I - SYSTEM/COMPONENT TESTS

1992 Infiniti G20

1992 ENGINE PERFORMANCE
Infiniti System & Component Testing

G20, M30, Q45

INTRODUCTION

Before testing separate components or systems, perform procedures in F - BASIC TESTING article in the ENGINE PERFORMANCE Section. Since many computer-controlled and monitored components set a trouble code if they malfunction, also perform procedures in G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section.

NOTE: Testing individual components does not isolate short or open circuits. Perform all voltage tests using a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance, unless stated otherwise is test procedure. Use ohmmeter to isolate wiring harness shorts or opens.

COMPUTERIZED ENGINE CONTROLS

ELECTRONIC CONTROL UNIT (ECU)

NOTE: See appropriate wiring diagram in L - WIRING DIAGRAMS article in the ENGINE PERFORMANCE Section to identify ECU ground and power circuit terminals.

Ground Circuits

1) Using an ohmmeter, check for continuity to ground on ECU terminals No. 6, 13, 39, 48, 107, 108 and 116 on G20 or terminals No. 10, 20, 50, 60, 107, 108 and 116 on M30 and Q45. Resistance should be zero ohms. If reading is not zero ohms, repair open to ground.

2) Using a DVOM, touch negative lead of voltmeter to a good ground. Using positive lead of voltmeter, backprobe each ground terminal at ECU connector. With vehicle running, voltmeter should indicate less than one volt. If voltmeter reading is greater than one volt, check for open, corrosion or loose connection on ground lead.

Power Circuits

1) Using a voltmeter, check for battery voltage between chassis ground and ECU terminals No. 46 and 109 on G20, or ECU terminal No. 58 on all other models. If battery voltage is not present, check fusible link. Fusible link also supplies power for fuel injectors.

2) Turn ignition switch to ON position. Using a voltmeter, check for battery voltage between chassis ground and ECU terminals No. 36, 38 and 47 on G20 or terminals No. 45, 49, 59 and 109 on M30 and Q45. If battery voltage is not present, check fusible link and fuse "G".

3) Connect voltmeter between chassis ground and ECU terminal No. 34 on G20 or terminal No. 43 on M30 and Q45. Turn ignition switch to START position. Battery voltage should be present only when ignition switch is in START position. If voltage is not present, check for blown fuse and defective ignition switch.

ENGINE SENSORS & SWITCHES

NOTE: Sensor resistance and/or voltage values (when available from

manufacturer) can be found in K - SENSOR RANGE CHARTS article in the ENGINE PERFORMANCE Section.

Airflow Meter

1) Ensure no dust or foreign material exists in hot wire air passage. Fold back airflow meter harness connector boot. Turn ignition on. Connect negative lead of voltmeter to ground. Using positive lead, backprobe airflow meter terminal No. 1 on Q45 or terminal "a" on G20 and M30. See Fig. 1 to 3. Voltmeter should read as specified. See AIRFLOW METER VOLTAGE SPECIFICATIONS table.

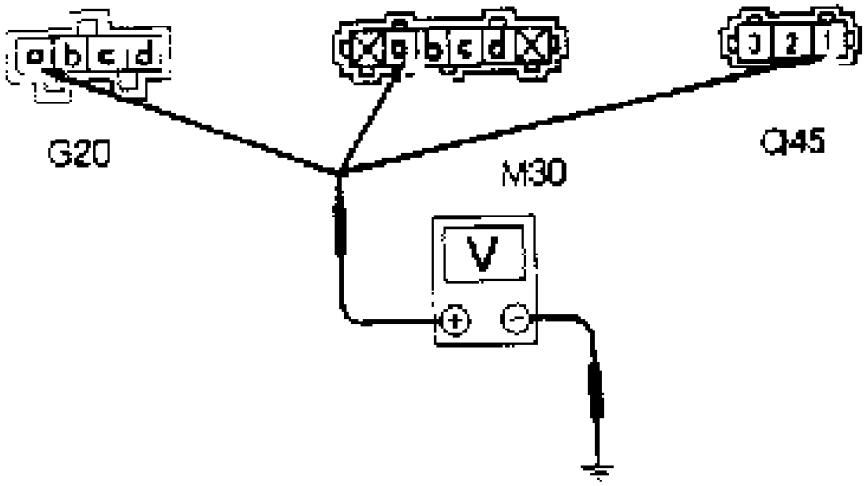


Fig. 1: Airflow Meter Terminal ID
Courtesy of Nissan Motor Co., U.S.A.

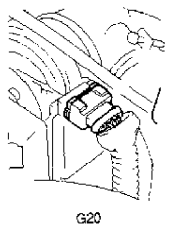
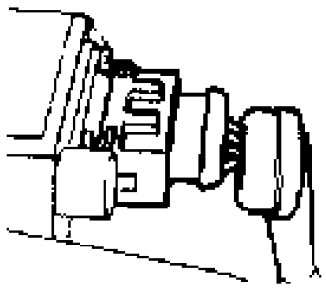


Fig. 2: Airflow Meter Connector ID (G20)
Courtesy of Nissan Motor Co., U.S.A.



M30 & Q45

Fig. 3: Airflow Meter Connector ID (M30 & Q45)
Courtesy of Nissan Motor Co., U.S.A.

2) Start engine, and allow it to warm to operating temperature. Recheck voltage reading. Voltage should be as specified. See AIRFLOW METER VOLTAGE SPECIFICATIONS table. Faults in airflow meter circuit should set a Code 12. If Code 12 is present, refer to G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section.

AIRFLOW METER VOLTAGE SPECIFICATIONS TABLE (1)

Application	(2) Key On Volts	Engine Running Volts
G20	0.2-0.5	1.3-1.7
M30	Less Than 0.5	1.0-1.3
Q45	Approx. 0.2	1.0-1.4

(1) - Engine at full operating temperature.
(2) - Engine off.

Coolant (Engine) Temperature Sensor

Disconnect coolant temperature sensor connector. Measure resistance across sensor terminals. See COOLANT TEMPERATURE SENSOR RESISTANCE TEST table. Replace sensor if it is not within specifications.

COOLANT TEMPERATURE SENSOR RESISTANCE TEST TABLE (1)

Temperature °F (°C)	Ohms

68 (20)	2100-2900
122 (50)	680-1000
176 (80)	300-330

(1) - Measure resistance across sensor terminals.

Crankshaft Angle Sensor

1) On G20 and M30, crankshaft angle sensor is part of distributor. On Q45, crankshaft angle sensor is a self-contained unit located on left front of engine. If a fault is present in crankshaft angle sensor, Code 11 may set in ECU memory. If Code 11 is set, proceed to G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section.

2) To test crankshaft angle sensor, remove crankshaft angle sensor (Q45) or distributor (G20 and M30). Leave sensor wiring connected. Using a logic probe or DVOM with an analog bar graph function, touch negative lead to ground and positive lead to one-degree and 90/120/180-degree signal terminals of ECU. See CRANKSHAFT ANGLE SENSOR SIGNAL HARNESS TERMINALS table. See Fig. 4 to 6.

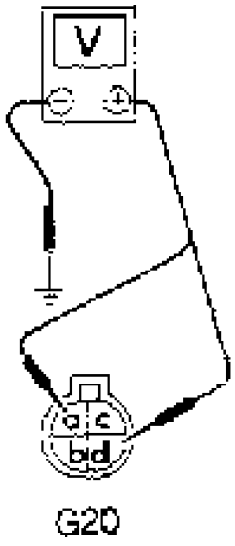


Fig. 4: Crankshaft Angle Sensor Terminal ID (G20)
Courtesy of Nissan Motor Co., U.S.A.

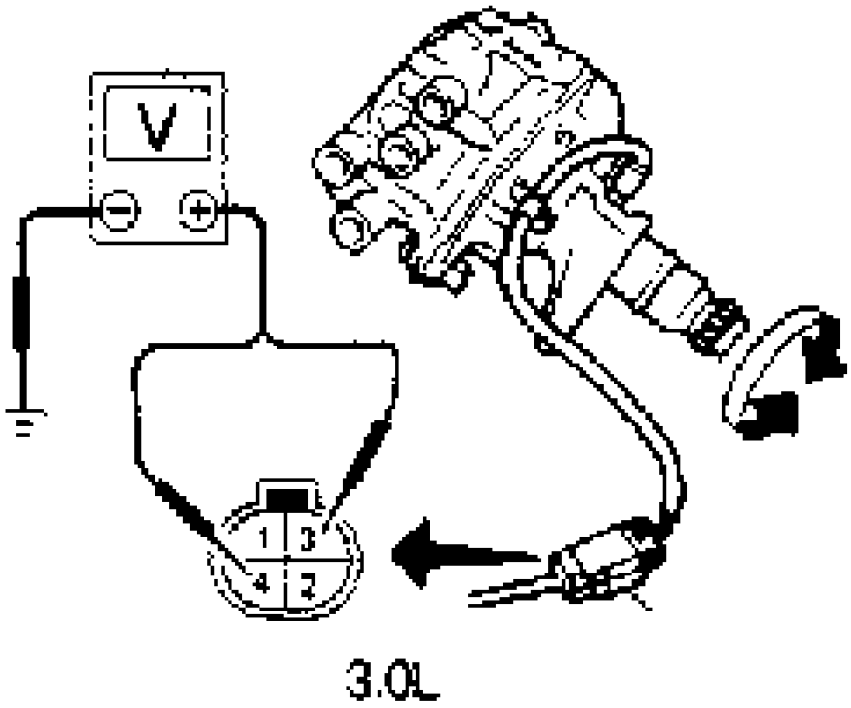


Fig. 5: Crankshaft Angle Sensor Terminal ID (M30)
Courtesy of Nissan Motor Co., U.S.A.

