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VQ35DE

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STARTING SYSTEM DIAGNOSIS WITH GR8-1200 NI
To test the starting system, use the following special service tool:
• GR8-1200 NI Multitasking battery and electrical diagnostic station

NOTE:
Refer to the diagnostic station Instruction Manual for proper starting system diagnosis procedures.
< BASIC INSPECTION >

OVERALL SEQUENCE

1. Perform starting system test with Multitasking battery and electrical diagnostic station GR8-1200 NI.

CRANKING NORMAL

2. Does the engine crank normally?
   No
   Check ring gear and starter drive pinion.
   Once resolved, perform battery test again.

   Yes
   Starter motor is OK.
   Perform further diagnosis of engine mechanical or engine control system.
   Refer to EM and EC sections.
   Once resolved, perform battery test again.

LOW VOLTAGE

5. Compare the engine coolant temperature and the cranking voltage with the specifications.
   Is the voltage less than the specified value?
   No
   Starter motor is OK.
   INSPECTION END

   Yes
   6. Does the starter motor turn smoothly?
      No
      Repair as needed.

      Yes
      Starter motor is OK.
      INSPECTION END

7. Check “B” terminal circuit.
   Is the “B” terminal circuit normal?
   No
   Repair as needed.

   Yes

8. Check “S” connector circuit.
   Is the “S” connector circuit normal?
   No
   Repair as needed.

   Yes

9. Does the engine turn freely by hand?
   No
   Perform further diagnosis of engine mechanical or powertrain mechanism.
   Refer to EM, or TM sections.
   Once resolved, perform battery test again.

   Yes
   Replace the starter motor.

DETAILLED FLOW

NOTE:
To ensure a complete and thorough diagnosis, the battery, starter motor and generator test segments must be done as a set from start to finish.

1. DIAGNOSIS WITH MULTITASKING BATTERY AND ELECTRICAL DIAGNOSTIC STATION GR8-1200 NI
Perform the starting system test with Multitasking battery and electrical diagnostic station GR8-1200 NI. For details and operating instructions, refer to diagnostic station Instruction Manual.

**Test result**

CRANKING NORMAL >> GO TO 2.
LOW VOLTAGE >> GO TO 5.
CHARGE BATTERY >> Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again. Refer to diagnostic station instruction manual.
REPLACE BATTERY >> Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again. Refer to diagnostic station instruction manual. If second test result is "REPLACE BATTERY", then do so. Perform battery test again to confirm repair.

---

2. **CRANKING CHECK**

Check that the starter motor operates properly.

Does the engine crank normally?

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

3. **ENGINE START CHECK**

Check that the engine starts.

Does the engine start?

- YES >> Inspection End.
- NO >> Perform further diagnosis of engine mechanical or engine control system. Refer to EM and EC sections. Once resolved, perform battery test again.

4. **STARTER MOTOR ACTIVATION**

Check that the starter motor operates.

Does the starter motor turn?

- YES >> Check ring gear and starter motor drive pinion. Once resolved, perform battery test again.
- NO >> GO TO 7.

5. **COMPARISON BETWEEN ENGINE COOLANT AND CRANKING VOLTAGE**

Compare the engine coolant temperature and verify the cranking voltage is within specifications.

<table>
<thead>
<tr>
<th>Engine coolant temperature [°C (°F)]</th>
<th>Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>−30 to −20 (−22 to −4)</td>
<td>8.6</td>
</tr>
<tr>
<td>−19 to −10 (−2 to 14)</td>
<td>9.1</td>
</tr>
<tr>
<td>−9 to 0 (16 to 32)</td>
<td>9.5</td>
</tr>
<tr>
<td>More than 1 (More than 34)</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Is the voltage less than the specified value?

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

6. **STARTER OPERATION**

Check the starter operation.

Does the starter motor turn smoothly?

- YES >> Inspection End.
- NO >> GO TO 7.

7. **“B” TERMINAL CIRCUIT INSPECTION**

Check “B” terminal circuit. Refer to STR-9, "Diagnosis Procedure".

Is “B” terminal circuit normal?

- YES >> GO TO 8.
- NO >> Repair as needed.

8. **“S” CONNECTOR CIRCUIT INSPECTION**

Check “S” connector circuit. Refer to STR-11, "Diagnosis Procedure".
< BASIC INSPECTION >

Is “S” connector circuit normal?
YES    >> GO TO 9.
NO     >> Repair as needed.

9. ENGINE ROTATION STATUS

Check that the engine can be rotated by hand.

Does the engine turn freely by hand?
YES    >> Replace starter motor.
NO     >> Perform further diagnosis of engine mechanical or powertrain mechanism. Once resolved, perform battery test again using Multitasking battery and electrical diagnostic station GR8-1200 NI. Refer to the diagnostic station Instruction Manual for proper testing procedures.
**OVERALL SEQUENCE**

1. **Does the engine start?**
   - **YES**
     - 2. **Does the starter motor stop after starting the engine?**
       - **YES**
         - **INSPECTION END**
       - **NO**
         - Replace starter motor.
   - **NO**
     - Replace starter motor.

