-452
P1610	1610	LOCK MODE	—	2	—	—	SEC-68
P1611	1611	ID DISCORD,IMMU-ECM	—	2	—	—	SEC-69
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	—	SEC-70
P1715	1715	IN PULY SPEED	—	2	—	—	EC-454
P1800	1800	VIAS S/V-1	—	2	—	—	EC-456
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	—	EC-459
P2004	2004	TUMBLE CONT/V	—	2	×	B	EC-462
P2014	2014	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	B	EC-465
P2016	2016	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	B	EC-465
P2017	2017	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	B	EC-465
P2018	2018	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	B	EC-465
P2096	2096	POST CAT FUEL TRIM SYS B1	—	2	×	A	EC-468
P2097	2097	POST CAT FUEL TRIM SYS B1	—	2	×	A	EC-468
P2100	2100	ETC MOT PWR-B1	—	1	×	B	EC-472
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	B	EC-475
P2103	2103	ETC MOT PWR	—	1	×	B	EC-472
P2118	2118	ETC MOT-B1	—	1	×	B	EC-478
P2119	2119	ETC ACTR-B1	—	1	×	B	EC-480
P2122	2122	APP SEN 1/CIRC	—	1	×	B	EC-482
P2123	2123	APP SEN 1/CIRC	—	1	×	B	EC-482
P2127	2127	APP SEN 2/CIRC	—	1	×	B	EC-485

P0506 ISC SYSTEM

Description

INFOID:0000000009462306

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:0000000009462307

DTC DETECTION LOGIC

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0506	ISC SYSTEM (Idle air control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.	• Electric throttle control actuator • Intake air leak

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.

If the target idle speed is out of the specified value, perform EC-179, "Work Procedure", before conducting DTC Confirmation Procedure.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and run it for at least 1 minute at idle speed.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-382, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009462308

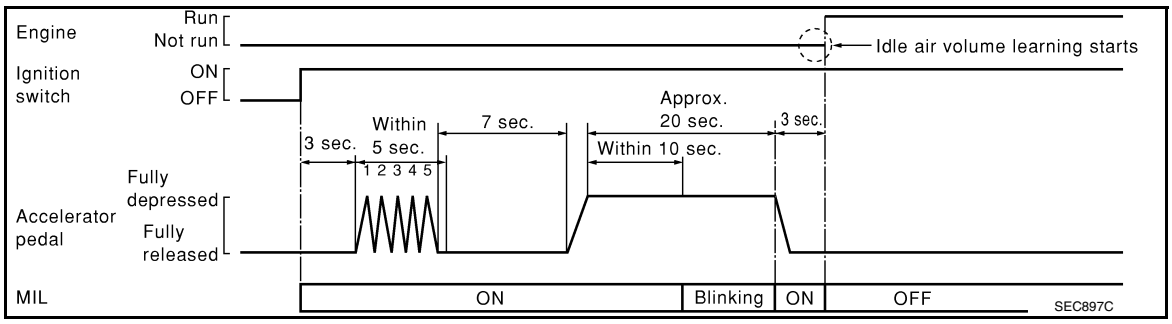
1.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine 2 or 3 times and check that idle speed and ignition timing are within the specifications.
For procedure, refer to EC-992, "Work Procedure" and EC-993, "Work Procedure".
For specifications, refer to EC-998, "Idle Speed" and EC-998, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

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?

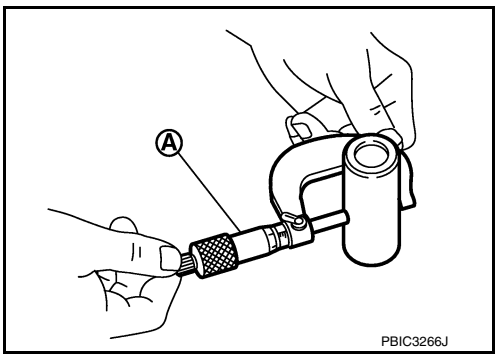
YES >> GO TO 6.
NO >> Repair or replace malfunctioning part.

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 EC-701, "Description".
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.
- Incorrect idle.