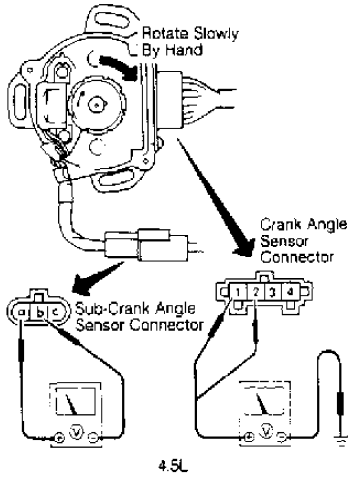


Fig. 6: Crankshaft Angle Sensor Terminal ID (Q45)
Courtesy of Nissan Motor Co., U.S.A.

3) Rotate sensor by hand. On a DVOM, one-degree signals should measure about 2.3-2.8 peak volts with sensor rotating. 45/60-

degree signal should measure about .1-.4 peak volt with sensor rotating. If either signal is not present, replace crank angle sensor. On Q45, also see SUB-CRANK ANGLE SENSOR (Q45).

NOTE: Crankshaft angle sensor voltage may be measured using a conventional DVOM without bar graph function; however, peak voltage signal may not easily be determined due to "averaging" of signal.

CRANKSHAFT ANGLE SENSOR SIGNAL HARNESS TERMINALS TABLE

Model	One-Degree Signal Terminal	90/120/180-Degree Signal Terminal
G20	"a"	"d"
M30	3	4
Q45	1	2

Knock Sensor

Using an ohmmeter capable of reading greater than 10-megohm, test for continuity between knock sensor terminal and chassis ground. If continuity exists, circuit is okay. If continuity does not exist, replace knock sensor. If a fault is present in detonation sensor circuit, a Code 34 will be set in ECM memory. If a Code 34 is set, proceed to appropriate G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section.

Exhaust Gas Oxygen Sensor (G20 & M30)

1) Disconnect oxygen sensor harness connector. Turn ignition on. Using DVOM, check voltage signal on center terminal of computer side of oxygen sensor harness. Voltmeter should indicate about one volt.

2) If one volt is not present, check for open or short to ground in oxygen sensor harness White wire between oxygen sensor and terminal No. 19 (G20) or terminal No. 29 (M30) at ECU. Also see FEEDBACK SYSTEM under FUEL CONTROL.

Exhaust Gas Oxygen Sensor (Q45)

See FEEDBACK SYSTEM under FUEL CONTROL.

Exhaust Gas Oxygen Sensor Heater

1) Disconnect oxygen sensor connector at sensor. Using ohmmeter, check resistance between 2 outside terminals on sensor side of harness.

2) Resistance should be 3-1000 ohms. If not within specification, replace oxygen sensor. DO NOT touch ohmmeter to center terminal of sensor, as damage to oxygen sensor will result.

3) Turn ignition on. Using voltmeter, measure voltage across 2 outside terminals on computer side of oxygen sensor harness. If battery voltage is not indicated, check ground at engine block, check for blown fuse "W" in engine compartment fuse block and check for open in harness between ECU and oxygen sensor.

Exhaust Gas Temperature Sensor (California)

1) Measure resistance across sensor terminals. Place exhaust gas temperature sensor in container of water. Sensor resistance should decrease as temperature increases.

2) Heat water until boiling temperature of 212°F (100°C) has been obtained. Resistance at 212°F (100°C) should be 76,770-93,830 ohms. If a fault is present in exhaust temperature sensor circuit, a Code 35 will be set in ECU memory. If a Code 35 is set, proceed to G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section.

Fuel Temperature Sensor (M30 & Q45)

Disconnect temperature sensor connector. Measure resistance across sensor terminals. See FUEL TEMPERATURE SENSOR RESISTANCE TEST (M30 & Q45) table.

FUEL TEMPERATURE SENSOR RESISTANCE TABLE (M30 & Q45) (1)

Temperature °F (°C)	Ohms
68 (20)	2100-2900
122 (50)	680-1000
176 (80)	300-330

(1) - Measure resistance between sensor terminals at fuel pressure regulator.

Neutral Switch (G20 M/T)

Disconnect neutral switch harness connector. Using a DVOM, check for continuity between terminals. Continuity should exist in Neutral only.

Park/Neutral Input (G20 & M30 A/T)

1) Backprobe ECU terminal No. 35 (G20) or 44 (M30) with positive lead of a 10-megohm DVOM. Connect negative lead to chassis ground. See appropriate L - WIRING DIAGRAMS article in the ENGINE PERFORMANCE Section to identify ECU terminals.

2) With gear selector in any position except Park or Neutral, voltmeter should indicate 8-10 volts. With gear selector lever in Park or Neutral, voltmeter should indicate about zero volts. On G20, check for short circuit between ECU and transmission inhibitor switch if voltmeter always indicates zero volts. If wiring is okay, substitute a known good ECU.

3) On M30, check for short circuit between transmission control unit terminal No. 13 and ECU if voltmeter always indicates zero volts. If wiring is okay, check for inhibitor switch misadjustment or short to voltage between A/T inhibitor switch and transmission control unit.

4) If wiring and switch are okay, substitute a known good transmission control unit. If circuit still does not operate correctly, substitute a known good ECU.

Park/Neutral Relay Input (Q45)

1) Backprobe ECU terminal No. 44 with positive lead of a 10-megohm DVOM. Connect negative lead to a good ground. See appropriate L - WIRING DIAGRAMS article in the ENGINE PERFORMANCE Section to identify ECU terminals.

2) With gear selector in any position except Park or Neutral, voltmeter should indicate 8-10 volts. With gear selector lever in Park or Neutral, voltmeter should indicate about zero volts. To test park/neutral relay, see RELAYS & SOLENOIDS.

Power Steering Oil Pressure Switch (G20)

1) Switch is attached to power steering high pressure hose. Disconnect switch connector. With engine idling and steering wheel in straight-ahead position, check continuity across switch terminals. Turn steering wheel quickly left or right. Resistance should change from infinite to zero ohms.

2) Reconnect switch connector. Check harness and signal to ECU. With engine idling and steering wheel in straight-ahead position, check voltage between chassis ground and ECU terminal No. 43. Voltage

reading should be 7-10 volts. Turn steering wheel quickly left or right. Voltage should change from 7-10 volts to zero volts.

Power Steering Oil Pressure Switch (Q45)

1) Switch is attached to power steering high pressure hose. Disconnect switch connector. With engine idling and steering wheel in straight-ahead position, check continuity across switch terminals. Turn steering wheel quickly left or right. Resistance should change from infinite to zero ohm.

2) Check harness and signal to ECU. With engine idling and steering wheel in straight-ahead position, check voltage between chassis ground and ECU terminal No. 40. Voltage should be zero. Turn steering wheel quickly left or right. Voltage should change from zero to battery voltage.

Start (Ignition Switch) Signal

Backprobe ECU terminal No. 34 (G20) or terminal No. 43 (M30 & Q45) with positive lead of DVOM. Connect negative lead to chassis ground. Turn ignition switch to START position, battery voltage should exist at ECU terminal. If battery voltage does not exist, check for open in wire between ignition switch and ECU. If wire is okay, replace ignition switch.

Sub-Crankshaft Position Sensor (Q45)

Disconnect harness at sub-crankshaft position sensor. Remove sensor. Connect analog volt-ohmmeter test leads between terminals "a" and "b" of sensor. See Fig. 6. Place voltmeter on low (100 millivolt) AC volt scale. Turn sensor by hand. Voltmeter needle should deflect. If voltmeter does not indicate generated voltage signal, replace sensor.

Throttle Position Sensor (TPS) & Idle Switch

1) Throttle position sensor and idle switch are a combined assembly located on side of throttle body. Idle switch connector is located on sensor; TPS connector is a separate harness connected to sensor. Warm engine to operating temperature. On Q45, ensure fast idle cam is fully released. On all models, turn ignition off. Disconnect TPS at harness. Connect ohmmeter between terminals No. 5 and 6 on sensor side of harness. See Fig. 7.

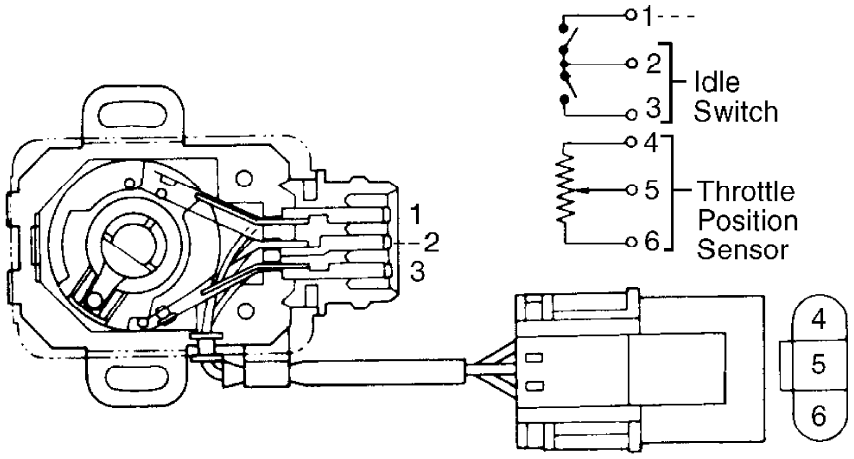


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Fig. 7: Testing Throttle Position Sensor
Courtesy of Nissan Motor Co., U.S.A.

2) On G20, resistance should be approximately 2000 ohms with throttle closed. With throttle completely open, resistance should be

approximately 10,000 ohms. If sensor does not respond as indicated, adjust TPS. See D - ADJUSTMENTS article in the ENGINE PERFORMANCE Section.

3) On M30, resistance should be approximately 1000 ohms with throttle closed. With throttle completely open, resistance should be approximately 9000 ohms. If sensor does not respond as indicated, adjust TPS. See D - ADJUSTMENTS article in the ENGINE PERFORMANCE Section.

