

Service Bulletin

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Category G	Applicable Model/s All Models	Subject DIAGNOSTIC PROCEDURES (See Itemized List Below)	Bulletin No. 002/93 Issued 9/16/93 Revised
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APPLICABLE MODELS

All 1988 model vehicles through 1994 model vehicles except Navajo and 1994 B-Series.

DESCRIPTION

This bulletin contains diagnostic and repair procedures for the following components:

Engine Control Units (ECU)

Air Flow Meters

Fuel Pumps

Alternators

Each procedure includes the following:

1. **Outline Of Diagnostics, Parts Requirements and Warranty Application** - Illustrates the steps from diagnostics through parts return and warranty submission.
2. **Diagnostic Procedures** - Step by step testing of the component and circuit.
3. **Component Check Sheet** - Details of the customer complaint and events leading to the repair.

NOTE: Proper completion of the check sheets are required for warranty claim submission.

NOTE: See page two of this bulletin for an individual component index.

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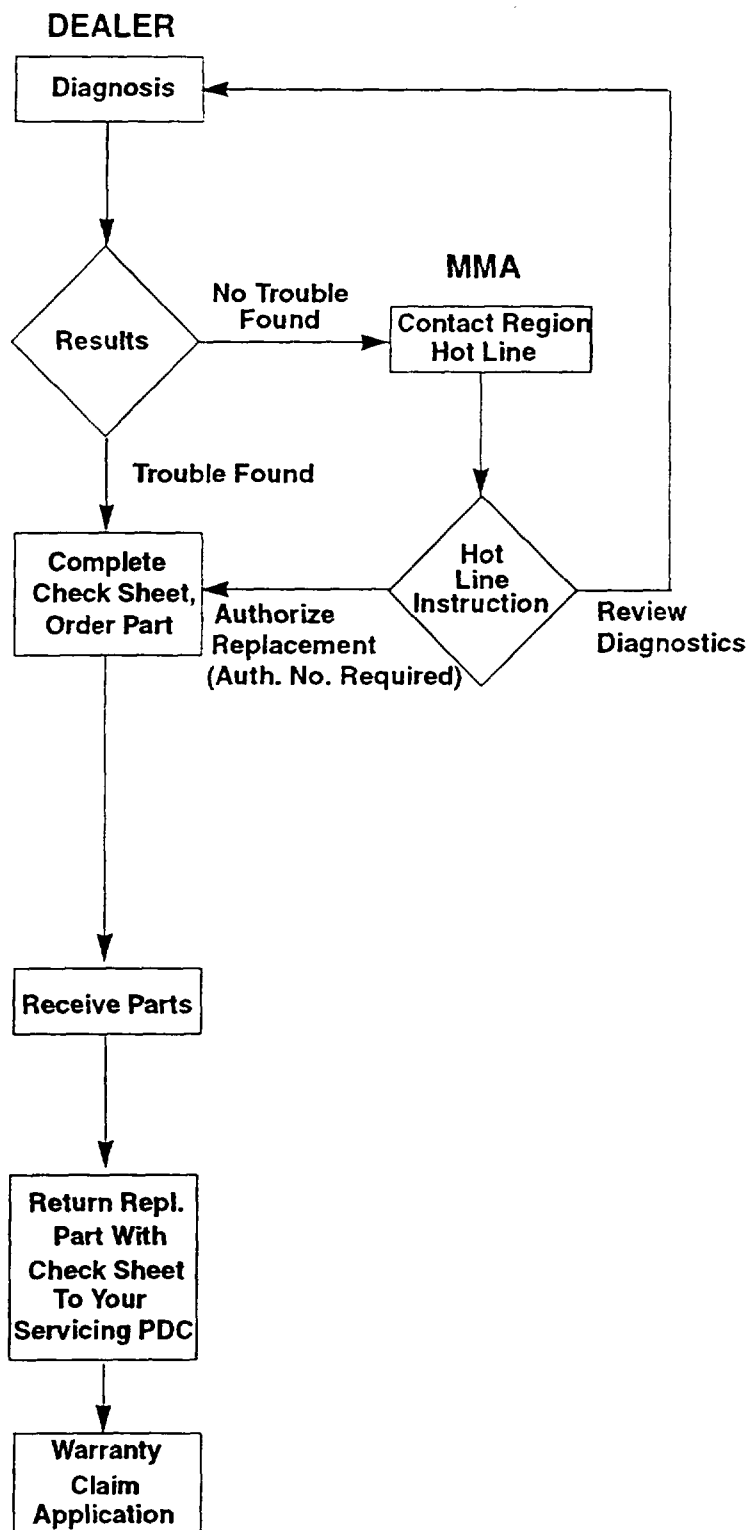
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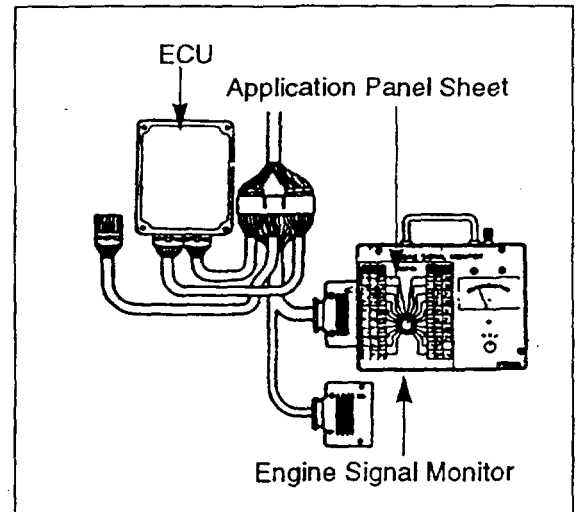
Refer to the applicable workshop manual for symptoms not described in this bulletin. If further reference is required, contact the Technical Hotline in your area.

