

I - SYSTEM/COMPONENT TESTS - EFI

Article Text

1993 Mazda 929

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Wednesday, March 24, 1999 11:59PM

ARTICLE BEGINNING

1993 ENGINE PERFORMANCE

Mazda System & Component Testing - Fuel Injection

B2200, B2600i, Miata, MPV, MX-3, MX-6,
Navajo, Protege, RX7, 323, 626, 929

INTRODUCTION

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

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

AIR INDUCTION SYSTEMS

TURBOCHARGER (RX7)

Air By-Pass Valve

Remove air by-pass valve. Connect vacuum pump to port "A" of valve. See Fig. 1. Apply 10 in. Hg to port "A", and blow air into port "B". Replace air by-pass valve if air does not flow from port "B" to port "C".

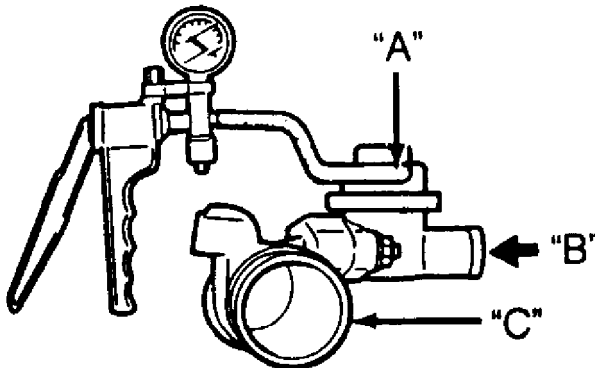


Fig. 1: Testing Air By-Pass & Charge Relief Valves (RX7)
Courtesy of Mazda Motors Corp.

Compressor & Turbine Wheel Deflection

Allow engine to cool. Remove air intake tube. Turn compressor wheel. Replace turbocharger if wheel does not turn freely or if wheel touches housing.

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Charge Relief Valve

Remove charge relief valve. Connect vacuum pump to port "A" of valve. See Fig. 1. Apply 8 in. Hg to port "A", and blow air into port "B". Replace charge relief valve if air does not flow from port "B" to port "C".

Intercooler

Remove intercooler. Inspect for cracks, restriction or damage. Replace as necessary.

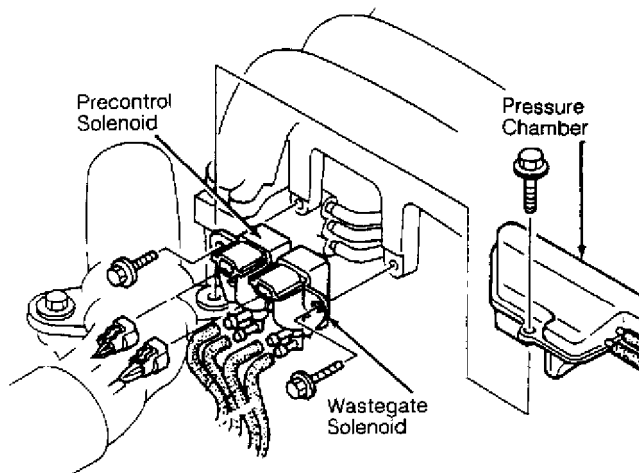
Oil Passage Inspection

Ensure engine is cool. Remove oil return pipe. Verify oil passage in turbocharger and oil return pipe are not blocked with carbonized oil. Replace turbocharger and return pipe as necessary.

Solenoid Valves (Turbo Precontrol & Wastegate Control)

1) Remove pressure chamber from intake manifold. Disconnect vacuum hoses. Disconnect solenoid valve connector and solenoid valves. Blow air through air tube and verify air does not flow. If air flows, replace solenoid valve.

2) Apply 12 volts and ground to solenoid valve connector. See Fig. 2. Blow air through air tube and verify air passes freely. If air does not pass freely with 12 volts applied, replace solenoid valve.



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Fig. 2: Testing Solenoid Valves (RX7)

Courtesy of Mazda Motors Corp.

Charge Actuator

1) Ensure engine is cool. Remove hose connected to actuator. Connect vacuum pump to charge actuator. See Fig. 3.

2) Apply 2 in. Hg to charge actuator. Ensure actuator rod moves when vacuum is applied. If actuator rod does not move, replace charge actuator.

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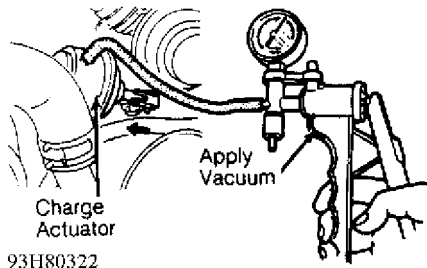


Fig. 3: Testing Charge Actuator (RX7)
Courtesy of Mazda Motors Corp.

Control Actuator

1) Ensure engine is cool. Remove hose connected to actuator. Connect air pressure source to pressure gauge. See Fig. 4. Apply air pressure to actuator.

CAUTION: DO NOT allow pressure to exceed 11 psi (.8 kg/cm²).

2) Apply 7 psi (0.5 kg/cm²) of compressed air. Ensure actuator rod moves when air pressure is applied. If actuator rod does not move, replace control actuator.

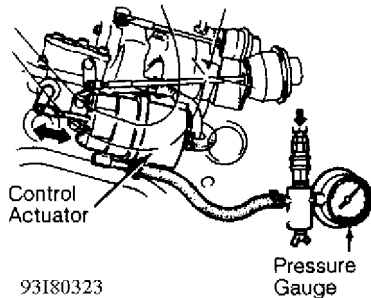


Fig. 4: Testing Control Actuator (RX7)
Courtesy of Mazda Motors Corp.

Precontrol Actuator

1) Ensure engine is cool. Remove hose connected to actuator. Connect air pressure source to pressure gauge. See Fig. 5. Apply air pressure to actuator.

CAUTION: DO NOT allow pressure to exceed 14 psi (1.0 kg/cm²).

2) Apply 10-14 psi (0.7-1.0 kg/cm²) of compressed air. Ensure actuator rod moves when air pressure is applied. If actuator rod does not move, replace precontrol actuator.

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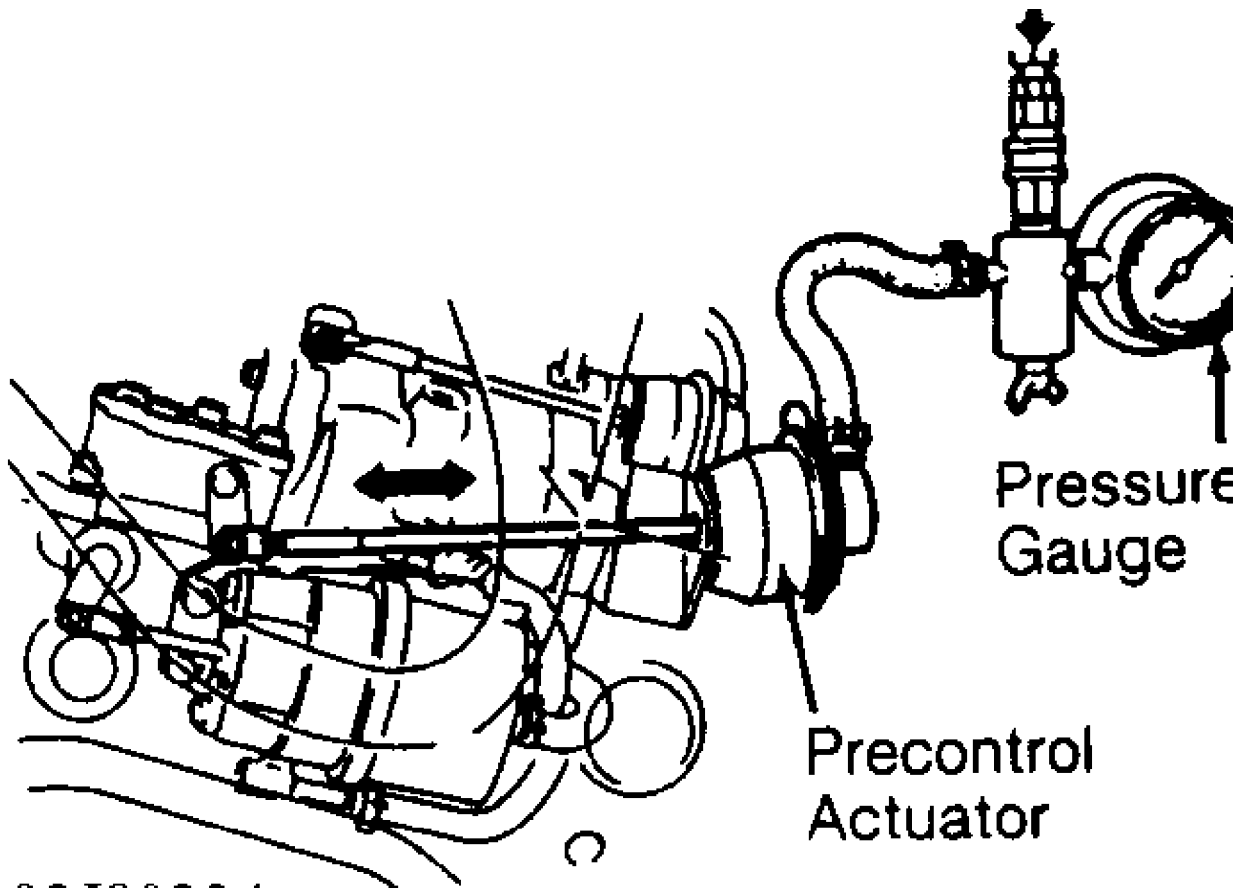
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Fig. 5: Testing Precontrol Actuator (RX7)
Courtesy of Mazda Motors Corp.

Wastegate Actuator

1) Ensure engine is cool. Remove hose connected to actuator. Connect air pressure source to pressure gauge. See Fig. 6. Apply air pressure to actuator.

CAUTION: DO NOT allow pressure to exceed 14 psi (1.0 kg/cm²).

2) Apply 10-14 psi (0.7-1.0 kg/cm²) of compressed air. Ensure actuator rod moves when air pressure is applied. If actuator rod does not move, replace wastegate actuator.

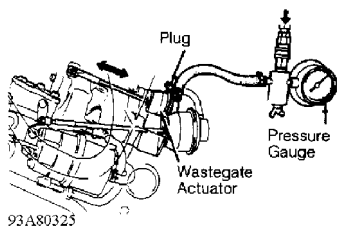


Fig. 6: Testing Wastegate Actuator (RX7)
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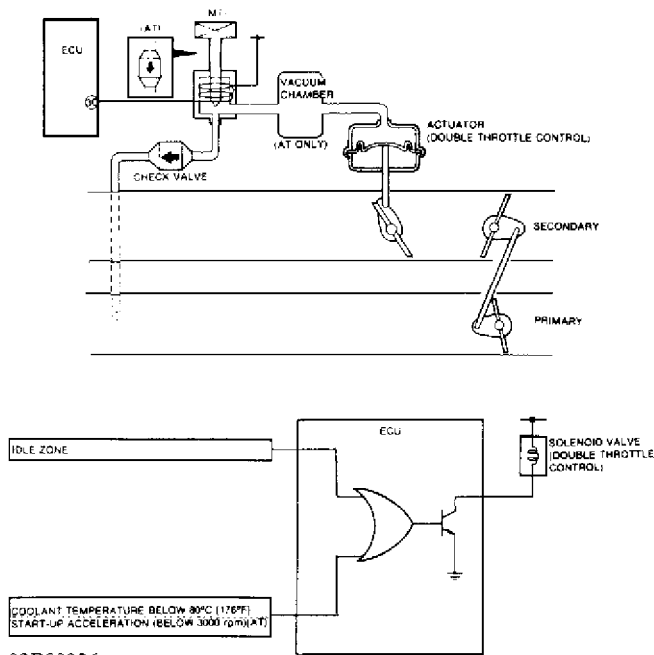
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DOUBLE THROTTLE CONTROL (RX7)

System Check

1) With engine cold, start engine. Ensure actuator rod is pulled in. See Fig. 7. If rod is not pulled in, check operation of coolant thermosensor and solenoid valve. Also check and repair any vacuum leaks. Apply vacuum to double throttle actuator. If rod does not pull in, replace double throttle actuator.

2) Warm engine until engine coolant temperature is greater than 176°F (80°C). Ensure actuator rod extends. If rod does not extend, check operation of coolant thermosensor and solenoid valve.



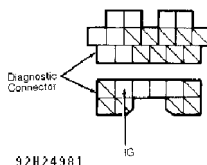
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Fig. 7: View Of Double Throttle Control System (RX7)

VARIABLE INERTIA CHARGING SYSTEM (PROTEGE DOHC & 929)

System Check (Protege DOHC)

Connect tachometer to IG terminal of diagnostic connector. See Fig. 8. Start engine, and operate it at idle. Ensure shutter valve actuator rod is retracted at idle. See Fig. 9. Gradually increase engine speed to 5000 RPM and ensure actuator rod extends. If necessary, check Variable Inertia Charging System (VICS) components.



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Fig. 8: Diagnostic Connector Terminal ID (MX-3 DOHC & Protege DOHC)
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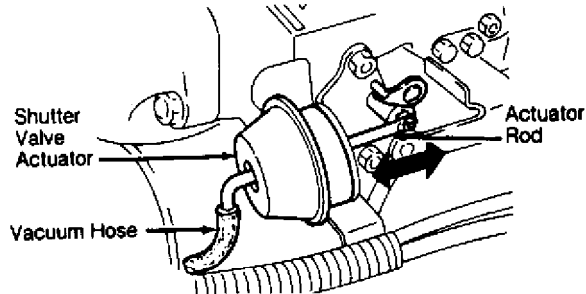


Fig. 9: Locating Shutter Valve Actuator & Rod
Courtesy of Mazda Motors Corp.

System Check (929)

Start engine, and operate it at idle. Ensure shutter valve actuator rod is retracted at idle. See Fig. 9. Actuator rod should extend when engine is started, for 5 seconds after engine is started and when engine is operating at 1100-4800 RPM with throttle opened in "D" range. If necessary, check Variable Inertia Charging System (VICS) components.

Check Valve (929)

Remove check valve. Blow air through port "A", and verify flow through port "B". Ensure air does not flow in reverse direction. Replace as necessary.

Solenoid Valve

Remove solenoid valve. Blow air through port "B". See Fig. 10. Ensure air flows from valve air filter. Connect 12 volts and a ground to solenoid valve terminals. Blow air through valve port "B", and ensure air flows from port "A". Replace solenoid valve as necessary.

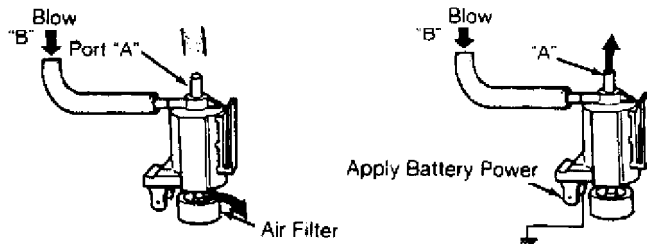


Fig. 10: Testing Solenoid Valve
Courtesy of Mazda Motors Corp.

Shutter Valve Actuator (Protege DOHC)

Disconnect vacuum hose from shutter valve actuator. See Fig. 9. Ensure shutter valve rod moves in and out smoothly. Place finger over hose. Ensure vacuum is present at idle. Reconnect vacuum hose on actuator and ensure rod retracts. Replace as necessary.

Shutter Valve Actuator (929)

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RPM

Position

MX-3 DOHC

Shutter Valve Actuator Rod No. 1

Less Than 1900 Closed

1900-2600 Open

2600-4000 Closed

4000-6300 Open

Greater Than 6300 Closed

Shutter Valve Actuator Rod No. 2

Less Than 1900 Closed

1900-2600 Open

2600-4700 Closed

4700-6300 Open

Greater Than 6300 Closed

MX-6 2.5L & 626 2.5L

Shutter Valve Actuator Rod No. 1

Less Than 3250 Closed

3250-4250 Open

4250-6250 Open

Greater Than 6250 Closed

Shutter Valve Actuator Rod No. 2

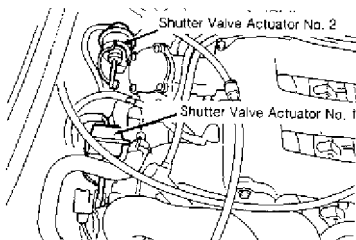
Less Than 3250 Closed

3250-4250 Closed

4250-6250 Open

Greater Than 6250 Closed

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Fig. 13: Locating Shutter Valve Actuators (MX-3 DOHC, MX-6 2.5L & 626 2.5L)

Courtesy of Mazda Motors Corp.

Check Valve

Remove check valve. Blow air through port "A" and verify flow through port "B". Ensure air does not flow in reverse direction. Replace as necessary.

Shutter Valve Actuator (MPV 3.0L)

1) Remove shutter valve actuator protector cover. Remove "C" clip. Disconnect shutter valve actuator vacuum hose. See Fig. 9. Remove shutter valve actuator.

