F - BASIC TESTING

1992 Infiniti G20

1992 ENGINE PERFORMANCE
Infiniti Basic Diagnostic Procedures

G20, M30, Q45

INTRODUCTION

The following diagnostic steps will help prevent overlooking a simple problem. This is also where to begin diagnosis for a no-start condition.

The first step in diagnosing any driveability problem is verifying customer complaint using a test drive under conditions problem reportedly occurred.

Before entering self-diagnostics, perform a careful and complete visual inspection. Most engine control problems result from mechanical breakdowns, poor electrical connections or damaged/misrouted vacuum hoses. Before condemning the computerized system, perform each test listed in this article.

NOTE: Perform all voltage tests using a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance unless otherwise instructed in test procedure.

PRELIMINARY INSPECTION & ADJUSTMENTS

VISUAL INSPECTION

Visually inspect all electrical wiring, looking for chafed, stretched, cut or pinched wiring. Ensure electrical connectors fit tightly and are not corroded. Ensure vacuum hoses are properly routed and are not pinched or cut. See M - VACUUM DIAGRAMS article in the ENGINE PERFORMANCE Section to verify routing and connections (if necessary). Inspect air induction system for possible vacuum leaks.

MECHANICAL INSPECTION

Compression

Check engine mechanical condition using a compression gauge, vacuum gauge or engine analyzer. See engine analyzer manual for specific instructions.

WARNING: DO NOT use ignition switch during compression tests on fuel injected vehicles. Use a remote starter to crank engine. Fuel injectors on many models are triggered by ignition switch during cranking mode, which can create a fire hazard or contaminate engine oiling system.

COMPRESSION SPECIFICATIONS TABLE (1)

Application	psi (kg/cm²)
G20	
Standard	178 (12.5)
Minimum	149 (10.2)
Maximum Differential	14 (1.0)
M30	
Standard	173 (12.2)
Minimum	128 (9.0)

Maximum Differential	14 (1.0)
Q45	
Standard	185 (13.0)
Minimum	142 (10.0)
Maximum Differential	14 (1.0)

(1) - Readings taken at cranking speed (300 RPM).

Exhaust System Backpressure

Exhaust system can be checked with a vacuum gauge or a pressure gauge. Remove O2 sensor or air injection check valve (if equipped). Connect a 1-10 psi (.07-.70 kg/cm²) pressure gauge, and run engine at 2500 RPM. If exhaust system backpressure is greater than 1. 75-2.00 psi (.12-.14 kg/cm²), exhaust system or catalytic converter is plugged.

If a vacuum gauge is used, connect it to intake manifold vacuum. Observe vacuum gauge reading at idle. Open throttle part way (about 2500 RPM) and hold steady. If vacuum gauge slowly drops after stabilizing, exhaust system should be checked for a restriction.

FUEL SYSTEM

FUEL PRESSURE

Basic diagnosis of fuel system should begin with determining fuel system pressure.

WARNING: ALWAYS relieve fuel pressure before disconnecting any fuel injection-related component. DO NOT allow fuel to contact engine or electrical components.

Relieving Fuel Pressure

To relieve pressure, remove fuel pump fuse, start engine and allow to run until engine stalls due to lack of fuel. Crank engine 2-3 more times to verify all pressure has dissipated.

Checking Fuel Pressure

1) Disconnect fuel hose on fuel filter outlet side and install fuel pressure gauge. Replace pump fuse. Start engine and check fuel line connections for leakage. Check fuel pressure with engine idling. Record fuel pressure gauge reading.

2) Disconnect and plug vacuum hose from pressure regulator and immediately note fuel pressure. Record fuel pressure gauge reading. See FUEL PRESSURE table.

3) Connect a hand-held vacuum pump to fuel pressure regulator. Start engine and watch indication of fuel pressure gauge as vacuum is changed. Fuel pressure should decrease as vacuum increases. If result is not as specified, replace fuel pressure regulator.

FUEL PRESSURE TABLE

Application	(1) psi (kg/cm²)	(2) psi (kg/cm²)
G20	36 (2.5)	43 (3.0)
M30 & Q45	34 (2.4)	43 (3.0)

(1) - With vacuum hose connected at fuel pressure regulator.
(2) - With vacuum hose disconnected at fuel pressure regulator.

