



# Subaru Supplemental Restraint Systems

*In accordance with Federal safety regulations, all Subaru vehicles are now equipped with driver and front passenger airbags. The following pages provide basic information for safely working on and around Subaru supplemental restraint systems (SRS).*

## **SRS Design Features**

The Subaru Supplemental Restraint System (SRS) features built-in self-diagnostics and a safety design with back-ups built into many of the circuits.

The design of the SRS System is basically very simple.

The major components include:

- Front Inertia Sensors (2) with integral harnesses
- Airbag Electronic Control Unit
- Airbag Module
- Steering Roll Connector
- Main Harness

All harnesses use built-in double locking connectors.

## **SRS System Precautions**

• When servicing the SRS system, turn the ignition switch *Off*; disconnect the battery and wait at least 10 minutes before proceeding. This gives the back-up capacitors in the airbag control unit time to discharge. This prevents accidental and unexpected airbag deployment.

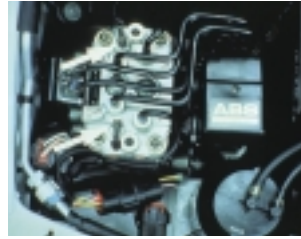
# Subaru Supplemental Restraint Systems



Driver's Airbag Module



Passenger Airbag Module



SRS Components



Airbag Module (rear)



Front Inertia Sensor



Airbag Electronic Control Unit



Steering Roll Connector



ECU Double Lock Safety Connector



ECU Location

- Always store the airbag module on a clean flat surface with the cover pad and horn buttons facing up. In addition, it should be stored with nothing else placed on top of it.
- The airbag module must not be exposed to temperatures exceeding 200 degrees Fahrenheit.

**Note:** Exposure to temperatures of 300 degrees Fahrenheit or greater will cause deployment.

- Never discard an undeployed airbag module. When replacing an undeployed airbag module, save the packaging material (inner packaging and carton) from the new module. After installing the new module on the vehicle, repack the old module in the same manner as the new module was packaged.

This packaging material is specifically designed for Subaru airbag modules and approved for use by the U.S. Department of Transportation.

- When the package is ready for shipment, follow the approved return procedures as specified by Subaru of America, Inc. Since airbag modules are regulated as dangerous goods by the U.S. Department of Transportation, failure to comply with all procedures may result in civil and/or criminal penalties. If the packaging material from the new module is damaged or misplaced, replacement packaging can be obtained from Subaru of America, Inc.

**Note:** Do not ship modules unless they are packaged in an approved container.

A deployed module may be enclosed in a plastic bag and then scrapped in a normal manner.

- Wear protective clothing when handling a deployed airbag module. Always use gloves and eye protection. Even though the residue is NOT toxic, it may cause minor eye and skin irritation.
- All of the SRS components are sealed. **Do not** disassemble or repair. If an SRS component is damaged or inoperable, it **must** be replaced.
- Do not drop any of the components. This could alter their sensitivity.
- All of the SRS wiring is enclosed in a yellow housing for quick identification.

**Always** use care whenever working near a yellow harness. If accidentally damaged, the SRS System harness **must** be replaced.

**Note:** Never make wiring repairs to any circuit in the SRS system.

- **Always** use a digital multimeter when checking the SRS System components or circuits. Use of an analog multimeter may cause accidental airbag deployment.
- **Never** attempt to measure the resistance of the airbag module.
- **Never** place yourself or test equipment between the airbag module and the driver's seat when servicing the SRS System.

**Note:** Review all precautions and service procedures outlined in the service manual.

## Component Overview

The airbag module is mounted to the center of the steering wheel. It contains the nylon airbag, an inflator assembly and a cover pad.

**Note:** The airbag module is serviced only as an assembly. Do not attempt to disassemble or repack the airbag.

There are two front sensors located inside the front fenders behind each inner fender liner. These inertia sensors are designed to detect a front end collision.