2) Apply vacuum to shutter valve actuator. See Fig. 14. Ensure rod retracts into actuator. Replace shutter valve actuator if rod does not retract. With shutter valve actuator removed, ensure

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shutter valve rod moves smoothly. Replace as necessary.

Shutter Valve Actuators (MX-3 DOHC, MX-6 2.5L & 626 2.5L)

Disconnect vacuum hose from shutter valve actuators No. 1 and 2. See Fig. 9 or 13. Connect vacuum pump to actuator. See Fig. 14. Apply vacuum to each actuator separately and verify shutter valve rod retracts. Replace actuator as necessary.

Solenoid Valve

Disconnect vacuum hose from solenoid valve port "A". Blow air through port "B". See Fig. 10. Ensure air flows from valve air filter. Disconnect solenoid valve connector, and connect 12 volts and a ground to solenoid valve terminals. Blow air through valve port "B", and ensure air flows from port "A". Replace solenoid valve as necessary.

Vacuum Chamber

Remove vacuum chamber. Visually inspect chamber for clogging, cracks and damage. Replace as necessary.

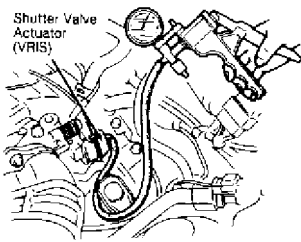


Fig. 14: Testing Shutter Valve Actuator (MPV 3.0L, MX-3 DOHC, MX-6 2.5L & 626 2.5L)

Courtesy of Mazda Motors Corp.

COMPUTERIZED ENGINE CONTROLS

POWERTRAIN CONTROL MODULE (NAVAJO)

Ground Circuits

1) Locate Powertrain Control Module (PCM) behind right kick panel. Using a DVOM, check for continuity to ground on PCM terminals No. 40 and 60. See Fig. 15. Reading on DVOM should be zero ohms. If reading is not zero ohms, repair open to ground.

2) Using a voltmeter, touch negative lead of voltmeter to a good ground. Touch positive lead of voltmeter to each ground terminal. With engine running, voltmeter should indicate less than one volt. If reading is one volt or more, check for open, corrosion and loose connection on ground lead.

Power Circuits

Using a voltmeter, check for battery voltage between PCM terminal No. 1 (constant battery power) and ground. Check for battery voltage at terminals No. 37 and 57 with ignition on. If battery voltage is not present, power is not being supplied from EEC power relay. See CIRCUIT TEST B in G - TESTS W/CODES article in the ENGINE

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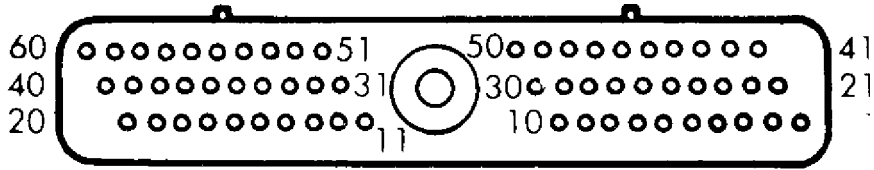
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PERFORMANCE section.



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Fig. 15: Identifying PCM 60-Pin Connector Terminals (Navajo)
Courtesy of Mazda Motors Corp.

POWERTRAIN CONTROL MODULE (EXCEPT NAVAJO)

1) Locate Electronic Control Unit (ECU) or Powertrain Control Module (PCME). See ECU/PCME LOCATION table. Connect Engine Signal Monitor (49-9200-162) to ECU/PCME. See Fig. 16. Check voltage at each terminal of ECU/PCME. If input and output component voltage readings are not as specified, check faulty component. See appropriate J - PIN VOLTAGE CHARTS article, appropriate information in G - TESTS W/CODES article in the ENGINE PERFORMANCE section, and testing for appropriate component in this article.

2) If input and output component voltages are as specified and ECU/PCME voltage is incorrect, replace ECU/PCME.

CAUTION: DO NOT apply voltage to terminals "A" and "B" of engine signal monitor. See Fig. 16.

ECU/PCME LOCATION TABLE

Application		Location
B2200, B2600i, RX7 & 929	.....	Behind Passenger Front Side Trim Panel
Miata & MPV	.....	Under Passenger Front Floor Mat
MX-3, Protege & 323	Behind Center Console
MX-6 & 626	Behind Center Console Top Cover

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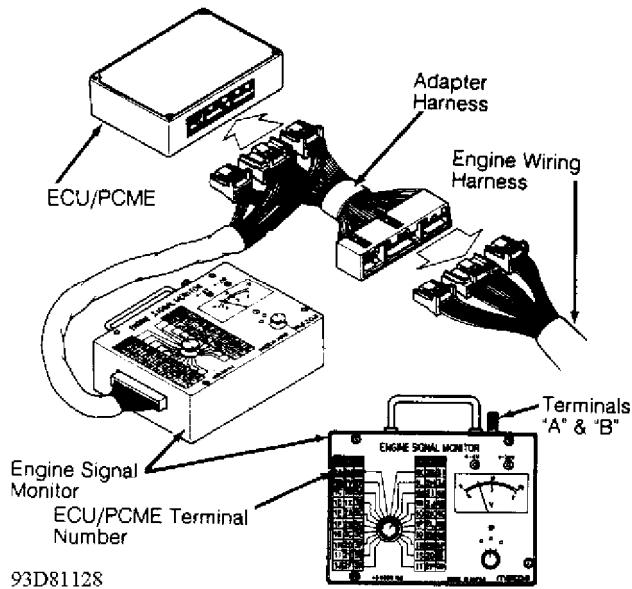


Fig. 16: Testing Engine Control Unit (ECU)
Courtesy of Mazda Motors Corp.

ENGINE SENSORS & SWITCHES

A/C SWITCH

See A/C CUT-OFF CONTROL SYSTEM (B2200, B2600i, MIATA, MPV, MX-3, MX-6, RX7, 626 & 929) under A/C CLUTCH under MISCELLANEOUS CONTROLS.

AIR CHARGE TEMPERATURE (ACT) SENSOR

MX-6 2.0L & 626 2.0L

Remove sensor from air cleaner housing. With sensor disconnected, measure resistance between sensor terminals. See ACT SENSOR RESISTANCE table. Replace sensor as necessary.

Navajo

Locate sensor on top left side of engine, behind idle air bypass valve. With sensor disconnected, measure resistance between sensor terminals. See ACT SENSOR RESISTANCE table. Replace sensor as necessary.

ACT SENSOR RESISTANCE TABLE

Temperature Ohms

MX-6 & 626 2.0L

77°F (25°C) 29,000-36,300

185°F (85°C) 3300-3700

Navajo

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50°F (10°C)	58,750
68°F (20°C)	37,300
176°F (80°C)	384
194°F (90°C)	280
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AIRFLOW SENSOR

B2200, B2600i, MX-6 2.0L, MPV 2.6L & 626 2.0L

1) Pull rubber boot back from airflow sensor connector.

Backprobe sensor connector, and check terminal voltages. See Fig. 17.
See AIRFLOW SENSOR TERMINAL VOLTAGES table.

2) If voltages are not correct, check wiring for open or short. If wiring is okay, check burn-off operation. See BURN-OFF OPERATION (B2200, B2600i & MPV 2.6L) procedure. If ECU control of burn-off operation is okay but voltages are still incorrect, replace airflow sensor.

NOTE: Airflow sensors on MX-6 2.0L and 626 2.0L do not have burn-off operation.

AIRFLOW SENSOR TERMINAL VOLTAGES TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Terminal Wire	Ignition On	Engine Running
Color	Volts	Volts

B2200, B2600i & MPV

Black/Yellow (Power Supply) (1)	12.0	.....	12.0
Green/Orange (Burn-Off)	0	.....	0
Green/Black (Airflow Mass)	1.0-2.0	.....	1.9-5.0
Green/Yellow (Ground) (1)	0	.....	0
Black/Orange (Ground)	0	.....	0

MX-6 & 626 2.0L

Red/Black (Power Supply)	12.0	.....	12.0
Black/Blue (Airflow Mass)	1.0-1.5	1.5-5.0
Black (Ground)	0	0

(1) - Black/White wire on MPV 2.6L.

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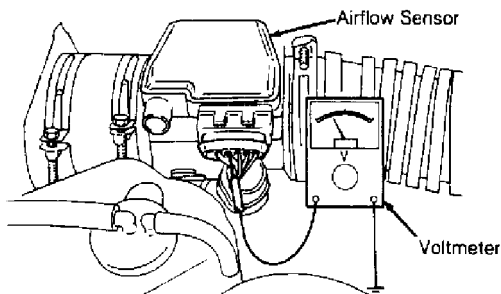


Fig. 17: Testing Airflow Sensor (B2200, B2600i, MX-6 2.0L, MPV 2.6L & 626 2.0L)

Courtesy of Mazda Motors Corp.

	Fully Closed	Fully Open
Terminals (1)	Ohms	Ohms

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E2 & Vs	20-400	20-1000
E2 & Vc	100-300	100-300
E2 & Vb	200-400	200-400
E2 & THAa (2)				
-40°F (-20°C)	13,600-18,400	.	13,600-18,400
68°F (20°C)	.....	2210-2690	.....	2210-2690
140°F (60°C)	.....	493-667	.....	493-667
E1 & Fc	Infinite	0

(1) - See Fig. 19 for terminal identification.

(2) - Intake air thermosensor.

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AIRFLOW METER TERMINAL RESISTANCE TABLE

(MX-3 DOHC, MX-6 2.5L, 626 2.5L & 929)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Terminals (1)	Temperature	Ohms
---------------	-------------	------

E2 & Vs			
Closed	.....	68°F (20°C)	..... 20-600
Open	.....	68°F (20°C)	..... 20-1000
E2 & Vc (2)	.....	68°F (20°C)	..... 200-400
E2 & THA (3)	.....	-40°F (-20°C)	..... 10,600-19,400
		68°F (20°C)	..... 2000-2700
		140°F (60°C)	..... 400-700

(1) - See Fig. 20 for terminal identification.

(2) - Measurement is from closed to open.

(3) - Intake air thermosensor.

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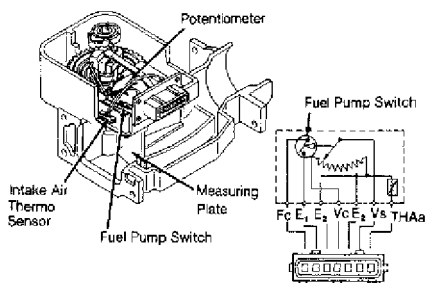


Fig. 18: Airflow Meter Terminal ID (Miata, MX-3 SOHC, Protege & 323)
Courtesy of Mazda Motors Corp.

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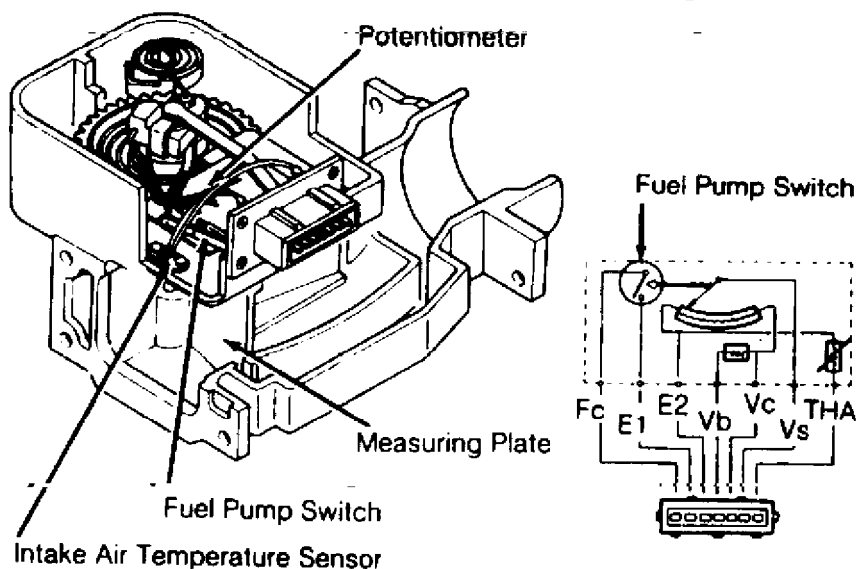


Fig. 19: Airflow Meter Terminal ID (MPV 3.0L)
Courtesy of Mazda Motors Corp.

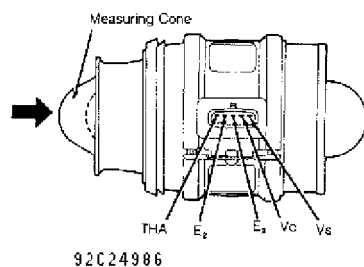


Fig. 20: Airflow Meter Terminal ID (MX-3 DOHC, MX-6 2.5L, 626 2.5L & 929)
Courtesy of Mazda Motors Corp.

ATMOSPHERIC PRESSURE SENSOR

See J - PIN VOLTAGE CHARTS article. On MX-6 2.0L A/T and 626 2.0L A/T, see TROUBLE CODE CHART 14 in H - TESTS W/O CODES article.

BAROMETRIC PRESSURE (BARO) SENSOR

RX7

1) Warm engine to operating temperature. Turn all accessories off. Connect positive lead of voltmeter to BARO sensor terminal "A" and negative lead to terminal "B".

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2) With engine at idle, voltmeter should read 1.3-1.6 volts. Disconnect hose from BARO sensor and plug. See Fig. 21. Voltmeter should read 2.38-2.78 volts.

3) Connect a vacuum pump to BARO sensor, and apply 29 in. Hg. Voltmeter should read 4.35-4.65 volts. If voltmeter readings do not test as described, replace BARO sensor.

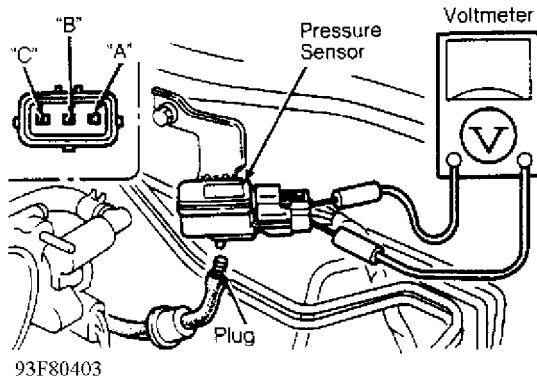


Fig. 21: Testing BARO Sensor (RX7)

Courtesy of Mazda Motors Corp.

BRAKELIGHT SWITCH

Disconnect brakelight switch connector. Measure resistance between terminals of brakelight switch. With brake pedal released, continuity should not exist. With brake pedal depressed, continuity should be present. Replace switch as necessary.

CAMSHAFT POSITION SENSOR (CMP)

Navajo

Camshaft Position Sensor (CMP) is a Hall-Effect switch, located on top rear of engine. See CIRCUIT TEST DR in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

CENTRAL PROCESSING UNIT (CPU)

MPV, RX7 & 929

CPU acts as an electrical load sensor. On MPV, remove CPU from behind left side of instrument panel. On RX7, remove CPU from right side kick panel above ECU. On 929, remove CPU from behind left front side trim panel near door. Check voltage at terminals of CPU connector. See appropriate CPU UNIT VOLTAGE CHART. If voltages are incorrect, check appropriate circuit. If circuits are okay but voltages are still incorrect, replace CPU.

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Terminal	Connected to	Test condition	Specification	To correct
b	Battery (through ROOM 10A fuse)	Constant	Approx. 12V	Check ROOM 10A fuse and wiring harness
c	Engine control unit	Electrical load OFF (Ignition switch ON)	Approx. 12V	Check engine control unit and wiring harness
		Electrical load ON (Ignition switch ON)	Below 1.5V	
d	Ground	Constant	0V	Check wiring harness
f	Headlight switch	Headlight switch ON	Approx. 12V	Check headlight switch and wiring harness
g	Blower fan switch	Blower fan switch High or Super high position	0V	Check blower fan switch and wiring harness
h	Rear window defroster switch	Rear window defroster switch ON	0V	Check rear window defroster switch and wiring harness
j	Ignition switch	Ignition switch ON	Approx. 12V	Check ignition switch and wiring harness

Fig. 22: CPU Unit Voltage Chart (MPV 2.6L)

Courtesy of Mazda Motors Corp.

