

AIR BAG RESTRAINT SYSTEM

1991 Mazda Miata

MAZDA 1990-91
AIR BAGS

Miata, RX7 Convertible

* PLEASE READ THIS FIRST *

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all WARNINGS and SERVICE PRECAUTIONS.

DESCRIPTION & OPERATION

The air bag restraint system, when used in conjunction with seat belt, provides increased protection for the driver in a collision. The air bag restraint system consists of the following: AIR BAG warning light, air bag module, clockspring connector, diagnostic module, crash sensors, back-up battery, and wiring harnesses.

The air bag is designed to deploy when rear safing sensor and at least one front impact sensor close in a collision, and ignition switch is in the ON position. The back-up battery supplies current for the ignitor if the vehicle battery or fuses fail during a collision. The diagnostic module monitors the air bag system for failures. If any failures are detected by the module, the driver is warned of such failure(s) through the activation or flashing of the AIR BAG warning light.

SYSTEM OPERATION CHECK

Turn ignition switch to the ON or START position. AIR BAG warning light in instrument cluster should illuminate for approximately 6 seconds then go out. This indicates that the air bag system is functioning properly. If any of the following conditions exists, air bag system is malfunctioning and needs repair.

- * AIR BAG warning light does not illuminate as described.
- * AIR BAG warning light stays on for more than 6 seconds.
- * AIR BAG warning light illuminates while driving.

If air bag system components are replaced for any reason, air bag system must be checked for proper function after repair. Turn ignition on. AIR BAG warning light should illuminate for approximately 6 seconds then go out. If AIR BAG warning light does not illuminate as described, air bag system is malfunctioning and needs repair. If warning light functions as described, check horn operation. If horn does not sound, remove air bag module and check air bag module and horn switch connections. Always follow service precautions and deactivate air bag system before performing repairs. See DISABLING AND ACTIVATING AIR BAG SYSTEM.

SERVICE PRECAUTIONS

NOTE: The following precautions should be observed when working with air bag systems.

- * Disable air bag system before servicing any air bag system or steering column component. See DISABLING & ACTIVATING AIR BAG SYSTEM

- * Wait about 10 MINUTES after disabling air bag system before servicing. Air bag system voltage is maintained for about 10 MINUTES after system is disabled. Failure to wait 10 MINUTES before servicing system may cause accidental air bag deployment and possible personal injury.
- * On Miata, obtain radio code number from customer and deactivate radio anti-theft function before disconnecting battery.
- * Because of the critical system operating requirements, DO NOT service any air bag system component. Corrections are made by replacement only.
- * DO NOT use an ohmmeter to check resistance of air bag module, as it may cause air bag deployment.
- * When carrying a live (undeployed) module, ensure trim cover is pointed away from your body. This minimizes chance of injury in the event of accidental air bag deployment.
- * When placing a live air bag module on any surface, always face trim cover upward to reduce motion of module if it is accidentally deployed.
- * If an open circuit is present, replace entire wiring harness. DO NOT attempt wire repair.
- * Impact sensors must always be installed with arrow marks facing front of vehicle. Also, check sensors for cracks, defects or rust before installation. Replace impact sensor(s) if required.
- * Air bag system clockspring MUST be aligned in the neutral position, since its rotation ability is limited. DO NOT turn steering wheel or column after removal of steering gear.
- * A double-lock mechanism is used on clockspring connectors. DO NOT use excessive force when disconnecting connectors, as damage to connector may occur.

DISABLING & ACTIVATING

AIR BAG SYSTEM

WARNING: Wait about 10 MINUTES after disabling air bag system before servicing. Air bag system voltage is maintained for about 10 MINUTES after system is disabled. Failure to wait 10 MINUTES before servicing system may cause accidental air bag deployment and possible personal injury.

Disabling System

On Miata, obtain radio code number from customer, and deactivate audio anti-theft function. On all models, turn ignition switch off. Disconnect and shield negative battery cable. Remove knee protector. Disconnect Orange and Blue clockspring connectors at base of steering column. See Fig. 1.

Activating System

Reconnect battery and clockspring connectors. Turn ignition switch to RUN position. Check AIR BAG indicator light to ensure system is operating properly. See SYSTEM OPERATION CHECK.

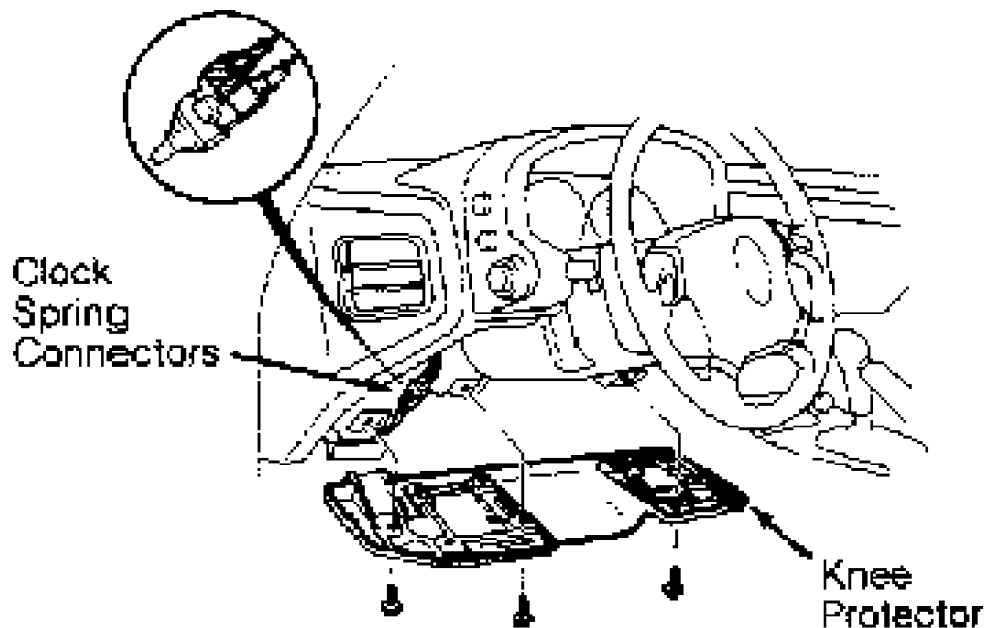


Fig. 1: Locating Clockspring Connector
Courtesy of Mazda Motors Corp.

DISPOSAL PROCEDURES

DEPLOYED AIR BAG

Dispose deployed air bag module as you would any other part. Wear gloves and safety glasses when handling air bag module.

SCRAPPED VEHICLE

NOTE: Perform the following procedures when scrapping a vehicle with undeployed air bag.

1) Ensure vehicle is outside, and away from other vehicles and people. Open convertible top and doors. Disconnect negative battery cable.

2) Ensure air bag module is firmly mounted to steering wheel. Remove knee protector and disconnect Orange and Blue clockspring connectors at base of steering column. See Fig. 1. Cut clockspring connector Blue wires.

3) Connect 2 jumper wires (20 feet long) to cut clockspring wires. Connect other ends of wires to a 12-volt battery to deploy air bag. Because of heat, wait 10 MINUTES before touching deployed air bag.

REMOVAL & INSTALLATION

* PLEASE READ THIS FIRST *

WARNING: Follow air bag service precautions to prevent accidental air bag deployment and personal injury. See SERVICE PRECAUTIONS.

NOTE: After component replacement, check system to ensure proper operation. See SYSTEM OPERATION CHECK.

CRASH SENSORS

NOTE: Crash sensor orientation and mounting is important for proper operation. All sensors must be positioned so that arrow points forward. If there is sheet metal damage near sensor mounting point, inspect body structure at sensor mounting point for deformation. If damaged, restore to original shape. Ensure sensor mounting bolts or nuts are tightened to specification. See TORQUE SPECIFICATIONS table.

Removal (Front Impact Sensors)

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Front impact sensors are located in left front and right front of vehicle. See Fig. 2 or 3. To remove left or right sensor, remove wheelwell undercover, and disconnect connector(s). Remove retaining clips and bolts. Remove sensor(s).