IGNITION CHECKS

DISTRIBUTORLESS IGNITION SYSTEM CHECKS (Q45)

To determine cause of a no-spark condition, following steps must be performed in order given. Deviation from this procedure may cause false diagnosis and replacement of non-defective components.

Ignition Coil Power Source

1) Disconnect ignition coil relay harness connector. Turn ignition on. Connect negative voltmeter lead to ground. Connect positive lead to harness Black/White wire and then to harness White/Black wire. Battery voltage should be present on both terminals.

2) If battery voltage is not present, check main harness connector, fusible link "G" in relay block, harness continuity between ignition coil and ignition switch, and harness continuity between ignition coil relay and battery. Repair or replace as necessary.

Ground Circuit

1) Turn ignition off. Disconnect ignition coil sub-harness connector and ignition coil relay harness connector. Check continuity between ignition coil relay harness connector terminal No. 5 (Brown/Yellow wire) and ignition coil sub-harness connector. Continuity should be present. If continuity is not present, check harness connector to ECU and ignition coil sub-harness connector.

2) Disconnect power transistor unit harness connector. Check continuity between Black wire on harness connector and ground. Continuity should be present. If continuity is not present, check harness connector between power transistor unit and engine ground.

Output Signal Circuit

1) Turn ignition off. Disconnect ECU and ignition coil relay harness connectors. Check continuity between ECU terminal No. 16 (harness side) and ignition coil relay connector terminal No. 1 (Gray/Red wire). See appropriate wiring diagram in L - WIRING DIAGRAMS article in the ENGINE PERFORMANCE Section. Continuity should be present. If continuity is not present, check harness and connectors between ECU and ignition coil relay.

2) Check harness continuity between ECU and ignition coil in each cylinder. See Fig. 1. Continuity should be present. If continuity is not present, repair or replace harness or connectors.

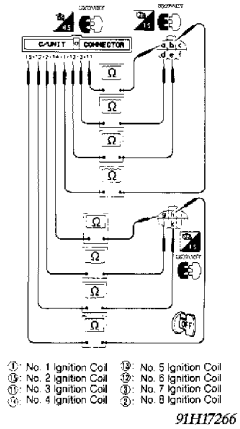


Fig. 1: Checking Output Signal Circuit (Q45)
Courtesy of Nissan Motor Co., U.S.A.

Ignition Coil Resistance

Disconnect ignition coil harness connector. Using ohmmeter, check resistance between coil terminals No. 1 and 2 (cylinders No. 1 and 2) and terminals No. 2 and 3 (cylinders No. 3-8). See Fig. 2. Resistance should be approximately .7 ohm. If resistance is not as specified, replace ignition coil.