Terminal	Connected to	Test condition	Specification	To correct
b BLU/RED WIRE	Battery (through ROOM 10A fuse)	Constant	Approx. 12V	Check ROOM 10A fuse and wiring harness
c YEL/RED WIRE	Engine control unit	Ignition switch ON	Approx. 12V	Check engine control unit and wiring harness
d	Ground	Constant	0V	Check wiring harness
f RED/GRN WIRE	Headlight switch	Headlight switch ON	Approx. 12V	Check headlight switch and wiring harness
g BLUE WIRE	Blower fan switch	Blower fan switch High or Super-high position	0V	Check blower fan switch and wiring harness
h WHT/YEL WIRE	Rear window defroster switch	Rear window defroster switch ON	0V	Check rear window defroster switch and wiring harness
j BLK/WHT WIRE	Ignition switch	Ignition switch ON	Approx. 12V	Check ignition switch and wiring harness

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Fig. 23: CPU Unit Voltage Chart (MPV 3.0L)

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Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
A	—	—	Main relay	Ignition switch ON	V_B	—
B	○		TNS relay	Position light ON	0V	—
				Position light OFF	V_B	
C	○		Water thermoswitch	Engine coolant temperature below 108°C	V_B	Ignition switch ON
				Engine coolant temperature above 108°C (221°F)	0V	
D	○		Rear window defroster ready	Rear window defroster OFF	V_B	Ignition switch ON
				Rear window defroster ON	Below 1.0V	
E	○		Blower motor relay	Blower switch 3rd or 4th position	Below 1.0V	Ignition switch ON
				Blower switch 1st or 2nd position	V_B	
F	—	—	—	—	—	—
G	—	—	—	—	—	—
H		○	Self-Diagnosis checker Diagnosis connector (FEN)	Buzzer sounded for 3 sec. after ignition switch OFF → ON	Below 2.5V	<ul style="list-style-type: none"> • With Self-Diagnosis checker and system Selector • With System Selector test switch at SELF TEST
				Buzzer not sounded for after 3 sec.	V_B	
				Buzzer sounded	Below 2.5V	
				Buzzer not sounded	V_B	
I	—	—	—	—	—	—
J	—	—	—	—	—	—
K		○	Malfunction indicator lamp (MIL)	Lamp illuminated for 3 sec. after ignition switch ON	Below 2.5V	With system selector test switch at SELF TEST
				Lamp not illuminated after 3 sec.	V_B	
				Lamp illuminated	Below 2.5V	
				Lamp not illuminated	V_B	
L	—	—	—	—	—	—
M	—	—	Ground	Constant	0V	—
N		○	ECU	Electrical load ON	Below 2.5V	Ignition switch ON
				Electrical load OFF	4.5~5.5	
O		○	Cooling fan relay	Engine coolant temperature below 105°C	Below 2.5V	Ignition switch ON
				Engine coolant temperature above 105°C	V_B	
P	○		Ignition switch	While cranking	V_B	—
				Ignition switch ON	Below 1.0V	

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Fig. 24: CPU Unit Voltage Chart (RX7)

Courtesy of Mazda Motors Corp.

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CPU UNIT VOLTAGE CHART (929)

Connector	Terminal	Connected to	Test condition	Specification (V)
A (14-pin)	3A	Interior lamps, courtesy lamp	Constant	12V
	3B	Battery	Constant	12V
	3C	Door lock relay (lock)	Constant	12V
	3D	Body ground	Constant	0
	3E	Headlights	Light switch ON 2nd step, low beam	12V
	3F	Door lock relay (unlock)	Constant	12V
	3G	Front fog light relay	Constant	12V
	3H	Door switch (passenger side)	Passenger door open; check for continuity to body ground	Yes
			Passenger door closed; check for continuity to body ground	No
	3I	Headlight relay	Light switch ON 2nd step	0
			Other	12V
	3J	Ignition switch	Ignition switch ON	12V
	3K	Ignition switch	Ignition switch ACC	12V
	3L	TNS relay	Light switch ON	12V
	3M	Door switch (driver side)	Driver door open; check for continuity to body ground	Yes
			Driver door closed; check for continuity to body ground	No
	3N	Key reminder switch	Ignition Key in ignition switch	12V
B (16-pin)	1A	Starter cut relay	Ignition switch ON	12V
	1B	Trunk key cylinder switch	Trunk key cylinder switch ON	0
	1C	Interlock resistor	Constant	12V
	1D	Trunk switch	Trunk switch ON	0
	1E	Hazard warning output	Hazard warning switch ON	0
			Other	12V
	1F	Hood switch	Hood switch ON	0
	1G	Seat belt warning lamp	For 5 seconds from ignition switch ON	0
			Other	12V
	1H	Buckle switch	Ignition switch ON	Seat belt connected 12V Other 0
	1I	NA	—	—
	1J	Brake warning lamp	Ignition switch ON	Parking brake pedal released 12V Parking brake pedal depressed 0
			—	—
	1K	NA	—	—
	1L	Parking brake switch	Ignition switch ON	Parking brake pedal released 12V Parking brake pedal depressed 0
			—	—
	1M	NA	—	—
	1N	P range switch	Ignition switch ON, shift lever P range	5
			Other	0
	1O	NA	—	—
	1P	NA	—	—

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Fig. 25: CPU Unit Voltage Chart (929, 1 Of 2)

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CPU UNIT VOLTAGE CHART (929 - Cont.)

Connector	Terminal	Connected to	Test condition		Specification (V)
B (20-pin)	2A	Ignition and door key illumination	Constant		12V
	2B	Outer handle switch	Door outer handle pulled		0
			Other		Approx. 4
	2C	Idle-up	Ignition switch ON		12V
			Headlights ON		4
			Front fog lights ON		4.5
	2D	Door switch (rear door)	Rear door open; check for continuity to body ground		Yes
			Rear door closed; check for continuity to body ground		No
	2E	Rear defroster indicator	Ignition switch ON	Rear defroster switch ON	0
			Other		Approx. 5
	2F	Lock link switch (passenger side)	Locked		Approx. 5
			Unlocked		0
	2G	Interlock solenoid coil	Constant		12V
	2H	Lock link switch (driver side)	Locked		Approx. 5
			Unlocked		0
	2I	NA	—		—
	2J	Lock link switch (rear door)	Locked		Approx. 5
			Unlocked		0
	2K	+B	Constant		12V
	2L	Door key cylinder switch (passenger side)	Locked		2.5
			Unlocked		0
			Other		5
	2M	Security lamp	Constant		12V
	2N	NA	—		—
	2O	Horn relay	Constant		12V
	2P	Door lock switch	Locked		2.5
			Unlocked		0
			Other		5
	2Q	Rear defroster relay	Ignition switch ON	Rear defroster switch ON	12V
			Other		0
	2R	Door key cylinder switch (driver side)	Unlocked		0
			Others		5
	2S	Rear defroster switch	Rear defroster switch	Rear defroster switch ON	12V
			Other		0
	2T	Front fog light switch	Front fog light switch	Front fog light switch ON	12V
			Other		0

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Fig. 26: CPU Unit Voltage Chart (929, 2 Of 2)

Courtesy of Mazda Motors Corp.

CLUTCH SWITCH (M/T)

Disconnect clutch switch electrical connector. Using ohmmeter, check continuity between switch terminals. With clutch pedal depressed, continuity should be present. With clutch pedal released, continuity should not exist. Replace switch as necessary.

COLD START THERMOSWITCH

929

Remove cold start thermoswitch. Place thermoswitch and thermometer in container of coolant. Connect ohmmeter to thermoswitch terminals. Slowly heat coolant. Note resistance at specified temperatures. See COLD START THERMOSWITCH RESISTANCE table. Replace thermoswitch as necessary.

COLD START THERMOSWITCH RESISTANCE TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Temperature

Ohms

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68°F (20°C) 25-35

176°F (80°C) 64-76

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

COOLANT TEMPERATURE SWITCH

Miata, MX-3 SOHC, Protege & 323

1) Remove switch from radiator or engine block. Place switch and thermometer in container of coolant. Connect ohmmeter to coolant temperature switch terminals. Slowly heat coolant.

2) Note temperature at which continuity is present between switch terminals. Continuity should be present with coolant temperature greater than 207°F (97°C). Continuity should not exist with temperature less than 194°F (90°C). Replace switch as necessary.

CRANK ANGLE SENSOR

See IGNITION CHECKS in F - BASIC TESTING article.

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Remove engine coolant temperature sensor. Place sensor and thermometer in container of coolant. Connect ohmmeter to sensor terminals. Slowly heat coolant. Note resistance at specified temperatures. See appropriate ECT SENSOR RESISTANCE table. Replace sensor as necessary.

ECT SENSOR RESISTANCE TABLE (B2200, B2600i, Miata, MPV & 929)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Temperature Ohms

-4°F (-20°C) (1) 14,600-17,800

68°F (20°C) 2200-2700

176°F (80°C) (2) 200-400

(1) - Resistance is 14,500-17,800 ohms on B2200, B2600i and MPV 2.6L.

(2) - Resistance is 280-350 ohms on B2200, B2600i and MPV 2.6L; 290-350 ohms on Miata and MPV 3.0L.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

ECT SENSOR RESISTANCE TABLE

(MX-3, MX-6, Protege, RX7, 323 & 626)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Temperature Ohms

-4°F (-20°C) 14,600-17,800

68°F (20°C) 2200-2700

104°F (40°C) 1000-1300

140°F (60°C) 500-650

176°F (80°C) 290-350

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ECT SENSOR RESISTANCE TABLE (Navajo)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Temperature	Ohms
-------------	------

50°F (10°C)	58,750
-------------------	--------

68°F (20°C)	37,300
-------------------	--------

176°F (80°C)	384
--------------------	-----

194°F (90°C)	280
--------------------	-----

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

EGR POSITION SENSOR

MX-3 DOHC, MX-6 2.5L, RX7, 626 2.5L & 929

See EXHAUST GAS RECIRCULATION (EGR) (MX-3 DOHC, MX-6, RX7, 626 & 929) under EMISSION SYSTEMS & SUB-SYSTEMS.

FUEL TEMPERATURE SENSOR

RX7

1) Remove circuit opening relay. Start engine and allow system to fuel pressure to bleed down. Install circuit opening relay. Remove upper intake manifold. Remove fuel temperature sensor from fuel rail.

2) Place sensor and thermometer in container of water. Connect ohmmeter to sensor terminals. Heat water. Note resistance at specified temperatures. See FUEL TEMPERATURE SENSOR RESISTANCE table. Replace sensor as necessary.

FUEL TEMPERATURE SENSOR RESISTANCE TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Temperature	Ohms
-------------	------

68°F (20°C)	2200-2700
-------------------	-----------

176°F (80°C)	290-350
--------------------	---------

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

HEAT HAZARD SENSOR

RX7

1) Remove right front seat. Lift floor mat and remove heat hazard sensor. Wrap sensor and a thermometer in aluminum foil. Place foil in a pot of oil. Connect a battery and 12-volt test light in series, to sensor terminals.

2) Heat oil to 221-239°F (105-115°C). Test light should light when sensor reaches specified temperature. If test light does not light, replace heat hazard sensor.

HEATED OXYGEN SENSOR (HO2S)

MPV 3.0L, MX-6, 626 & 929

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With engine at room temperature, disconnect HO2S connector. Measure resistance across terminals "A" and "B" on MX-6 2.0L and 626 2.0L, or terminals "C" and "D" on all others. See Fig. 27. See HO2S RESISTANCE table. Replace HO2S as necessary. Also see PIN VOLTAGE CHARTS article.

HO2S RESISTANCE TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Ohms
-------------	------

MPV 3.0L	Continuity
----------------	------------

MX-6 & 626	8
------------------	---

929	4-40
-----------	------

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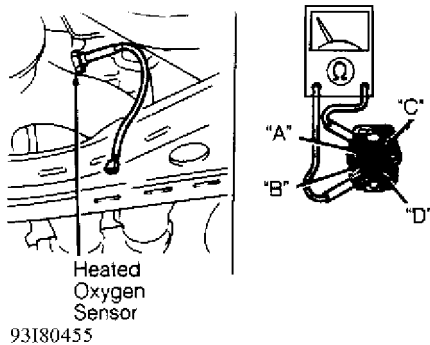


Fig. 27: Testing HO2S (MPV 3.0L, MX-6, 626 & 929)
Courtesy of Mazda Motors Corp.

Navajo

HO2S is located in exhaust pipe, upstream of the catalytic converter. Faults in sensor or circuit should set a service code. See QUICK TEST in G - TESTS W/CODES article. If no service code has been set, see CIRCUIT TEST H in G - TESTS W/CODES article for additional sensor specifications and circuit testing procedures. Ensure following conditions do not exist:

- * Moisture inside sensor/harness connector.
- * HO2S coated with contaminants.
- * Sensor circuit open or shorted to ground.

IDLE SWITCH

B2200, B2600i, MPV 2.6L, MX-6 2.0L & 626 2.0L

1) Disconnect idle switch electrical connector. See Fig. 28. Check continuity between switch and ground. Continuity should be present with throttle valve fully closed. Continuity should not exist with throttle valve open.

2) If continuity is not as specified, check wiring harness for open or short circuits. On B2200, B2600i, MX-6 2.0L and 626 2.0L, replace idle switch and throttle body as an assembly if wiring harness is okay. On MPV 2.6L, replace idle switch if wiring harness is okay.

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Miata, MPV 3.0L, MX-3, MX-6 2.5L, Protege, RX7, 323, 626 2.5L & 929

Idle switch is part of throttle position sensor. See D - ADJUSTMENTS article.

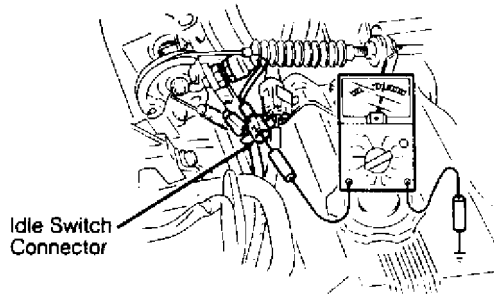


Fig. 28: Testing Idle Switch (B2200, B2600i & MPV 2.6L Shown; MX-6 2.0L & 626 2.0L Similar)
Courtesy of Mazda Motors Corp.

INERTIA FUEL SHUTOFF (IFS) SWITCH

Navajo

1) Inertia fuel shutoff switch is located under dash, right of transmission tunnel. To reset switch, ensure no fuel leaks are present. Push reset button.

2) Disconnect inertia fuel shutoff switch electrical connector. Connect ohmmeter set on 200-ohm scale across switch connector terminals. If resistance is greater than .3 ohm, replace switch.

INHIBITOR SWITCH (A/T)

Disconnect inhibitor switch electrical connector. Connect ohmmeter to indicated switch terminals. See Figs. 29-35. Continuity should be present with gearshift in Park and Neutral positions. Continuity should not exist in any other gear positions. Replace switch as necessary.

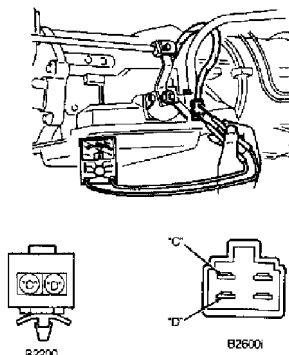


Fig. 29: Testing Inhibitor Switch (B2200 & B2600i Hyd. Controlled)
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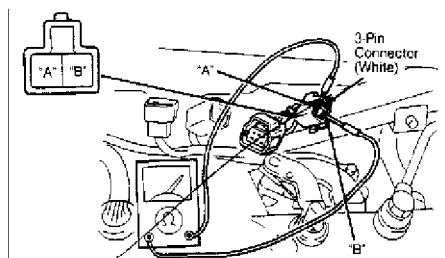


Fig. 30: Inhibitor Switch Terminal ID (B2200 & B2600i Hyd. Controlled)
Courtesy of Mazda Motors Corp.

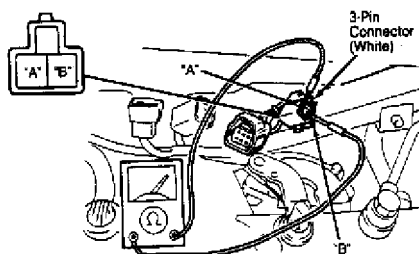


Fig. 31: Testing Inhibitor Switch (B2600i Elect. Controlled, MPV 3.0L, MX-6 & 626)
Courtesy of Mazda Motors Corp.

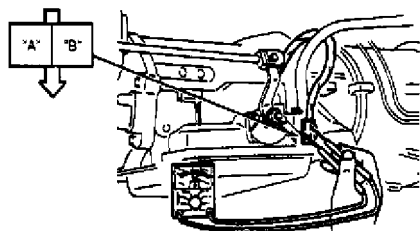


Fig. 32: Testing Inhibitor Switch (Miata)
Courtesy of Mazda Motors Corp.

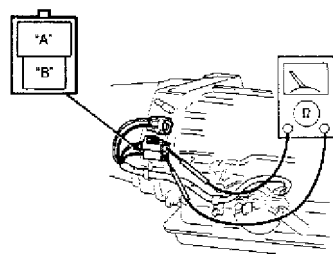


Fig. 33: Testing Inhibitor Switch (MPV 2.6L)
Courtesy of Mazda Motors Corp.

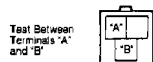


Fig. 34: Testing Inhibitor Switch (MX-3, Protege & 323)
Courtesy of Mazda Motors Corp.

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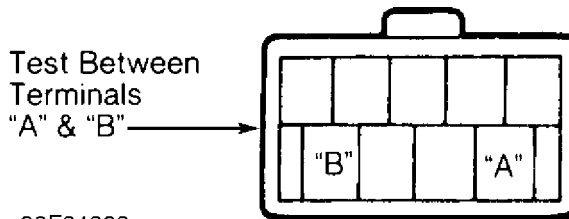
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Fig. 35: Testing Inhibitor Switch (MX-6, RX7, 626 & 929)

Courtesy of Mazda Motors Corp.