ECU - OUTLINE OF DIAGNOSTICS, PARTS ORDERING AND WARRANTY APPLICATION



Section 1- ECU DIAGNOSTICS PROCEDURE

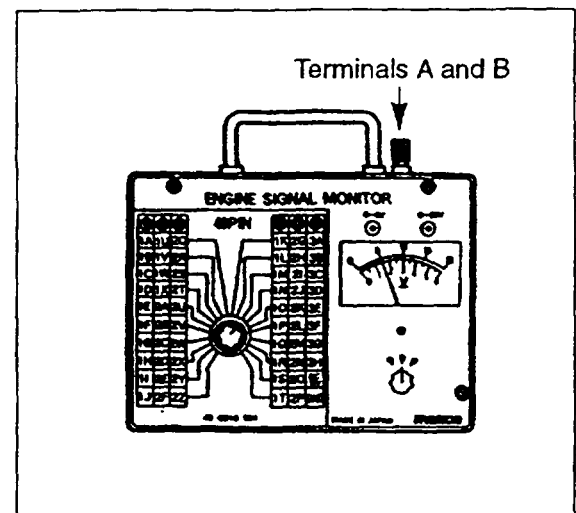
1. Disconnect ECU connectors
2. Connect SST (Engine Signal Monitor and Adapter) as shown. Place application panel sheet on the Engine Signal Monitor.



3. Measure the voltage according to the specifications in the workshop manual.
4. If the voltage is different than specified, check the related input and output devices and wiring for damage. If no problem is found and the reading remains out of specification, replace the ECU.
5. If the voltage is within specification and the problem still exists, contact the Technical Hotline for assistance.

CAUTION: Terminals A&B are for external voltmeter connections. Use these terminal to attach a digital voltmeter or oscilloscope for precise volt readings.

Never apply current to these terminals, damage to the ECU will result.