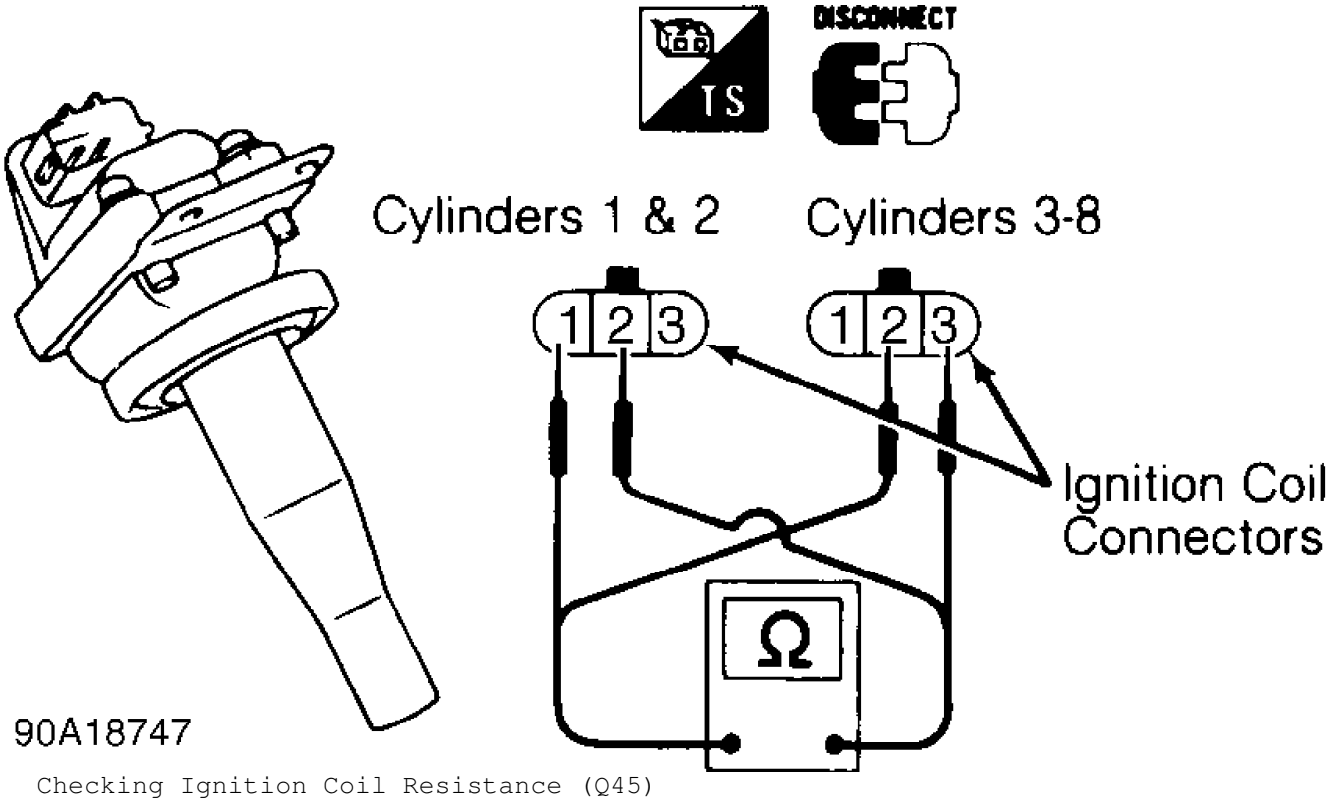
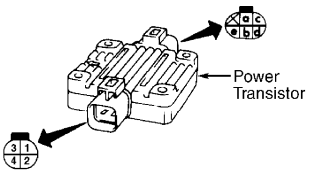


Fig. 2: Checking Ignition Coil Resistance (Q45)
Courtesy of Nissan Motor Co., U.S.A.

Power Transistor

Disconnect power transistor harness connector. Using ohmmeter, check power transistor continuity. See Fig. 3. Replace power transistor if results are not as specified.



Terminal combination				Tester polarity	Continuity	Tester polarity	Continuity
e 1	e 2	e 3	e 4	⊕ ⊖	No	⊖ ⊕	Yes
e a	e b	e c	e d	⊕ ⊖	Yes	⊖ ⊕	Yes
1 a	2 b	3 c	4 d	⊕ ⊖	Yes	⊖ ⊕	No

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Fig. 3: Checking Power Transistor Circuit (Q45)
Courtesy of Nissan Motor Co., U.S.A.

Power Transistor Relay

1) Connect a 12-volt power source and ground to terminals No.

1 and 2 of relay. See Fig. 4. Using ohmmeter, check continuity between terminals No. 3 and 5. Continuity should exist while relay is energized.

2) Disconnect power source and recheck continuity across terminals No. 3 and 5. No continuity should exist. Check harness and connectors. If harness and connectors are okay, replace power transistor relay.