INTAKE AIR THERMOSENSOR (DYNAMIC CHAMBER)

B2200, B2600i & MPV

Disconnect intake air thermosensor connector. Connect ohmmeter to switch terminals. See Fig. 36 or 37. Measure resistance of sensor at various temperatures. See INTAKE AIR THERMOSENSOR RESISTANCE table. Replace sensor as necessary.

RX7

Remove sensor from under upper intake manifold. Using a heat light, ohmmeter and thermometer, measure resistance of sensor at various temperatures. See Fig. 38. See INTAKE AIR THERMOSENSOR RESISTANCE table. Replace sensor as necessary.

929

Remove intake air thermosensor. Using a heat light, ohmmeter and thermometer, measure resistance of sensor at various temperatures. See Fig. 38. See INTAKE AIR THERMOSENSOR RESISTANCE table. Replace sensor as necessary.

INTAKE AIR THERMOSENSOR RESISTANCE TABLE

Application Ohms

B2200, B2600i, MPV & 929

77°F (25°C) (1) 29,700-36,300

185°F (85°C) 3300-3700

RX7

68°F (20°C) 2200-2700

176°F (80°C) 290-350

(1) - Resistance is 29,000-36,000 ohms on MPV.

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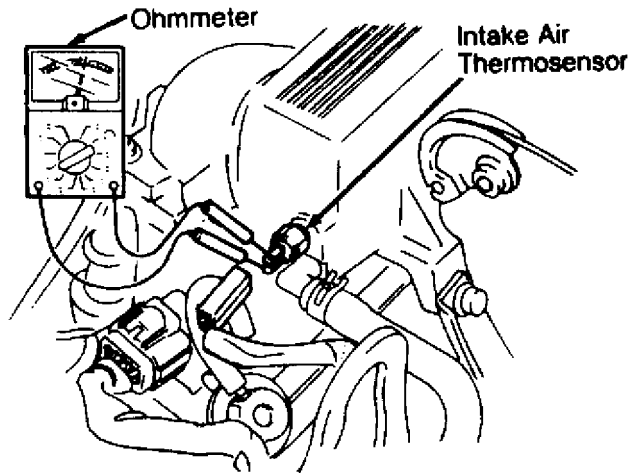


Fig. 36: Testing Intake Air Thermosensor (B2200, B2600i & MPV 2.6L)
Courtesy of Mazda Motors Corp.

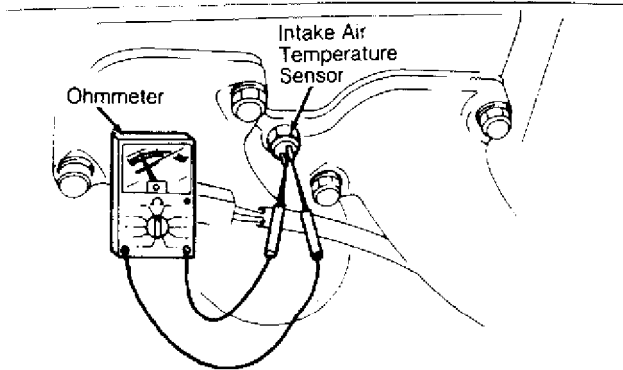


Fig. 37: Testing Intake Air Thermosensor (MPV 3.0L)
Courtesy of Mazda Motors Corp.

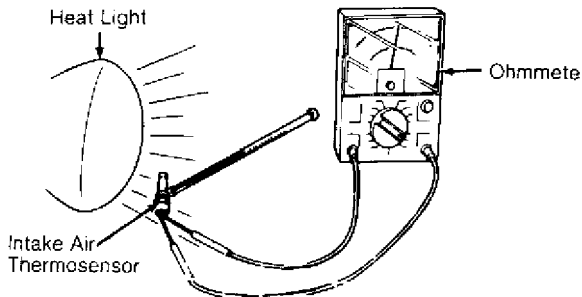


Fig. 38: Testing Intake Air Thermosensor (RX7 & 929)
Courtesy of Mazda Motors Corp.

KNOCK SENSOR

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See J - PIN VOLTAGE CHARTS article.

MASS AIRFLOW (MAF) SENSOR (NAVAJO)

Faults in MAF sensor or circuit should set a service code. See QUICK TEST in G - TESTS W/CODES article. If no service code has been set, see CIRCUIT TEST DC in G - TESTS W/CODES article for sensor and circuit testing and specifications.

MILEAGE SWITCH (RX7)

See J - PIN VOLTAGE CHARTS article.

NEUTRAL SWITCH

Except Navajo (M/T)

Disconnect neutral switch electrical connector. Using ohmmeter, check continuity between switch terminals. Ensure continuity exists with transmission in Neutral. Continuity should not exist with transmission in any other gear. Replace switch as necessary.

Navajo

With ignition switch in OFF position, set DVOM to 200-ohm scale. Locate neutral switch on transmission. Disconnect neutral switch electrical connector. Using ohmmeter, measure resistance across neutral terminals. If resistance is greater than 5 ohms, replace switch.

OXYGEN (O2) SENSOR

B2200, B2600i, Miata, MPV 2.6L, MX-3, Protege, RX7 & 323

1) Warm engine to operating temperature. Operate engine at idle. Disconnect O2 sensor electrical connector. Connect voltmeter between connector and ground. On B2200, B2600i, MPV 2.6L and MX-3 DOHC, increase engine speed to 4500 RPM until voltmeter indicates about .7 volt. On Miata, MX-3 SOHC, Protege, RX7 and 323, increase engine speed to 3000 RPM until voltmeter indicates about .55 volt.

2) Observe voltmeter while rapidly accelerating and decelerating engine speed. Voltage should be 0.5-1.0 volt during acceleration and 0.0-0.4 volt during deceleration. Replace O2 sensor as necessary.

MPV 3.0L, MX-6, 626 & 929

1) Warm engine to operating temperature. Operate engine at idle. Disconnect O2 sensor electrical connector. Connect voltmeter between O2 sensor connector terminals "C" and "D" on MX-6 2.5L and 626 2.5L, or terminals "A" and "B" on all others. See Fig. 39.

2) Observe voltmeter while rapidly accelerating and decelerating engine speed. Voltage should be 0.5-1.0 volt during acceleration and 0.0-0.4 volt during deceleration. Replace O2 sensor as necessary.

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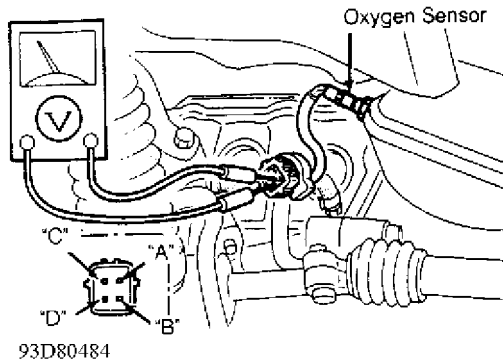


Fig. 39: Testing Oxygen Sensor (MPV 3.0L, MX-6, 626 & 929)
Courtesy of Mazda Motors Corp.

POWER STEERING PRESSURE SWITCH (PSPS)

Disconnect power steering pressure switch electrical connector. Connect ohmmeter to PSPS terminals. Start engine, and operate it at idle. Turn steering wheel from side to side, and observe ohmmeter. Ohmmeter should indicate continuity when front wheels are turned. Continuity should not exist when wheels are not turned. Replace switch as necessary.

THROTTLE POSITION SENSOR

See D - ADJUSTMENTS article for checking and adjustment procedures.

VARIABLE RELUCTANCE (VR) SENSOR

Navajo

See appropriate article below:

F - BASIC TESTING

G - TESTS W/CODES

VEHICLE SPEED SENSOR (VSS)

Except Navajo & 929

See J - PIN VOLTAGE CHARTS article.

Navajo

Disconnect VSS electrical connector on transmission. Using DVOM, measure resistance across VSS terminals. Resistance should be 190-250 ohms. Replace sensor as necessary.

929

1) Connect positive lead of voltmeter to Green/Red wire of combination meter. Connect negative lead of voltmeter to ground. Raise and support rear wheels. Start engine. Engage Drive and rotate rear wheels. Voltmeter should show 3-4 volts. If not, stop engine.

2) Disconnect connector from combination meter. Measure

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resistance across Blue/White and Blue/Yellow wires (terminals 1K and 1L). Resistance should be 290 ohms. If resistance is not 290 ohms, check wiring to transmission. If wiring is okay, check resistance of VSS at transmission.

3) If resistance of VSS is not 290 ohms, replace VSS. If resistance of VSS is 290 ohms, replace VSS buffer in instrument cluster.

1-2 SWITCH

RX7 (M/T)

1) Disconnect 1-2 switch connector at transmission. Check continuity across White and Yellow wires. In first gear, no continuity should exist. In all other gears, continuity should be present. If switch does not test as described, replace 1-2 switch.

2) Check continuity across Red and Blue wires. In second gear, continuity should be present. In all other gears, no continuity should exist. If switch does not test as described, replace 1-2 switch.

RELAYS & SOLENOIDS

RELAYS

Circuit Opening Relay

See FUEL PRESSURE (FUEL INJECTION) under FUEL SYSTEM in F - BASIC TESTING article.

Cold Start Injector Relay (929)

Remove cold start injector relay. Apply battery voltage to terminal "C", and ground terminal "D". Continuity should be present with battery voltage applied. Continuity should not exist without voltage applied. Replace relay as necessary.

Fuel Pump Relay (Navajo)

Remove relay from vehicle. Connect battery voltage to terminal "C". See Fig. 40. Ground terminal "D". Check continuity between terminals "A" and "B". Continuity should exist with power applied. Continuity should not exist with power removed.

NOTE: For additional testing, see CIRCUIT TEST J in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

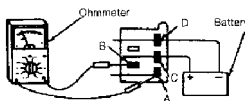


Fig. 40: Testing EEC Power & Fuel Pump Relays (Navajo)
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Main Relay (Except Navajo)

1) Ensure main relay clicks when ignition is turned on and off.

2) If no sound is heard, unplug relay. Apply 12 volts to terminal "A", and ground terminal "B". See Fig. 41, 42 or 43.

3) Using ohmmeter, check continuity between terminals "C" and "D". Continuity should be present with 12 volts applied. Continuity should not exist with no voltage applied. Replace main relay as necessary.

EEC Power Relay (Navajo)

Remove relay from vehicle. Connect battery voltage to terminal "C". See Fig. 40. Ground terminal "D". Measure resistance between terminals "A" and "B". Resistance should be less than one ohm with power applied. Continuity should not exist with power removed.

NOTE: For additional testing, see CIRCUIT TEST B in
G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

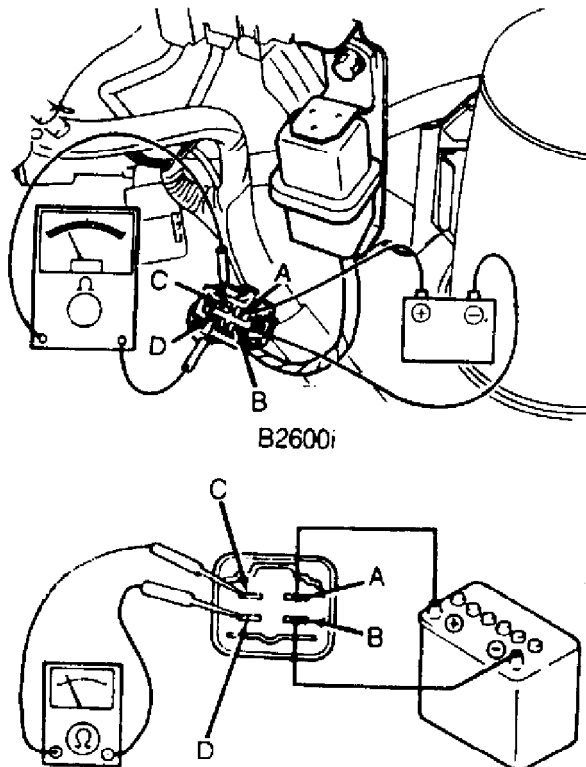


Fig. 41: Testing Main Relay (B2200 & B2600i)
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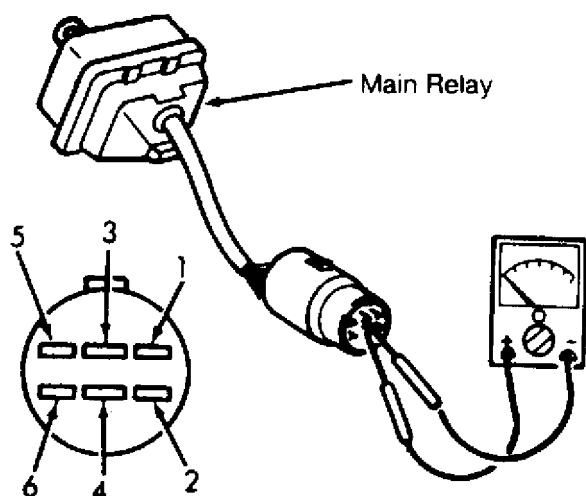
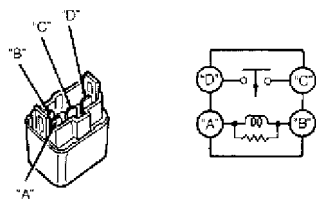


Fig. 42: Testing Main Relay (Miata, MPV, MX-3 DOHC, MX-6, Protege, RX7, 323, 626 & 929)
Courtesy of Mazda Motors Corp.



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Fig. 43: Identifying Main Relay Terminals (MX-3 SOHC)
Courtesy of Mazda Motors Corp.

SOLENOIDS

NOTE: All solenoids (used on all vehicles except Navajo) operate the same way. See Fig. 44 to locate specific solenoids used on RX7.

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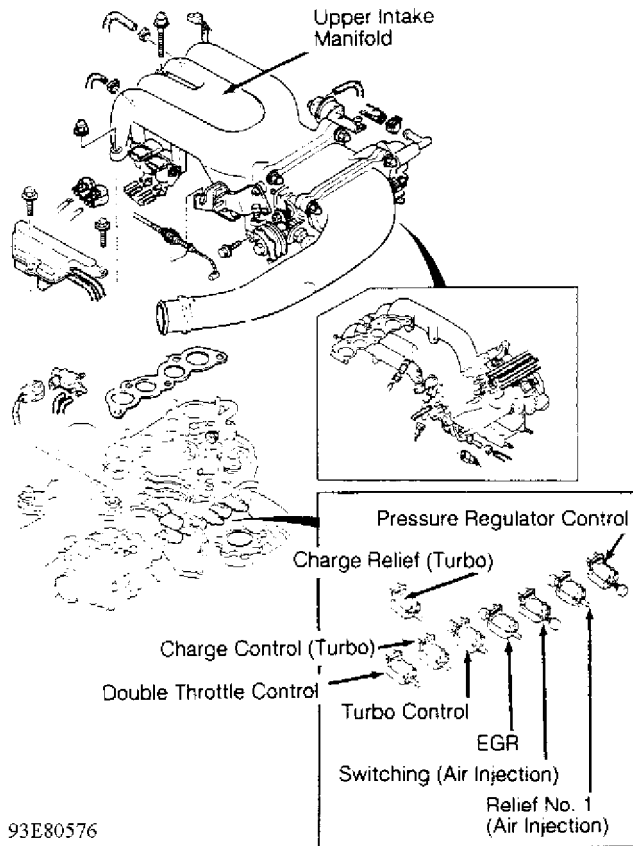


Fig. 44: Locating Vacuum Solenoids (RX7)
Courtesy of Mazda Motors Corp.

Backpressure EGR Vacuum Regulator Valve (Navajo)

See EXHAUST GAS RECIRCULATION (EGR) (NAVAJO - CALIFORNIA)
under EMISSION SYSTEMS & SUB-SYSTEMS.

Canister Purge (CANP) Solenoid (Navajo)

See FUEL EVAPORATION (NAVAJO) under EMISSION SYSTEMS & SUB-SYSTEMS.

Cold Start Injector Resistance (929)

Disconnect cold start injector electrical connector. Using ohmmeter, measure resistance between injector terminals. Resistance should be 2.7-3.4 ohms at 68°F (20°C). Replace injector as necessary.

Double Throttle Control Solenoid (RX7)

Disconnect vacuum hose from double throttle control solenoid. Blow air through solenoid port "A". See Fig. 45. Ensure air flows through port "B". Disconnect solenoid valve electrical connector. Connect 12 volts and ground to solenoid terminals. Blow air through solenoid port "A". Air should flow through valve air filter. Replace solenoid as necessary.

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EGR Solenoid (MX-3 DOHC, MX-6, RX7, 626 & 929)

See EXHAUST GAS RECIRCULATION (EGR) (MX-3 DOHC, MX-6, RX7, 626 & 929) under EMISSION SYSTEMS & SUB-SYSTEMS.

Fuel Injectors

Using stethoscope, listen for normal clicking sound at each injector during idle and acceleration. If clicking sound is not heard, check injector wiring circuit, or main relay and circuit.

Fuel Injector Resistance

Disconnect fuel injector electrical connector. Using ohmmeter, measure resistance between injector terminals. Resistance should be 12-16 ohms. Replace injector as necessary.