3. **Does engine turn when cranking?**
   - **YES**
     - 4. **Does engine turn normally?**
       - **YES**
         - Check ignition/fuel system.
       - **NO**
         - Check battery as follows and repair as needed.
           - Charging condition
           - Terminal connections
           - Terminal corrosion
   - **NO**

5. **Does starter motor turn?**
   - **YES**
     - Replace starter motor.
   - **NO**

6. **Check following conditions.**
   - **Fuse and fusible link.**
   - **Charge condition, corrosion and connection condition of the battery.**
   - **NG**
     - Repair as needed.
   - **OK**

7. **Check starting system wiring.**
   - **NG**
     - Repair as needed.
   - **OK**

Replace starter motor.

**DETAILED FLOW**

**NOTE:**
If any malfunction is found, immediately disconnect the battery cable from the negative terminal.

1. **CHECK ENGINE START**

Crank the engine and check that the engine starts.

**Does the engine start?**
- **YES**  >>  GO TO 2.
- **NO**  >>  GO TO 3.
2. CHECK THAT THE STARTER MOTOR STOPS

Check that the starter motor stops after starting the engine.

Does the starter motor stop?

YES >> Inspection End.
NO  >> Replace starter motor. Refer to STR-19, "Removal and Installation".

3. CHECK THAT THE ENGINE TURNS WHEN CRANKING

Check that the engine turns when cranking.

Does engine turn when cranking?

YES >> GO TO 4.
NO  >> GO TO 5.

4. CHECK THE ENGINE SPEED WHEN CRANKING

Check that the engine speed is not low when cranking.

Does engine turn normally?

YES >> Check ignition/fuel system.
NO  >> Check charge condition, corrosion and connection condition of the battery. Refer to PG-2, "How to Handle Battery".

5. CHECK STARTER MOTOR ACTIVATION

Check that the starter motor runs at cranking.

Does starter motor turn?

YES >> Replace starter motor. Refer to STR-19, "Removal and Installation".
NO  >> GO TO 6.

6. CHECK POWER SUPPLY CIRCUIT

Check the following conditions:
• Fuse and fusible link
• Charge condition, corrosion and connection of the battery.

Are these inspection results normal?

YES >> GO TO 7.
NO  >> Repair as needed.

7. CHECK STARTING SYSTEM WIRING

Check the following:
• "B" terminal circuit. Refer to STR-9, "Diagnosis Procedure".
• "S" terminal circuit. Refer to STR-11, "Diagnosis Procedure".

Are the inspection results normal?

YES >> Replace starter motor. Refer to STR-19, "Removal and Installation".
NO  >> Repair as needed.
System Description

The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, the starter motor operates.

Component Description

<table>
<thead>
<tr>
<th>Component part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCM</td>
<td>TCM supplies power to the starter relay and starter control relay inside IPDM E/R when the selector lever is shifted to the P or N position.</td>
</tr>
<tr>
<td>BCM</td>
<td>BCM controls the starter relay inside IPDM E/R.</td>
</tr>
<tr>
<td>IPDM E/R</td>
<td>CPU inside IPDM E/R controls the starter control relay.</td>
</tr>
<tr>
<td>Starter motor</td>
<td>The starter motor plunger closes and the motor is supplied with battery power, which in turn cranks the engine, when the “S” terminal is supplied with electric power.</td>
</tr>
</tbody>
</table>
B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS
B TERMINAL CIRCUIT

Description

The “B” terminal is constantly supplied with battery power.

Diagnosis Procedure

Regarding Wiring Diagram information, refer to STR-12, "Wiring Diagram".

CAUTION:
Perform diagnosis under the condition that the engine cannot start by the following procedure.
1. Remove fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is depleted.

1. CHECK TERMINAL B POWER SUPPLY VOLTAGE

1. Turn ignition switch OFF.
2. Make sure that starter motor connector F27 terminal B connection is clean and tight.
3. Check voltage between starter motor connector F27 terminal B and ground.

<table>
<thead>
<tr>
<th>B - ground</th>
<th>Battery voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is there battery voltage present?

YES >> GO TO 2
NO  >> Check harness between battery and starter motor for open circuit.

2. CHECK BATTERY CABLE (VOLTAGE DROP TEST)

1. Shift CVT selector lever to “P” or “N” position.
2. Check voltage between battery positive terminal and starter motor connector F27 terminal B while cranking the engine.

<table>
<thead>
<tr>
<th>While cranking the engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal B - B+ terminal</td>
</tr>
<tr>
<td>Less than 0.5V</td>
</tr>
</tbody>
</table>

Is the voltage drop less than 0.5V?

YES >> GO TO 3
NO  >> Check harness between the battery and the starter motor for high resistance.