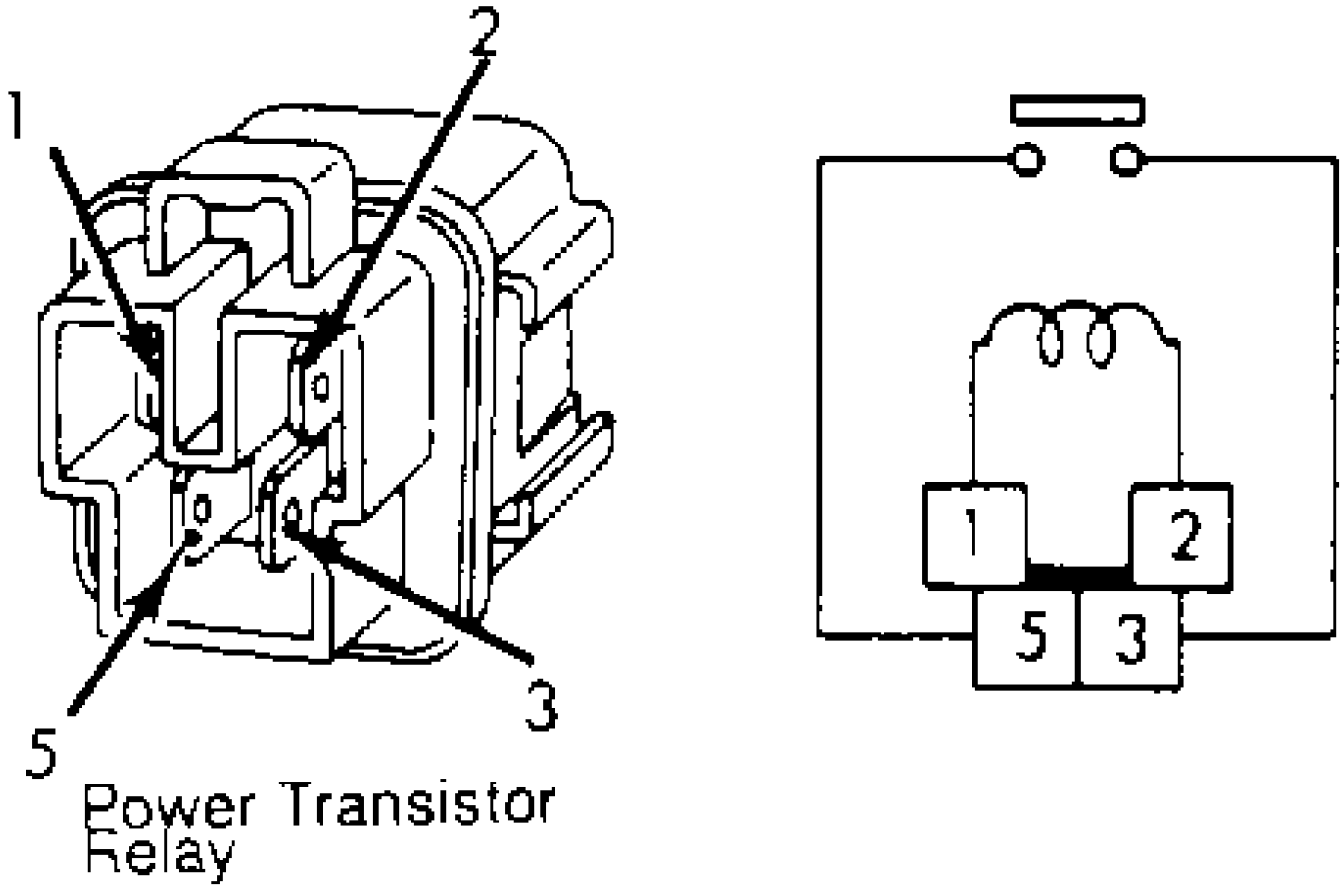


Fig. 4: Checking Power Transistor Relay Continuity (Q45)
Courtesy of Nissan Motor Co., U.S.A.

Crank Angle & Sub-Crank Angle Sensor Signal

1) Remove crank angle sensor from engine. DO NOT disconnect crank angle sensor harness connector. Turn ignition on (engine off).

2) Connect negative voltmeter lead to ground. Rotate crank angle sensor shaft slowly by hand. Connect positive voltmeter lead to crank angle sensor connector terminal No. 1 (90-degree signal). Voltage should fluctuate between 0 and 5 volts. Move voltmeter positive lead to terminal No. 2 (one-degree signal). Voltage should again fluctuate between 0 and 5 volts. See Fig. 5.