Pressure Regulator Control Solenoid (Except Navajo)

Disconnect vacuum hose from pressure regulator control solenoid. Blow air through solenoid port "A". See Fig. 45. Ensure air flows through port "B". Disconnect solenoid valve electrical connector. Connect 12 volts and ground to solenoid terminals. Blow air through solenoid port "A". Air should flow through valve air filter. Replace solenoid as necessary.

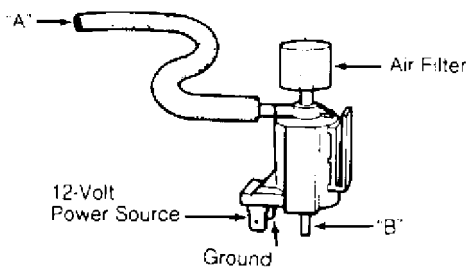


Fig. 45: Testing Solenoid
Courtesy of Mazda Motors Corp.

Purge Control Solenoid

See FUEL EVAPORATION (EXCEPT NAVAJO) under EMISSION SYSTEMS & SUB-SYSTEMS.

Air Injection Solenoid (RX7)

See AIR INJECTION (RX7) under EMISSION SYSTEMS & SUB-SYSTEMS.

Turbocharger Solenoid (RX7)

See TURBOCHARGER (RX7) under AIR INDUCTION SYSTEMS.

VICS Solenoid (Protege DOHC & 929)

See VARIABLE INERTIA CHARGING SYSTEM (PROTEGE DOHC & 929) under AIR INDUCTION SYSTEMS.

VRIS Solenoid (MPV 3.0L, MX-3 DOHC, MX-6 2.5L & 626 2.5L)

See VARIABLE RESONANCE INDUCTION SYSTEM (MPV 3.0L, MX-3 DOHC, MX-6 2.5L & 626 2.5L) under AIR INDUCTION SYSTEMS.

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FUEL SYSTEM

FUEL DELIVERY

NOTE: For fuel system pressure testing, see F - BASIC TESTING article.

Circuit Opening Relay

See FUEL PRESSURE (FUEL INJECTION) under FUEL SYSTEM in F - BASIC TESTING article.

Fuel Pump Circuit

See FUEL PRESSURE (FUEL INJECTION) under FUEL SYSTEM in F - BASIC TESTING article.

Fuel Pump Relay (Navajo)

See FUEL PUMP RELAY (NAVAJO) under RELAYS under RELAYS & SOLENOIDS. Also see FUEL PRESSURE (FUEL INJECTION) under FUEL SYSTEM in F - BASIC TESTING article.

Inertia Fuel Shutoff (IFS) Switch (Navajo)

See INERTIA FUEL SHUTOFF (IFS) SWITCH under ENGINE SENSORS & SWITCHES. Also see FUEL PRESSURE (FUEL INJECTION) under FUEL SYSTEM in F - BASIC TESTING article.

Fuel Pressure Regulator (Except Navajo)

See FUEL PRESSURE (FUEL INJECTION) under FUEL SYSTEM in F - BASIC TESTING article.

Fuel Pressure Regulator (Navajo)

1) Ensure ignition is off. Connect fuel pressure gauge to Schrader valve on fuel rail. Ensure manifold vacuum supply tube is connected to fuel pressure regulator. Start engine, and run it for 10 seconds. Stop engine, and wait 10 seconds. Start engine, and operate it for 10 seconds. Stop engine, and remove pressure regulator vacuum hose. See Fig. 46. Check vacuum port for fuel.

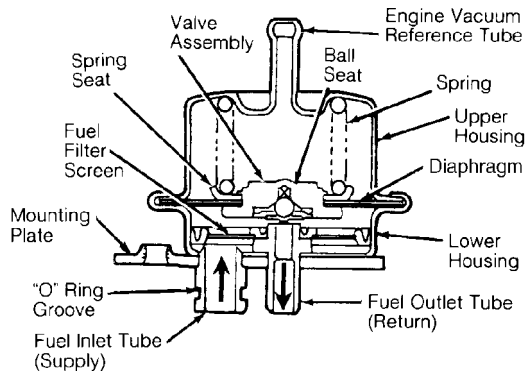


Fig. 46: Identifying Fuel Pressure Regulator Components (Navajo)
Courtesy of Ford Motor Co.

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2) If fuel is present, replace fuel pressure regulator and repeat test. If fuel is not present, plug pressure regulator vacuum hose. Observe fuel pressure while driving vehicle and accelerating heavily. If fuel pressure remains at 27-48 psi, go to next step. If fuel pressure does not remain at 27-48 psi, check fuel filter. If filter is okay, replace fuel pump. If filter is dirty, replace filter and recheck system.

3) Remove plug from vacuum hose, and connect hose to pressure regulator. Install vacuum gauge to intake manifold. Start engine, and observe fuel pressure gauge and vacuum gauge readings. Increase engine speed. Fuel pressure gauge reading should increase as vacuum gauge reading decreases and vacuum gauge reading should increase as fuel pressure gauge decreases.

4) If gauges responds as specified, no fault is present in fuel system. Check for other causes of driveability symptoms. If gauges do not respond as specified, turn ignition off. Remove vacuum hose from fuel pressure regulator, and plug hose. Install a vacuum pump to pressure regulator. Start engine, and observe fuel pressure. Apply vacuum.

5) If fuel pressure changes as vacuum is applied, check and repair vacuum system. If fuel pressure does not change as vacuum is applied, replace fuel pressure regulator.

Fuel Pressure Regulator Pressure Leakage (Navajo)

1) Ensure ignition is off. Relieve fuel pressure. See FUEL SYSTEM in F - BASIC TESTING article. Remove fuel pressure regulator. Check "O" ring, gasket and mounting surfaces for cracks, cuts and other damage.

2) Connect vacuum pump to fuel return tube, and apply 20 in. Hg vacuum. See Fig. 46. If maximum vacuum loss exceeds 10 in. Hg in 10 seconds, replace fuel pressure regulator. If maximum vacuum loss does not exceed 10 in. Hg in 10 seconds, fuel pressure regulator is functioning properly.

Pulsation Damper (Navajo & RX7)

Start engine, and allow it to idle. Pulsation damper is located at end of fuel rail. Place finger over pulsation damper and ensure damper pulsates. Replace pulsation damper as necessary.

Pressure Regulator Control (Except Miata, Navajo & 929)

1) Engine must be at or near operating temperature. Turn engine off. Disconnect vacuum hose at fuel pressure regulator and connect a vacuum gauge to hose.

2) Without touching throttle, start engine. Observe vacuum gauge. Vacuum should not exist. If vacuum is present, check pressure regulator control solenoid and related circuits. If no vacuum exists, count seconds until vacuum gauge shows intake manifold vacuum. See PRESSURE REGULATOR SPECIFICATIONS table.

3) If vacuum gauge shows intake manifold vacuum after specified amount of time, system is okay. See Fig. 47. If intake manifold vacuum is not present, check vacuum source, pressure regulator control solenoid and related circuits.

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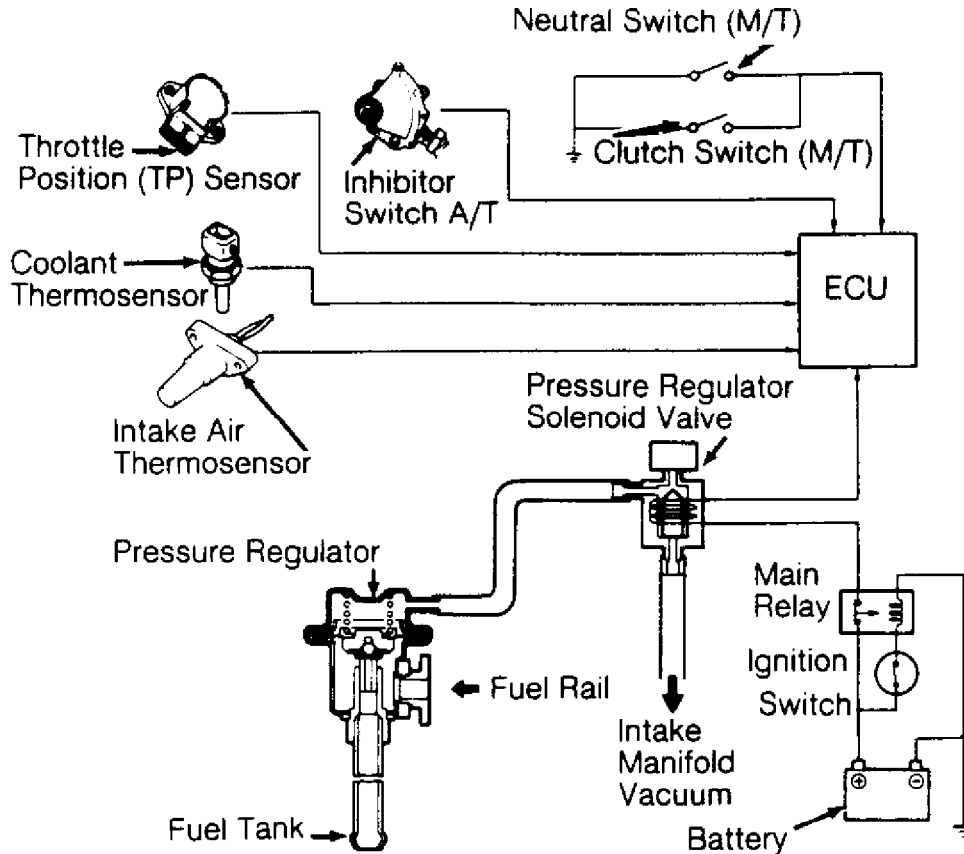
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Pressure Regulator Control Solenoid (Except Navajo)

See PRESSURE REGULATOR CONTROL SOLENOID (EXCEPT NAVAJO) under SOLENOIDS under RELAYS & SOLENOIDS.



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Fig. 47: Typical Pressure Regulator Control System (Except Miata, Navajo & 929)

Courtesy of Mazda Motors Corp.

PRESSURE REGULATOR SPECIFICATION TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Operating Time (sec.)
B2200 & 2600i	120
MPV	
2.6L	240
3.0L	120
MX-3	120
MX-6 & 626	
2.0L	10
2.5L	120
Protege & 323	
1.6L & 1.8L DOHC	60
1.8L SOHC	120

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RX7 60
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FUEL CONTROL

Fuel Injectors

See FUEL INJECTORS under SOLENOIDS under RELAYS & SOLENOIDS.

Injector Fuel Leakage (Except Navajo)

1) Relieve fuel system pressure. See F - BASIC TESTING article. Remove air valve or dynamic chamber as necessary. Remove delivery pipe with hoses still connected. Remove fuel injectors. Using wire, secure injectors tightly onto delivery pipe.

CAUTION: Ensure injectors are securely tied to delivery pipe. If injectors are not properly secured to delivery pipe, fuel may spray from loose connections.

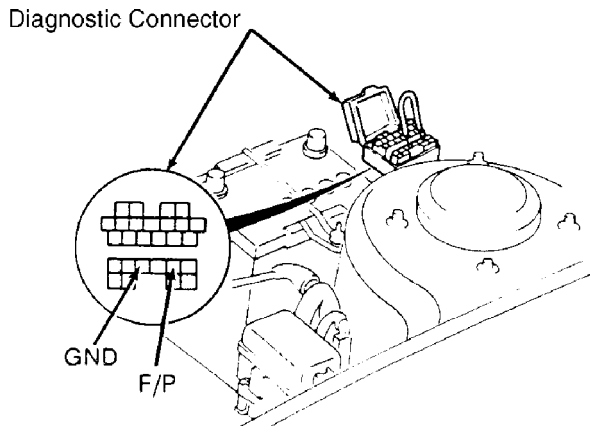
2) On Miata, MX-3, MX-6, Protege, RX7, 323, 626 and 929, connect a jumper wire between terminals F/P and GND of diagnostic connector located near battery. See Fig. 48.

3) On B2200, B2600i and MPV, install a jumper wire between terminals of Yellow fuel pump check connector. Fuel pump check connector is located on firewall, under windshield wiper motor.

4) Turn ignition on for 10 seconds. Turn ignition off, and clean injector nozzles. On 4-cylinder models, tilt injectors about 60 degrees. On all models, turn ignition on. Ensure no fuel leakage exists at injectors. After one minute, a single drop of fuel is acceptable. If fuel leakage is present, replace faulty injector.

Injector Fuel Leakage (Navajo)

Use fuel injector tester/cleaner to test injector fuel leakage. Testing procedures are provided in instructions included with tester/cleaner from manufacturer.



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Fig. 48: Diagnostic Connector Terminal ID (Miata, MX-3, MX-6, Protege, RX7, 323, 626 & 929)
Courtesy of Mazda Motors Corp.

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IDLE CONTROL SYSTEM

IDLE SPEED CONTROL (ISC) SYSTEM (B2200, B2600i, MPV, MX-3, MX-6, 626 & 929)

Air Valve (B2200, B2600i, MPV 2.6L, MX-6 2.0L & 626 2.0L)

1) Remove air valve from throttle body. Blow air through valve from port "A" and ensure air comes out of port "B" when valve is cold. See Fig. 49.

2) Place air valve in water at temperature greater than 176°F (80°C) for one minute. Blow air through valve from port "A". No air should come out of port "B". Replace valve as necessary.

Air Valve (MPV 3.0L & 929)

1) Disconnect air hoses from air valve. Blow air through valve from port "A" and ensure air flows through valve when engine is cold. See Fig. 50.

2) Warm engine to normal operating temperature. Blow air through valve from port "A". Air should not flow through valve. Replace valve as necessary.

Air Valve System (MX-3, MX-6 & 626)

Connect jumper wire between diagnostic connector terminals TEN and GND. Connect tachometer to diagnostic connector terminal IG. See Fig. 51. Start engine. Idle speed should decrease as engine reaches normal operating temperature. Replace valve as necessary.

ISC Valve

Disconnect ISC valve electrical connector. Connect ohmmeter to ISC valve 2-wire connector. Measure resistance. See ISC RESISTANCE SPECIFICATIONS table. If resistance is not within specification, replace ISC valve.

ISC RESISTANCE SPECIFICATIONS TABLE

Testing Temperature		
Application	°F (°C)	Ohms
B2200, B2600i, MX-6 2.0L, MPV 2.6L & 626 2.0L	73 (23)	7.7-9.3
MPV 3.0L, MX-3, MX-6 2.5L, 626 2.5L & 929	68 (20)	10.7-12.3

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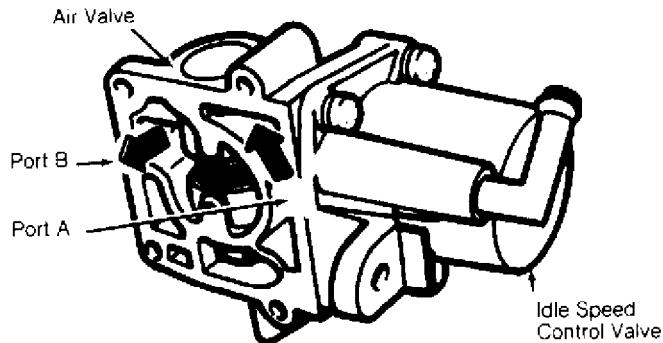


Fig. 49: Testing Air Valve (B2200, B2600i, MPV 2.6L, MX-6 & 626)
Courtesy of Mazda Motors Corp.

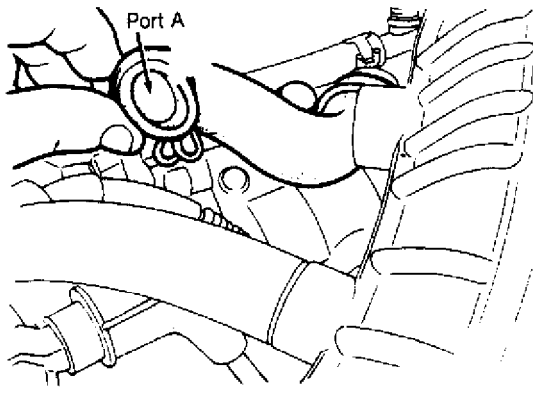


Fig. 50: Testing Air Valve (MPV 3.0L & 929)
Courtesy of Mazda Motors Corp.

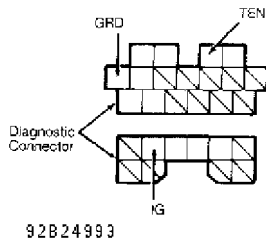


Fig. 51: Diagnostic Connector Terminal ID (MX-3, MX-6 & 626)
Courtesy of Mazda Motors Corp.

IDLE SPEED CONTROL (ISC) SYSTEM (MIATA, PROTEGE & 323)

Air Valve

Remove air valve. Cool air valve to temperature less than 32°F (0°C). Using a drier, heat air valve and verify plunger moves in direction of arrow. See Fig. 52.

ISC Valve

Disconnect ISC valve electrical connector. Connect ohmmeter to Idle Speed Control (ISC) valve 2-wire connector. Measure resistance. Resistance should be 11-13 ohms at 68°F (20°C). If resistance is not within specification, replace ISC valve.