4) On Q45, resistance should be about 400 ohms with throttle closed. With throttle completely open, resistance should be about 5000 ohms.

5) As throttle angle is slowly changed, resistance should change smoothly, with no skips or sudden changes indicated on ohmmeter. If sensor does not respond as indicated, replace TPS.

6) On M30 and Q45, reconnect TPS harness connector. Disconnect idle switch connector at TPS. Connect ohmmeter leads between terminals No. 2 and 3 of idle switch harness to sensor.

7) With throttle fully closed, resistance should be zero ohms. With throttle slightly open, resistance should be infinite. If sensor does not respond as indicated, replace TPS.

Vehicle Speed Sensor

Raise and support front of G20 or rear of J30 and Q45 on jackstands. Disconnect vehicle speed sensor connector at wheel. Using an ohmmeter, check continuity across speed sensor harness connectors while rotating one driving wheel. Resistance should fluctuate between zero and infinite ohms.

RELAYS & SOLENOIDS

RELAYS

A/C Clutch Relay

See MISCELLANEOUS CONTROLS.

ECCS, Fuel Pump & Ignition Coil Relays

Relays are Green. For relay location, see RELAY LOCATION & IDENTIFICATION table. With battery voltage and ground applied to terminals No. 1 and 2 of relay, continuity should exist between terminals No. 3 and 5. See Fig. 8.

RELAY LOCATION & IDENTIFICATION TABLE

Application	Location
G20	
ECCS	In Underhood Relay Box
Fuel Pump	In Underhood Relay Box
Ignition Coil Relay	Under Dash Left Side
M30	
ECCS	At Right Kick Panel
Fuel Pump	At Center Rear Of Trunk
Ignition Coil Relay	Under Dash Left Side
Q45	
ECCS	At Right Kick Panel
Fuel Pump	At Center Rear Of Trunk
Ignition Coil Relay	At Right Kick Panel

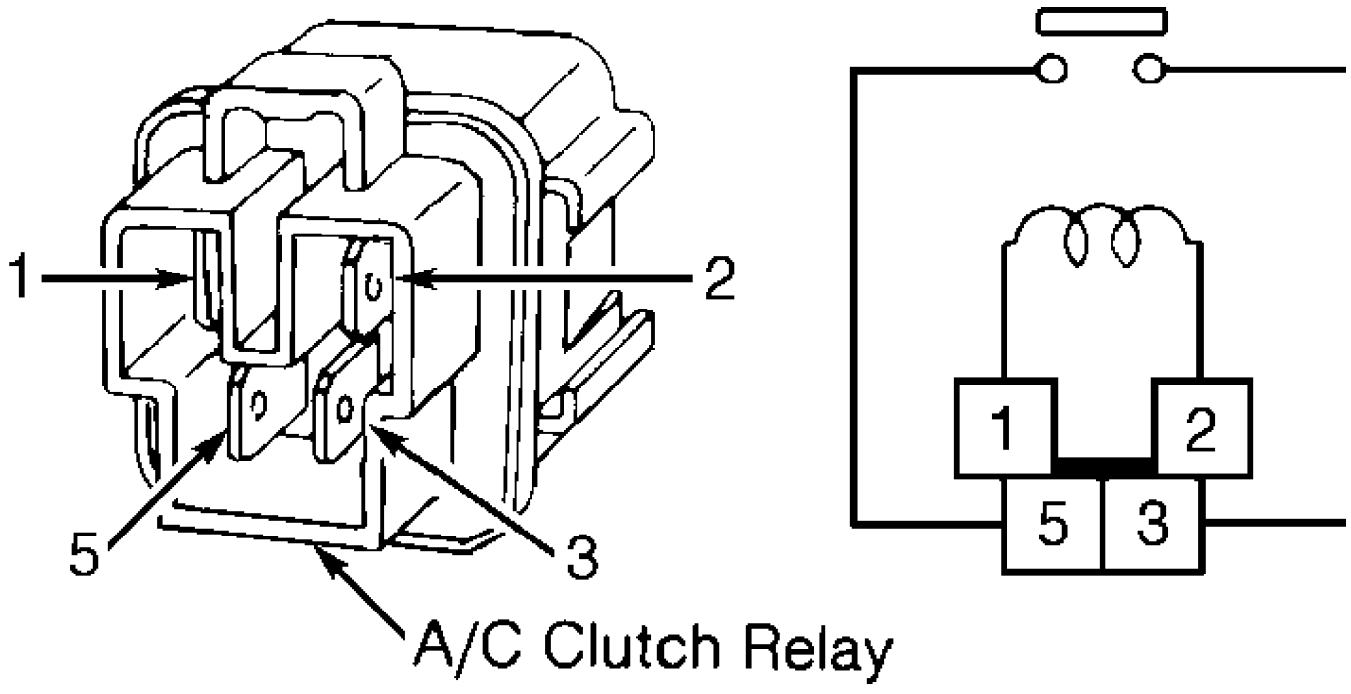

Fig. 8: ECCS, Fuel Pump & Ignition Coil Relay Terminal ID
Courtesy of Nissan Motor Co., U.S.A.

Park/Neutral Relay (Q45)

Remove park/neutral relay (Gray), located in relay box in right front corner of engine compartment. With battery voltage and ground applied to terminals No. 1 and 2 of relay, continuity should exist between terminals No. 3 and 4. See Fig. 9.

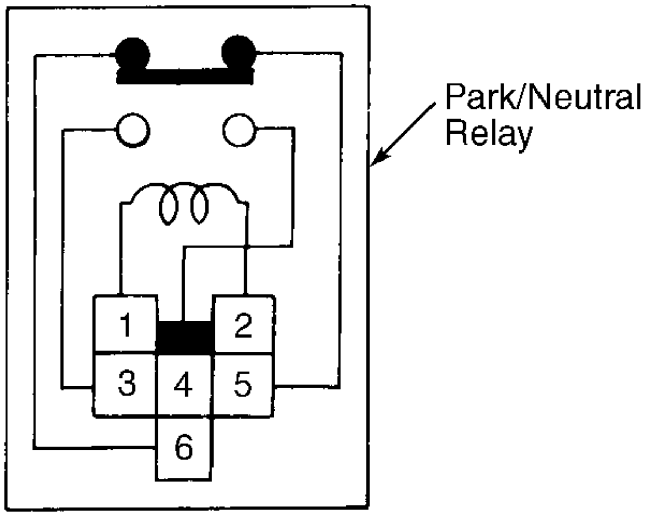

Fig. 9: Park/Neutral Relay Terminal ID (Q45)
Courtesy of Nissan Motor Co., U.S.A.

Safety Relay (M30)

1) Safety relay (Orange) is located at right kick panel.

Remove relay from vehicle. Connect battery voltage to terminal No. 1 of relay. See Fig. 10.

2) Connect terminal No. 2 of relay to ground. Using ohmmeter, ensure continuity does not exist between terminals No. 2 and 3.

3) Reverse voltmeter power and ground leads. Continuity should now exist. If relay does not respond as indicated, replace relay.

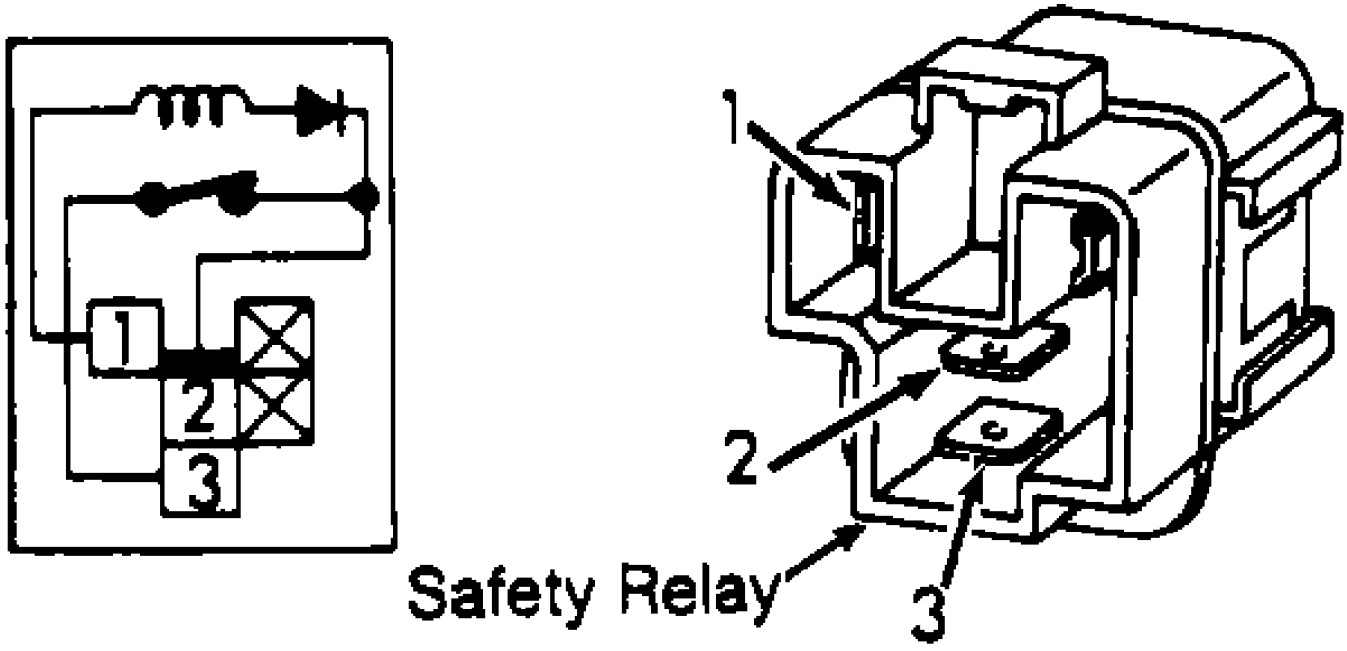

Fig. 10: Safety Relay Terminal ID (M30)
Courtesy of Nissan Motor Co., U.S.A.