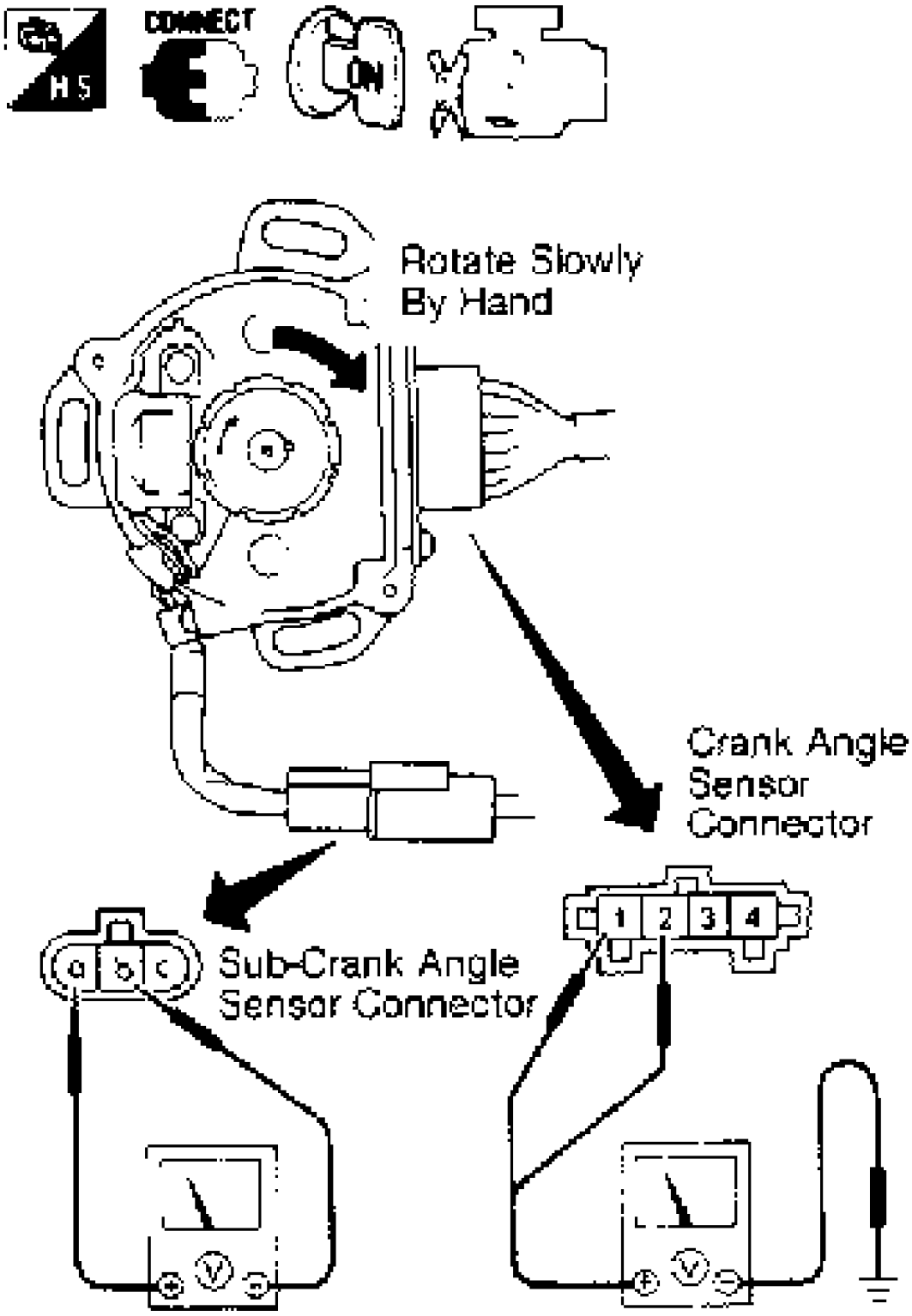


Fig. 5: Checking Crank Angle & Sub-Crank Angle Sensor Circuits (Q45)
Courtesy of Nissan Motor Co., U.S.A.

3) Set voltmeter to 100-mV AC scale. Connect positive voltmeter lead to terminal "a" and negative voltmeter lead to terminal

"b" of sub-crank angle sensor terminal connector. See Fig. 5. Rotate crank angle sensor shaft slowly by hand; voltmeter should deflect. If voltmeter does not deflect, replace crank angle sensor.

OPTICAL IGNITION SYSTEM CHECKS (G20 & M30)

To determine cause of a no-spark condition, following steps must be performed in order given. Deviation from this procedure may cause false diagnosis and replacement of non-defective components.

Spark

Check for spark at coil wire and each spark plug wire using a spark tester. Crank engine in short bursts. DO NOT crank engine more than 2 seconds continuously. Inspect secondary coil wire for arcing while testing spark at plugs. Check spark plug wire resistance on suspect wires. Resistance should not be more than 30,000 ohms. Coil wire resistance should not be more than 7000 ohms. Check connections at crank angle sensor, ignition coil and power transistor.

Ignition Coil Power Source

1) Disconnect ignition coil harness connector. Turn ignition on. Using voltmeter, check voltage between ignition coil harness connector terminal "a" and ground. Battery voltage should be present.