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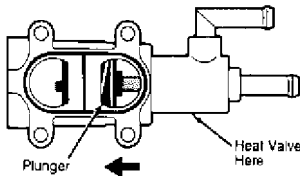


Fig. 52: Cross-Sectional View Of Air Valve (Miata, Protege & 323)
Courtesy of Mazda Motors Corp.

IDLE SPEED CONTROL (ISC) SYSTEM (NAVAJO)

Idle Speed Control (ISC) Solenoid

1) Solenoid is a by-pass air-type solenoid. Disconnect coolant hoses. Make sure coolant flows through ISC and air valve is open at room temperature.

2) Ensure ignition is off. Disconnect ISC solenoid electrical connector. Set DVOM to 200-ohm scale. Measure resistance between ISC solenoid terminals. A diode is located in solenoid; connect DVOM positive test lead to VPWR terminal (Red wire) and negative lead to ISC terminal (White/Light Blue wire). Resistance should be 6-13 ohms. Replace solenoid as necessary.

IDLE SPEED CONTROL (ISC) SYSTEM (RX7)

ISC Valve

1) Make sure fast idle cam has released throttle lever. See Fig. 53. Disconnect ISC valve electrical connector. Connect ohmmeter to ISC valve 2-wire connector. See Fig. 54. Measure resistance. Resistance should be 10.7-12.3 ohms at 68°F (20°C). If resistance is not within specification, replace ISC valve.

2) With engine idling at operating temperature, disconnect ISC valve electrical connector. Engine speed should increase to 1000-1500 RPM. If engine speed does not increase, replace ISC valve.

Accelerated Warm-Up System (AWS) Valve

Make sure fast idle cam has released throttle lever. See Fig. 53. Disconnect AWS valve electrical connector. Connect ohmmeter to AWS valve 2-wire connector. See Fig. 55. Measure resistance. Resistance should be 9.3-11.3 ohms at 68°F (20°C). If resistance is not within specification, replace AWS valve.

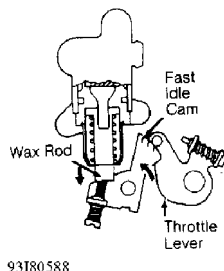


Fig. 53: Checking Fast Idle Cam & Throttle Lever
Courtesy of Mazda Motors Corp.

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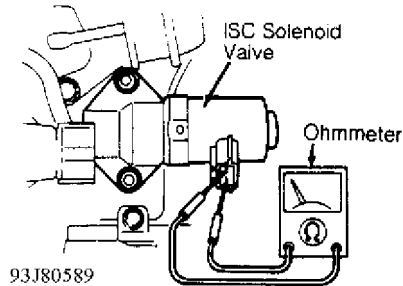


Fig. 54: Checking ISC Solenoid Valve
Courtesy of Mazda Motors Corp.

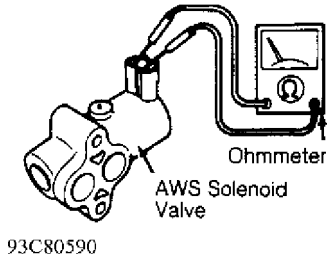


Fig. 55: Checking AWS Solenoid Valve
Courtesy of Mazda Motors Corp.

IGNITION SYSTEM

NOTE: For basic ignition checks, see F - BASIC TESTING article.

PINPOINT TESTS (NAVAJO)

NOTE: Before testing Electronic Distributorless Ignition System (EDIS), ensure all tests in F - BASIC TESTING and G - TESTS W/CODES articles have been performed. In following tests, Electronic Distributorless Ignition System (EDIS) or Ignition Control Module (ICM) may be used to describe ignition system.

NOTE: Use EDIS Diagnostic Cable (49-UN01-057) to diagnose system. Cable is equipped with additional circuits and components to enhance and modify signals for testing purposes. If using an aftermarket test cable or DVOM, become familiar with system wiring diagram and system operation. See Figs. 56 and 57.

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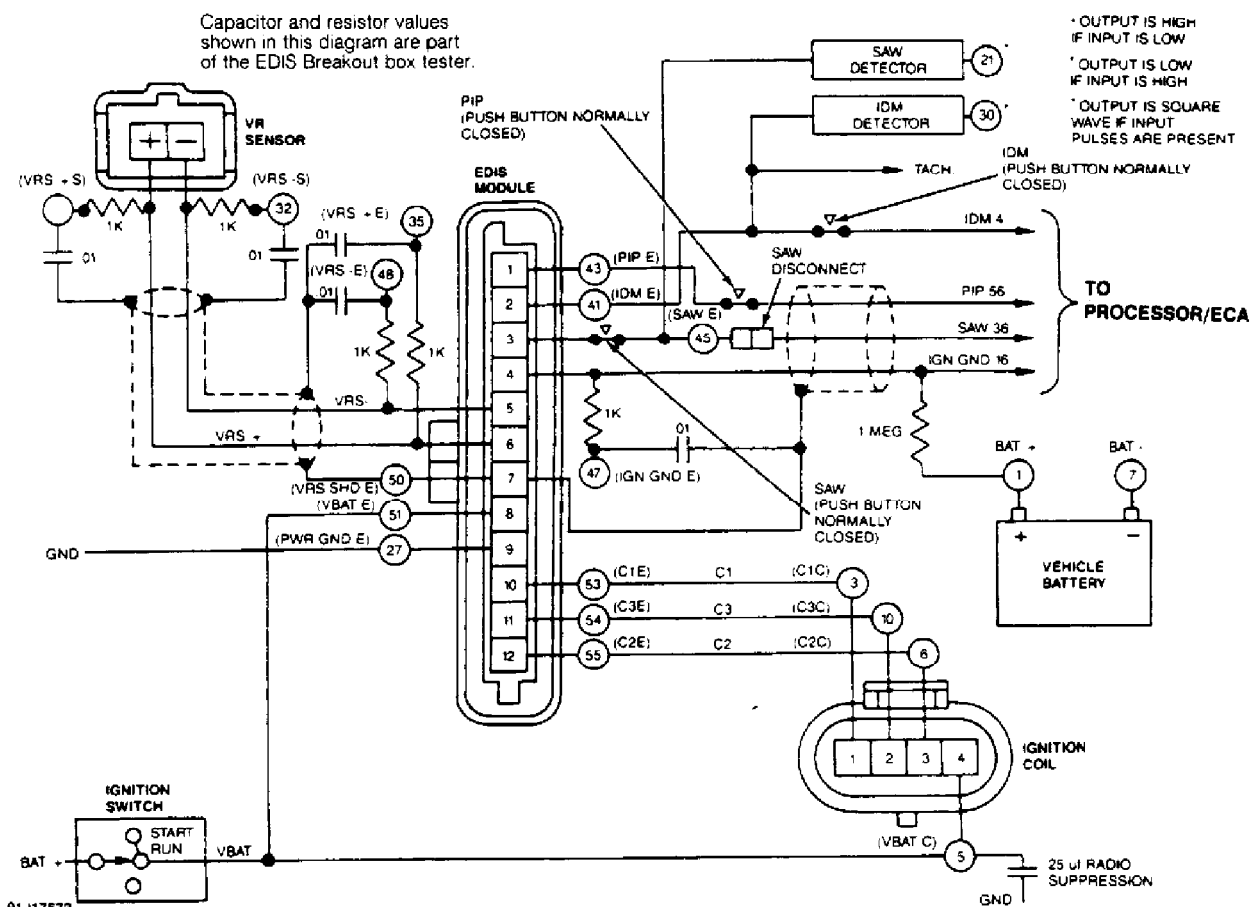


Fig. 56: Ignition System Wiring Diagram (Navajo)
Courtesy of Mazda Motors Corp.

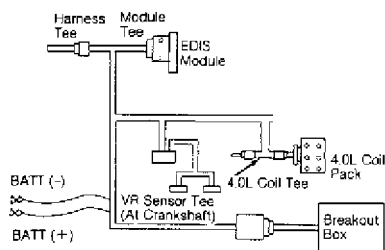


Fig. 57: EDIS/ICM Diagnostic Cable Diagram (Navajo)
Courtesy of Mazda Motors Corp.

CAUTION: Unless directed otherwise, DO NOT connect PCM to Breakout Box (BOB) when performing ICM diagnostics.

Pinpoint Test B (IDM Failure Code 212)

1) With ignition off, connect ICM diagnostic cable to Breakout Box (BOB) and ICM module. DO NOT connect VR sensor tee or coil tee. Use ICM "6" overlay. Connect negative and positive leads of

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ICM diagnostic cable to battery. Set ICM diagnostic cable box switch to 4/6 CYLINDER position. Set DVOM on 20-volt AC scale. Start engine. Measure voltage between IDM DETECTOR (30) and BAT- (7) of diagnostic cable Ignition Diagnostic Monitor (IDM) at BOB. If pulses are present, IDM detector output will be 5-7 volts AC. If AC voltage is 5-7 volts, go to next step. If AC voltage is not 5-7 volts, go to step 3).

2) With ignition off, ICM module and PCM disconnected, disconnect ICM module from ICM module tee, leaving ICM diagnostic cable connected to vehicle harness connector. Set DVOM on 200-ohm scale. Connect PCM Breakout Box (BOB) to PCM harness connector. Measure resistance between IDM E (41) at BOB and terminal No. 4 at PCM BOB. If resistance is less than 5 ohms, IDM signal at PCM is okay. PCM does not respond to IDM signal. Replace PCM. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section. If resistance is 5 ohms or more, IDM is open. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in appropriate G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

3) With ignition off and IDM circuit disconnected, set DVOM on 20-volt AC scale. Push ICM IDM button at ICM diagnostic cable connector to BOB. Start engine, and measure voltage between diagnostic cable IDM DETECTOR (30) and BAT- (7) at BOB. If AC voltage is 5-7 volts, go to next step. If AC voltage is not 5-7 volts, IDM output from ICM module does not exist. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

4) With ignition off and PCM disconnected, set DVOM on 20-volt AC scale. Crank engine, and measure voltage between diagnostic cable IDM DETECTOR (30) and BAT- (7) at BOB. If voltage is less than 5 volts, go to next step. If voltage is 5 volts or more, PCM is loading IDM signal. Replace PCM. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

5) With ignition off and ICM module and PCM disconnected, disconnect ICM module from diagnostic cable module tee, leaving ICM diagnostic cable connected to vehicle harness connector. Set DVOM on 20-k/ohm scale. Measure resistance between IDM E (41) and BAT- (7) at BOB. If resistance is 10-k/ohms or more, go to next step. If resistance is less than 10-k/ohms, IDM is shorted low. Check connections and/or repair short circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

6) With ignition off and ICM module and PCM disconnected, set DVOM on 20-volt DC scale. With Key On Engine Off (KOEO), measure voltage between IDM E (41) and BAT- (7) at BOB. If DC voltage is .5 volt or more, IDM is shorted high. Check connections and/or repair short circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST.

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See QUICK TEST in G - TESTS W/CODES article.

7) If voltage is less than .5 volt, IDM is shorted to another wire between ICM module and PCM. Check connections and/or repair short circuit or replace harness. Remove test equipment and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

CAUTION: Unless directed otherwise, DO NOT connect PCM to Breakout Box (BOB) when performing ICM diagnostics.

Pinpoint Test C (Lack Of Power Or Poor Fuel Economy Code 213)

1) With ignition off, install ICM diagnostic cable to BOB and ICM module. DO NOT connect VR sensor tee or coil tee. Use ICM 6 overlay. Connect negative and positive leads of ICM diagnostic cable to battery. Set ICM diagnostic cable box switch to 4/6 CYLINDER position. Connect timing light (must be ICM compatible). Start engine, and warm it to normal operating temperature. Push and hold down ICM diagnostic cable SAW detector button. If timing is 8-12 degrees BTDC, go to next step. If timing is not 8-12 degrees BTDC, go to step 8).

2) Release ICM diagnostic cable SAW detector button. Go to next step if timing is not 15 degrees BTDC. If timing is more than 15 degrees BTDC, ICM is okay. Check for other causes of driveability symptoms.

3) With ignition off, set DVOM on 20-volt AC scale. Start engine and measure voltage between SAW DETECTOR (21) of ICM diagnostic cable and BAT- (7) at BOB. If AC voltage is 5 volts or more, go to next step. If AC voltage is less than 5 volts, SAW input to ICM module is okay and no spark advance is present. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

4) With ignition off and SAW circuit disconnected, set DVOM on 20-volt AC scale. Push and hold down SAW detector button at ICM diagnostic cable connector to BOB. Start engine, and measure voltage between SAW DETECTOR (21) of ICM diagnostic cable and BAT- (7) at BOB. If AC voltage is less than 5 volts, go to next step. If AC voltage is 5 volts or more, SAW is shorted in ICM module. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

5) With ignition off and ICM module and PCM disconnected, disconnect ICM module from ICM module tee, leaving ICM diagnostic cable connected to vehicle harness connector. Set DVOM on 20-k/ohm scale. Disconnect ICM diagnostic cable positive lead to battery. Measure resistance between SAW E (45) and BAT- (7) at BOB. If resistance is 10 k/ohms or more, go to next step. If resistance is less than 10 k/ohms, SAW is shorted low. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

6) With ignition off and ICM module and PCM disconnected, set

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DVOM on 20-volt DC scale. With Key On Engine Off (KOEO), measure voltage between SAW E (45) and BAT- (7) at BOB. If DC voltage is less than .5 volt, go to next step. If DC voltage is .5 volt or more, SAW is shorted high. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

7) With ignition off and ICM module and PCM disconnected, set DVOM on 200-ohm scale. Connect PCM Breakout Box (BOB) to PCM harness connector. Measure resistance between SAW E (45) at BOB and terminal No. 36 at PCM BOB. If resistance is less than 5 ohms, SAW is open. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in appropriate G - TESTS W/CODES article. If resistance is 5 ohms or more, SAW is not being transmitted by ECU. Replace ECU. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

8) If VR sensor or trigger wheel is loose, misaligned or damaged, repair or replace as necessary. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section. If VR sensor or trigger wheel is not loose, misaligned or damaged, ICM module has incorrect output. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

CAUTION: Unless directed otherwise, DO NOT connect PCM to PCM Breakout Box (BOB) when performing ICM diagnostics.

Pinpoint Test D (No Start Or Coil Failure Code 232)

1) Using spark plug tester, check for spark at all spark plug wires while cranking. If spark was consistent on all spark plug wires (one spark per crankshaft revolution), ignition system is okay. Check for other causes of driveability symptoms. If spark was not consistent on all spark plug wires, check spark plug wires for insulation damage, looseness, shorting and other damage. Remove and check spark plugs for wear, carbon deposits, improper gap and damage. If spark plugs and wires are okay, go to next step. If spark plugs and wires are not okay, repair or replace as necessary. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

2) With ignition off, install ICM diagnostic cable to BOB. Connect ICM diagnostic cable negative lead to battery. Set ICM diagnostic cable box switch to 4/6 CYLINDER position. Install coil tee. Use ICM "6" overlay. Set DVOM on 20-volt DC scale. With Key On, Engine Off (KOEO), measure voltage between VBAT C (5) and BAT- (7) at BOB. If DC voltage is 10 volts or more, go to next step. If DC voltage is less than 10 volts, VBAT is open. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST.

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See QUICK TEST in G - TESTS W/CODES article.

3) With Key On Engine Off (KOEO), measure voltage between C1C (3) and BAT- (7) at BOB. If DC voltage is 10 volts or more, go to next step. If DC voltage is less than 10 volts, go to step 15).

4) With Key On Engine Off (KOEO), measure voltage between C2C (6) and BAT- (7) at BOB. If DC voltage is 10 volts or more, go to next step. If DC voltage is less than 10 volts, go to step 17).

5) With Key On Engine Off (KOEO), measure voltage between C3C (6) and BAT- (7) at BOB. If DC voltage is 10 volts or more, go to next step. If DC voltage is less than 10 volts, go to step 19).

6) With ignition off, connect ICM module tee to ICM module and vehicle harness connector. Set DVOM on 20-volt DC scale. With KOEO, measure voltage between C1E (53) and BAT- (7) at BOB. If DC voltage is 10 volts or more, go to next step. If DC voltage is less than 10 volts, C1 is open. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

7) With KOEO, measure voltage between C2E (55) and BAT- (7) at BOB. If DC voltage is 10 volts or more, go to next step. If DC voltage is less than 10 volts, C2 is open. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

8) With KOEO, measure voltage between C3E (54) and BAT- (7) at BOB. If DC voltage is 10 volts or more, go to next step. If DC voltage is less than 10 volts, C3 is open. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

9) With ignition off and coil disconnected, disconnect coil pack from coil tee. Leave ICM diagnostic cable connected to vehicle harness connector. Set DVOM on 20-volt DC scale. With KOEO, measure voltage between C1C (3) and BAT- (7) at BOB. If voltage is less than .5 volt, go to next step. If voltage is .5 volt or more, go to step 21).

10) With KOEO and coil disconnected, measure voltage at BOB between C2C (6) and BAT- (7). If DC voltage is less than .5 volt, go to next step. If DC voltage is .5 volt or more, go to step 22).