>> INSPECTION END

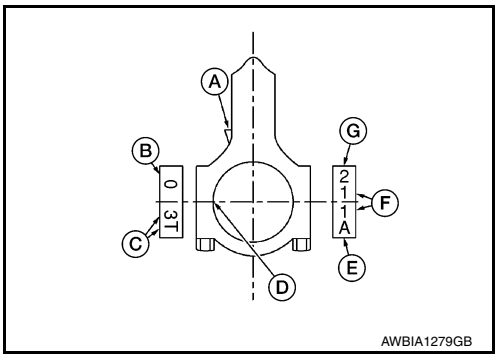
- Measure outer diameter of piston pin using suitable tool (A). Refer to EM-111, "Standard and Limit".



Piston Pin to Connecting Rod Bushing Clearance (Small End)
(Piston pin to connecting rod bushing clearance (small end)) = (Inner diameter of connecting rod small end) – (Outer diameter of piston pin)

Standard : 0.005 - 0.017 mm (0.0002 - 0.0007 in)

- If the measured value exceeds the standard, replace the connecting rod assembly and/or piston and piston pin assembly.



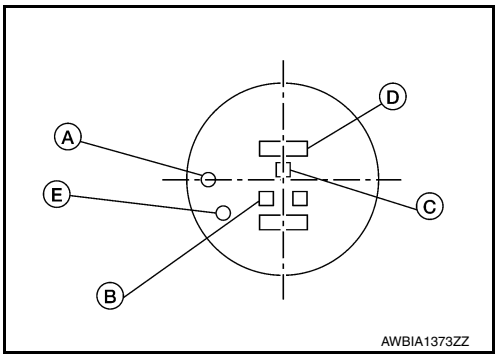
(A) : Oil splash
(B) : Small end diameter grade
(C) : Reference code
(D) : Bearing stopper groove
(E) : Reference code
(F) : Cylinder No.
(G) : Big end diameter grade

- If replacing the piston and piston pin assembly, use the "Piston Selection Table" to select the piston corresponding to the applicable bore grade of the cylinder block to be used. Refer to EM-105, "How to Select Piston and Bearing".

Factory Installed Parts Grading:
- Service parts apply only to grade 0 (B).

Unit: mm (in)

Piston Pin Grade	0	1
Connecting rod small end inner bushing diameter	20.000 - 20.006 (0.7874 - 0.7876)	20.006 - 20.012 (0.7876 - 0.7879)
Piston pin outer diameter	19.989 - 19.995 (0.7870 - 0.7872)	19.995 - 20. 001 (0.7872 - 0.7874)
Piston pin bore diameter	19.993 - 19.999 (0.7871- 0.7874)	19.999 - 20.005 (0.7874 - 0.7876)



(A) : Front mark
(B) : Piston pin bore grade
(C) : Piston grade I.D. stamp
(D) : Piston crown I.D. code stamp
(E) : ID mark

CYLINDER BLOCK DISTORTION

- Using a scraper, remove gasket on the cylinder block surface, and also remove oil, scale, carbon, or other contamination.

CAUTION:
Be careful not to allow gasket debris to enter the oil or coolant passages.