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ECU CHECK SHEET

Dealer Name _____ Technician Number: _____

Vehicle Year: _____ Model: _____ M/T: _____ A/T: _____ VIN: _____

Repair Date: ____/____/____ Mileage: _____ Repair Order Number: _____

1. Customer Complaint: _____

2. Was the customer's complaint verified: _____ Yes _____ No

3. Reason for replacement:

Terminal Voltage Out Of Specification: _____ Yes _____ No

Terminal Number	Voltage Reading	Factory Specifications

According to Service Bulletin instructions: _____ Category _____ Number

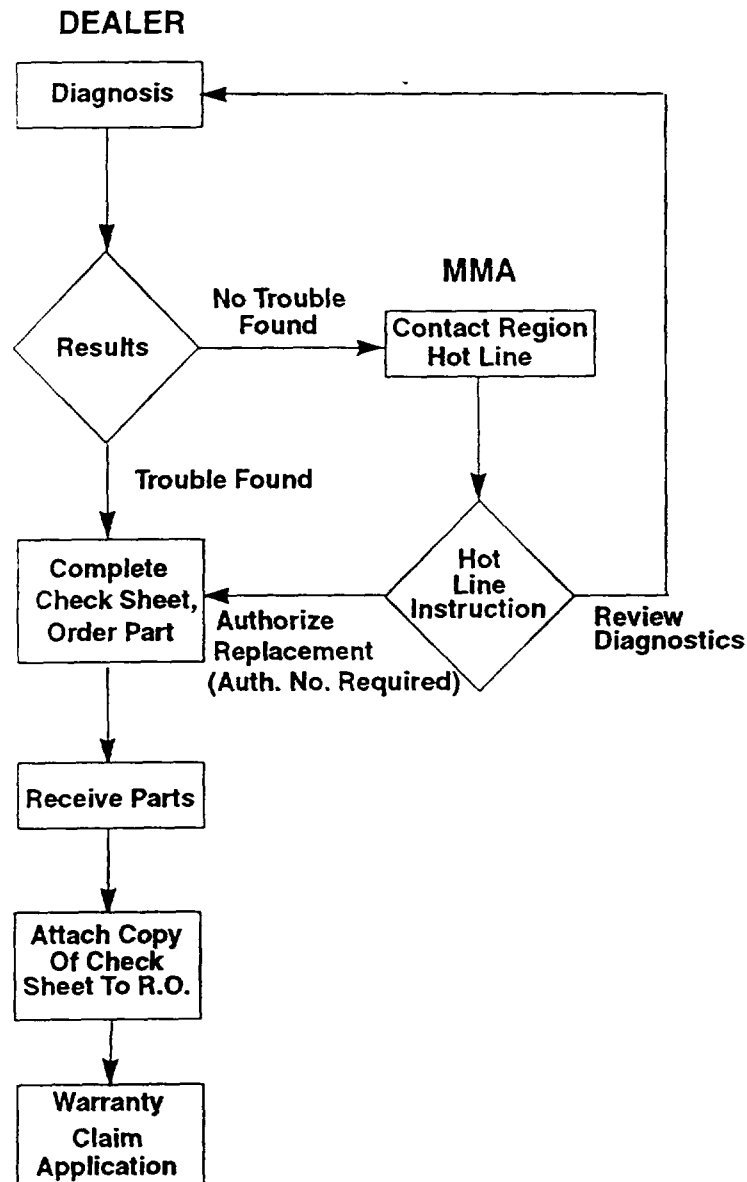
According to DSM or Hot Line Authorization: _____ (Authorization Number)

Other: _____

4. Repair Type: _____ Warranty _____ Customer Pay

Technician's Signature: _____ Date: ____/____/____

NOTE: This check sheet must be returned with the replaced part to your servicing PDC

AIR FLOW METER - OUTLINE OF DIAGNOSTICS, PARTS ORDERING AND WARRANTY APPLICATION

Section 2 - AIR FLOW METER DIAGNOSTIC PROCEDURES

NOTE: Procedures listed below do not apply to the following model/year vehicles:

1988 - 92 B2600

1989 - 90 RX-7 (up to and including vehicles with a VIN of JM1FC3***L0806489

1993 RX-7

1. Check the air intake temperature sensor resistance.

- Remove air flow meter and allow to sit until its temperature is the same as the ambient temperature.
- Using a multi tester, measure and record the resistance of the intake air temperature sensor terminals (THAA-E2) and the atmospheric temperature at that time.

NOTE: Use a multi tester with an accuracy equivalent of the FLUK 70 series.

CAUTION: Refer to the illustration at the right and the "Standard Values" table when measuring resistance.