3. CHECK GROUND CIRCUIT STATUS (VOLTAGE DROP TEST)

1. Shift CVT selector lever to “P” or “N” position.
2. Check voltage between starter motor case and battery negative terminal while cranking the engine.

<table>
<thead>
<tr>
<th>While cranking the engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starter case - B- terminal</td>
</tr>
<tr>
<td>Less than 0.2V</td>
</tr>
</tbody>
</table>

Is the voltage drop less than 0.2V?

YES  >> Terminal B circuit is OK. Further inspection is necessary. Refer to STR-2, "Work Flow (With GR8-1200 NI)" or STR-6, "Work Flow (Without GR8-1200 NI)."

NO   >> Check the starter motor case to engine mounting for high resistance.
S CONNECTOR CIRCUIT

Description

The starter motor magnetic switch is supplied with power when the ignition switch is turned to the START position while the selector lever is in the P or N position.

Diagnosis Procedure

Regarding Wiring Diagram information, refer to STR-12, "Wiring Diagram".

**CAUTION:**
Perform diagnosis under the condition that engine cannot start by the following procedure.
1. Remove fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.

1. **CHECK “S” CONNECTOR CIRCUIT**
   1. Turn ignition switch OFF.
   2. Disconnect starter motor connector F28.
   3. Shift CVT selector lever to “P” or “N” position.
   4. Check voltage between starter motor harness connector F28 terminal S and ground with the ignition in START.

   **With ignition switch in START**
   - S - ground
   - Battery voltage

   Is battery voltage present?
   - YES >> “S” circuit is OK. Further inspection is necessary. Refer to STR-2, "Work Flow (With GR8-1200 NI)" or STR-6, "Work Flow (Without GR8-1200 NI)."
   - NO >> GO TO 2

2. **CHECK CONNECTOR**
   1. Turn ignition switch OFF.
   2. Check the following terminals and connectors for damage, bent pins and loose connections.
      - IPDM E/R harness connector F10
      - Starter motor harness connector F28

   Is the inspection result normal?
   - YES >> GO TO 3
   - NO >> Repair the terminal and connector.

3. **CHECK HARNESS CONTINUITY (OPEN/SHORT CIRCUIT)**
   1. Disconnect the following harness connectors.
      - IPDM E/R connector F10
      - Starter motor connector F28
   2. Check continuity between starter motor harness connector F28 terminal S and IPDM E/R harness connector F10 terminal 80.

   **S - 80**
   - Continuity exists

   Is the inspection result normal?
   - YES >> Further inspection is necessary. Refer to STR-2, "Work Flow (With GR8-1200 NI)" or STR-6, "Work Flow (Without GR8-1200 NI)."
   - NO >> Repair the harness.
**SYMPTOM DIAGNOSIS**

STARTING SYSTEM

Symptom Table

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>No normal cranking</td>
<td>Refer to STR-2, &quot;Work Flow (With GR8-1200 NI)&quot; or STR-6, &quot;Work Flow (Without GR8-1200 NI)&quot;.</td>
</tr>
<tr>
<td>Starter motor does not rotate</td>
<td></td>
</tr>
</tbody>
</table>
PRECAUTIONS

PRECAUTION

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 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 3 minutes before performing any service.

Precaution for Power Generation Voltage Variable Control System

CAUTION:
For this model, the battery current sensor that is installed to the battery cable at the negative terminal measures the charging/discharging current of the battery, and performs various controls. If the electrical component or the ground wire is connected directly to the battery terminal, the current other than that being measured with the battery current sensor is charging to or discharging from the battery. This condition causes the malfunction of the control, and then the battery discharge may occur. Do not connect the electrical component or the ground wire directly to the battery terminal.
Special Service Tool

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

<table>
<thead>
<tr>
<th>Tool number (Kent-Moore No.)</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model GR8-1200 NI</td>
<td>Multitasking battery and electrical diagnostic station</td>
<td>Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.</td>
</tr>
</tbody>
</table>

Commercial Service Tools

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power tools</td>
<td>Loosening nuts, screws and bolts</td>
</tr>
</tbody>
</table>
REMOVAL AND INSTALLATION

STARTER MOTOR

Removal and Installation

REMOVAL

1. Remove the battery tray. Refer to PG-68, "Removal and Installation (Battery Tray)".
2. Disconnect the battery cable (A) and starter harness connector.
3. Remove the starter bolts, then remove the starter.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

Tighten cable (A) nut carefully.
Reset electronic systems as necessary. Refer to PG-5, "ADDITIONAL SERVICE WHEN REMOVING BATTERY NEGATIVE TERMINAL: Special Repair Requirement".
## Starter Motor

**Application**  
VQ35DE  
CVT model

**Type***  
Mitsubishi M000TA0072  
Reduction gear type

**System voltage**  
12V

**No-load**  

<table>
<thead>
<tr>
<th>Terminal voltage</th>
<th>11V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Less than 90A</td>
</tr>
<tr>
<td>Revolution</td>
<td>More than 2,400 rpm</td>
</tr>
</tbody>
</table>

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