SYMPTOM DIAGNOSIS

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

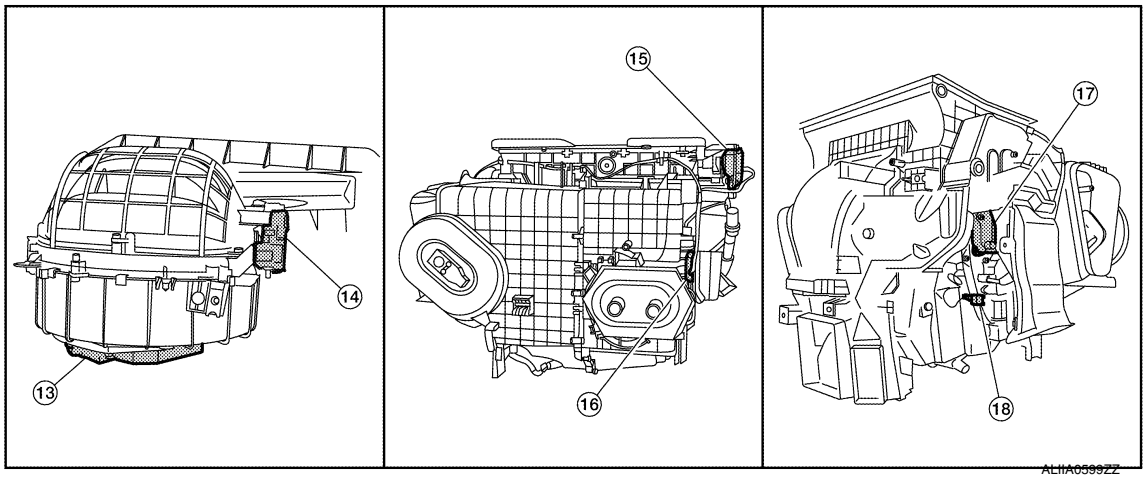
NVH Troubleshooting Chart

INFOID:0000000009464433

Use chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Possible cause and SUSPECTED PARTS			Excessive joint angle	Joint sliding resistance	Imbalance	Improper installation, looseness	Parts interference	Wheel bearing damage	SUSPENSION	FRONT AXLE	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING
Reference page			—	FAX-15, "Disassembly and Assembly (LH)", FAX-20, "Disassembly and Assembly (RH)"	FAX-7, "Inspection"	FAX-10, "Removal and Installation (LH)", FAX-12, "Removal and Installation (RH)"	—	FAX-6, "Inspection"	FSU-6, "NVH Troubleshooting Chart"	Refer to FRONT AXLE in this chart.	WT-52, "NVH Troubleshooting Chart"	WT-52, "NVH Troubleshooting Chart"	Refer to DRIVE SHAFT in this chart.	BR-6, "NVH Troubleshooting Chart"	ST-29, "NVH Troubleshooting Chart"
Symptom	DRIVE SHAFT	Noise	×	×					×	×	×	×		×	×
		Shake	×		×				×	×	×	×		×	×
	FRONT AXLE	Noise				×	×		×		×	×	×	×	×
		Shake				×	×		×		×	×	×	×	×
		Vibration				×	×		×		×		×		×
		Shimmy				×	×		×		×	×		×	×
		Shudder				×			×		×	×		×	×
		Poor quality ride or handling				×	×	×	×		×	×			

×: Applicable



1. ECM
2. IPDM E/R
3. BCM (view with combination meter removed)
4. A/C auto amp. (view with A/C switch assembly removed)
5. A/C switch assembly
6. A/C Compressor
7. Sunload sensor
8. Refrigerant pressure sensor (view with front bumper fascia removed)
9. Ambient sensor
10. Fuse Block (J/B), Front blower motor relay
11. In-vehicle sensor
12. Accessory relay-2 (view with instrument panel removed)
13. Blower motor (view with front A/C assembly removed from vehicle)
14. Intake door motor
15. Mode door motor
16. Air mix door motor LH
17. Air mix door motor RH
18. Intake sensor

Component Description

INFOID:0000000009463092

Component	Description
A/C auto amp.	A/C auto amp. controls front automatic air conditioning system by inputting and calculating signals from each sensor and each switch.
A/C Compressor	Vaporized refrigerant is drawn into the A/C compressor from the evaporator, where it is compressed to a high pressure, high temperature vapor. The hot, compressed vapor is then discharged to the condenser.
A/C switch assembly	The A/C switch assembly controls the operation of the A/C and heating system based on inputs from the temperature control knob, the mode switches, the blower control dial, the ambient temperature sensor, the intake sensor, and inputs received from the ECM across the CAN. Diagnosis of the A/C switch assembly can be performed using the CONSULT. There is no self-diagnostic feature available.
Air mix door motor LH	The air mix door controls the mix of hot or cold air that enters the ventilation system. It is controlled by the A/C auto amp. based on the position of the temperature dial. The air mix door motor LH receives position commands from the A/C auto amp. and reports actual door position back via an LCU (Local Control Unit) installed inside the motor. Commands and responses are sent across the LIN (Local Interconnect Network) to each motor simultaneously, with each motor having its own unique address, thereby only responding to requests sent to its specific address. The LCU reads the door position from a Position Balanced Resistor (PBR), also part of the motor, and returns that information to the A/C auto amp. The LCU switches the polarity of the circuits connected to the DC motor to drive the motor forward or backward as requested by the A/C auto amp. If the air mix door moves to a position less than 5% or more than 95% of its expected or allowed positions, the A/C auto amp. will set a DTC.

CAN COMMUNICATION CIRCUIT

Diagnosis Procedure

INFOID:0000000009461451

1.CONNECTOR INSPECTION

1. Turn the ignition switch OFF.
2. Disconnect the battery cable from the negative terminal.
3. Disconnect all the unit connectors on CAN communication system.
4. Check terminals and connectors for damage, bend and loose connection.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair the terminal and connector.