SOLENOIDS

Air Induction Valve (AIV) Control Solenoid
See AIR INDUCTION (G20) under EMISSION SYSTEMS & SUB-SYSTEMS.

Auxiliary Air Control (AAC) Solenoid
See IDLE CONTROL SYSTEM.

EGR Solenoid Valve
See EXHAUST GAS RECIRCULATION (EGR) under EMISSION SYSTEMS & SUB-SYSTEMS.

Fuel Injector
See FUEL CONTROL under FUEL SYSTEM.

Fuel Pressure Regulator Solenoid (M30)
See FUEL DELIVERY under FUEL SYSTEM.

Canister Purge Solenoid Valve (G20 & Q45)
See FUEL EVAPORATION under EMISSION SYSTEMS & SUB-SYSTEMS

Variable Valve Timing Solenoid (Q45)
See MISCELLANEOUS CONTROLS.

FUEL SYSTEM

FUEL DELIVERY

Relieving Fuel Pressure

Remove fuel pump fuse, start engine and allow engine to run until it stalls due to lack of fuel. Crank engine an additional 2-3 times to verify all pressure has dissipated.

Fuel Pressure

For basic fuel pressure procedures and specifications, see FUEL PRESSURE under FUEL SYSTEM in F - BASIC TESTING article in the ENGINE PERFORMANCE Section.

Fuel Pressure Regulator

1) Relieve fuel pressure from system. Connect fuel pressure gauge between fuel filter and fuel tube. Remove hose from fuel pressure regulator and plug hose. Jump fuel pump relay. Connect hand-held vacuum pump to pressure regulator. Turn ignition on.

2) Gradually apply vacuum to regulator. Fuel pressure should decrease as vacuum increases. Compare values to FUEL PRESSURE table in F - BASIC TESTING article in the ENGINE PERFORMANCE Section. If results are unsatisfactory, replace fuel pressure regulator.

Fuel Pressure Regulator Solenoid (M30)

1) Remove vacuum lines and electrical connector from solenoid. Remove solenoid from vehicle. Apply battery voltage to White/Black wire terminal of solenoid. Apply ground to Purple wire terminal of solenoid. Blow into vacuum port "A" on end of solenoid. See Fig. 11.

2) As battery voltage is applied, air should pass out of right angle vacuum port "B". With power and ground removed from solenoid, air should pass out of port "C". Port "C" may be covered by a filter.

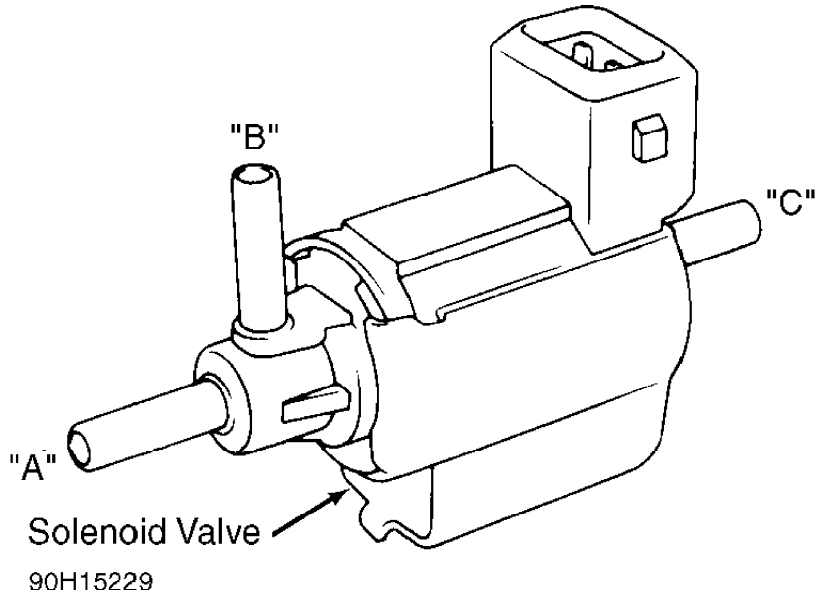

Fig. 11: Identifying Solenoid Valve Ports
Courtesy of Nissan Motor Co., U.S.A.

Fuel Pump

Remove fuel tank filler cap. Turn ignition on. Listen for

fuel pump operating noise. If noise is not present, check fuel pump relay and wiring harness between relay and pump. On Q45, check operation of fuel pump control unit. If fuel pump control unit is okay, disconnect fuel pump/sending unit connector at fuel tank and check resistance across fuel pump winding terminals. See FUEL PUMP WINDING IDENTIFICATION table. Ohmmeter should indicate .5 ohm. If resistance is not correct, replace fuel pump.

FUEL PUMP WINDING IDENTIFICATION TABLE

Application	Wire Colors
G20	Black & Black/Red
M30	White & Blue
Q45	White & Orange/Blue

Fuel Pump Control Unit (Q45)

1) Disconnect fuel pump control unit connector, located above fuel tank at rear of vehicle. Install 3 jumper wires from unit side of harness, terminals No. 5, 6 and 7, to ECU side of harness, terminals "e", "f" and "g" respectively. See Fig. 12.

2) Connect one, then 2 and finally 3 jumper wires as indicated in illustration. Using a DVOM, check voltage between terminals No. 4 and 7 as each jumper wire is connected. See Fig. 12. If voltage readings are not as indicated, replace fuel pump control unit.

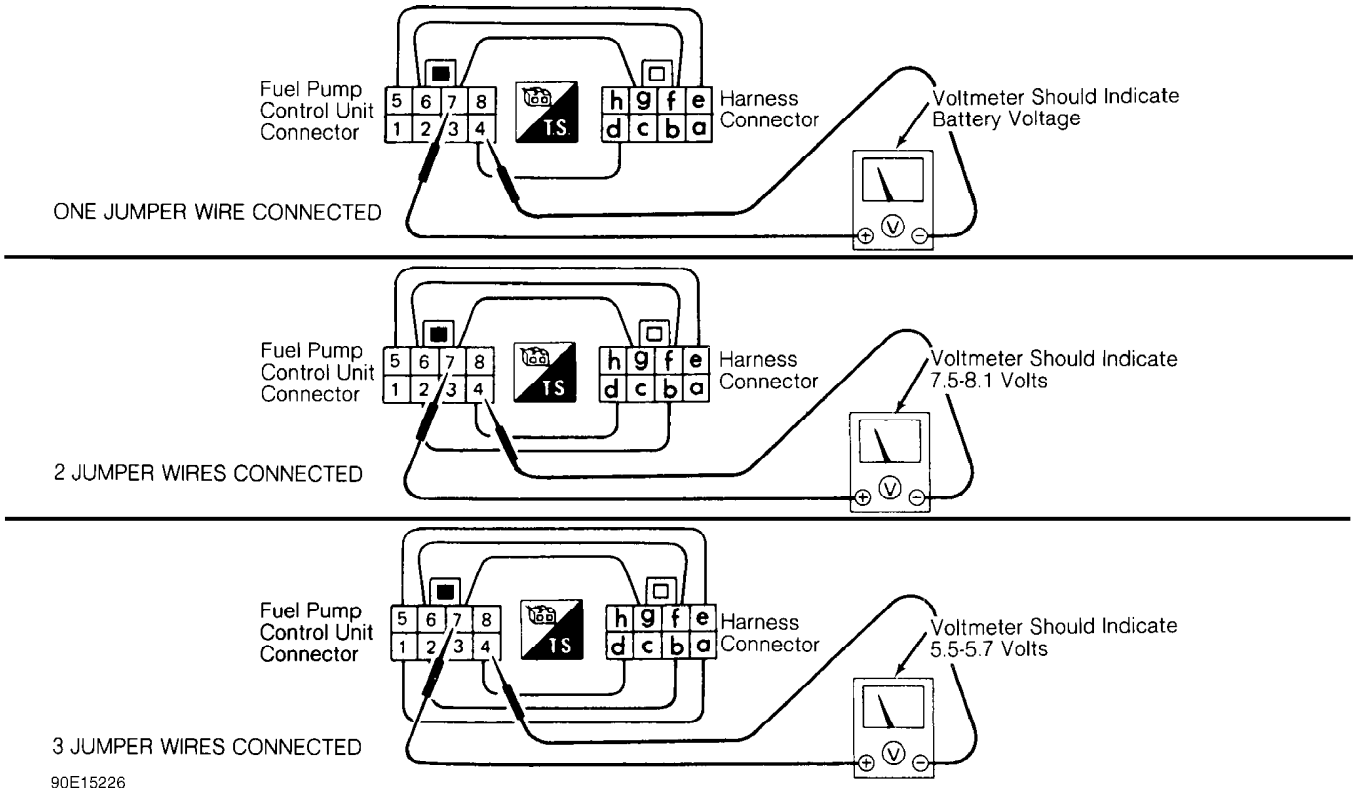

Fig. 12: Testing Fuel Pump Control Unit (Q45)
Courtesy of Nissan Motor Co., U.S.A.

Fuel Pump Relay

See RELAYS under RELAYS & SOLENOIDS.

Start Signal

Start signal from ignition switch is used for ECU control of fuel pump and pressure regulator control solenoid. On Q45, start signal is used by ECU in controlling fuel pump control unit. See ENGINE SENSORS & SWITCHES.

FUEL CONTROL

ECU controls fuel system based upon sensor input signals. See FUEL CONTROL SYSTEM INPUT SIGNALS table. If feedback system does not function properly, check input signals before replacing ECU.