2) If battery voltage is not present, check harness connectors. Check harness continuity between ignition coil and ignition switch. Repair or replace as necessary.

Ground Circuit

1) Turn ignition off. Disconnect resistor and condenser harness connector. Disconnect power transistor harness connector. Using ohmmeter, check continuity between ignition coil terminal "b" to resistor and condenser terminal "d" and power transistor terminal "i". See Fig. 6.

2) Connect ohmmeter leads between power transistor terminal "h" and ground. See Fig. 6. If continuity does not exist at all these terminals, check and repair wiring harness or connectors.

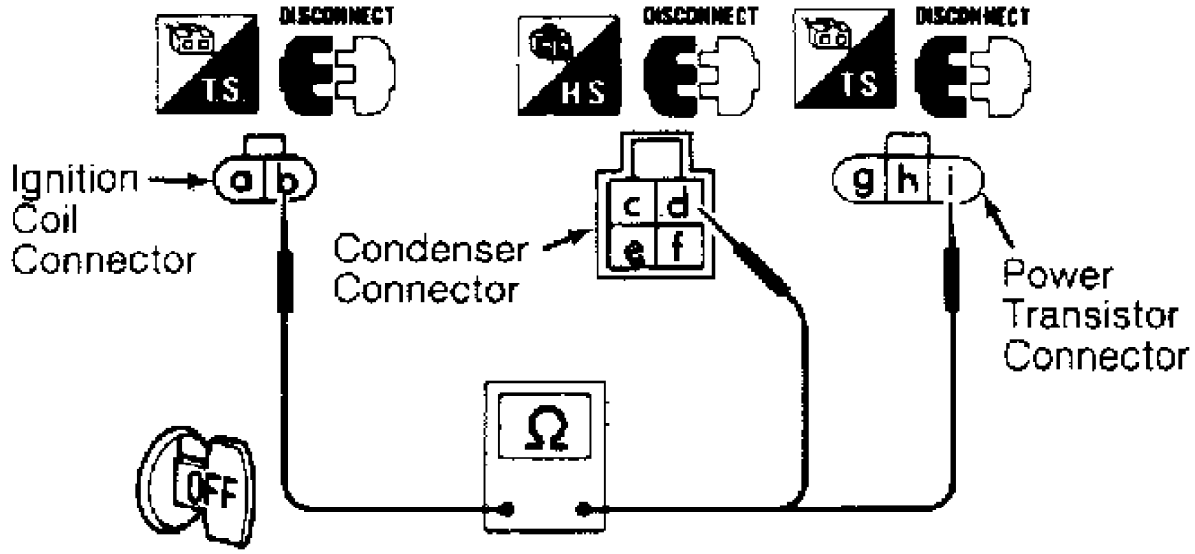


Fig. 6: Checking Ground Circuit (G20 & M30)
Courtesy of Nissan Motor Co., U.S.A.

Input Signal Circuit

Turn ignition off. Disconnect ECU, resistor and condenser

harness connector. Using ohmmeter, check continuity between ECU terminal No. 1 and resistor and condenser terminal "c". Continuity should be present. If continuity is not present, repair or replace wiring harness or connectors.

Output Signal Circuit

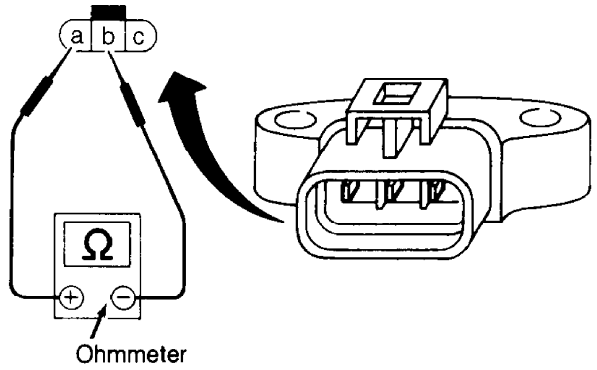
Check harness continuity between power transistor terminal "g" and ECU terminal No. 1. Continuity should be present. If continuity is not present, repair or replace wiring harness or connectors.

Ignition Coil Resistance

Disconnect ignition coil harness connector. Using ohmmeter, check resistance between ignition coil terminals No. 1 and 2. Resistance should be about one ohm. Check resistance between ignition coil terminals No. 1 and 3. Resistance should be approximately 10,000 ohms.