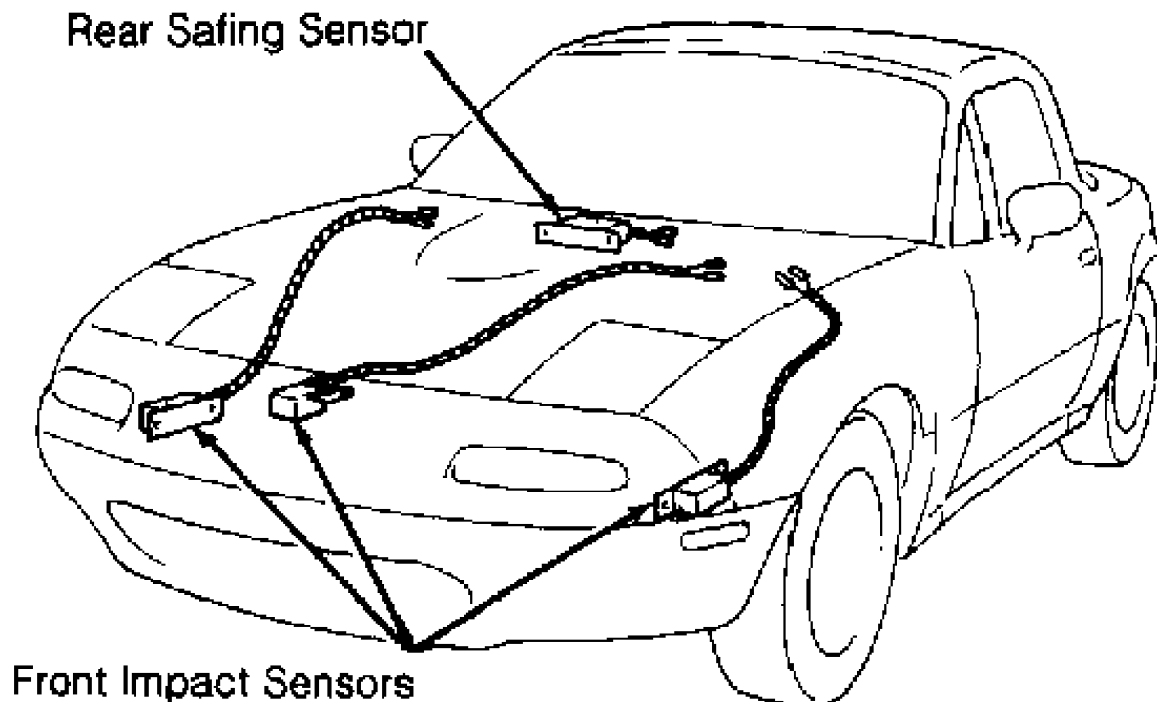


Fig. 2: Locating Crash Sensors (Miata)
Courtesy of Mazda Motors Corp.

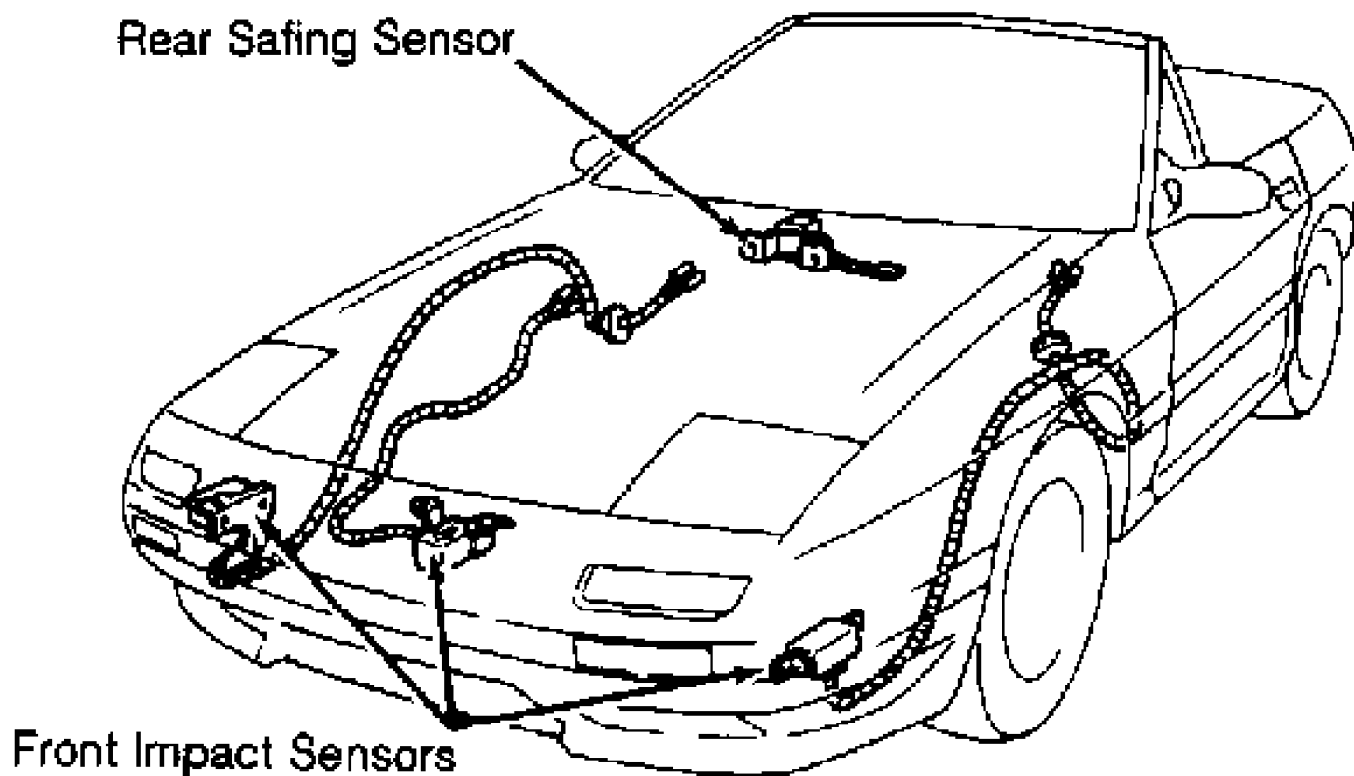


Fig. 3: Locating Crash Sensors (RX7 Convertible)
Courtesy of Mazda Motors Corp.

Installation

To install, reverse removal procedure. Position sensor with arrow toward front of vehicle. Tighten mounting bolts to specification. See TORQUE SPECIFICATIONS table. Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check AIR BAG indicator light to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

Removal (Rear Safing Sensor)

Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Rear safing sensor is located under center of instrument panel. Remove instrument panel. Locate and disconnect safing sensor connectors. See Fig. 2 or 3. Remove sensor and cover.

CAUTION: A double-lock mechanism is used on clockspring connectors. DO NOT use excessive force when disconnecting connectors, as damage to connector may occur.

Installation

To install, reverse removal procedure. Position sensor with arrow toward front of vehicle. Tighten mounting nuts to specification. See TORQUE SPECIFICATIONS table. Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check AIR BAG indicator light to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

AIR BAG MODULE

Removal & Installation

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Air bag module is located on center of steering wheel. See Fig. 4 or 5. Remove air bag module nuts and remove module from steering wheel. To install, reverse removal procedure. Tighten air bag module mounting nuts to specification. See TORQUE SPECIFICATIONS table. Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check AIR BAG indicator light to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