11) With KOEO and coil disconnected, measure voltage at BOB between C3C (10) and BAT- (7). If DC voltage is less than 10.5 volts, go to next step. If DC voltage is 10.5 volts or more, go to step 23).

12) With coil disconnected, connect ICM diagnostic cable positive lead to battery. Connect incandescent test light between C1C (3) and BAT+ (1). Crank engine. If test light blinks consistently and brightly (one blink per engine revolution), go to next step. If test light does not blink consistently and brightly, C1 is open in ICM module. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

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13) With coil disconnected, connect incandescent test light between C2C (6) and BAT+ (1). Crank engine. If test light blinks consistently and brightly (one blink per engine revolution), go to next step. If test light does not blink consistently and brightly, C2 is open in ICM module. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

14) With coil disconnected, connect incandescent test light between C3C (10) and BAT+ (1). Crank engine. If test light blinks consistently and brightly (one blink per engine revolution), input to coil pack is okay and no high voltage output is present. Replace coil pack. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article. If test light does not blink consistently and brightly, C3 is open in ICM module. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

15) With ignition off and coil disconnected, set DVOM on 20-k/ohm scale. Disconnect coil from coil tee, leave ICM diagnostic cable connected to vehicle harness connector. Measure voltage at BOB between C1C (3) and BAT- (7). If resistance is less than 2 k/ohms, go to next step. If resistance is 2 k/ohms or more, C1 is open in coil. Replace coil pack. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

16) With ignition off and ICM module and coil disconnected, disconnect ICM module from vehicle harness connector. Set DVOM on 20-k/ohm scale. Measure voltage between C1C (3) and BAT- (7) at BOB. If resistance is less than 10-k/ohms, C1 is shorted low. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article. If resistance is 10-k/ohms or more, C1 is shorted low. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

17) With ignition off and coil disconnected, set DVOM on 20-k/ohm scale. Disconnect coil from coil tee, leave ICM diagnostic cable connected to vehicle harness connector. Measure resistance between C2C (6) and BAT- (7) at BOB. If resistance is less than 2k/ohms, go to next step. If resistance is 2 k/ohms or more, C2 is open in coil. Replace coil pack. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

18) With ignition off and ICM module and coil disconnected, disconnect ICM module from vehicle harness connector. Set DVOM on 20-k/ohm scale. Measure resistance between C2C (6) and BAT- (7) at BOB. If resistance is less than 10 k/ohms, C2 is shorted low. Check connections and/or repair open circuit or replace harness. Remove test

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equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in SELF-DIAGNOSTICS - NAVAJO article. If resistance is 10 k/ohms or more, C2 is shorted low. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

19) With ignition off and coil disconnected, set DVOM on 20-k/ohm scale. Disconnect coil from coil tee, leave ICM diagnostic cable connected to vehicle harness connector. Measure resistance between C3C (10) and BAT- (7) at BOB. If resistance is less than 2 k/ohms, go to next step. If resistance is 2 k/ohms or more, C3 is open in coil. Replace coil pack. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

20) With ignition off and ICM module and coil disconnected, disconnect ICM module from vehicle harness connector. Set DVOM on 20-k/ohm scale. Measure resistance between C3C (10) and BAT- (7) at BOB. If resistance is less than 10 k/ohms, C3 is shorted low. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article. If resistance is 10 k/ohms or more, C3 is shorted low. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

21) With ignition off and ICM module and coil disconnected, disconnect ICM module from ICM module tee. Leave ICM diagnostic cable connected to vehicle harness connector. Set DVOM on 20-volt DC scale. With KOEO, measure voltage between C1C (3) and BAT- (7) at BOB. If DC voltage is .5 volt or more, C1 is shorted high. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article. If DC voltage is less than .5 volt, C1 is shorted high. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article.

22) With ignition off and ICM module and coil disconnected, disconnect ICM module from ICM module tee. Leave ICM diagnostic cable connected to vehicle harness connector. Set DVOM on 20-volt DC scale. With KOEO, measure voltage between C2C (6) and BAT- (7) at BOB. If DC voltage is .5 volt or more, C2 is shorted high. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article. If DC voltage is less than .5 volt, C2 is shorted high. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

23) With ignition off and ICM module and coil disconnected, disconnect ICM module from ICM module tee. Leave ICM diagnostic cable

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connected to vehicle harness connector. Set DVOM on 20-volt DC scale. With KOEO, measure voltage between C3C (10) and BAT- (7) at BOB. If DC voltage is .5 volt or more, C3 is shorted high. Check connections and/or repair open circuit or replace harness. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article. If DC voltage is less than .5 volt, C3 is shorted high. Replace ICM module. Remove test equipment, and reconnect all components. Clear continuous memory codes, and rerun QUICK TEST. See QUICK TEST in G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

EMISSION SYSTEMS & SUB-SYSTEMS

AIR INJECTION (RX7)

System Inspection

1) Warm engine to normal operating temperature. Disconnect electrical connector from switching valve solenoid. Using jumper wires, energize solenoid.

2) If engine idles rough, air control valve and switching valve solenoid are okay. See Fig. 58. If engine does not idle rough, check vacuum routing, switching valve solenoid, air pump and air control valve.

Air Control Valve

1) Remove air control valve. Apply about 15 in. Hg to switching valve port. See Fig. 59. Ensure switching valve opens. If switching valve does not open, replace air control valve.

2) Apply about 19 in. Hg to air relief valve port. See Fig. 60. Ensure air relief valve opens. If air relief valve does not open, replace air control valve.

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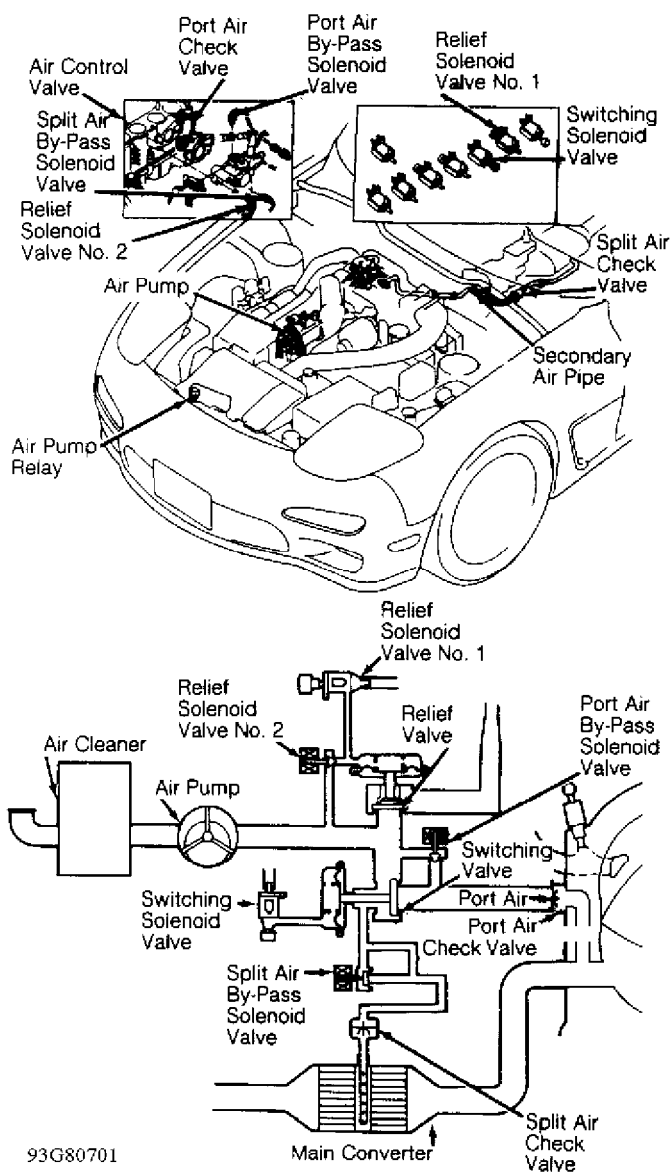


Fig. 58: View Of Air Injection System (RX7)
Courtesy of Mazda Motors Corp.

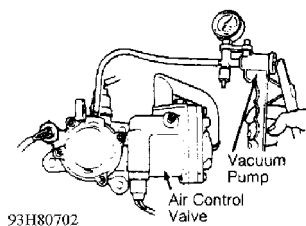


Fig. 59: Testing Switching Valve (RX7)
Courtesy of Mazda Motors Corp.

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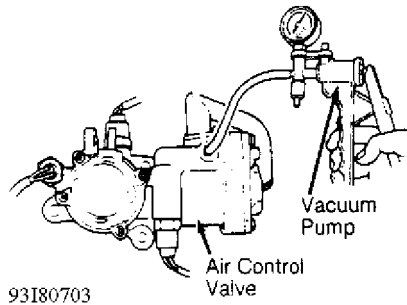


Fig. 60: Testing Air Relief Valve (RX7)
Courtesy of Mazda Motors Corp.

Air Pump

1) Install a "T" fitting into hose between air pump and air control valve. Connect a pressure gauge to fitting. Start engine. Pressure gauge should show at least .7 psi (.05 kg/cm²) coming from air pump. If pressure is less than specified, replace air pump.

2) Increase engine speed to 3250 RPM and verify air pump magnetic clutch disengages. If air pump magnetic clutch does not disengage, disconnect electrical connector from air pump. Air pump magnetic clutch should disengage.

3) If air pump is still engaged, replace air pump. If air pump magnetic clutch disengaged when electrical connector was disconnected, check air pump relay (located in front engine compartment relay box).

Air Relief Valve

1) Warm engine to normal operating temperature. Disconnect hose from air relief valve. Ensure no air flows from hose. If air does flow, air relief valve may be stuck open.

2) Disconnect electrical connector from relief valve solenoid No. 1. Using jumper wires, energize solenoid. If air flows from air relief valve, air relief valve and relief valve solenoid No. 1 are okay. See Fig. 58. If air does not flow, check vacuum routing, relief valve solenoid No. 1, air pump and air control valve.

Control Solenoids

Disconnect electrical connector from each solenoid. See Fig. 58. Using jumper wires, energize solenoid. Ensure each solenoid clicks. Measure resistance across solenoid terminals. Resistance should be 26-33 ohms at room temperature. If any solenoid does not test as described, replace solenoid.

Port Air & Split Air Check Valves

1) Operate engine at idle. Disconnect hose between air pump and air control valve. See Fig. 58. Ensure exhaust gas is not leaking from port air check valve. If exhaust gas is leaking, replace air control valve.

2) Disconnect hose from split air check valve. See Fig. 58. Increase engine speed to 2000 RPM and verify exhaust gas is not

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leaking from split air check valve. If valve is not working correctly, replace split air check valve.

DECELERATION CONTROL SYSTEM

NOTE: Deceleration control system is a function of dashpot and ECU. Dashpot prevents sudden closure of throttle valve. ECU controls fuel cut during deceleration. For adjustment and testing, see D - ADJUSTMENTS article.

EXHAUST GAS RECIRCULATION (EGR) (MX-3 DOHC, MX-6, RX7, 626 & 929)

System Check (MX-3 DOHC, MX-6 2.5L, 626 2.5L & 929)

1) Connect Engine Signal Monitor (49-9200-162) and Test Harness (49 G018 903) to ECU. Start engine. Increase engine speed, and check voltage at ECU terminals 30 and 3P while engine is cold. See PIN VOLTAGE CHARTS article. Voltage should be 12 volts.

2) Warm engine to operating temperature, and operate it at idle. Increase engine speed, and ensure engine signal monitor Green and Red lights flash at ECU terminals 30 and 3P.

3) Disconnect EGR solenoid valve (vacuum side) electrical connector. Apply 12 volts and a ground to solenoid valve. Ensure engine runs rough or stalls at idle. Test EGR components as necessary. See Fig. 61 or 63.

System Check (MX-6 2.0L & 626 2.0L)

Check all connectors and hose routings. Check for cracks, leakage and restrictions, and repair as necessary. Start engine, and ensure diaphragm of EGR control valve does not move while engine is cold. Warm engine to operating temperature and operate at idle. Increase engine speed to about 2000 RPM, and ensure diaphragm of EGR control valve moves. If no movement is detected, test EGR components as necessary. See Fig. 62.

System Check (RX7)

Check all connectors and hose routings. Check for cracks, leakage and restrictions, and repair as necessary. Start engine, and ensure diaphragm of EGR control valve does not move while engine is cold. Warm engine to operating temperature and allow it to idle. Ground Blue/Yellow wire at EGR solenoid. Ensure EGR control valve moves and engine idles rough or stalls. If no movement occurs or engine idles smooth, test EGR components as necessary.

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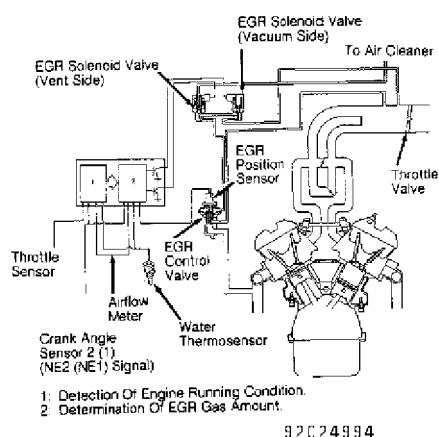


Fig. 61: EGR System Component ID (MX-3 DOHC, MX-6 2.5L & 626 2.5L)
Courtesy of Mazda Motors Corp.

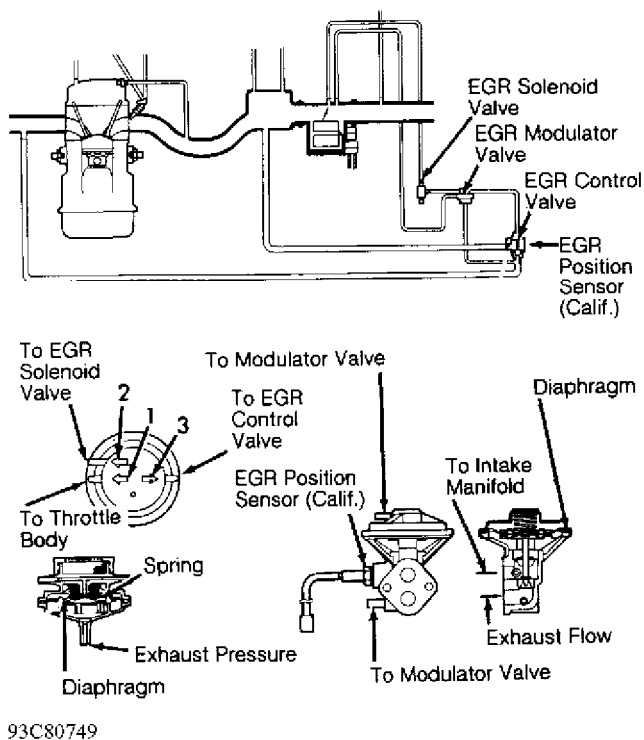


Fig. 62: EGR System Component ID (MX-6 2.0L & 626 2.0L)
Courtesy of Mazda Motors Corp.

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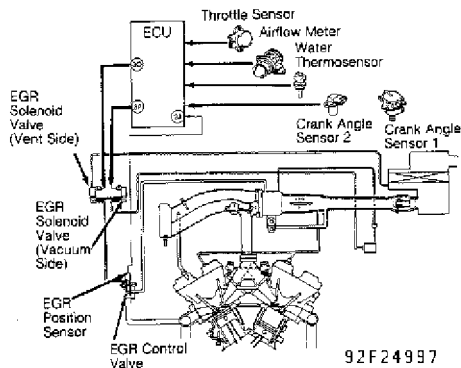


Fig. 63: EGR System Component ID (929)
Courtesy of Mazda Motors Corp.

EGR Control Valve

Bring engine to normal operating temperature and operate at idle. Disconnect and plug vacuum hose at EGR control valve. Engine should run smoothly. Connect vacuum pump to EGR control valve, and apply vacuum. See EGR CONTROL VALVE OPERATING VACUUM table. Engine should run rough or stall. If engine does not operate as specified, clean or replace EGR control valve.

EGR CONTROL VALVE OPERATING VACUUM TABLE

Application	Vacuum
MX-3 DOHC	1.6-2.4 in. Hg
MX-6 2.0L & 626 2.0L	6 in. Hg
MX-6 2.5L & 626 2.5L	1.6-2.4 in. Hg
RX7	3.3-4.5 in. Hg
929	1.6-2.4 in. Hg

EGR Modulator Valve (MX-6 2.0L & 626 2.0L)

Remove EGR modulator valve. Plug port No. 3, and connect a vacuum pump to port No. 1. See Figs. 56 and 58. Blow into exhaust gas port. Operate vacuum pump and verify vacuum is held. Release exhaust port and verify vacuum is released. Replace EGR modulator valve if it does not test as described.

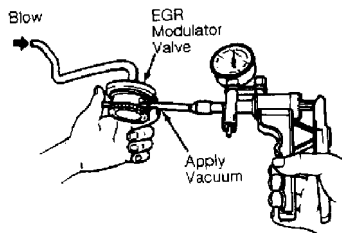


Fig. 64: Testing EGR Modulator Valve (MX-6 2.0L & 626 2.0L)
Courtesy of Mazda Motors Corp.