Power Transistor

Disconnect power transistor harness connector. Using ohmmeter, check power transistor continuity. See Fig. 7 or 8. Replace power transistor if results are not as specified.



⊖terminal side / ⊕terminal side		Terminal ⓐ		Terminal ⓑ		Terminal ⓒ
		Resistance Ω	Result	Resistance Ω	Result	Resistance Ω	Result
Terminal ⓐ		—		∞	O.K.	∞	O.K.
			—	Not ∞ or 0	N.G.	Not ∞ or 0	N.G.
		—	—	0	N.G.	0	N.G.
Terminal ⓑ		∞	N.G.		—	∞	N.G.
		Not ∞ or 0	O.K.	—	—	Not ∞ or 0	O.K.
		0	N.G.	—	—	0	N.G.
Terminal ⓒ		∞	N.G.	∞	N.G.	—	—
		Not ∞ or 0	O.K.	Not ∞ or 0	O.K.	—	—
		0	N.G.	0	N.G.	—	—

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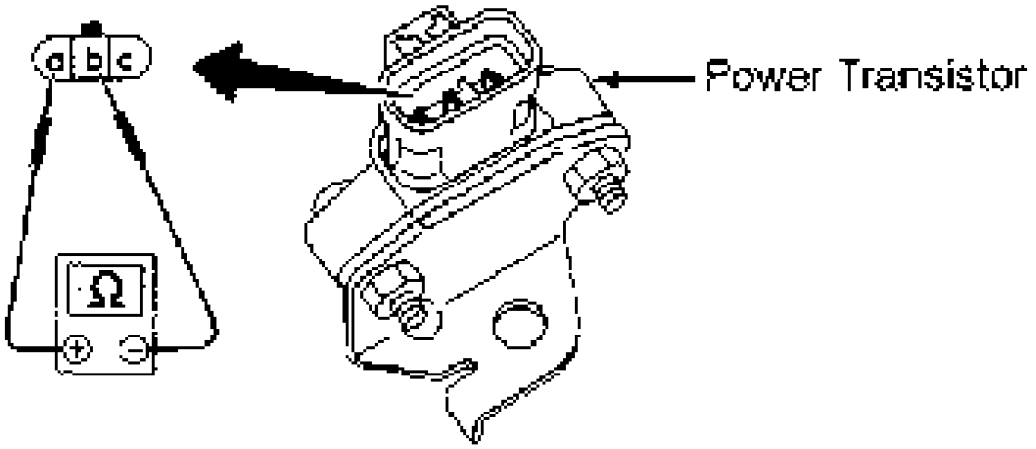
Fig. 7: Checking Power Transistor Circuit (G20)
Courtesy of Nissan Motor Co., U.S.A.



Terminal No.	Tester polarity	Continuity
a	⊕	Yes
b	⊖	
a	⊖	No
b	⊕	
a	⊕	Yes
c	⊖	
a	⊖	No
c	⊕	

Fig. 8: Checking Power Transistor Circuit (M30)
Courtesy of Nissan Motor Co., U.S.A.

Crank Angle Sensor

1) Remove crank angle sensor from engine. DO NOT disconnect crank angle sensor harness connector. Turn ignition on (engine off).

2) Connect negative voltmeter lead to ground. Rotate crank angle sensor shaft slowly by hand. Connect positive voltmeter lead to crank angle sensor connector terminal No. 1 (180-degree signal) for G20 or No. 3 (120-degree signal) for M30. See Fig. 9. Voltage should fluctuate between 0 and 5 volts. Move voltmeter positive lead to terminal No. 2 for G20 or No. 4 for M30 (one-degree signal). Voltage should again fluctuate between 0 and 5 volts.