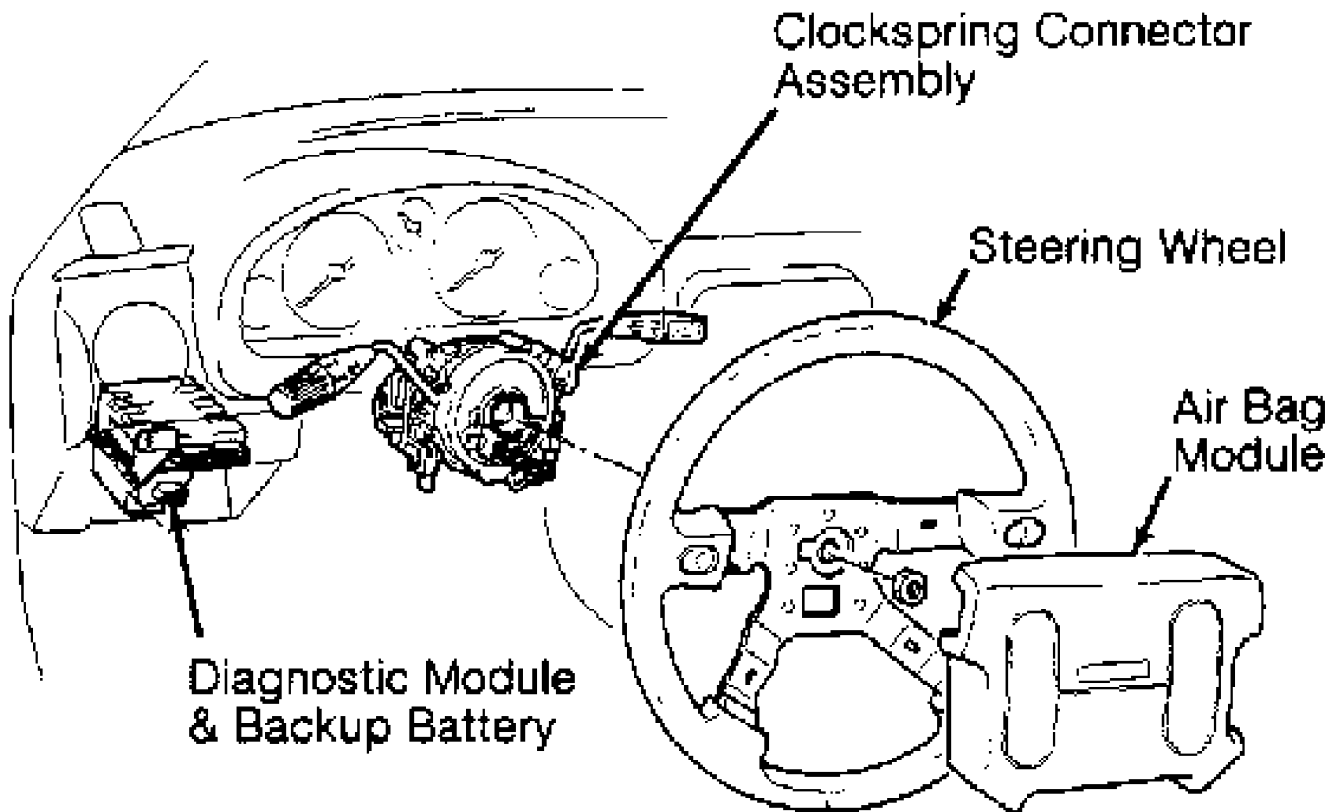


Fig. 4: Identifying Air Bag System Components (Miata)
Courtesy of Mazda Motors Corp.

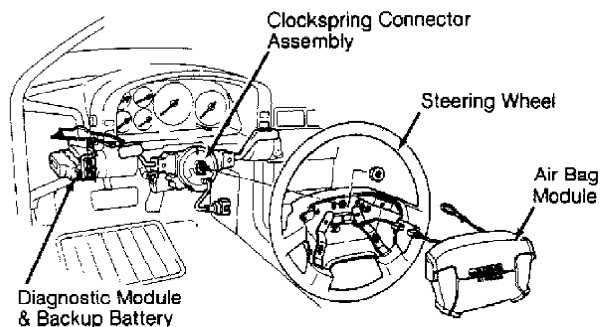


Fig. 5: Identifying Air Bag System Components (RX7 Convertible)
Courtesy of Mazda Motors Corp.

STEERING WHEEL

Removal & Installation

Remove air bag module. See AIR BAG MODULE. Remove steering wheel nut. DO NOT strike steering shaft with a hammer, or steering shaft may collapse. Remove steering wheel with steering wheel puller. To install, reverse removal procedure. Tighten steering wheel nut to specification. See TORQUE SPECIFICATIONS table.

CLOCKSPRING CONNECTOR ASSEMBLY

NOTE: Clockspring connector assembly is part of the combination switch. When replacing clockspring, replace clockspring and combination switch as an assembly.

Removal

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Clockspring connector assembly is located under steering wheel, in steering column. See Fig. 4 or 5. Remove air bag module. See AIR BAG MODULE. Remove steering wheel nut and remove steering wheel with steering wheel puller. Remove column covers. Remove screws. Remove clockspring connector and combination switch as an assembly.

Installation

1) To install, reverse removal procedure. Before installing steering wheel, center clockspring. See CLOCKSPRING CENTERING under ADJUSTMENTS. Tighten steering wheel nut to specification. See TORQUE SPECIFICATIONS table.

2) After installing clockspring connector and combination switch assembly, reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check AIR BAG indicator light to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

DIAGNOSTIC MODULE & BACK-UP BATTERY

Removal & Installation

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Diagnostic module and back-up battery is located under left side of instrument panel. See Fig. 4 or 5. Disconnect diagnostic module and back-up battery connectors. Remove nuts. Remove diagnostic module and back-up battery as an assembly. To install, reverse removal procedure. After diagnostic module and back-up battery are installed, reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check AIR BAG indicator light to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

ADJUSTMENTS

CLOCKSPRING CENTERING

Set front wheels in straight-ahead position. Turn clockspring connector clockwise until it stops (do not force). Return connector 2 3/4 turns counterclockwise. Rotate clockspring connector further, if necessary, to align marks on connector and outer housing.

WIRE REPAIR

DO NOT repair air bag system wiring. If air bag harness connectors are faulty, replace faulty wiring harness.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Air Bag Module Nuts	12-15 (16-20)
Steering Wheel Nut	29-36 (39-49)
	INCH Lbs. (N.m)
Front Impact Sensor Bolts	78-113 (9-13)
Rear Safing Sensor Nuts	
Miata	78-113 (9-13)
RX7	61-87 (7-10)

DIAGNOSIS & TESTING

* PLEASE READ THIS FIRST *

WARNING: Follow air bag service precautions to prevent accidental air bag deployment and personal injury. See SERVICE PRECAUTIONS.

NOTE: After component replacement, check system to ensure proper operation. See SYSTEM OPERATION CHECK.

SELF-DIAGNOSTIC SYSTEM

Trouble Shooting

AIR BAG warning light flashes are used to diagnose air bag system. The number of warning light flashes depends on the type of fault being detected. Codes are prioritized so that if 2 or more faults are present, the highest test-priority fault indication will remain until corrected.

Warning Light Does Not Illuminate

Check for blown fuses, burned-out bulb, disconnected diagnostic module, or open circuit between warning light and diagnostic module.

Warning Light Flashes Or Remains On

Check code output of AIR BAG warning light. See AIR BAG FLASH CODES table.

AIR BAG FLASH CODES

Priority	Flash Code	Cause/Diagnosis
1	Remains On	* Faulty Diagnostic Module
Diagnostic		* Poor Connection Of Module Connector (See DIAGNOSTIC TEST NO. 1)
2	Flashes 3 Times	* Open Circuit
		* Poor Connection Of Power Source Circuit (See DIAGNOSTIC TEST NO. 2)

3	Flashes 5 Times	* Faulty Front Impact Sensor (See DIAGNOSTIC TEST NO. 3)
4	Flashes 10 Times	* Faulty Diagnostic Module (System Down-Fused Burned) (See DIAGNOSTIC TEST NO. 4)
5	Flashes 4 Times	* Faulty Rear safing Sensor (See DIAGNOSTIC TEST NO. 5)
6	Flashes 6 Times	* Faulty Air Bag Module * Poor Connection Of Clockspring Connector (See DIAGNOSTIC TEST NO. 6)
7 (1)	Flashes 7 Times	* Poor Wiring Harness Ground (See DIAGNOSTIC TEST NO. 8)
8	Flashes 8 Times	* Poor Ground Of Front Impact Sensor (See DIAGNOSTIC TEST NO. 8)
9	Flashes 9 Times	* Open Circuit Between Diagnostic Module and Front Impact Sensor (See DIAGNOSTIC TEST NO. 3)
10	Flashes 2 Times	* Poor Ground Of All Front Impact Sensors (See DIAGNOSTIC TSET NO. 7)
(1) Code 7 Does not apply to 1990 Miata		

DIAGNOSTIC TEST NO. 1

Warning Light Remains On

Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Ensure diagnostic module connectors are properly connected. If connector is okay, replace diagnostic module.