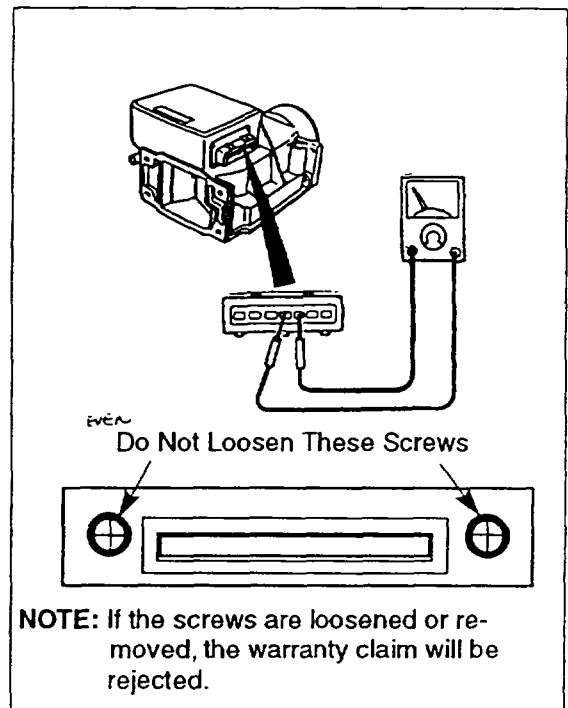
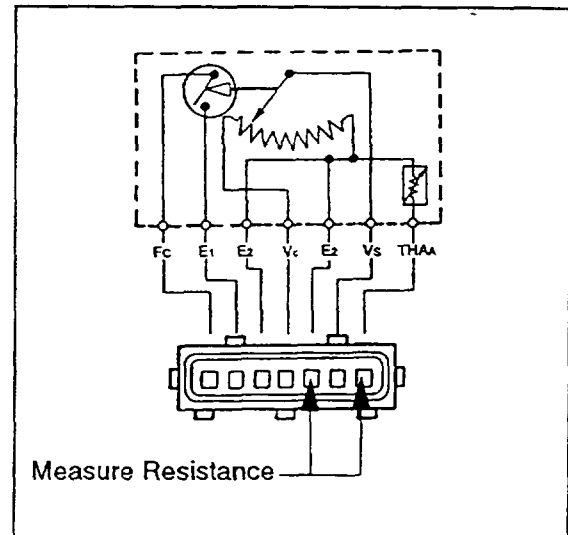
Standard Values

Ambient Temp. (F)	Resistance (K, Ohms)	Ambient Temp. (F)	Resistance (K, Ohms)
0	11.1 - 18.7	70	1.9 - 2.9
10	8.2 - 13.7	80	1.5 - 2.3
20	6.4 - 10.3	90	1.2 - 1.9
30	4.9 - 7.9	100	0.9 - 1.5
40	3.8 - 6.0	110	0.8 - 1.3
50	3.0 - 4.7	120	0.6 - 1.1
60	2.4 - 3.7		

2. Check resistance between E2 and Vc.

2. Standard Value= 200 - 400 ohms

NOTE: Use a multi-tester with the accuracy equivalent of a FLUK 70 Series.

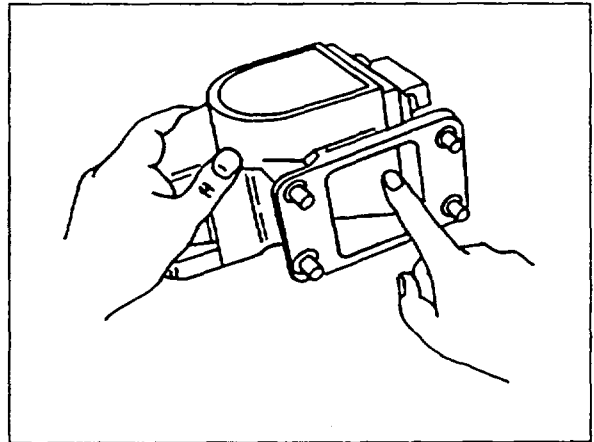


Section 2 - AIR FLOW METER DIAGNOSTIC PROCEDURES CONT'D.

NOTE: The following models have air flow meters with measuring plates and should be diagnosed using the method listed below:

1986 - 89 323**1990 - 93 323/Protege****1990 - 92 626/MX-6****1990 - 91 929****1988 - 93 MPV****1990 - 93 MX-5****1993 MX-3 (1.6 Litre)**

1. Check for smooth movement of the measuring plate.
If no problem is found, reinstall the air flow meter.
2. If no problem is found in the air flow meter, contact the Technical Hotline for assistance.



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AIR FLOW METER CHECK SHEET

Dealer Name _____ Technician Number: _____

Vehicle Year: _____ Model: _____ M/T: _____ A/T: _____ VIN: _____

Repair Date: ____/____/____ Mileage: _____ Repair Order Number: _____

1. Customer Complaint: _____

2. Was the customer's complaint verified: ____ Yes ____ No

3. Reason for replacement:

Air Flow Meter Out Of Specification: ____ Yes ____ No

	Measurement	Factory Specifications
Intake Air Temperature Sensor		
Base Resistance (E2-VC)		