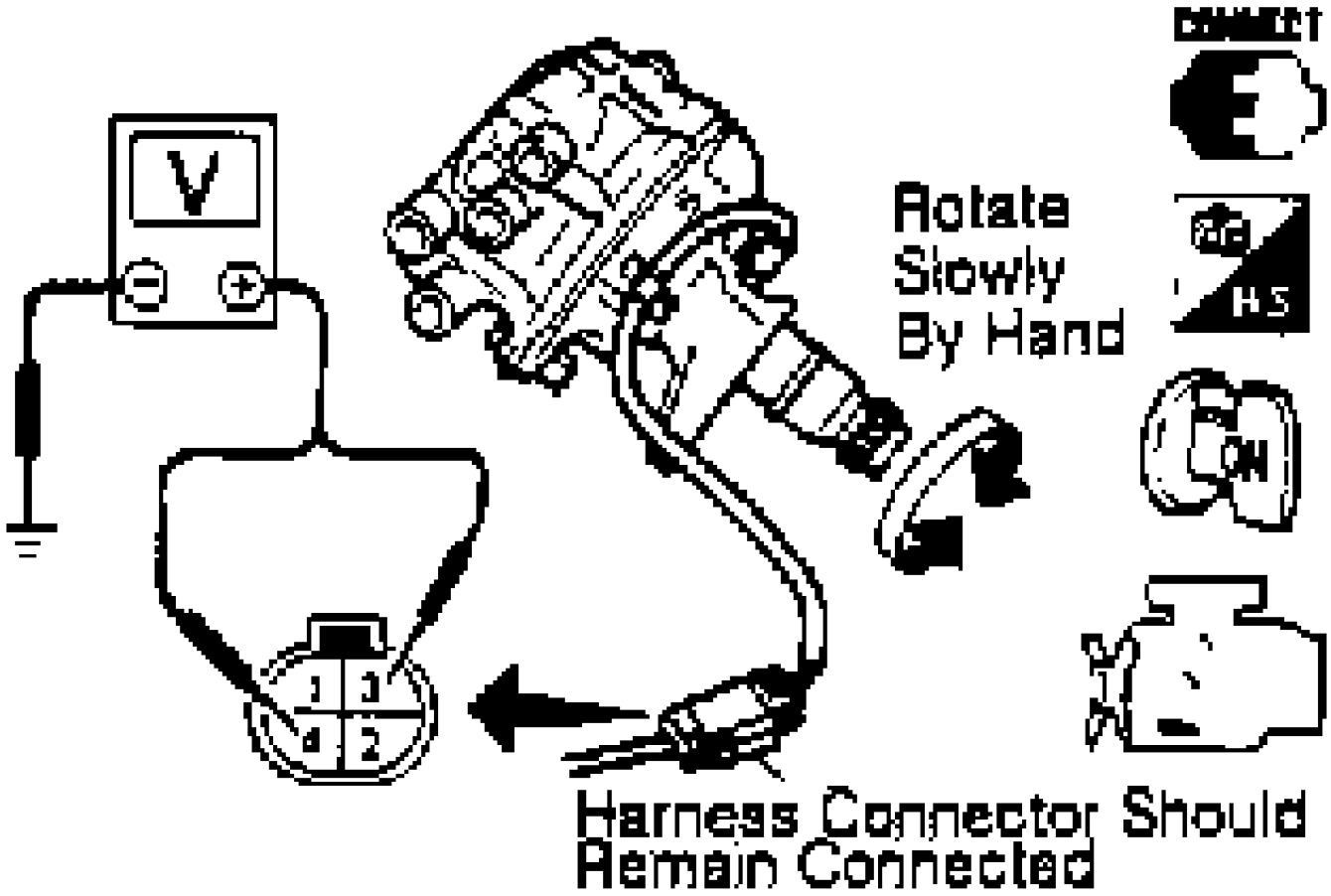


Fig. 9: Checking Crank Angle Sensor Ckt. (M30 Shown; G20 Is Similar)
Courtesy of Nissan Motor Co., U.S.A.

IDLE SPEED & IGNITION TIMING

Ensure idle speed and ignition timing are set to specification. For adjustment procedures, see D - ADJUSTMENTS article in the ENGINE PERFORMANCE Section.

IDLE SPEED TABLE

Application	Idle RPM
G20	700-800
M30	(1) 750-850
Q45	(1) 600-700

(1) - Transmission in Neutral.

IGNITION TIMING TABLE (Degrees BTDC @ RPM)

Application	Specification
G20	(1) 13-17 @ 700-800
M30	(1) 13-17 @ 750-850
Q45	(1) 13-17 @ 600-700

(1) - Automatic transmission in Neutral.

SUMMARY

If no faults were found while performing F - BASIC TESTING, proceed to G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section. If no hard codes are found in self-diagnostics, proceed to H - TESTS W/O CODES article in the ENGINE PERFORMANCE Section for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.) or intermittent diagnostic procedures.