DIAGNOSTIC TEST NO. 2

Warning Light Flashes 3 Times

1) Measure battery voltage. If voltage is less than 9 volts, charge battery. If battery voltage is okay, check fuses/relays in order given in FUSE/RELAY LOCATION table. See Fig. 6 or 7.

2) If fuses and relays are okay, disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Ensure back-up battery connector is properly connected. If connection is okay, disconnect back-up battery connector.

3) Reconnect negative battery cable. Measure voltage between Green/Red wire of back-up battery connector and ground. See Fig. 8 or 9. If voltage is zero volt, replace wire harness assembly.

4) If battery voltage is present, disconnect negative battery cable and diagnostic module Black and Gray connectors. See Fig. 10 or 11. Reconnect negative battery cable. Measure voltage between White/Green wire of Gray diagnostic module connector and ground. If voltage is zero volt, replace wire harness assembly.

5) If battery voltage is present, measure voltage between Green/Yellow wire of Gray diagnostic module connector and ground. If voltage is zero volt, replace wire harness assembly. If battery voltage is present, replace diagnostic module.

FUSE/RELAY LOCATION

Fuse/Relay	Location
Miata	
Air Bag (15 Amps)	In Fuse Block
Air Bag (10 Amps)	In Main Fuse Block
Engine (15 Amps)	In Fuse Block
INJ (30 Amps)	In Main Fuse Block
RX7	
Air Bag (15 Amps)	In Fuse Block
Air Bag (30 Amps)	In Main Fuse Block
Engine (30 Amps)	In Main Fuse Block
Wiper (15 Amps)	In Fuse Block

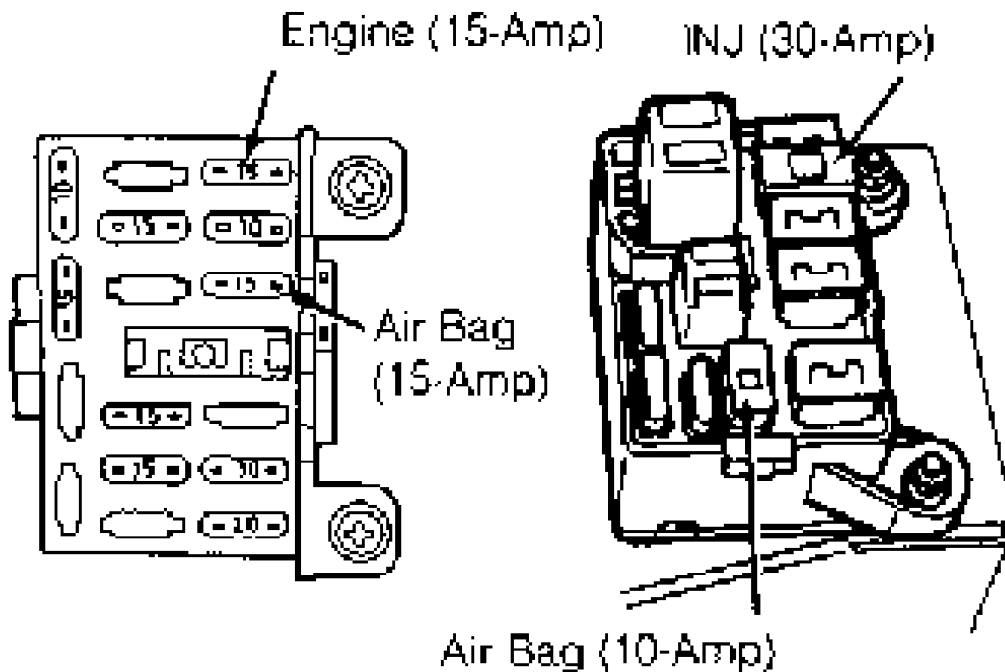


Fig. 6: Identifying Fuses & Relays (Miata)
Courtesy of Mazda Motors Corp.

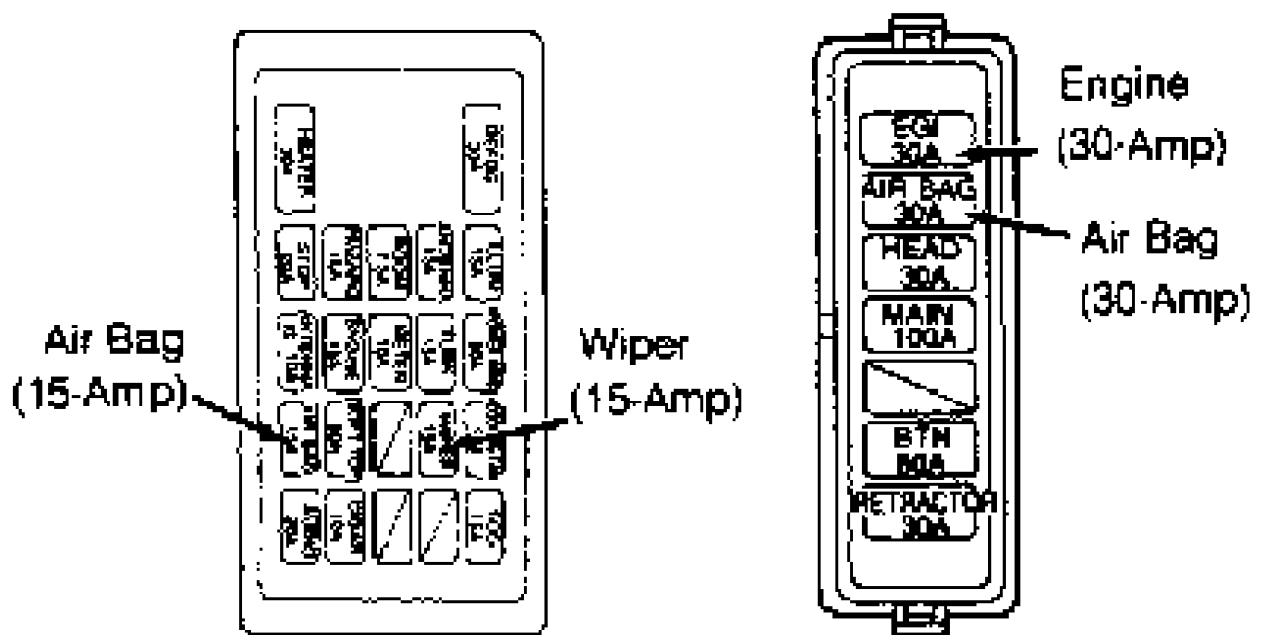


Fig. 7: Identifying Fuses & Relays (RX7)
 Courtesy of Mazda Motors Corp.

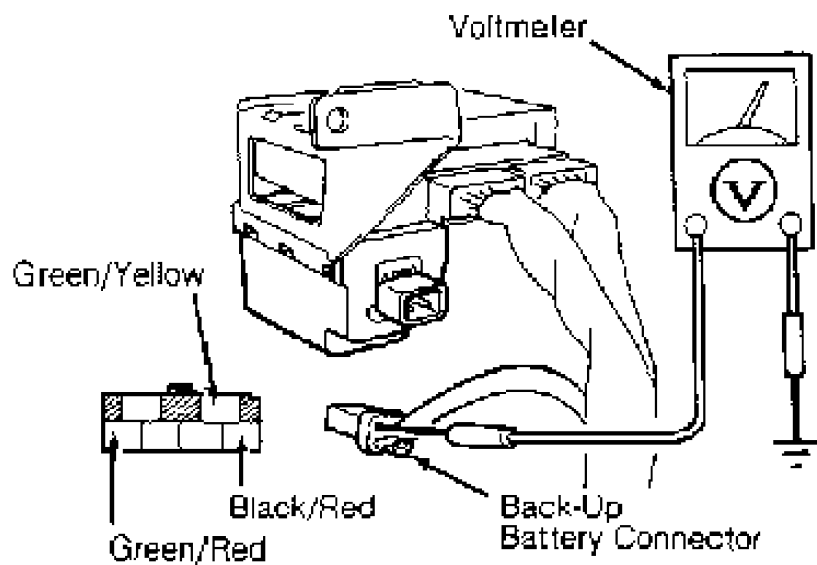


Fig. 8: Checking Back-Up Battery Connector (Miata)
 Courtesy of Mazda Motors Corp.