FUEL CONTROL SYSTEM INPUT SIGNALS TABLE

Application	Model Usage
A/C Clutch Signal	G20 & (1) Q45
Airflow Meter	G20, M30 & Q45
Battery Voltage	G20, M30 & Q45
Crank Angle Sensor	G20, M30 & Q45
Engine (Coolant) Temperature	G20 M30 & Q45
Exhaust Gas Temperature Sensor (2)	G20, M30 & Q45
Fuel Temperature Sensor	M30 & Q45
Ignition (START) Switch	G20 M30 & Q45
Neutral Switch	(3) G20
Oxygen Sensor	G20, M30 & (4) Q45
Park/Neutral (Inhibitor) Switch	G20, (5) M30 & (6) Q45
Power Steering Pressure Switch	G20 & Q45
Secondary Throttle Sensor	(7) Q45
Sub-Crank Angle Sensor	Q45
Throttle Position Sensor	G20, M30 & Q45
Throttle (Idle) Switch	M30 & Q45
Vehicle Speed Sensor	G20, M30 & Q45

(1) - Signal received from automatic A/C amplifier.
(2) - California models only.
(3) - M/T models only.
(4) - 2 used.
(5) - Signal received from transmission control unit.
(6) - Signal received from P/N relay.
(7) - Traction control system equipped models.

Feedback System

1) Start engine, and warm it to operating temperature. Ensure idle speed and timing are adjusted to specification. Increase engine speed to about 2000 RPM for 2 minutes under no-load condition. Using a small screwdriver, turn diagnostic mode selector screw on ECU.

2) With screwdriver turned fully clockwise for at least 2 seconds, inspection lights will begin to flash. Turn screwdriver fully counterclockwise. This switches ECU to Mode II which is used to monitor exhaust gas sensor feedback signals.

3) With engine speed at 2000 RPM for 2 minutes, LED should flash at least 5 times during a 10-second period. If sensor does not respond as indicated and no other faults which may affect air/fuel mixture are indicated by ECU self-diagnostic system, use a voltmeter to verify input signals to ECU are correct. If so, replace oxygen sensor. If still not correct, replace ECU.

4) Q45 uses 2 oxygen sensors. When Mode II is first entered, left bank oxygen sensor is being monitored. To change to right bank monitoring (with engine running), turn diagnostic mode selector on ECU fully clockwise. Wait at least 2 seconds. Turn selector lever fully counterclockwise. Repeat step 2).

Fuel Injector

1) With engine idling, individually disconnect injector harness connectors. Each injector should produce an equal RPM drop.

2) With engine cranking or while manually rotating crank angle sensor (harness connected with ignition on), listen for clicking or feel for vibration, indicating injectors are triggering. If injectors are not triggering, check power and ground circuits and crank angle sensor signal to ECU.

3) Disconnect fuel injector connector. Using ohmmeter, check across injector terminals for 10-14 ohms resistance. If 10-14 ohms is not indicated, replace fuel injector.

4) Check for injector leaks by removing injector fuel rail. Keep fuel hose and all injectors connected to rail. Turn ignition on. DO NOT start engine. Observe injector tips for leakage. If injectors drip, replace faulty injectors.

Fuel Temperature Sensor (M30 & Q45)

See ENGINE SENSORS & SWITCHES.

IDLE CONTROL SYSTEM

Idle speed is controlled by ECU through AAC valve and Fast Idle Control Device (FICD) valve on G20 and M30. ECU controls idle speed components based upon signals received from various input devices. If idle speed components test correctly but idle speed is not being regulated properly, check input signals to ECU. See IDLE SPEED SYSTEM INPUT SIGNALS table.

On Q45, fast idle is controlled by fast idle cam on non-traction control system equipped vehicles and air cut valve on traction control system equipped vehicles. Engine coolant temperature changes volume of wax element to control amount of air by-passing secondary throttle valve. As engine warms, by-pass air is reduced, reducing idle speed.

NOTE: On Q45, see D - ADJUSTMENTS article in the ENGINE PERFORMANCE Section for testing and adjustment of fast idle cam.

IDLE SPEED SYSTEM INPUT SIGNALS TABLE

Application	Model Usage
A/C Clutch Signal (1)	G20, M30 & Q45
Airflow Meter	Q45
Battery Voltage	G20, M30 & Q45
Crank Angle Sensor	G20, M30 & Q45
Engine (Coolant) Temperature	G20, M30 & Q45
Ignition (START) Switch	G20, M30 & Q45
Neutral Switch	(2) G20
Park/Neutral (Inhibitor) Switch	G20, (3) M30 & (4) Q45
Power Steering Pressure Switch	G20, M30 & Q45
Throttle Position Sensor	G20, M30 & Q45
Throttle (Idle) Switch	M30 & Q45
Vehicle Speed Sensor	G20, M30 & Q45

(1) - Signal received from automatic A/C amplifier.
(2) - M/T models only.
(3) - Signal received from transmission control unit.
(4) - Signal received from P/N relay.

Air Cut Valve (Q45 With Traction Control System)

1) Remove air cut valve. Place valve, gasket side up, in about one inch of 32°F (0°C) water. DO NOT wet gasket. Blow through air inlet. Air should pass easily.

2) Heat water to warmer than 122°F (50°C). Blow through air inlet. Almost no air should pass. If valve does not function as specified, replace valve.

Air Regulator (G20 & M30)

Start engine. Pinch off large air line going to regulator. When engine is cold, RPM should drop. When engine is warmed up, RPM should not change. Disconnect air regulator connector. Check resistance across regulator terminals for 70-80 ohms.

Auxiliary Air Control (AAC) Solenoid

1) Warm engine to operating temperature. Place transmission in Neutral. Ensure idle speed is within specification. If idle speed is not within specification, adjust it before proceeding. See D - ADJUSTMENTS article in the ENGINE PERFORMANCE Section. If idle speed cannot be adjusted, check idle speed screw passage for blockage.

2) With engine idling at specified RPM, disconnect AAC solenoid connector. RPM should drop. If RPM drops, AAC is functioning correctly.

3) If RPM does not drop, turn ignition off. Disconnect electrical connector from AAC solenoid. Using ohmmeter, ensure resistance of solenoid windings is 10 ohms. Remove AAC valve, and check for plunger seizing or sticking. Check for broken tension spring. If no faults are found, check AAC power and ground circuits. Check ECU input signals used to control AAC solenoid.

Fast Idle Control Device (FICD) Solenoid (G20 & M30)

Disconnect FICD solenoid connector. Briefly apply ground and battery voltage to solenoid. Solenoid should click as it is energized. If solenoid does not click, remove FICD and check for seizing or sticking plunger. Check for broken tension spring.

IGNITION SYSTEM

For basic ignition system and no-start testing, see F - BASIC TESTING article in the ENGINE PERFORMANCE Section.

DISTRIBUTORLESS IGNITION SYSTEM (Q45)

Ignition Coil

See IGNITION CHECKS in F - BASIC TESTING article in the ENGINE PERFORMANCE Section.

Power Transistor

See IGNITION CHECKS in F - BASIC TESTING article in the ENGINE PERFORMANCE Section.

Crankshaft Angle Sensor

ECU depends upon crankshaft angle sensor for RPM signals. ECU uses signals to determine triggering of power transistors and fuel injectors. See CRANKSHAFT ANGLE SENSOR and SUB-CRANK ANGLE SENSOR under ENGINE SENSORS & SWITCHES.

OPTICAL IGNITION SYSTEM (G20 & M30)

Ignition Coil

See IGNITION CHECKS in F - BASIC TESTING article in the ENGINE PERFORMANCE Section.

Power Transistor

See IGNITION CHECKS in F - BASIC TESTING article in the ENGINE PERFORMANCE Section.

Crankshaft Angle Sensor

ECU depends upon crankshaft angle sensor for RPM signals. Signals are used by ECU to determine triggering of power transistor and fuel injectors. See CRANKSHAFT ANGLE SENSOR under ENGINE SENSORS & SWITCHES.

IGNITION TIMING CONTROL SYSTEM

Timing Advance System

ECU controls ignition timing advance based upon sensor input signals that reflect ignition timing needs. If timing problems are experienced, inspect input signals for proper operation. See TIMING ADVANCE SYSTEM INPUT SIGNALS table. To check input signals, see ENGINE SENSORS & SWITCHES or ECU pin voltage charts in J - PIN VOLTAGE CHARTS article in the ENGINE PERFORMANCE Section.

TIMING ADVANCE SYSTEM INPUT SIGNALS TABLE

Application	Model Usage
A/C Clutch Signal	(1) Q45
Airflow Meter	G20, M30 & Q45
Battery Voltage	G20, M30 & Q45
Crank Angle Sensor	M30 & Q45
Engine (Coolant) Temperature	G20, M30 & Q45
Ignition Switch START Signal	G20, M30 & Q45
Neutral Switch	(2) G20
Park/Neutral Signal	G20 & (3) Q45
Power Steering Oil Pressure Switch	Q45
Throttle Position Sensor & Idle Switch	M30 & Q45
Vehicle Speed Sensor	G20, M30 & (4) Q45

(1) - Signal received from automatic A/C amplifier.
(2) - M/T models only.
(3) - Signal received from P/N relay.
(4) - Signal received from transmission control unit.

Detonation Retard Operation

Problems with detonation sensor retard circuit should set a Code 34. If code is present, see Code 34 chart in G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section. Check knock sensor wire for open or short to ground. Check knock sensor shield ground wire for continuity to ground. Check routing of knock sensor wire. Wire should not be routed close to spark plug wires or high output accessories.

EMISSION SYSTEMS & SUB-SYSTEMS

AIR INDUCTION (G20)

Air induction is controlled by Air Induction Valve (AIV) and AIV control solenoid. AIV sends secondary air to exhaust manifold using vacuum created by exhaust pulsation. Reed valves prevent secondary air from being sent back to air cleaner when exhaust pressure is greater than atmospheric pressure.

AIV control solenoid provides vacuum to open AIV at idle and on deceleration. During acceleration, solenoid is energized, preventing vacuum from opening AIV.