The airbag control unit is located under the center console, just ahead of the shifter.

There are two safety sensors located inside the airbag control unit. They are also inertia sensors designed to detect a front end collision.



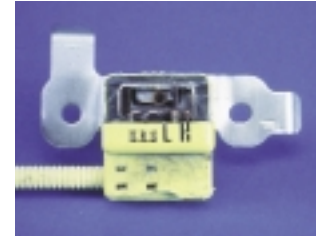
Airbag Warning Light



Disassembled ECU



Inertia Sensor Cutaway Closeup



Cutaway Front Inertia Sensor

The airbag control unit also contains two capacitors to supplement low battery voltage. The capacitors also provide back up voltage in the event of total loss of battery voltage. They are controlled by an internal voltage regulator.

**Note:** The capacitors can activate the SRS airbag up to 10 minutes after a total loss of battery voltage. The internal voltage regulator monitors battery voltage and supplements battery voltage as needed in the event of a collision.

The steering roll connector is mounted between the steering wheel and the steering column. It is an integral part of the combination switch assembly.

The steering roll connector contains a continuous flat ribbon type cable. It provides a direct hard wire connection between the airbag module and the SRS System harness. The coiled wire design allows full steering wheel rotation.

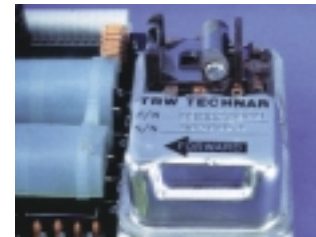
Two guide pins are used to align the roll connector with the steering wheel during reassembly. It is important that the roll connector be properly oriented to the steering system in order to prevent damage.

All SRS System electrical connectors are equipped with double locks and lock sensors. For identification purposes, the double locks are green.

The double lock sensors indicate that the connectors are fully engaged and the double lock mechanism is locked. If the coupling is incomplete, the **AIRBAG** warning light comes on in the combination meter, and a trouble code is generated.



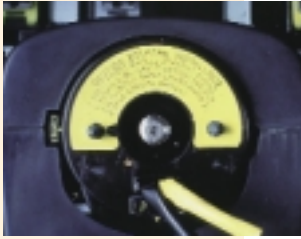
ECU with Front Inertia Sensors and Wiring Harness



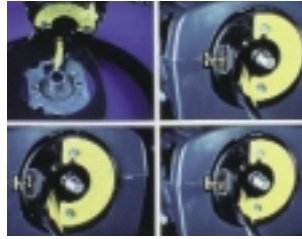
Cutaway Inertia Sensor



# Subaru Supplemental Restraint Systems



Roll Connector Orientation



Roll Connector Orientation



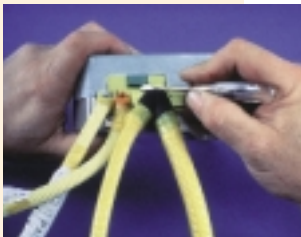
Late Model Steering Roll Connector



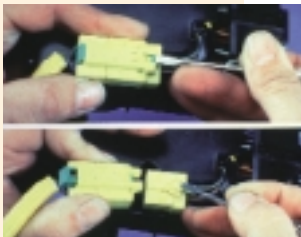
Safety Connector (Open)



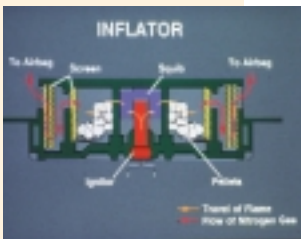
Safety Connector (Closed)



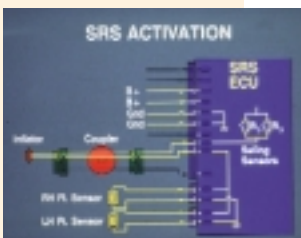
Releasing Double Lock



Double Lock Operation



SRS Inflator



SRS Activation

## System Operation

The airbag control unit receives inertia sensor input signals in the event of a frontal collision. It then sends a voltage signal to trigger airbag deployment. The control unit also features self-diagnostic capabilities including a long term memory.