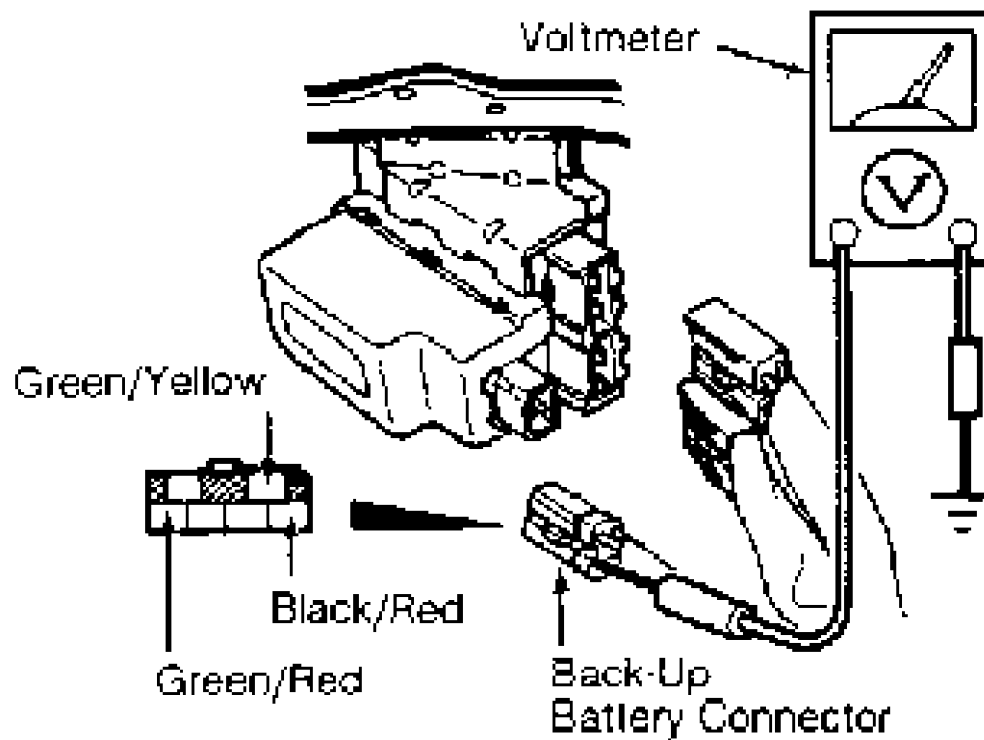


Fig. 9: Checking Back-Up Battery Connector (RX7)
 Courtesy of Mazda Motors Corp.

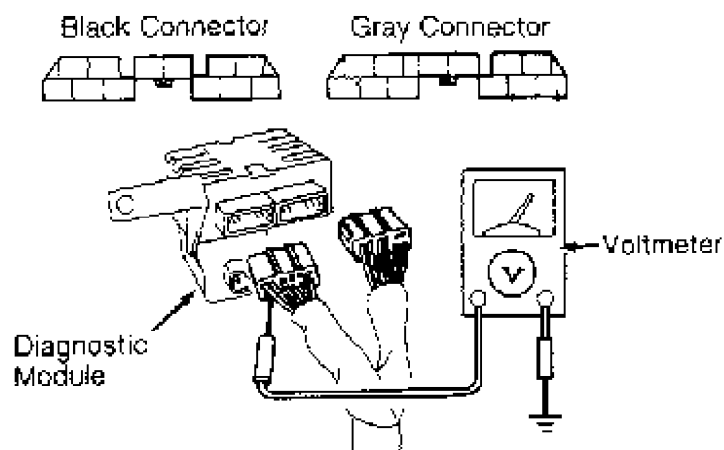


Fig. 10: Locating Diagnostic Module Black & Gray Connectors (Miata)
 Courtesy of Mazda Motors Corp.

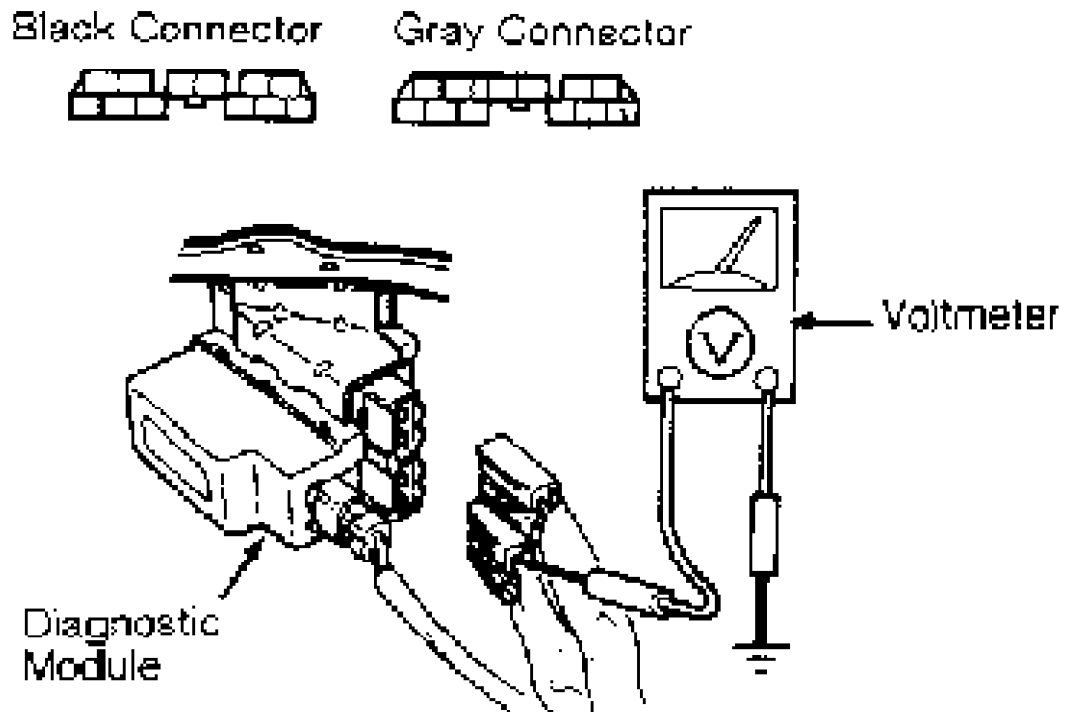


Fig. 11: Locating Diagnostic Module Black & Gray Connectors (RX7)
 Courtesy of Mazda Motors Corp.

DIAGNOSTIC TEST NO. 3

Warning Light Flashes 5 Or 9 Times

1) Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Disconnect front impact sensor connectors (center, left, and right), and measure resistance of each sensor. See Fig. 12. Resistance should be approximately 1.2 k/ohms. If resistance is not as specified, replace sensor.

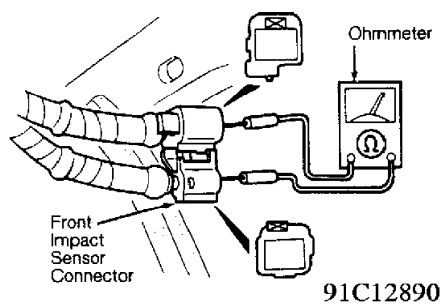


Fig. 12: Checking Impact Sensor Resistance
 Courtesy of Mazda Motors Corp.

2) If resistance is about 1.2 k/ohms, reconnect all front impact sensor connectors. Disconnect diagnostic module Black and Gray

connectors. See Fig. 10 or 11. Measure resistance between diagnostic module Gray connector Brown/Green wire and ground. If resistance is 1.2 k/ohms, go to next step. If resistance is not 1.2 k/ohms, replace wire harness.

3) Measure resistance between diagnostic module Gray connector Brown/Red wire and ground. If resistance is 1.2 k/ohms, go to next step. If resistance is not 1.2 k/ohms, replace wire harness.

4) Measure resistance between diagnostic module Black connector Brown/Black wire and ground. If resistance is 1.2 k/ohms, replace diagnostic module. If resistance is not 1.2 k/ohms, replace wire harness.

