NISSAN ALTIMA
MOTOR 3.5L VQ35DE
CODIGOS P0011 y P0021

IVTC
INTAKE VALVE TIMING CONTROL

automecanico.com
DTC P0011, P0021 IVT CONTROL

Description

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 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.

COMPONENT 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.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT/V TIM (B1)</td>
<td>Engine: After warming up</td>
<td>Idle: −5° - 5°C</td>
</tr>
<tr>
<td>INT/V TIM (B2)</td>
<td>Shift lever: N, Air conditioner switch: OFF, No-load</td>
<td>When revving engine up to 2,000 rpm quickly: Approx. 0° - 30°C</td>
</tr>
</tbody>
</table>
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On Board Diagnosis Logic

These self-diagnoses have the one trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>Detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0011 0011 (Bank 1)</td>
<td>Intake valve timing control performance</td>
<td>There is a gap between angle of target and phase-control angle degree.</td>
<td>Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)</td>
</tr>
<tr>
<td>P0021 0021 (Bank 2)</td>
<td></td>
<td></td>
<td>Intake valve timing control solenoid valve, Crankshaft position sensor (POS), Camshaft position sensor (PHASE), Accumulation of debris to the signal pick-up portion of the camshaft</td>
</tr>
</tbody>
</table>

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

<table>
<thead>
<tr>
<th>Detected items</th>
<th>Engine operating condition in fail-safe mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake valve timing control</td>
<td>The signal is not energized to the solenoid valve and the valve control does not function</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

CAUTION:
Always drive at a safe speed.

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

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

WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Maintain the following conditions for at least 20 consecutive seconds.

| ENGINE SPEED | 1,700 - 3,175 rpm (A constant rotation is maintained.) |
| COOLANT TEMPS | 70 - 105°C (176 - 194°F) |
| 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.) |

4. If the DTC is detected, go to EC-779, "Diagnostic Procedure".

WITH GST

Follow the procedure "WITH CONSULT-II" above.
Specification data are reference values and are measured between each terminal and ground.

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

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 9            | R/L        | Intake valve timing control solenoid valve (bank 1) | [Engine is running]  
  ● Warm-up condition  
  ● Idle speed | BATTERY VOLTAGE  
(11 - 14V)★ |
|              |            |      |           | 7 - 12V★         |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
DTC P0011, P0021 IVT CONTROL

BANK 2

EC-IVCB2-01

REFER TO “PG-POWER”.

REFER TO THE FOLLOWING.

SUPER MULTIPLE JUNCTION (SMJ)

EC-778
Specification data are reference values and are measured between each terminal and ground.

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

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Y</td>
<td>Intake valve timing control solenoid valve (bank 2)</td>
<td>[Engine is running]</td>
<td>BATTERY VOLTAGE (11 - 14V)★</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Warm-up condition</td>
<td>SEC988C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>7 - 12V★</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Warm-up condition</td>
<td>SEC989C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Engine speed is 2,500 rpm</td>
<td></td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

**Diagnostic Procedure**

1. **CHECK 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 voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

OK  >> GO TO 3.
NG  >> GO TO 2.
2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E130, E27
- Harness connectors E20, F32
- Harness connectors F44, F101
- IPDM E/R harness connector E124
- 10A fuse
- Harness for open or short between intake valve timing control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 9 (bank 1) or 8 (bank 2) and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.
   OK or NG
   OK  >> GO TO 5.
   NG  >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F44, F101
- Harness for open and short between ECM and intake valve timing control solenoid valve and fuse

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

5. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-781, "Component Inspection".
   OK or NG
   OK  >> GO TO 6.
   NG  >> Replace intake valve timing control solenoid valve.

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-953, "Component Inspection".
   OK or NG
   OK  >> GO TO 7.
   NG  >> Replace crankshaft position sensor (POS).

7. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-961, "Component Inspection".
   OK or NG
   OK  >> GO TO 8.
   NG  >> Replace camshaft position sensor (PHASE).
8. CHECK CAMSHAFT

Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to EM-135, "CAMSHAFT".

OK or NG
OK  >> GO TO 9.
NG  >> Remove debris and clean the signal pick-up cutout of camshaft.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-764, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".
For wiring diagram, refer to EC-950 for CKP sensor (POS), and EC-956 for CMP sensor (PHASE).

>> INSPECTION END

Component Inspection
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals as follows.

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>7.0 - 7.5Ω at 20°C (68°F)</td>
</tr>
<tr>
<td>1 or 2 and ground</td>
<td>∞Ω (Continuity should not exist)</td>
</tr>
</tbody>
</table>

Removal and Installation
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Refer to EM-146, "TIMING CHAIN".