Measuring Plate Does Not Move Smoothly ____ Yes ____ No

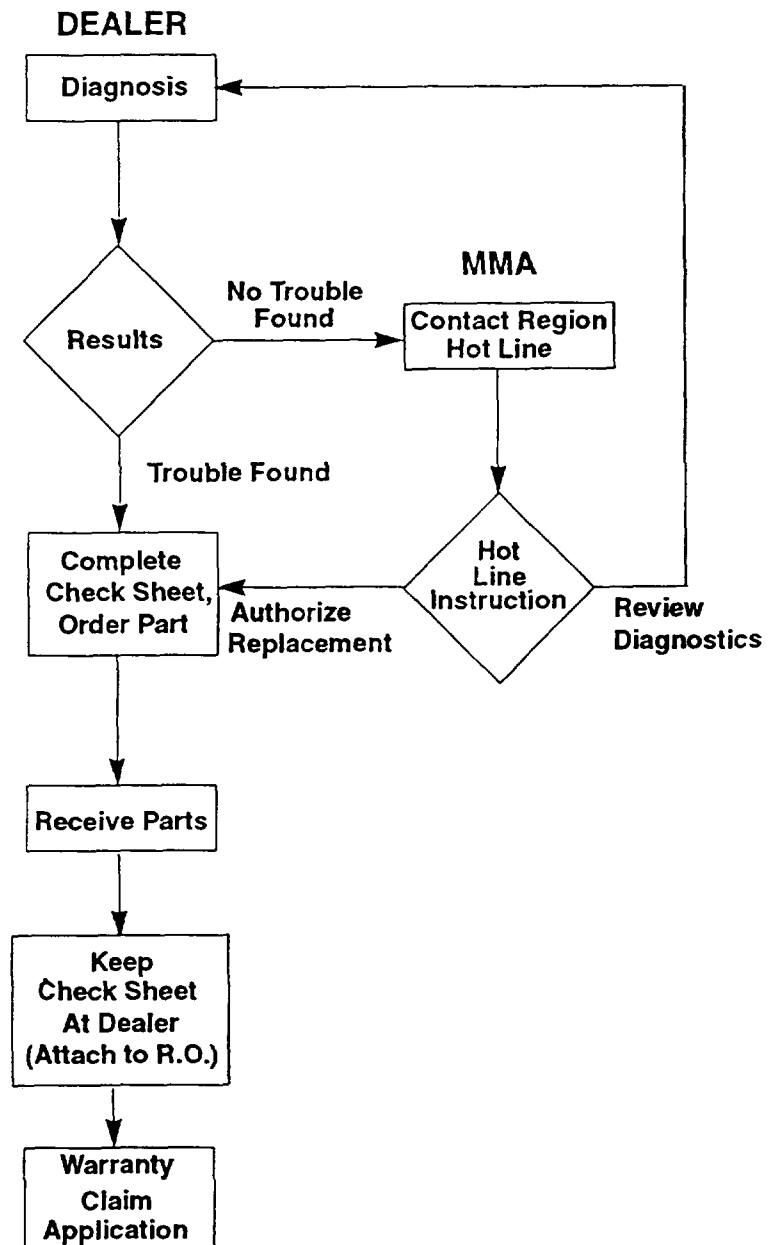
According to Service Bulletin instructions: ____ Category ____ Number

According to DSM or Hot Line Authorization: _____ (Authorization Number)

Other: _____

Technician's Signature: _____ Date: ____/____/____

NOTE: Attach the check sheet to the repair order. If requested to return the failed air flow meter to Mazda, attach a copy of the check sheet and repair order.

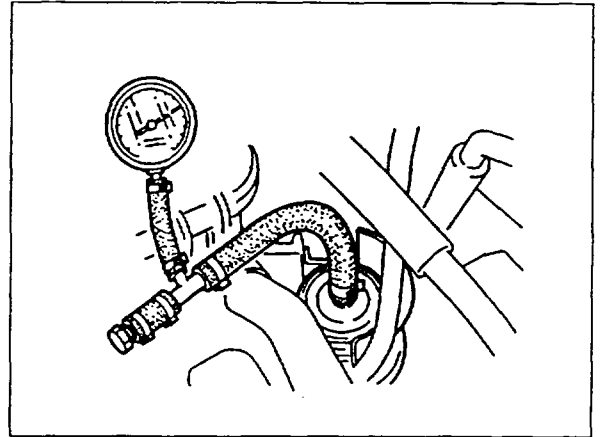
FUEL PUMP - OUTLINE OF DIAGNOSTICS, PARTS ORDERING AND WARRANTY APPLICATION

Section 3 - FUEL PUMP DIAGNOSTIC PROCEDURES

1. Disconnect negative terminal and check battery voltage. Voltage should be 12.4V or more. Reconnect terminal.
2. Start engine and run at idle.
3. Disconnect circuit opening relay. Engine will continue to run until all fuel in the supply line is used.