DIAGNOSTIC TEST NO. 4

Warning Light Flashes 10 Times

1) Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Disconnect front impact sensor connectors (center, left, and right), and measure resistance of each sensor. See Fig. 12. Resistance should be approximately 1.2 k/ohms. If resistance is not as specified, replace sensor and go to step 5).

2) If resistance is about 1.2 k/ohms, reconnect all front impact sensor connectors. Disconnect diagnostic module Black and Gray connectors. See Fig. 10 or 11. Measure resistance between diagnostic module Gray connector Brown/Green wire and ground. If resistance is 1.2 k/ohms, go to next step. If resistance is not 1.2 k/ohms, replace wire harness.

3) Measure resistance between diagnostic module Gray connector Brown/Red wire and ground. If resistance is 1.2 k/ohms, go to next step. If resistance is not 1.2 k/ohms, replace wire harness.

4) Measure resistance between diagnostic module Black connector Brown/Black wire and ground. If resistance is 1.2 k/ohms, go to next step. If resistance is not 1.2 k/ohms, replace wire harness and go to next step.

5) If disconnected, reconnect diagnostic module and clockspring connectors. Reconnect negative battery cable. Turn ignition switch to ON position and check warning light operation. If warning light flashes 10 times, replace diagnostic module.

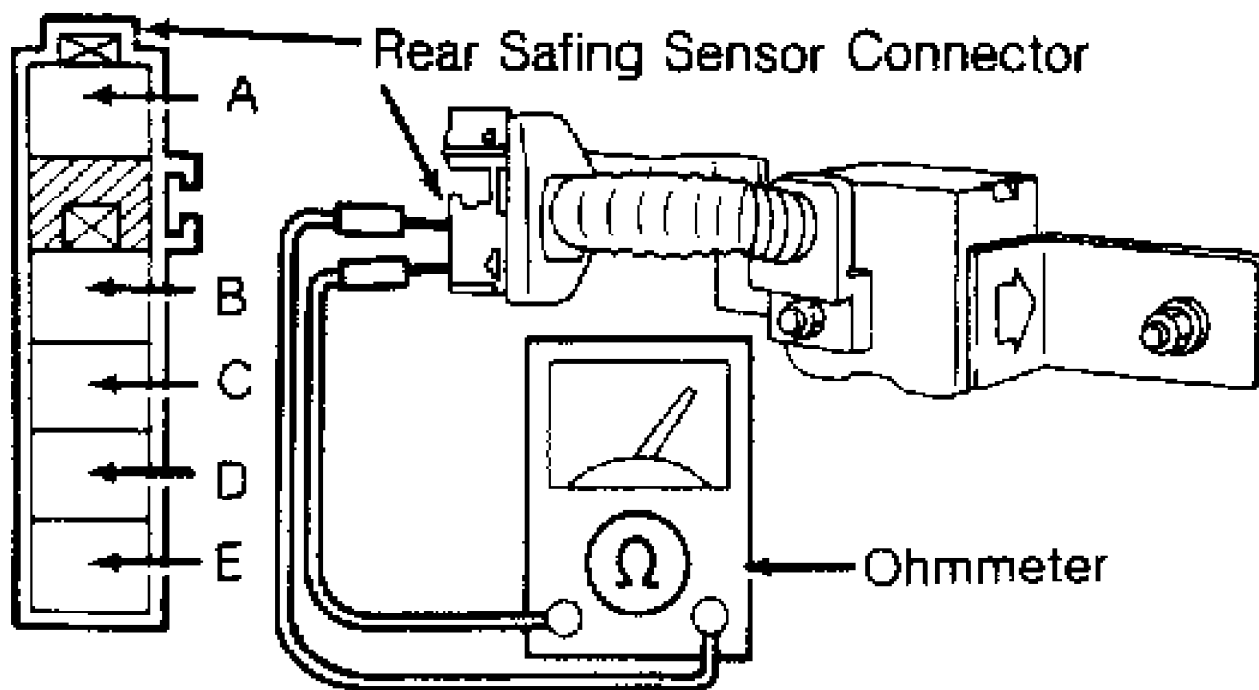
DIAGNOSTIC TEST NO. 5

Warning Light Flashes 4 Times

1) Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Disconnect diagnostic module Black and Gray connectors. See Fig. 10 or 11. Check continuity between Black connector Green/White wire terminals. If continuity is not present, replace wire harness.

2) If continuity is present, check continuity between Black connector Green wire and ground (1990 Miata), or between Gray connector Red/Black wire terminal and ground (all others). If continuity is not present, go to step 4). If continuity is present, check continuity between Black connector Green wire terminal and Gray connector Green/Black wire terminal. If continuity is present, go to step 4) (1990 Miata), or step 5) (all others).

3) If continuity is not present, disconnect rear safing sensor connectors. Check continuity between sensor terminals "B" and "E". See Fig. 13. If continuity is present, replace wire harness. If continuity is not present, replace rear safing sensor.



91D12891

Fig. 13: Identifying Rear Saging Sensor Terminals
Courtesy of Mazda Motors Corp.

4) Check rear saging sensor installation; repair as necessary. If installation is okay, disconnect rear saging sensor connectors. Check continuity between sensor terminal "A" and ground. If continuity is not present, replace rear saging sensor. If continuity is present, replace wire harness.

5) Disconnect diagnostic connector. Check continuity between Black connector Green/White wire and ground. If continuity is present, replace wire harness. If continuity is not present, repeat step 4).

DIAGNOSTIC TEST NO. 6

Warning Light Flashes 6 Times

1) Disconnect negative battery cable. Check connection of Orange/Blue clockspring connector; repair as necessary.

2) If connection is okay, disconnect air bag module and clockspring connector. Check continuity, as shown in illustration, for both terminals of Blue side of clockspring connector. See Fig. 14. If continuity is not present, replace Orange/Blue clockspring connector.

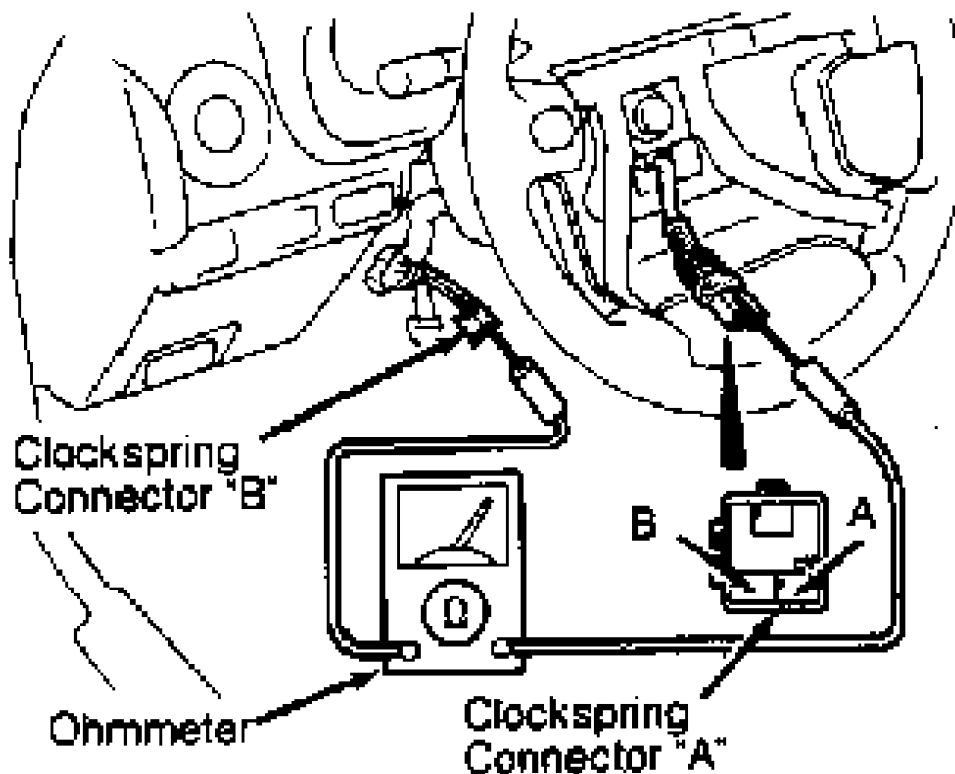


Fig. 14: Checking Resistance at Clockspring Terminal
 Courtesy of Mazda Motors Corp.