Air Induction Valve (AIV)

Start engine, and bring it to full operating temperature. With engine at idle, AIV should operate. Raise engine speed to greater than 2000 RPM, and then allow it to return to idle. AIV should not operate during acceleration and should operate on deceleration. If AIV does not operate as specified, check vacuum hoses and AIV control solenoid. See AIV CONTROL SOLENOID. If hoses and solenoid are okay, replace AIV.

AIV Control Solenoid

1) Remove vacuum lines and electrical connector from solenoid. Remove solenoid from vehicle. Apply battery voltage to White/Green wire terminal of solenoid. Apply ground to Gray wire terminal of solenoid. Blow into vacuum port "A" on end of solenoid.

2) As battery voltage is applied, air should pass out of right angle vacuum port "B". With power and ground removed from solenoid, air should pass out of port "C". Port "C" may be covered by a filter. See Fig. 11.

EXHAUST GAS RECIRCULATION (EGR)

ECU controls EGR through a EGR solenoid valve. ECU controls solenoid based upon input signals received from various input components. If EGR system components test okay and system fails to function properly due to ECU control of EGR solenoid, test input signals which ECU uses to determine control of EGR system. See EGR SYSTEM INPUT SIGNALS table.

EGR SYSTEM INPUT SIGNALS TABLE

Signal	Data Usage
Coolant (Engine) Temperature Sensor	Engine Temperature
Crank Angle Sensor	Engine Speed
Ignition Switch	Crank (START) Signal
Throttle Position Sensor	Idle Position
Throttle (Idle) Switch	Idle Position

EGR System Check

1) Warm engine to normal operating temperature. Disconnect vacuum line at EGR valve and connect vacuum gauge. Increase engine speed to 2000 RPM. Vacuum should be indicated on gauge.

2) If vacuum is not indicated, check backpressure transducer, EGR solenoid valve and input signals which ECU uses to control EGR system. See EGR SYSTEM INPUT SIGNALS table. Also check EGR solenoid power supply and harness between ECU and EGR solenoid for opens or shorts.

EGR Backpressure Transducer

1) Remove vacuum and exhaust lines from transducer. Plug one upper vacuum port of EGR transducer. Connect hand-held vacuum pump to remaining EGR vacuum port. See Fig. 13. Apply vacuum. Vacuum should not hold. If vacuum holds, replace transducer.

2) Blow into exhaust pressure port. Apply vacuum to EGR vacuum port again. Vacuum should hold only when air pressure is applied to transducer pressure port. If vacuum is not as specified, replace transducer.

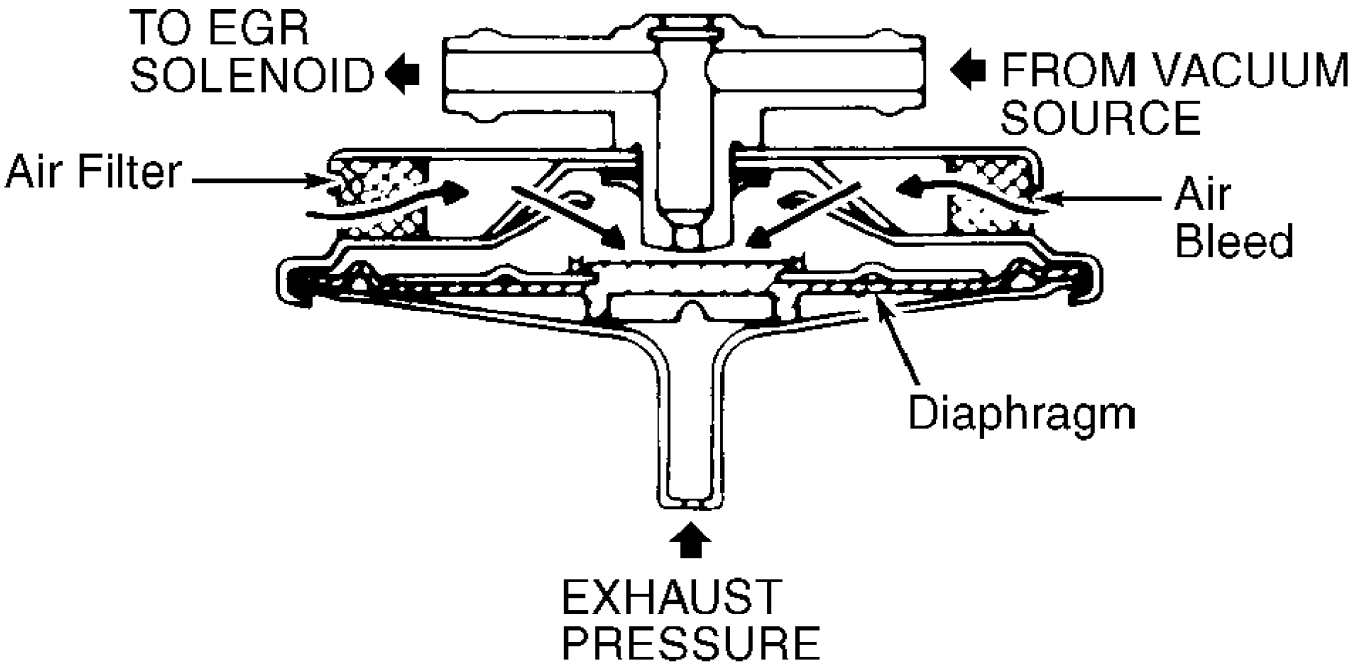

Fig. 13: Testing EGR Backpressure Transducer
Courtesy of Nissan Motor Co., U.S.A.

EGR Valve

1) With engine idling, disconnect EGR vacuum line. Apply vacuum to EGR valve. Engine speed should decrease or engine should stall. If engine does not respond in this manner, go to step 2). Vacuum should hold on gauge. If vacuum does not hold, replace EGR valve.

2) Manually compress EGR valve diaphragm from underside. If engine speed does not decrease or engine does not stall, remove EGR valve and inspect EGR passages for plugging. If engine speed decreases or engine stalls, replace EGR valve.

EGR Solenoid Valve

1) Remove vacuum lines and electrical connector from solenoid. Remove solenoid from vehicle. Using jumper wires, connect battery voltage and ground to appropriate terminal of solenoid. See EGR SOLENOID TERMINAL IDENTIFICATION table. Blow into vacuum port "A" on end of solenoid.

EGR SOLENOID TERMINAL IDENTIFICATION TABLE

Application	Power	Ground
G20	White/Green	Purple
M30	White/Black	Light Green
Q45	Red	Blue/Red

2) As battery voltage is applied, air should pass out of right angle vacuum port "B". With power and ground removed from solenoid, air should pass out of port "C". Port "C" may be covered by a filter. See Fig. 11.

Exhaust Gas Temperature Sensor

Check sensor resistance with sensor immersed in a coolant

solution heated to 212°F (100°C). Resistance across sensor terminals should be 77,000-94,000 ohms. Resistance should also decrease in response to temperature increase. If resistance is not as indicated, replace sensor.

FUEL EVAPORATION

Carbon Canister & Purge Control Valve

Remove hoses from canister. Blow through port "C" of canister. Air should pass freely out of bottom of canister. Blow through port "B" of canister. A low volume of air should pass into canister. Apply vacuum to port "A" of canister. Volume of air blown into port "B" should increase. See Fig. 14.

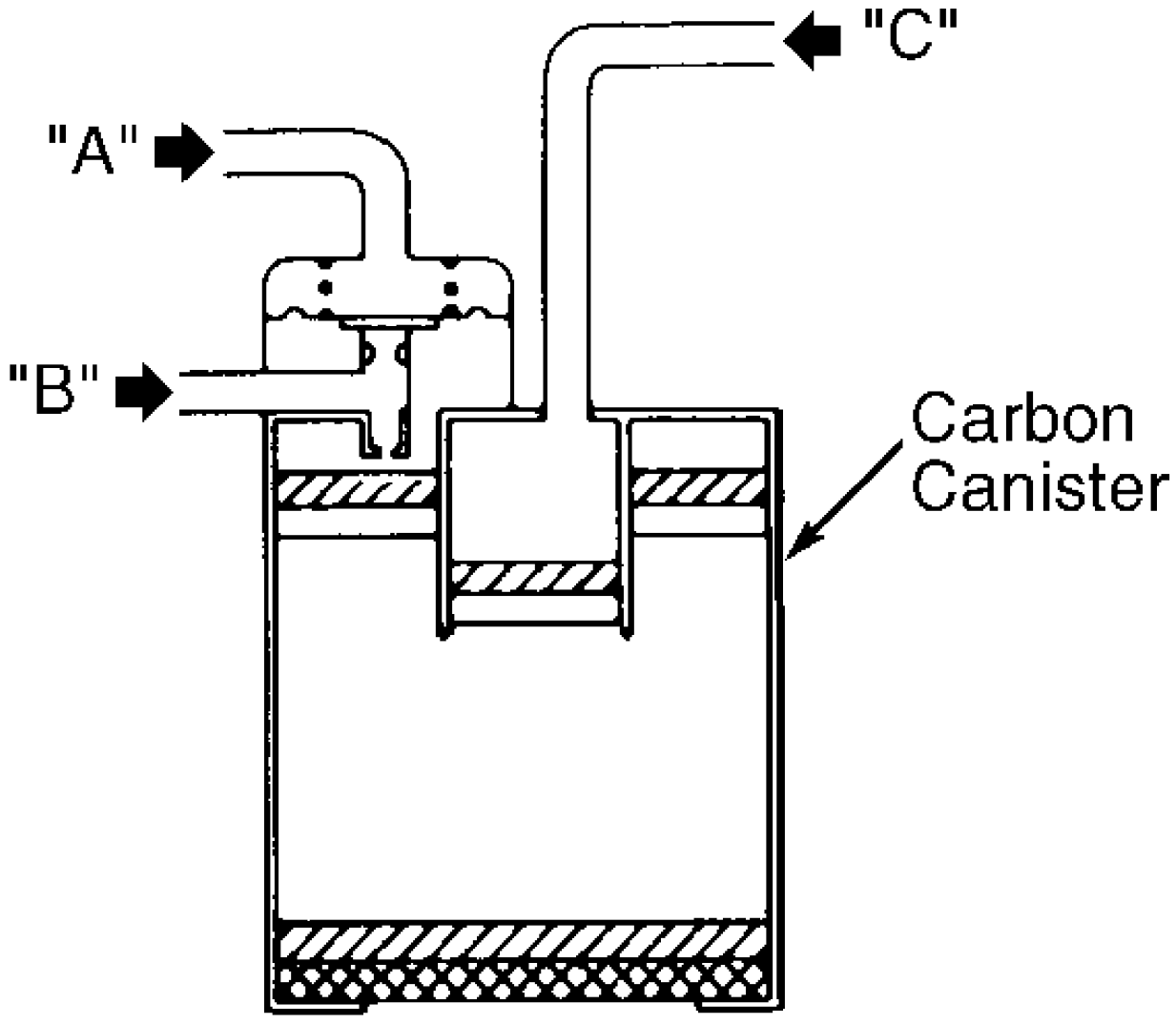

Fig. 14: Testing Carbon Canister & Purge Control Valve
Courtesy of Nissan Motor Co., U.S.A.