WARNING: Step 3 is designed to eliminate fuel in the supply line and enable safe installation of the fuel pressure gauge. Refer to the workshop manual for further instructions.

4. Disconnect the negative battery terminal.
5. Install the fuel pressure gauge on the outlet side of the fuel filter.
6. Short circuit the fuel pump test terminals (yellow 2 pin connector with a jumper wire on the following vehicles.



1988 - 89 323

1993 - 626/MX-6

1990 - 91 929

1989 - 92 MPV

1989 - 91 RX-7

7. Short circuit the fuel pump check terminal and the ground terminal of the diagnostic connector with a jumper wire on the following vehicles.

1990 - 93 323/Protege

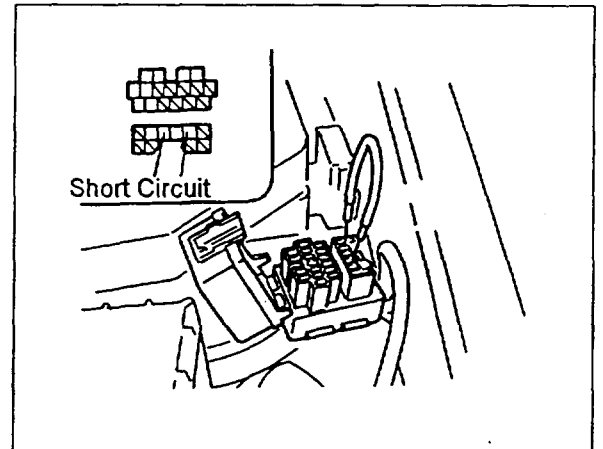
1993 626/MX-6

1992 - 93 929

1992 - 93 MX-3

1990 - 93 MX-5

1993 RX-7



8. Turn the ignition switch on and measure the maximum fuel pressure. Turn the ignition switch off and remove the jumper wires.

Year/Model	Standard Value (PSI)
1988-89 323, 1990-91 323/Protege, 1990-92 626/MX-6, 1990-91 929, MPV (All)	49 or Over
1992-93 323/Protege, 1992-93 929, 1993 626/MX-6, MX-3 (All), MX-5 (All)	52 or Over
1989-91 RX-7	56 or Over
1993 RX-7	53 or Over

FUEL PUMP DIAGNOSTIC PROCEDURES CONT'D.

9. If the value of fuel pressure (Max.) is below standard, measure the voltage at the fuel pump connector (vehicle side) using the procedures below.

- a) Reinstall the jumper wire and turn the Ignition on. Refer to steps 6 and 7 of the previous page.
- b) Connect test leads to the fuel pump positive and negative terminals and measure the voltage at the fuel pump connector (vehicle side).

NOTE: Do not disconnect the fuel pump connector.

If the voltage is above the standard value, replace the fuel pump.

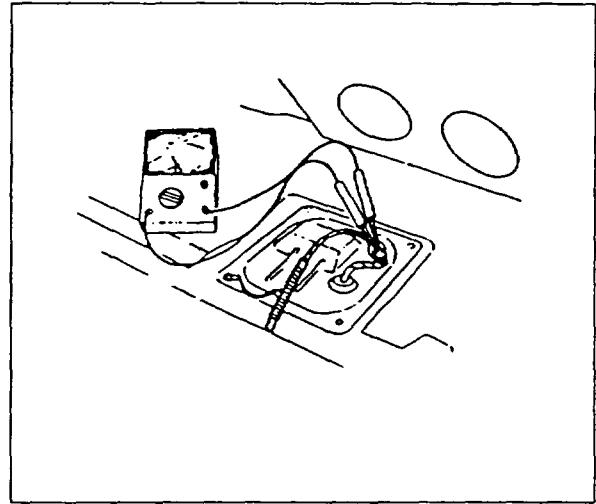
If the voltage is below standard, check for a damaged harness, relay or a poor ground at the pump.

Standard Value: 8.5V and over (93 RX-7)

9.5V and over (Other Models)

10. After restoring the standard voltage value, measure the fuel pump pressure (Max.). If pressure is not to specification, replace the fuel pump.