2.CHECK HARNESS CONTINUITY (SHORT CIRCUIT)

Check the continuity between the data link connector terminals.

Data link connector			Continuity
Connector No.	Terminal No.		
M22	6	14	Not existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check the harness and repair the root cause.

3.CHECK HARNESS CONTINUITY (SHORT CIRCUIT)

Check the continuity between the data link connector and the ground.

Data link connector		Ground	Continuity
Connector No.	Terminal No.		
M22	6		Not existed
	14		Not existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Check the harness and repair the root cause.

4.CHECK ECM AND BCM TERMINATION CIRCUIT

1. Remove the ECM and the BCM.
2. Check the resistance between the ECM terminals.

- QR engine models

ECM		Resistance (Ω)
Terminal No.		
100	99	Approx. 108 – 132

- VQ engine models

ECM		Resistance (Ω)
Terminal No.		
114	113	Approx. 108 – 132

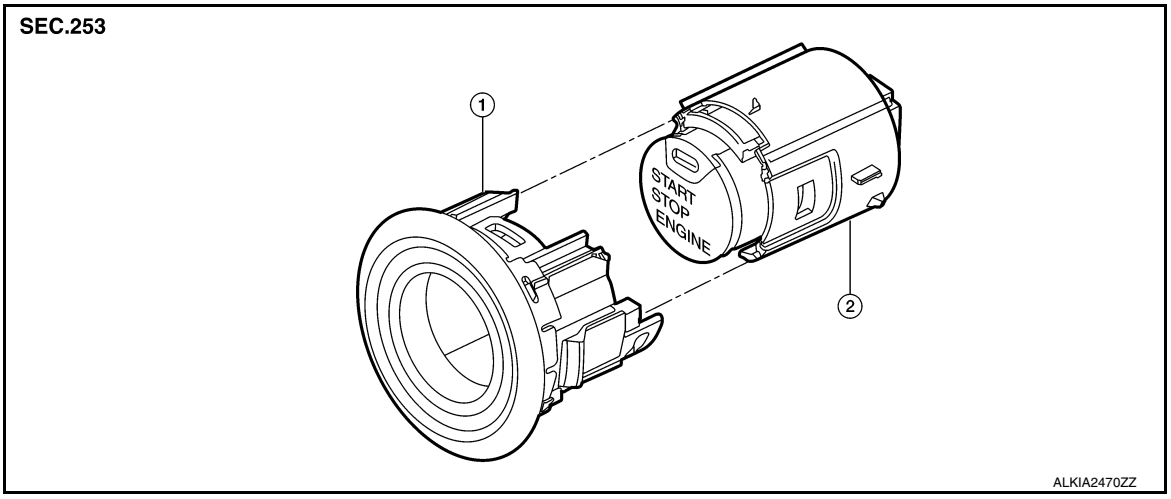
3. Check the resistance between the BCM terminals.

BCM		Resistance (Ω)
Terminal No.		
60	59	Approx. 108 – 132

PUSH BUTTON IGNITION SWITCH

Exploded View

INFOID:0000000009461665



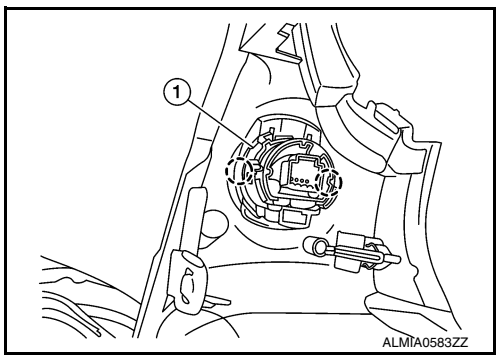
1. NATS antenna amp.
2. Push-button ignition switch

Removal and Installation

INFOID:0000000009461666

REMOVAL

1. Remove instrument pad (LH). Refer to IP-14, "Exploded View".
2. Release the pawl on each side of NATS antenna amp. (1) using a suitable tool and remove from the instrument pad (LH).
   ◌: Pawl