Canister Purge Solenoid Valve (G20 & Q45)

1) Remove vacuum lines and electrical connector from

solenoid. Remove solenoid from vehicle. Using jumper wires, connect battery voltage and ground to appropriate terminal of solenoid. See CANISTER PURGE SOLENOID TERMINAL IDENTIFICATION table. Blow into vacuum port "A" on end of solenoid.

CANISTER PURGE SOLENOID TERMINAL IDENTIFICATION TABLE

Application	Power	Ground
G20	White/Green	Purple
Q45	Red	Green/Yellow

2) As battery voltage is applied, air should pass out of right angle vacuum port "B". With power and ground removed from solenoid, air should pass out of port "C". Port "C" may be covered by a filter. See Fig. 11.

Vacuum Relief Filler Cap

Wipe cap clean. Apply vacuum from tank side. Slight resistance should be felt and cap should make distinct clicking noises. As vacuum increases, resistance should decrease and clicking noise should go away. If valve is plugged or no resistance is felt, replace cap as an assembly.

POSITIVE CRANKCASE VENTILATION

Run engine at idle. Remove ventilation hose from PCV valve; hissing noise should be heard from hose and a strong vacuum should be felt immediately when finger is placed over valve inlet. If vacuum is not felt, check hose and hose connections for leaks and obstructions. Check PCV valve. Service or replace as necessary.

MISCELLANEOUS CONTROLS

A/C Clutch Relay

1) A/C clutch relay is controlled by ECU. Under normal conditions, ECU will engage clutch relay by providing a ground circuit for relay windings. If ECU receives a wide open throttle signal from throttle position sensor while it is also receiving a A/C on signal from A/C Auto Amplifier, ECU will disengage relay.

2) A/C clutch relay (Blue or Green) is located in relay box on right side of engine compartment. On G20, relay is in foremost position. On M30, relay is second from rear. On Q45, relay is in rearmost position.

3) Remove relay from relay box. Apply ground to terminal No. 2 of relay. See Fig. 15. Apply battery voltage to terminal No. 1. With relay energized, continuity should exist between terminals No. 3 and 5. No continuity should exist with relay de-energized.

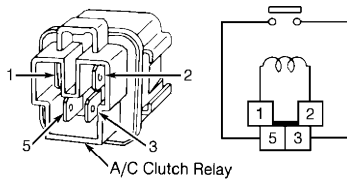

Fig. 15: A/C Clutch Relay Terminal ID
Courtesy of Nissan Motor Co., U.S.A.

Variable Valve Timing Solenoid (Q45)

Remove solenoid from front of engine. Apply battery voltage

across solenoid terminals. See Fig. 16. If solenoid does not energize, replace solenoid.

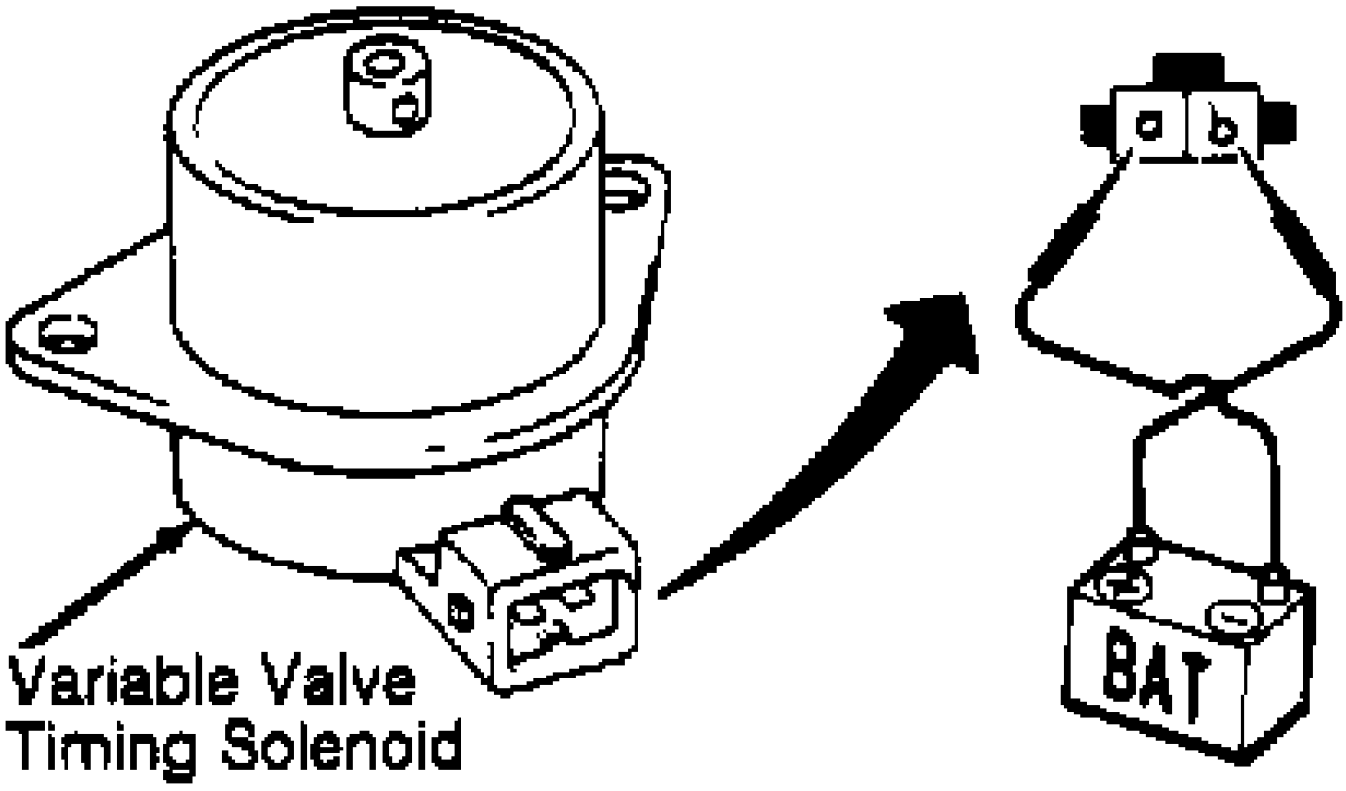

Fig. 16: Energizing Variable Valve Timing Solenoid
Courtesy of Nissan Motor Co., U.S.A.

COMPONENT LOCATIONS

When attempting to locate components, refer to following diagrams. See Figs. 17-19.