3) If continuity is present, disconnect diagnostic module Black and Gray connectors. See Fig. 10 or 11. Check continuity between diagnostic module Black connector Green/White wire and clockspring connector Red wire. Also check continuity between diagnostic module Black connector Green/Yellow wire and clockspring connector Green/Yellow wire. If continuity is not present, replace wire harness assembly.

4) If continuity is present, check continuity between diagnostic module Black connector Green/Yellow wire and ground. If continuity is present, replace wire harness assembly. If continuity is not present, replace air bag module.

DIAGNOSTIC TEST NO. 7

Warning Light Flashes 2 Or 8 Times

1) Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Disconnect diagnostic module Black and Gray connectors. See Fig. 10 or 11. Check continuity between Black connector Brown/Yellow wire and ground. If continuity is not present, go to step 4). If continuity is present, go to next step.

2) Check continuity between Black connector Brown/White wire and ground. If continuity is not present, go to step 5). If continuity is present, go to next step.

3) Check continuity between Black connector Brown wire and

ground. If continuity is present, replace diagnostic module. If continuity is not present, go to step 6).

4) Disconnect right front impact sensor connector. Check continuity between ground and each harness sensor terminal. See Fig. 15. If continuity is present, replace wire harness assembly. If continuity is not present, go to step 7).

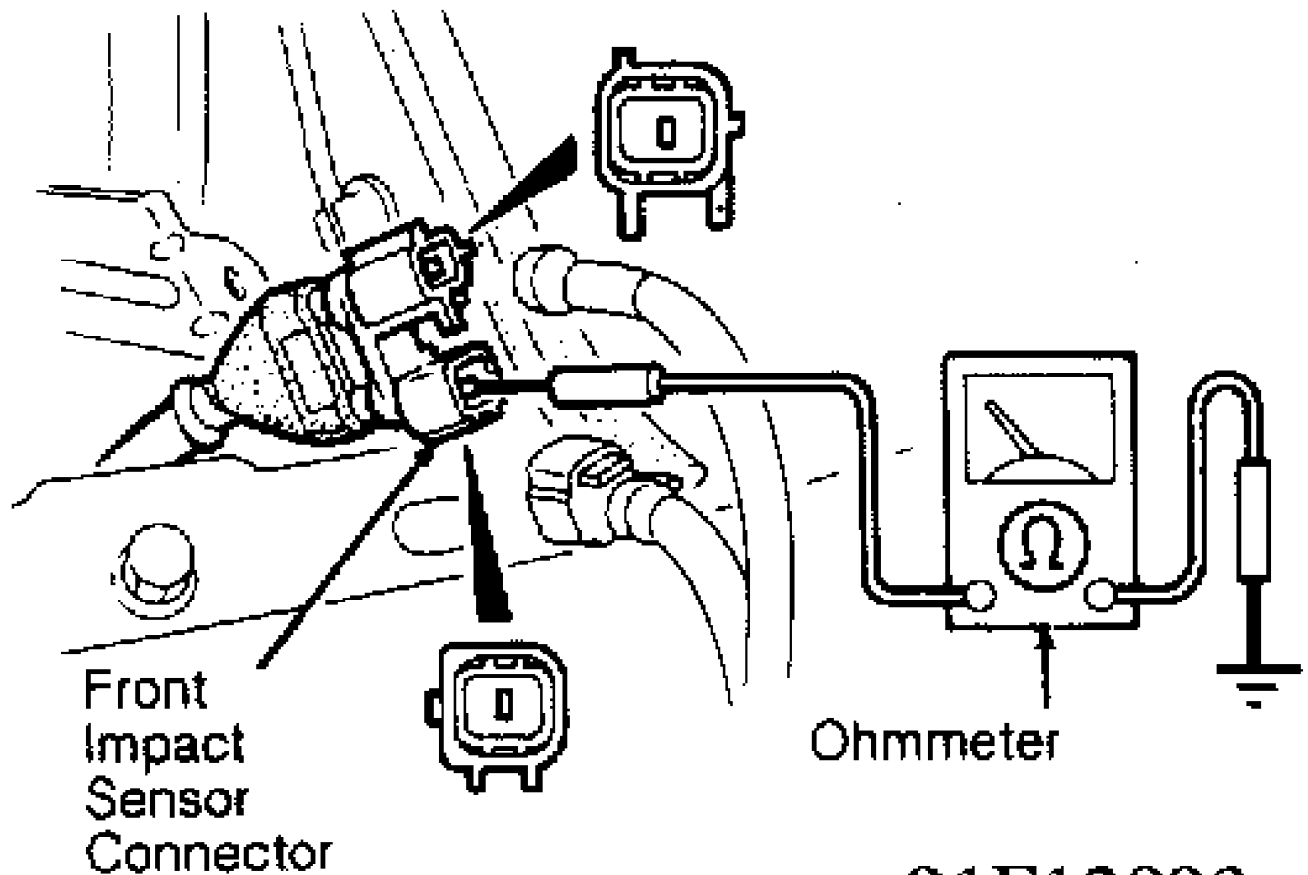


Fig. 15: Checking Continuity at Right Front Impact Sensor Connector
Courtesy of Mazda Motors Corp.

5) Disconnect center front impact sensor connector. Check continuity between ground and each harness sensor terminal. If continuity is present, replace wire harness assembly. If continuity is not present, go to step 7).

6) Disconnect left front impact sensor connector. Check continuity between ground and each harness sensor terminal. If continuity is present, replace wire harness assembly. If continuity is not present, go to step 7).

7) Ensure all front impact sensors are correctly installed. If all front impact sensors are installed correctly, replace defective front impact sensor.

DIAGNOSTIC TEST NO. 8

Warning Light Flashes 7 Times

1) Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Disconnect diagnostic module Black and Gray connectors. See Fig. 10 or 11.

2) Check continuity between Black connector Black wire and ground. If continuity is present, replace diagnostic module. If continuity is not present, replace wire harness.

POST-COLLISION AIR BAG SAFETY INSPECTION

POST-COLLISION AIR BAG SAFETY INSPECTION TABLE

Replace After Deployment	<ul style="list-style-type: none"> * Air Bag Module(s) * Clockspring
Inspect & If Damaged, Replace Component (Even If Air Bag Did Not Deploy)	<ul style="list-style-type: none"> * Air Bag Diagnosis Control Unit * Impact Sensors & Sensors Mountings * Steering Column * Steering Wheel * Wiring Harness
Comments	<ul style="list-style-type: none"> * DO NOT attempt wiring harness repairs. Replace entire wiring harness. * Impact sensors must always be installed with arrow on sensor facing front of vehicle.

WIRING DIAGRAMS

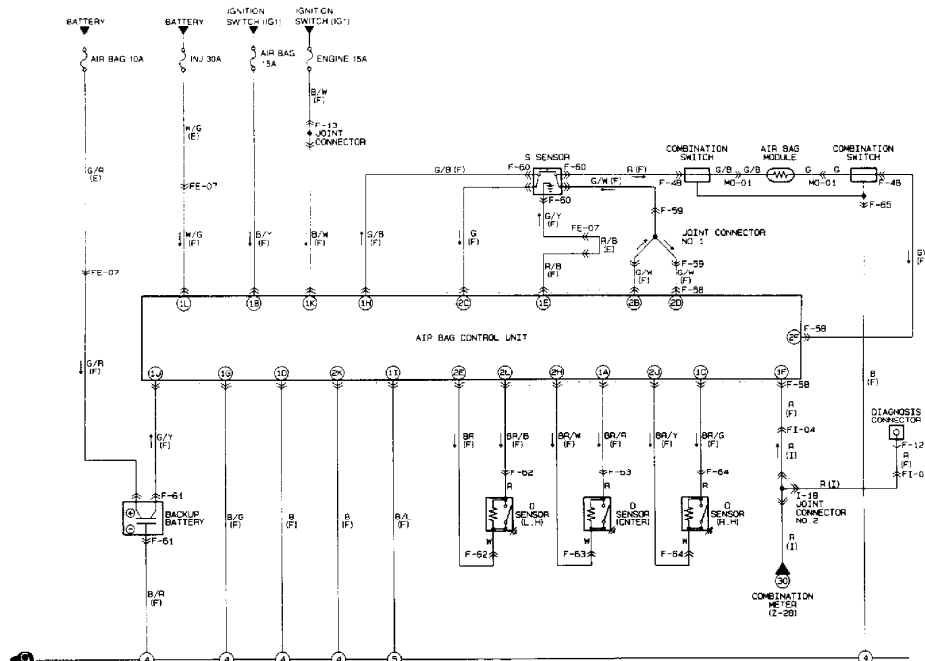
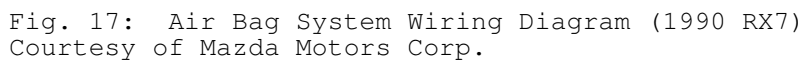


Fig. 16: Air Bag System Wiring Diagram (1990 Miata)
Courtesy of Mazda Motors Corp.