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EGR Position Sensor (MX-3 DOHC)

1) Disconnect ECU electrical connector. Connect Engine Signal Monitor (49-9200-162) and Test Harness (49 G018 903) to ECU. Connect vacuum pump to EGR control valve. Turn ignition on. Check voltage at ECU connector terminals. See EGR POSITION SENSOR VOLTAGE table.

2) If voltage is not correct at terminals "A" and "B", check wiring harness and connection at ECU connector terminals 2J and 3D. If voltage is not correct at terminal "C", check sensor resistance, wiring harness and ECU connector terminal 2I.

3) Disconnect EGR position sensor electrical connector. Connect ohmmeter to EGR position sensor. Disconnect vacuum hose from EGR control valve. Connect vacuum pump to EGR control valve.

4) Check sensor resistance between indicated terminals. See EGR POSITION SENSOR RESISTANCE table. If resistance is not within specifications, replace sensor.

EGR Position Sensor (MX-6 2.0L & 626 2.0L)

Disconnect EGR position sensor electrical connector. Check resistance across terminals. See Fig. 65. At room temperature, resistance should be 182-336 ohms. If resistance is not as specified, replace EGR control valve.

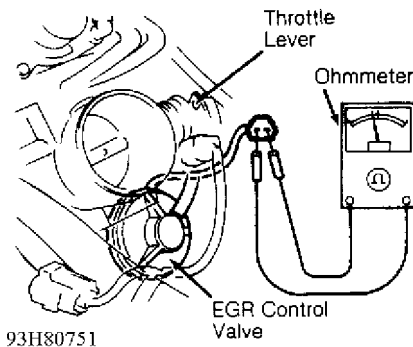


Fig. 65: Testing EGR Position Sensor (MX-6 2.0L & 626 2.0L)
Courtesy of Mazda Motors Corp.

EGR Position Sensor (MX-6 2.5L & 626 2.5L)

1) Disconnect ECU electrical connector. Connect Engine Signal Monitor (49-9200-162) and Test Harness (49 G018 903) between ECU and wiring harness. Disconnect vacuum hose from EGR control valve. Connect vacuum pump to EGR control valve.

2) Turn ignition on. Check voltage at adapter harness connector terminals. See Fig. 66. See EGR POSITION SENSOR VOLTAGE table.

3) If voltage is not correct at terminals "A" and "B", check wiring harness and connection at ECU connector terminals 2J and 3C. If voltage is not correct at terminal "C", check sensor resistance, wiring harness and ECU connector terminal 2I.

4) Disconnect EGR position sensor electrical connector. Disconnect vacuum hose from EGR control valve. Apply vacuum to EGR control valve.

[illegible]

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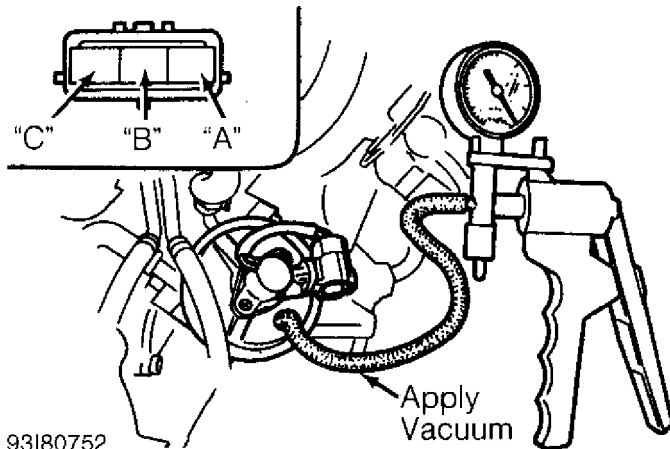


Fig. 66: Testing EGR Position Sensor (MX-6 2.5L & 626 2.5L)
Courtesy of Mazda Motors Corp.

EGR Solenoid Valve (MX-3 DOHC, MX-6 2.5L, 626 2.5L & 929)

1) Disconnect vacuum hoses. Blow air through vacuum hose (vacuum side). Ensure air does not flow. Disconnect EGR solenoid valve (vacuum side) electrical connector. Apply 12 volts and a ground to solenoid valve (vacuum side) terminals. See Fig. 67. Blow air through vacuum hose and ensure air flows.

2) Blow air through vacuum hose (vent side). Ensure air flows. Disconnect EGR solenoid valve (vent side) electrical connector. Apply 12 volts and a ground to solenoid valve (vent side) terminals. See Fig. 67. Blow air through vacuum hose and ensure air does not flow. Replace solenoid valves as necessary.

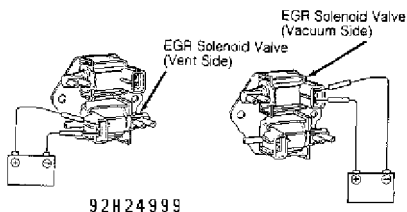


Fig. 67: Testing EGR Solenoid Valves (MX-3 DOHC Shown; MX-6 2.5L, 626 2.5L & 929 Similar)
Courtesy of Mazda Motors Corp.

EXHAUST GAS RECIRCULATION (EGR) (NAVAJO - CALIFORNIA)

System Check

1) Check all connectors and hose routings. Check for cracks, leakage and restrictions, and repair as necessary. Start engine, and ensure diaphragm of EGR control valve does not move while engine is cold. Warm engine to operating temperature and allow it to idle.

2) Disconnect vacuum hose at EGR control valve. See Fig. 68. Ensure less than 1 in. Hg is present. If specified amount of vacuum is present, check EGR control valve. If specified amount of vacuum is not present, test EGR components as necessary.

NOTE: Most EGR problems should set a trouble code in computer

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Purge system operation takes place when vehicle is accelerating in gear (off idle), engine is at operating temperature and oxygen sensor is functioning normally. See Fig. 69.

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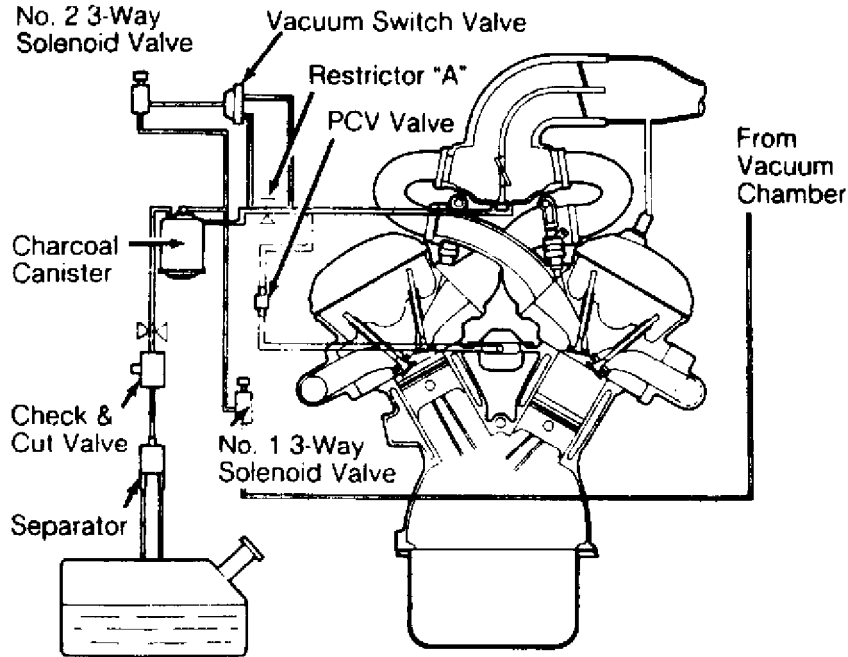


Fig. 69: Identifying Fuel Evaporation Control System Components
Courtesy of Mazda Motors Corp.

Charcoal Canister

Check for loose, missing, cracked and broken connections and parts. Repair or replace as necessary. No liquid should exist in canister.

1-Way Check Valve (B2200, B2600i & MPV)

Note direction of valve installation. Remove check valve. Blow air into both ends of valve. Air should flow through valve from charcoal canister side but should not flow from airflow meter side (beveled end). Replace valve as necessary.

2-Way Check Valve (All Except B2200, B2600i & MPV)

Remove check valve. Connect a vacuum pump to one end of check valve. Air should flow with about 1-1.7 in. Hg applied. Connect vacuum pump to other end of check valve. Air should also flow with about 1-1.7 in. Hg applied. Replace valve as necessary.

3-Port Check Valve (Miata A/T & 929)

Note direction of valve installation. Remove check valve. Cap port going to 2-way check valve. Connect a vacuum pump to lower port. Air should flow from port going to fuel tank with 3.0 in. Hg applied. Replace valve as necessary.

Check & Cut Valve (B2200, B2600i, MPV, MX-3, Protege & 323)

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1) Remove check and cut valve. Connect pressure gauge with "T" fitting to check and cut valve nipple leading to fuel tank. Cap opposite nipple. See Fig. 70.

2) Blow air through port "A". On MX-3, Protege and 323, valve should open when pressure gauge indicates 0.92-1.20 psi (.065-.085 kg/cm²). On all other models, valve should open when pressure gauge reads 0.78-1.00 psi (.06-.07 kg/cm²). Remove "T" fitting and pressure gauge. Connect "T" fitting to bottom of valve. Blow air through port "B". When pressure gauge reads .14-.71 psi (.01-.05 kg/cm²), valve should open. Replace cut and check valve as necessary.

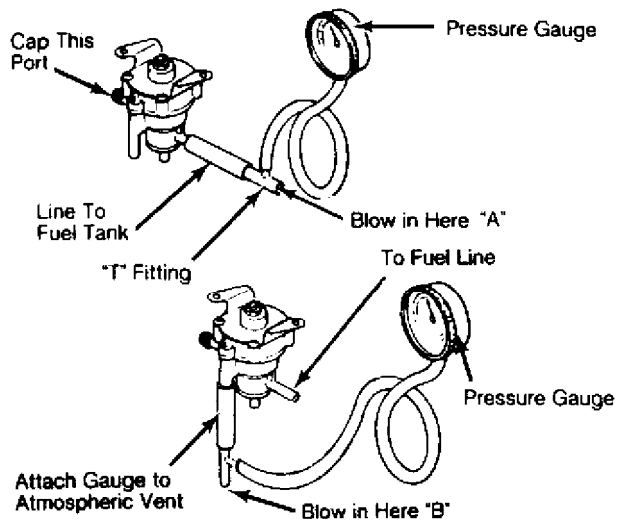


Fig. 70: Testing Check & Cut Valve
Courtesy of Mazda Motors Corp.

Fuel Vapor Valve (B2200, B2600i, Miata, MX-6, RX7, 626 & 929)

Remove fuel vapor valve. Blow air into upper port of valve. Air should flow through valve to lower port. Turn valve upside down. Blow air through lower port of valve. Air should not flow. Replace valve as necessary.

Purge Control Solenoid Valve

1) Warm engine to normal operating temperature and operate at idle. Disconnect vacuum hoses from solenoid valve. Ensure vacuum is not present at solenoid valve. Disconnect vacuum hoses from charcoal canister.

2) Ensure air does not flow through solenoid valve. If air flows through solenoid valve, disconnect solenoid valve connector.

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Connect 12 volts and a ground to solenoid valve terminals. See Fig. 71. Blow air through check valve. Air should flow through valve. Replace valve as necessary.

Separator

Check for loose, missing, cracked and broken connections and parts. Repair or replace as necessary. No liquid should exist in canister.

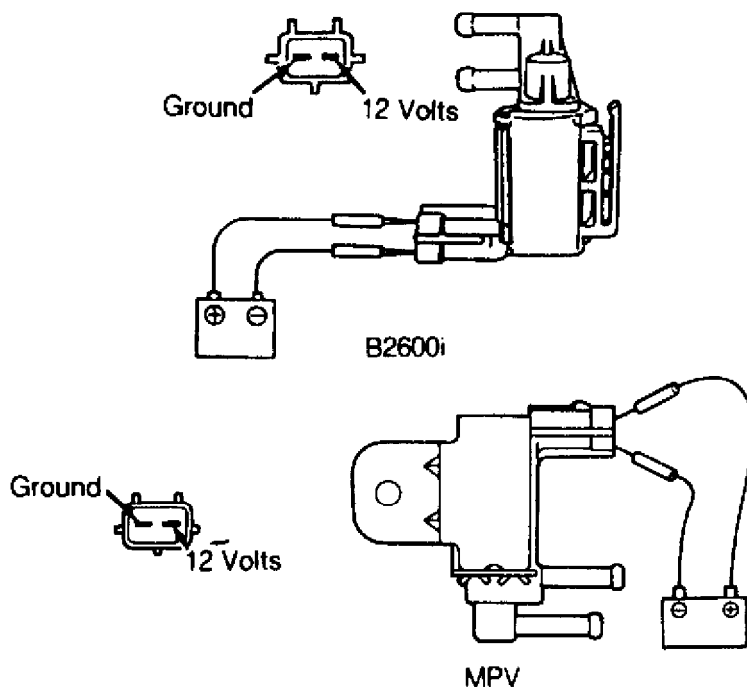


Fig. 71: Testing Purge Control Solenoid Valve
Courtesy of Mazda Motors Corp.

FUEL EVAPORATION (NAVAJO)

Canister Purge (CANP) Solenoid

1) Disconnect CANP solenoid harness connector. Set DVOM to 200-ohm scale. Measure resistance across CANP solenoid terminals. Resistance should be 40-90 ohms. If resistance is not as specified, replace CANP solenoid.

2) Disconnect vacuum hose at CANP solenoid on manifold vacuum side. Apply 16 in. Hg to manifold vacuum side of solenoid. CANP solenoid should hold vacuum for 20 seconds. Using jumper wires, energize CANP solenoid. Vacuum should flow through solenoid. If CANP solenoid does not test as described, replace solenoid.

3) Faults in CANP solenoid or circuit should set a service code. See QUICK TEST in G - TESTS W/CODES article. If no service code has been set, see CIRCUIT TEST KD in G - TESTS W/CODES article for

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additional solenoid and circuit testing.

EVAP Canister

Check for loose, missing, cracked and broken connections and parts. Repair or replace as necessary. No liquid should exist in canister.

POSITIVE CRANKCASE VENTILATION (PCV)

System Inspection

1) Warm engine to normal operating temperature, and operate it at idle. Disconnect Positive Crankcase Ventilation (PCV) valve, together with vent hose, from valve cover. Block PCV valve opening and check for vacuum. If no vacuum is felt, check for collapsed line and blockage.

2) Note direction of valve installation. Remove PCV valve. Blow air into upper port of valve. Air should flow through valve from lower port. Blow air through lower port of valve. Air should not flow from upper port. Replace valve as necessary.

THERMOSTATIC AIR CLEANER (TAC) (NAVAJO)

Air Cleaner Temperature Sensor

With temperature sensor less than 75°F (24°C), apply 8 in. Hg to source port. Duct door should close. If door does not close, replace sensor.

Air Control Door

When 8 in. Hg or more is applied to vacuum motor, door should stay in appropriate position for as long as vacuum is applied. If vacuum bleeds off and door returns to rest position, replace vacuum motor.

MISCELLANEOUS CONTROLS

A/C CLUTCH

A/C Cut-Off Control System (B2200, B2600i, Miata, MPV, MX-3, MX-6, RX7, 626 & 929)

1) Turn A/C, blower and ignition on. DO NOT start engine. Shift transmission into a drive gear. Open throttle fully. Listen for A/C clutch disengaging and re-engaging after a few seconds. See A/C CUT-OFF TIME SPECIFICATIONS table.

2) If system does not function as specified, check operation of related switches, sensors and relays. See J - PIN VOLTAGE CHARTS article.

A/C CUT-OFF TIME SPECIFICATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Time Before Re-Engagement
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B2200, B2600i, MPV 2.6L, MX-3 DOHC,
MX-6, RX7, 626 & 929 5 Seconds
Miata 16 Seconds
MPV 3.0L & MX-3 SOHC 10 Seconds
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Wide Open Throttle A/C Cut-Out (WAC) & A/C Demand Switch
(Navajo)

Faults in WAC & A/C demand switch or circuit should set a service code. See QUICK TEST in G - TESTS W/CODES article. If no service code has been set, see CIRCUIT TEST KM in G - TESTS W/CODES article in the ENGINE PERFORMANCE section for testing.

ANTI-BACKFIRE

Anti-Afterburn Control (RX7)

Start engine and allow it to idle. Disconnect Idle Speed Control (ISC) connector. Raise engine speed to more than 4000 RPM, and quickly close throttle. Engine should idle rough at 1000-1500 RPM. No other information is available.

EXHAUST CONTROL

Variable Exhaust System (929)

1) With engine idling, ensure exhaust gas comes out of one exhaust pipe. Raise engine speed to 3500 RPM. Exhaust gas should come out of both exhaust pipes.

2) To test control motor, remove inside-rear trunk panel. Disconnect control motor connector. Apply 12 volts to Yellow/Black wire and ground to Blue wire. Control motor should rotate clockwise. Reverse leads and control motor should rotate counterclockwise. If system does not function as specified, check wiring between computer and control motor. See J - PIN VOLTAGE CHARTS article.

END OF ARTICLE