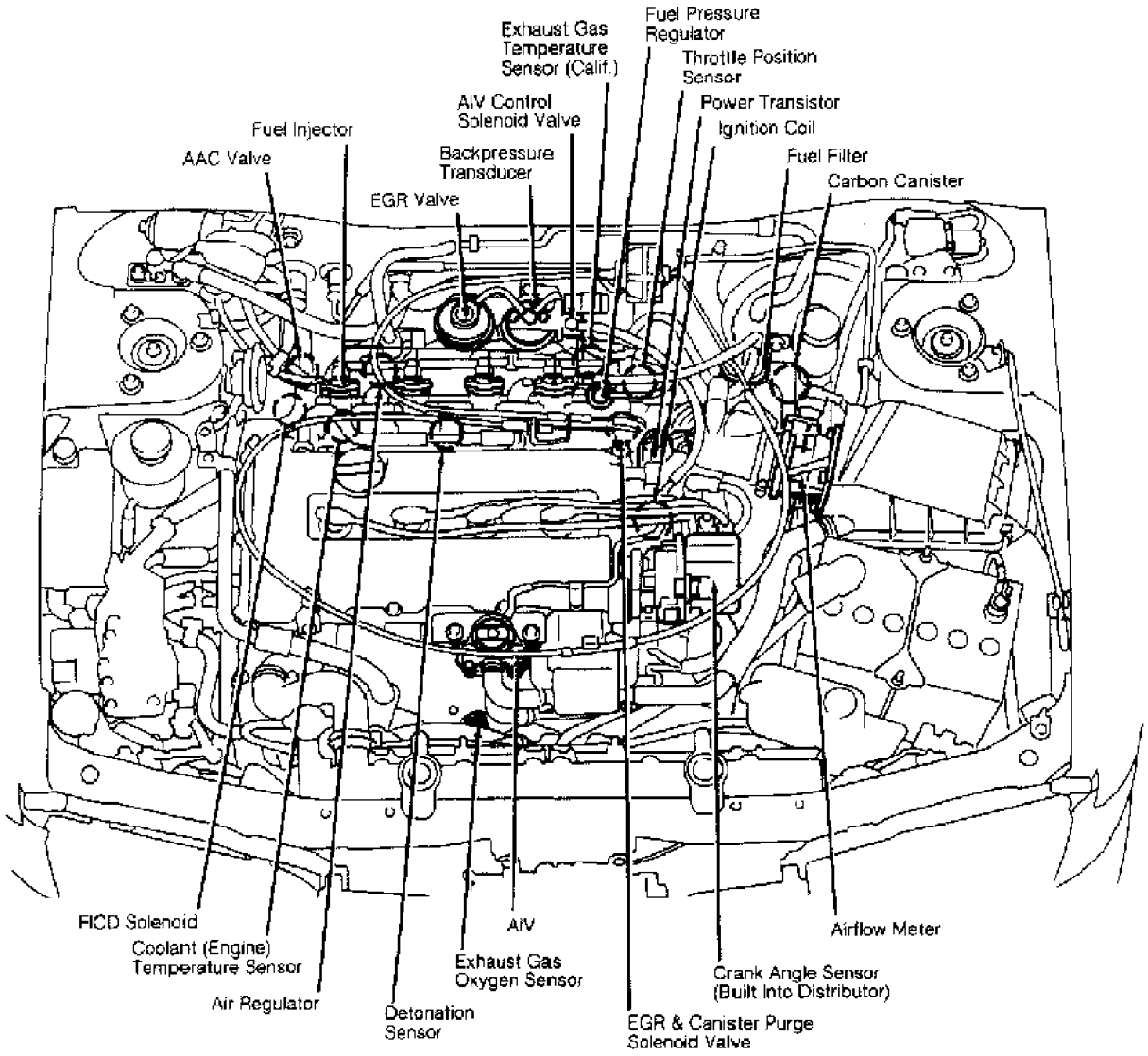

Fig. 17: Underhood Engine Performance Component Locations (G20)
Courtesy of Nissan Motor Co., U.S.A.

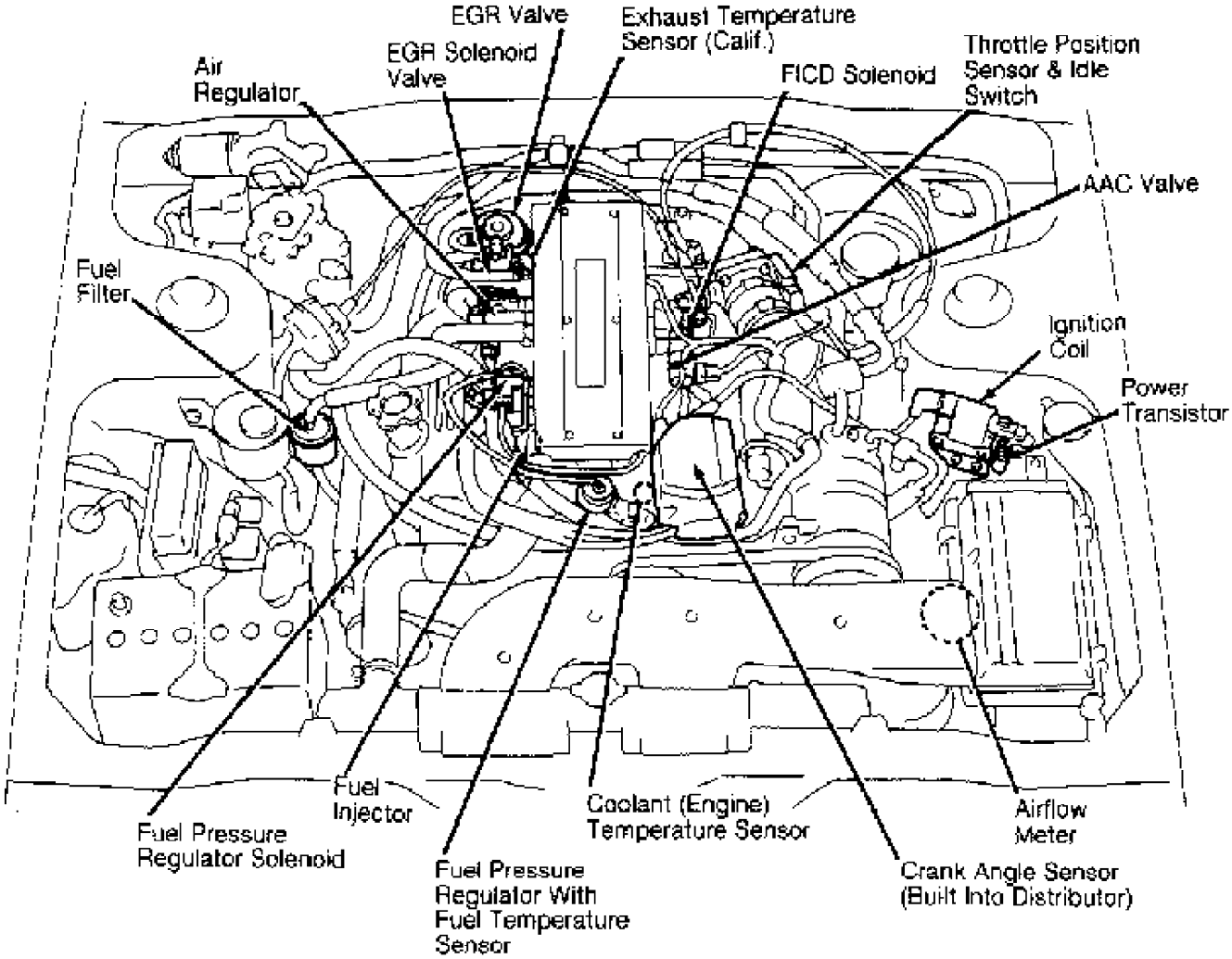

Fig. 18: Underhood Engine Performance Component Locations (M30)
Courtesy of Nissan Motor Co., U.S.A.

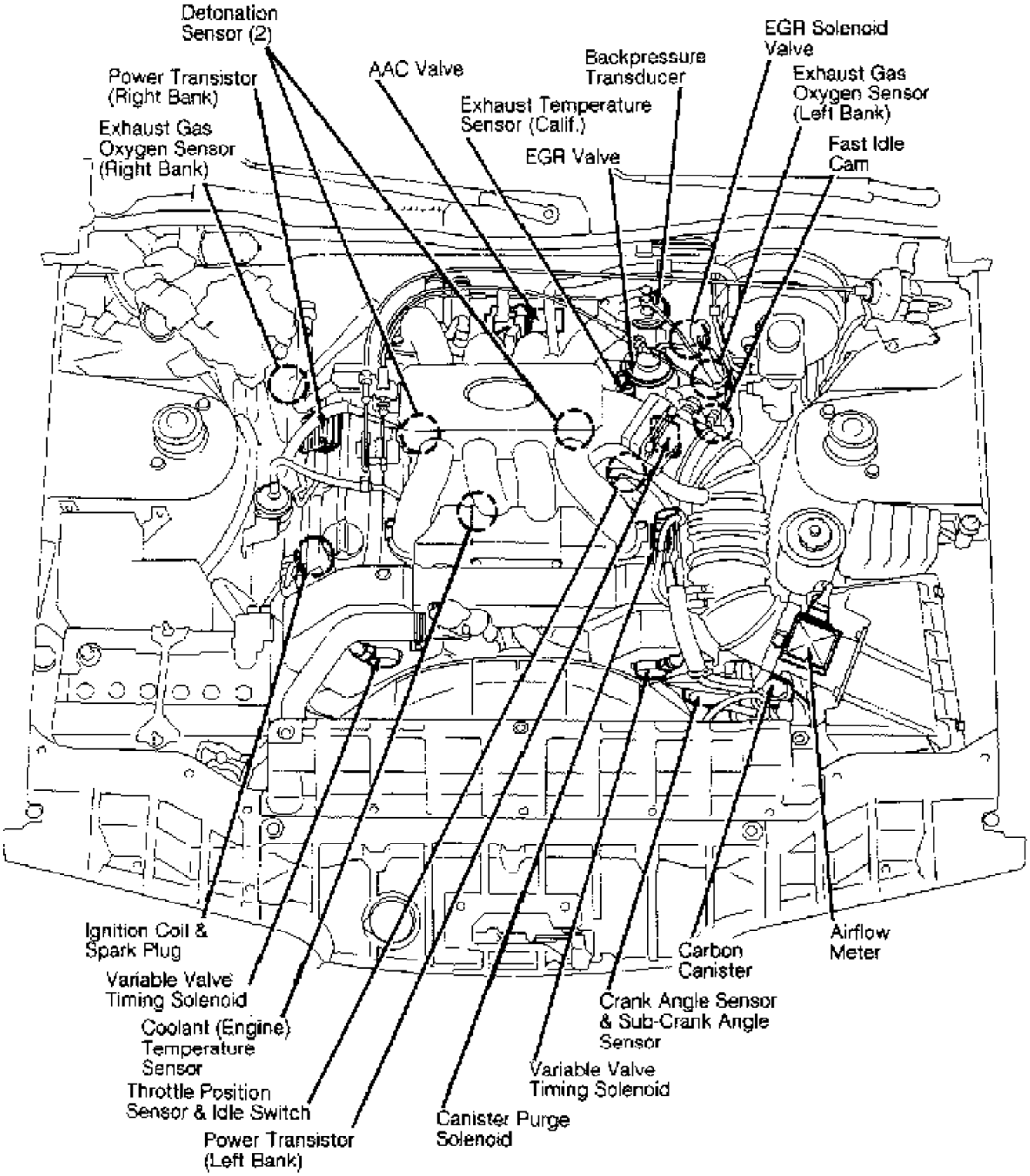

Fig. 19: Underhood Engine Performance Component Locations (Q45)
Courtesy of Nissan Motor Co., U.S.A.