Courtesy of Mazda Motors Corp.

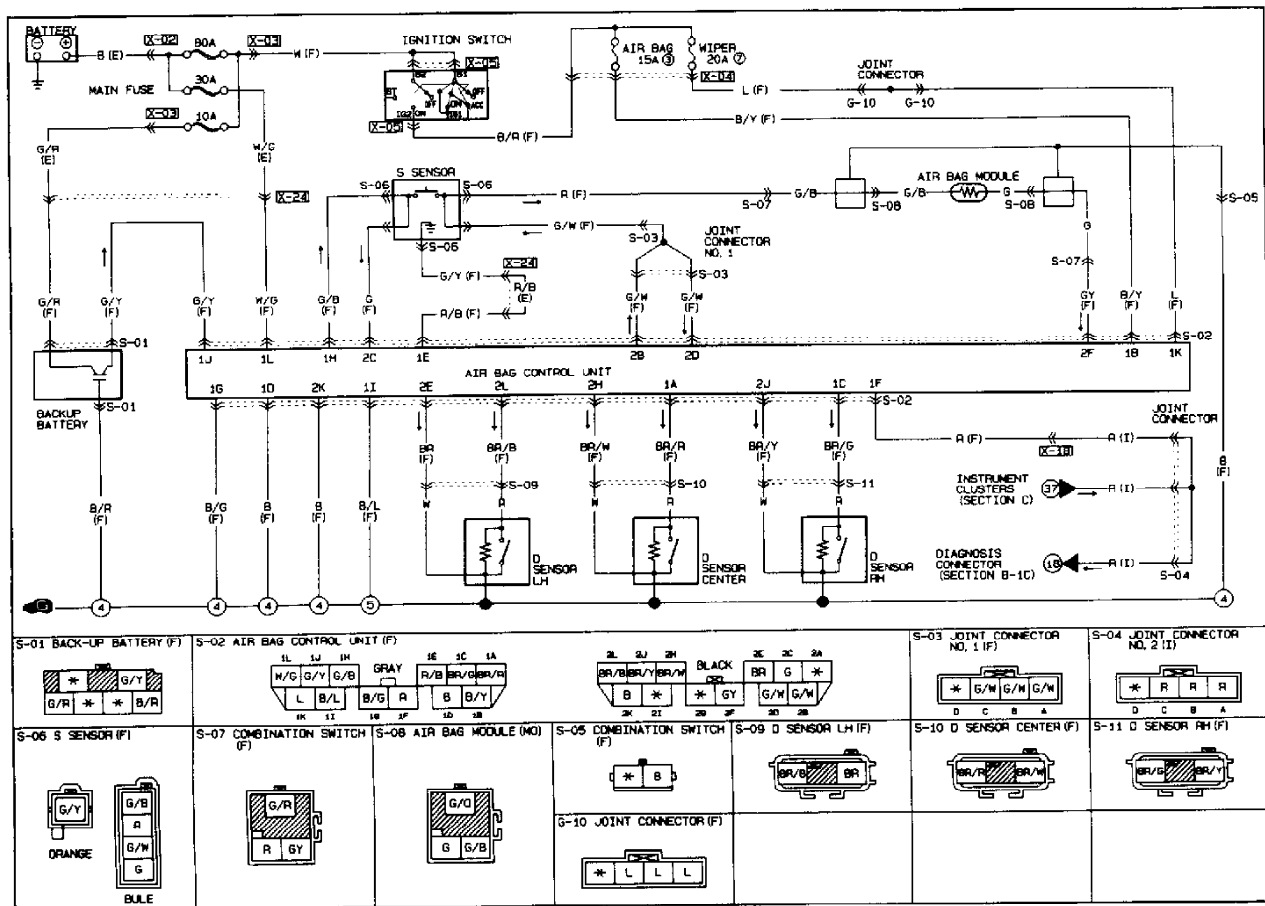


Fig. 18: Air Bag System Wiring Diagram (1991 Miata)
Courtesy of Mazda Motors Corp.

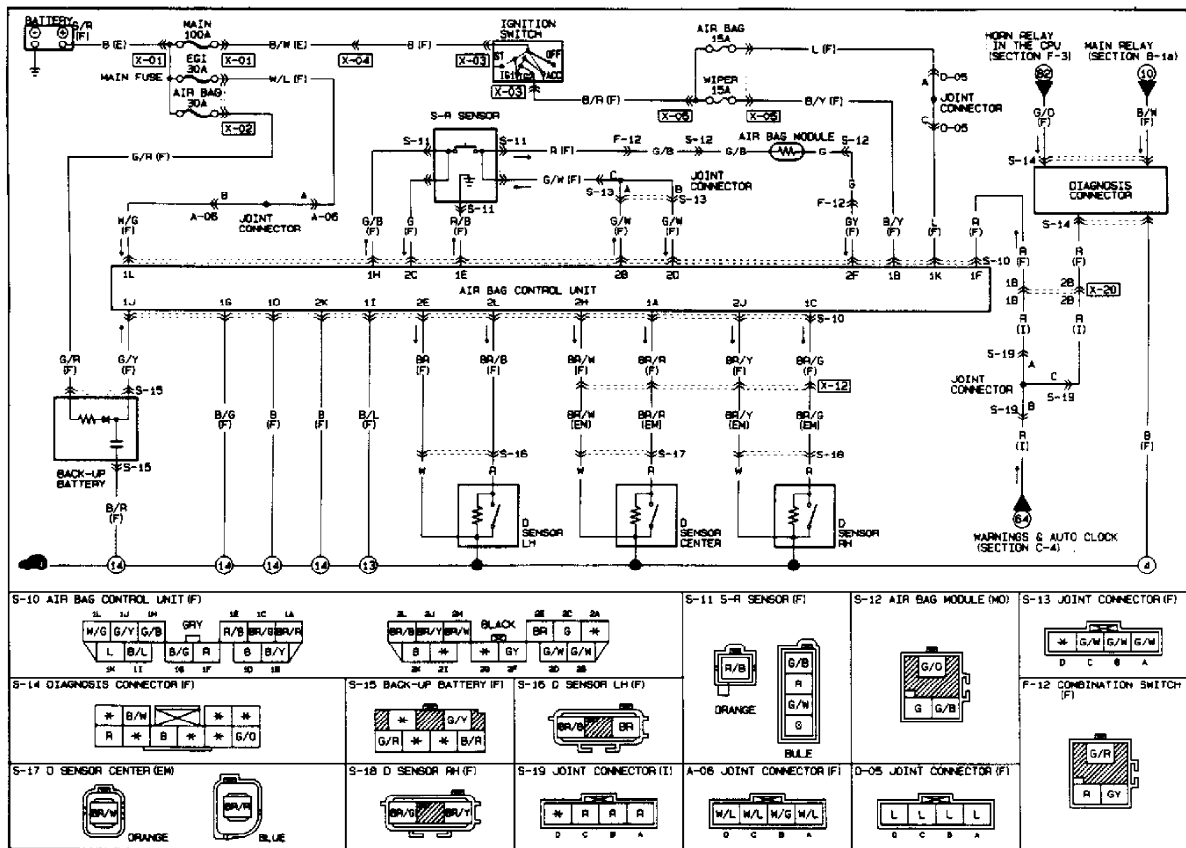


Fig. 19: Air Bag System Wiring Diagram (1991 RX7)
 Courtesy of Mazda Motors Corp.