11. If no trouble is found with the fuel pump and the problem still exists, contact the Technical Hotline for assistance.



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FUEL PUMP CHECK SHEET

Dealer Name _____ Technician Number: _____

Vehicle Year: _____ Model: _____ M/T: _____ A/T: _____ VIN: _____

Repair Date: ____/____/____ Mileage: _____ Repair Order Number: _____

1. Customer Complaint: _____

2. Was the customer's complaint verified: ____ Yes ____ No

3. Reason for replacement:

Fuel Pump Did Not Operate: ____ Yes ____ No

Insufficient Fuel Pressure: ____ Yes ____ No

Maximum Fuel Pump Pressure: _____ (PSI) Factory Specification: _____

According to Service Bulletin instructions: _____ Category _____ Number

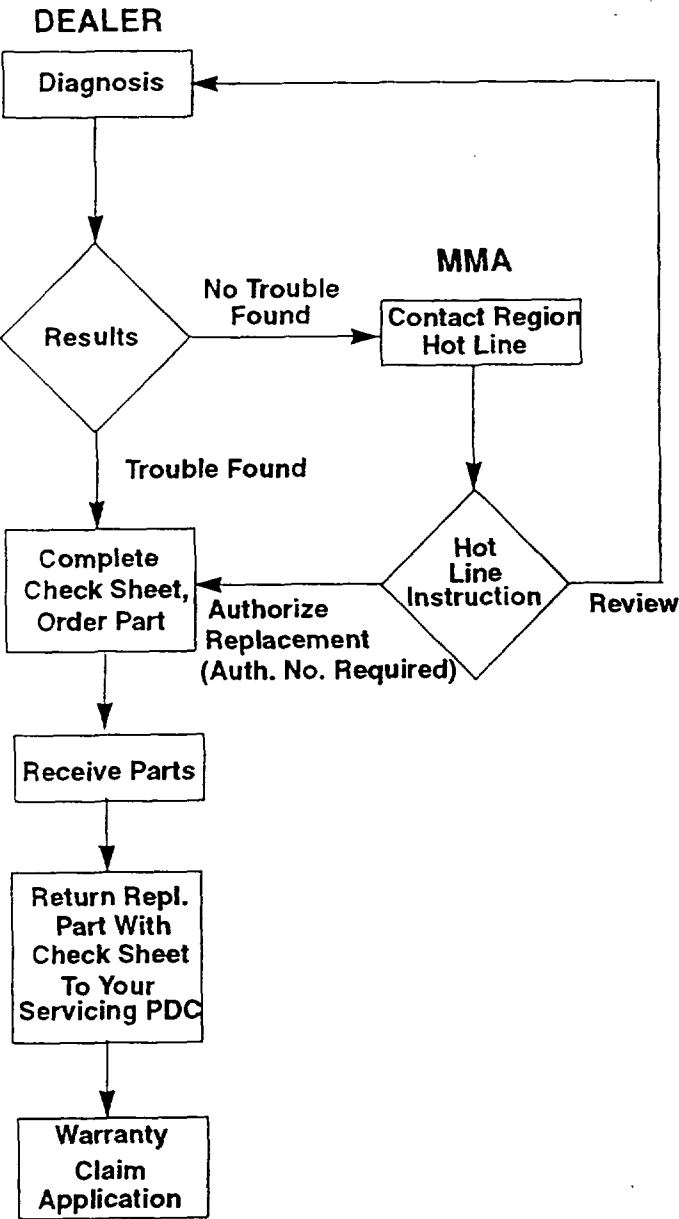
According to DSM or Hot Line Authorization: _____ (Authorization Number)

Other: _____

Technician's Signature: _____ Date: ____/____/____

NOTE: Attach the check sheet to the repair order. If requested to return the failed fuel pump to Mazda, attach a copy of the check sheet and repair order.