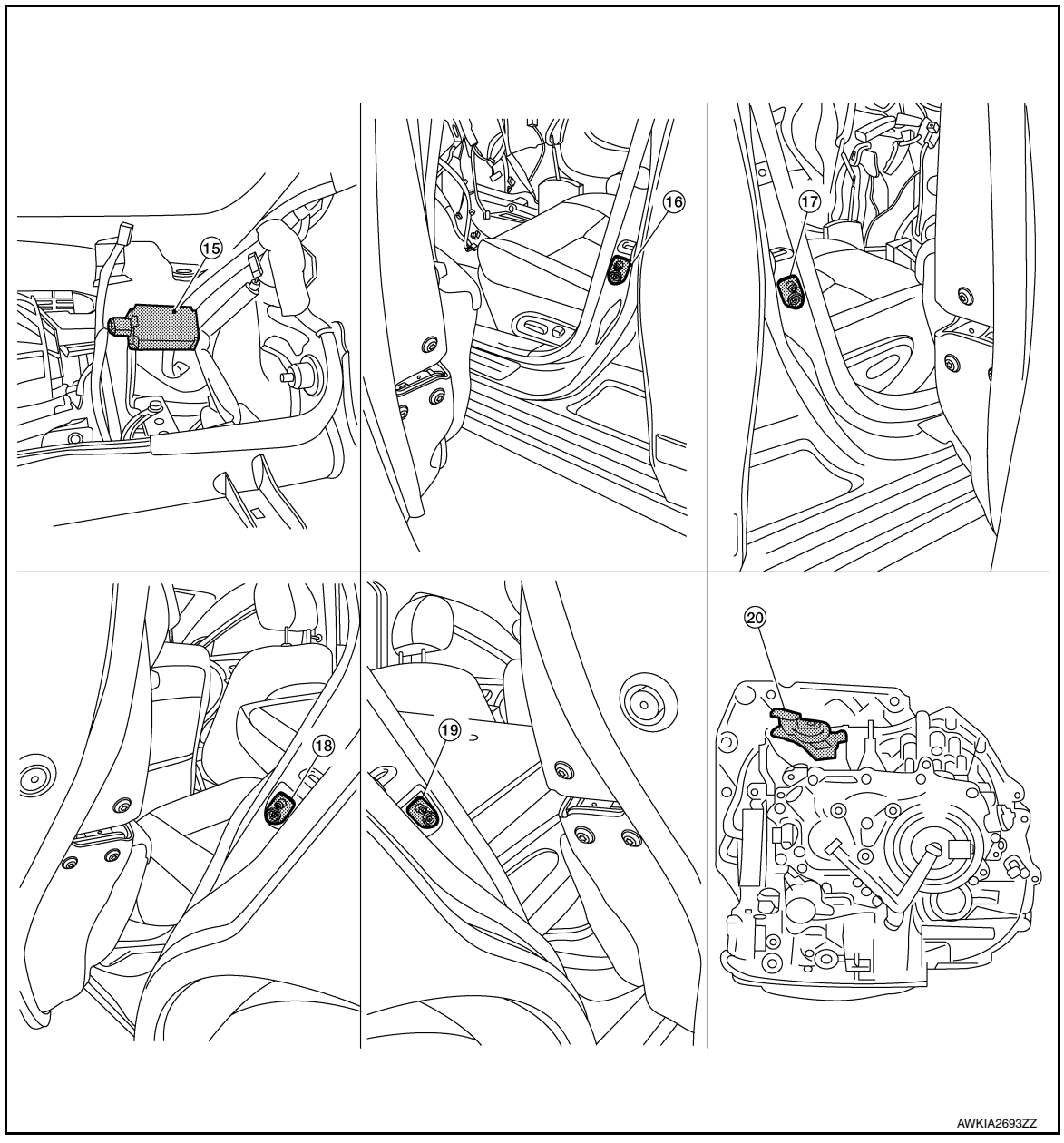


3. Release the pawl on each side using a suitable tool and remove the push-button ignition switch from the NATS antenna amp.

INSTALLATION

Installation is in the reverse order of removal.

1. BCM (view with combination meter removed)
2. IPDM E/R
3. Combination meter
4. Security indicator lamp
5. Push-button ignition switch
6. NATS antenna amp.
7. Inside key antenna (front console)
8. Inside key antenna (rear parcel shelf) (view with rear parcel shelf trim removed)
9. Stop lamp switch
10. CVT shift selector (park position switch)
11. Outside key antenna (drivers side)
12. Outside key antenna (passenger side)
13. Outside key antenna (rear bumper) (view with rear bumper cover removed)
14. Hood switch



15. Remote keyless entry receiver (view with upper dash pad removed)
16. Front door switch (LH)
17. Front door switch (RH)
18. Rear door switch (LH)
19. Rear door switch (RH)
20. Transmission range switch