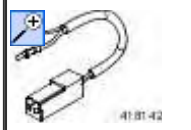
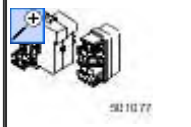
## Supplemental Restraint System - Airbag and Seatbelt Pretensioner Supplemental Restraint System (SRS)

Print

### Diagnosis and Testing

**Special Tool(s) / General Equipment**

| | |
|---|---|
|  | Test and Deployment Lead, Air Bag/Pyrotechnic Safety Belt<br>418-S055 |
|  | Test and Deployment Lead; Driver, Driver Lower and Passenger Air Bags and Side Air Curtain Module<br>418–525 |
|  | Test and Deployment Lead, Side Air Bag Module<br>418–555 |
|  | Simulator, Driver, Driver Lower and Passenger Air Bags and Side Air Curtain Module<br>418-160 |
|  | Simulator, Occupant Restraint Systems<br>501–077 |
|  | Simulator, Passenger Safety Belt Retractor and Pretensioner<br>418-138 |
| Ford diagnostic equipment | |

Refer to Wiring Diagram Section 046-1 for schematic and connector information.

For SRS Depowering and Repowering,
REFER to: Supplemental Restraint System (SRS) Depowering (501-20B Supplemental Restraint System, General Procedures).

### Principles of Operation

#### SRS Operation

The vehicle is equipped with a DC fired sensing system.

In the event of a severe frontal or three-quarter frontal impact, in excess of a predetermined limit, the driver and passenger front air bags and safety belt retractor pretensioners and driver knee air bag (if equipped) will deploy.

In the event of a severe full side impact, in excess of a predetermined limit, either the driver or passenger side air bag, side air curtain (if equipped) will deploy.

Air bag deployment will only occur, in the event of a severe collision, when the ignition key is in the RUN position. The passenger air bag deactivation (PAD) switch (if equipped) will deactivate the passenger frontal air bag in the event of a severe frontal impact; it will not deactivate any other deployable device.

**RCM**

The RCM retains full control of the whole system, providing continual system checks and full diagnostic capabilities. The non-volatile memory stores the diagnostic trouble codes, which can then be downloaded through the data link connector (DLC) to the Ford diagnostic equipment.

In the event of a failure in the vehicle supply during an accident, the RCM provides a backup power supply, sufficient to deploy the air bag(s) for a minimum of 150 ms. The backup power supply is discharged by the RCM within 60 seconds of the battery ground cable being disconnected.

The RCM contains electronic acceleration sensors which measure the longitudinal acceleration and the lateral acceleration and provide both signals to the micro-controller proportional to the amount of acceleration measured. The RCM also contains a safing sensor, which prevents unintentional deployment of the front air bags and safety belt retractor pretensioners and knee air bag (if equipped) in the event of a fault within the electronic acceleration sensor(s). The RCM compares the values it receives from the crash sensor, side impact sensors, safing sensor and the internal electronic sensors. If the deceleration due to a frontal or side impact exceeds a stored threshold value then the RCM triggers the air bags and safety belt pretensioners as required.

**Air Bag Warning Indicator**

The air bag warning indicator is incorporated into the instrument cluster, together with the automatic detach detect circuit. The air bag warning indicator illuminates for 3.2 seconds at key ON and goes OFF for 4.8 seconds. If the system self-tests OK the indicator will stay OFF, but if there is a fault condition, the air bag warning indicator will come ON again and stay illuminated.

The system is designed to illuminate the air bag warning indicator continuously if the RCM circuit is broken, either by loss of power, ground supply, module disconnect or CAN BUS failure.

Diagnostic evaluation of the SRS should be made through the DLC using the Ford diagnostic equipment to establish the nature of the concern.

**Front Crash Sensor**

The front crash sensor contains an acceleration sensor, filter, amplifier and an application specific integrated circuit for signal transmitting and is mounted on the radiator grille opening panel reinforcement. The crash sensor sends a signal at a level determined by the crash severity to the RCM. The RCM will evaluate the signal against stored data and deploy the frontal air bags and safety belt retractor pretensioners and knee air bag (if equipped) when required. Both the crash sensor and the internal RCM longitudinal acceleration sensor must exceed a preset limit to initiate the air bag.

**Side Impact Sensor**

The side impact sensors are mounted at the base of the B-pillar on either side of the vehicle, to facilitate remote lateral impact sensing. Each side impact sensor contains an acceleration sensor, filter, amplifier and an application specific integrated circuit for signal transmitting. In the event of an impact, in excess of a predetermined limit, the side impact sensor sends a signal at a level determined by the crash severity to the RCM. The RCM will evaluate the signal against stored data and deploy the side air bag on the side the deployment request was initiated. Both the side impact sensor and the internal RCM lateral acceleration sensor must exceed a preset limit to initiate the air bag. The RCM retains control of the side air bags, side air curtains.

**Diagnosing Customer Concerns Without Hard DTCs**

WARNING: To avoid accidental deployment, the restraints control module (RCM) backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing any repair or adjustment to the supplemental

restraint system (SRS), or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.
NOTE: Following the pinpoint tests when a diagnostic trouble code (DTC) is not present, or the air bag warning lamp is not permanently illuminated, will result in needless replacement of air bag system components and repeat repairs.
Speak with the customer to determine if a particular set of conditions must be met in order for a fault to occur. If an illuminated air bag warning lamp is reported by the customer but is not present when the vehicle comes in for repair, pinpoint test diagnostics cannot be used.

**Diagnosing Customer Concerns with Hard DTCs**

 WARNING: Do not use substitute air bag simulators when working on the SRS. Use only the appropriate tool. Failure to follow these instructions may result in personal injury.
Most air bag system diagnostic procedures require the use of system deactivation and system reactivation procedures. These procedures require the air bag module(s) and safety belt retractor pretensioners to be disconnected from the SRS, thereby removing the risk of air bag deployment while diagnostics are carried out.

Air bag simulators are required to carry out diagnosis and testing of the air bag system. The simulator contains a resistor, used to simulate an air bag module connection to the system. It is not acceptable to short-circuit the air bag module connections with a 0 ohm jumper wire. If a 0 ohm jumper wire is used to short-circuit the air bag module connections, an illuminated air bag warning lamp will be displayed and a DTC logged by the RCM.

**Glossary**

Air Bag Simulator

Air bag simulators are used to simulate air bag module connections to the system.

Prove Out the System

The air bag warning indicator will illuminate for three seconds. If there is a fault condition, the air bag warning indicator will stay illuminated or illuminate after a five second delay.

**Inspection and Verification**

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

**VISUAL INSPECTION CHART**

| Mechanical | Electrical |
|---|---|
| • Safety belt retractor pretensioner(s)<br>• Driver frontal air bag<br>• Passenger frontal air bag<br>• Driver and passenger side air bags<br>• Driver and passenger side air curtains<br>• Impact sensor(s) | • Fuse(s)<br>• Wiring harness<br>• Electrical connector(s)<br>• Driver safety belt buckle switch<br>• Safety belt retractor pretensioner(s)<br>• Passenger seat occupant sensor<br>• Passenger air bag deactivation (PAD) switch<br>• PAD indicator<br>• Clockspring<br>• Impact sensor(s)<br>• Message center switch<br>• Front impact severity sensor<br>• Auxiliary junction box (AJB)<br>• Body control module (BCM)<br>• Anti-Lock Brake System (ABS) module<br>• Restraints control module (RCM) |

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the diagnostic tab within the Ford Diagnostic Equipment.