CHARGING SYSTEM - OUTLINE OF DIAGNOSTICS, PARTS ORDERING AND WARRANTY APPLICATION



Section 4 - CHARGING SYSTEM DIAGNOSTIC PROCEDURES

1. Start the engine and confirm that the alternator warning light is not illuminating.

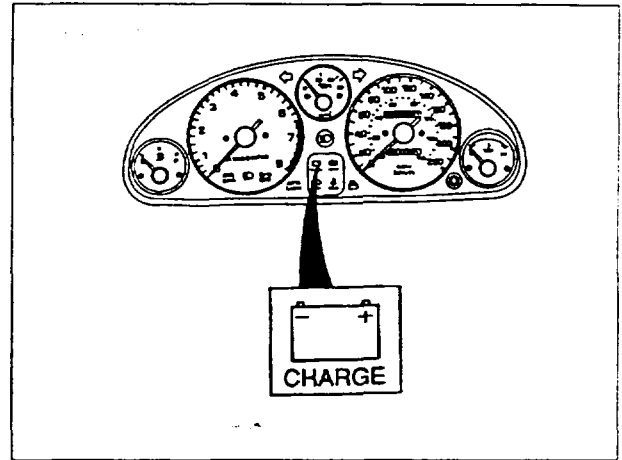
NOTE: If the warning light is illuminated, the self diagnosis operation is functioning. Check the alternator and related harness' according to section "G" of the workshop manual.

2. Fluctuate the engine RPM and listen for alternator bearing or engine belt noise. If noise is present, inspect for loose or damaged belt or damage to the alternator bearing.

NOTE: Perform the above inspection with the vehicle headlights illuminated.

3. Turn off the ignition and all accessories. Connect a load tester (VAT-40 or equivalent).

4. Apply the load test referring to the chart to the right. The final voltage must be above the standard minimum value shown below.

**STANDARD MINIMUM VOLTAGE**

Approx Battery Temperature	Minimum Voltage
70F (21C)	9.6V
60F (15C)	9.5V
50F (10C)	9.4V
40F (4C)	9.3V
30F (-1C)	9.1V
20F (-7C)	8.9V

If the voltage measures at or above the minimum, proceed to step 4.

If the voltage is below the minimum, quick charge the battery for 30 minutes and load test. If the battery remains below the minimum, replace the battery and proceed to step 4.

NOTE: Battery inspection and charging procedures for Navajo vehicles are different than those outlined in this bulletin. Refer to the workshop manual for instructions.

LOAD TEST CHART

Model	Test Load (Amps)
323/Prot.	180
626/MX-6	174
929	180 195
MX-3	150 180 165
MX-5	105
RX-7	180 165 195
MPV	150 195
B-Series	150 195 195

Section 4 - CHARGING SYSTEM DIAGNOSTICS CONT'D.

4. Start the vehicle and raise the RPM to 2500.
5. Connect a battery load tester (VAT 40/70 or equivalent)
6. Apply a load equal to the alternator rating. The generated voltage should be 14.1V to 14.7V.

LOAD TEST RESULTS

Over 14.7V - Replace Alternator

Under 14.1V - Check for resistance between the battery and terminals "B" and "S". If resistance is present, repair the damaged harness and retest. If the voltage is still below 14.1V, replace the alternator.

14.1V to 14.7V - No trouble with the alternator or battery.

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ALTERNATOR AND BATTERY CHECK SHEET

Dealer Name _____ Technician Number: _____

Vehicle Year: _____ Model: _____ M/T: _____ A/T: _____ VIN: _____

Repair Date: ____/____/____ Mileage: _____ Repair Order Number: _____

1. Customer Complaint: _____

2. Was the customer's complaint verified: ____ Yes ____ No

3. Reason for replacement:

Alternator output or battery voltage was out of specification: ____ Yes ____ No

	Reading	Factory Spec.
Output Voltage		
Output Amp.		
Instrument Used		
Battery Voltage (Open Terminal)		
Battery Voltage (Load Test)		

According to Service Bulletin instructions: ____ Category ____ Number

According to DSM or Hot Line Authorization: _____ (Authorization Number)

Other: _____

4. Repair Type: ____ Warranty ____ Customer Pay

Technician's Signature: _____ Date: ____/____/____

MELA Comments:	

Signature _____	Date: ____/____/____

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Section 5 - WARRANTY INFORMATION

Symptom Code: Complete Applicable Code

Damage Code: Complete Applicable Code

Part Number Main Cause: Complete Applicable Part Number

Operation Number and Labor Hours:

	Operation Number	Labor Hours
Engine Control Unit(ECU), Diagnosis	F0005XDX	0.9
Air Flow Sensor (AFM), Diagnosis	F0006XDX	0.4
Fuel Pump, Diagnosis	F0007XDX	0.5
Charging System, Diagnosis	G0003XDX	1.4

NOTE: Labor hours shown are the maximum allowable time. Claim only the actual time used for these operations.