The control unit continuously monitors the inertia sensors, the roll connector, the main harness, and the airbag module. It also checks for circuit and connector integrity.

The **AIRBAG** warning light is located in the combination meter. Two bulbs are used to illuminate this one indicator position. In normal operation, the SRS warning light goes out approximately 8 seconds after the key is turned on. If the light stays on, comes back on, flickers, or never comes on, this tells the driver that service is required. The light is also used to communicate trouble codes to the technician. To activate the SRS system, a frontal collision *must* exceed a pre-set level of approximately 12.5 MPH. The force of this impact causes the roller to overcome the tension of the roller springs in the front sensors and the roller springs in the safety sensors. The roller then makes contact with the circuit terminals. When this occurs, the front sensors complete a ground circuit to the airbag module while the safety sensors provide a positive power source to the module.

For the control unit to activate the airbag inflator, it must simultaneously receive at least one collision signal from either of the front sensors and at least one collision signal from either of the safety sensors. After receiving an electrical signal from the control unit, the igniter instantly heats up, starting a rapid combustion process which generates harmless nitrogen gas. The nitrogen gas passes through a filter screen, into the airbag, causing it to expand rapidly through the cover pad. Driver forward movement is absorbed by the inflated airbag. The driver's forward movement simultaneously discharges the nitrogen gas through two vent holes behind the bag. This deflates the bag and completes the process.

**Note:** A vehicle with a deployed airbag must be towed, not driven, to the dealer for service.

## Diagnostics

The self-diagnostic system includes the following modes:

- U-Check
- Self-Diagnosis
- Clear Memory

In the U.C.-check Mode, the airbag control unit continuously monitors all of the SRS system components and circuits. It then warns the driver of a system fault by illuminating the **AIRBAG** warning light on the dash.

In the self-diagnostic check mode, a technician may access trouble codes, which are then displayed by the **AIRBAG** warning light. Trouble codes may be either current codes or codes stored in long term memory. They are displayed similar to fuel system codes as follows:

A long flash lasts for 1.2 seconds and indicates a unit of 10. A short flash lasts 0.3 seconds indicating a unit of 1.

A continuous series of 0.6 second flashes is normal and indicates no trouble.

## Roll Connector Phasing

The roll connector *must* be properly oriented to the steering system. With the front wheels centered, align the inner *Center* indicator located behind the window in the roll connector, with the *Center* indicator located on the cover next to the window. There is also an alignment arrow on the connector case.

If the inner indicator shows *1R* in the window, rotate the cover one full rotation to the left.

If the inner indicator shows *2R* in the window, rotate the cover two full rotations to the left. Similarly, if the indicator shows either *1L* or *2L*, rotate the cover one or two right hand rotations.

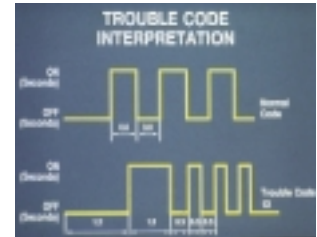
**Note:** To maintain proper steering wheel alignment, center the front wheels and scribe an alignment mark between the steering wheel hub and the shaft, prior to disassembly.

## Diagnosis and Repair Notes

Always consult the Subaru service manual before performing any SRS system diagnosis or repair.

The safe and effective diagnosis of the SRS system requires the use of dedicated test harnesses. Specific test harnesses are used to conduct the diagnostic tests as outlined in the vehicle service manual.

The SRS airbag system is thoroughly designed to prevent accidental deployment, however caution and the proper tools and equipment should always be used when servicing or diagnosing the system. The SRS system, when handled properly, is less hazardous to service than a car battery or fuel system.



Trouble Code Activation



SRS Test Harnesses