TRAINING PROGRAM

JAGUAR SUPPLEMENTARY RESTRAINT SYSTEMS

PUBLICATION CODE – 620

Published by Service Training **Jaguar Cars North America**
Publication Part No. T620, August 2003
Printed in the USA

COURSE OBJECTIVES

- To describe and demonstrate safe working practices with Supplementary Restraint Systems (SRS).
- To identify the different Jaguar SRS systems used based on model applicability.
- To describe the components and functionality of the various SRS systems used by Jaguar.
- To demonstrate diagnostic fault code extraction and diagnostic procedures for SRS systems.

Airbag systems and seat belt systems are designed to be integral with the vehicle energy absorbing structure and components.

Although the entire vehicle is designed and tested to provide for the occupants protection, this course is intended to cover Jaguar's airbag and seat restraint systems specifically.

COURSE CONTENT

1. INTRODUCTION
2. GENERAL INFORMATION
3. JAGUAR RESTRAINT SYSTEMS EVOLUTION
4. SAFETY AND HANDLING
5. MECHANICAL RESTRAINT SYSTEMS
6. ELECTRO-MECHANICAL RESTRAINT SYSTEMS
7. SINGLE POINT SENSING (SPS) RESTRAINT SYSTEMS
8. ADAPTIVE RESTRAINT SYSTEMS
9. ISOFIX AND AWS SYSTEMS
10. POST TEST

DISCLAIMER

The illustrations, technical information, data and descriptive text in this publication, to the best of our knowledge, were correct at the time of going to print. The right to change specifications, equipment, procedures and maintenance instructions at any time without notice is reserved as part of our policy of continuous development and improvement.

No liability can be accepted for any inaccuracies or omissions in this publication, although every possible care has been taken to make it as complete and accurate as possible.

The training manual is intended to provide an overview only and must not be used as a reference source for servicing procedures. All servicing must be carried out in accordance with the appropriate Jaguar service literature (JTIS/GTR).

Jaguar Cars North America Service Training Department

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JAGUAR MODEL YEAR AND MODEL CODE INFORMATION

Table 1

Model year	Model (Engineering Designation)
1995-1997	XJ Sedan Range (X300)
1998-2003	XJ Sedan Range (X308)
2004–Onwards	XJ Sedan Range (X350)
1997-2002	XK Range (X100)
2003–2004	XK Range (X103)
2005–Onwards	XK Range (X105)
2000–2002	S-TYPE (X200)
2003–2004	S-TYPE (X202)
2005–Onwards	S-TYPE (X204)
2002–2003	X-TYPE (X400)
2004–Onwards	X-TYPE (X404)

ACRONYMS AND ABBREVIATIONS

NOTE:

A large majority of these abbreviations conform to the standards of SAE J1930.

- ALR — Automatic Locking Retractor
- ARM — Advanced Restraints Module
- ARTS — Advance Restraints Technology System
- AWD — All Wheel Drive
- AWS — Anti Whiplash System
- B+ – Battery Voltage
- CAN – Controller Area Network
- CM — Control Module
- C/O — Carry Over
- CPU – Central Processing Unit
- DC — Direct Current
- DIN — Deutsche Industrie Normen
- DLC – Data Link Connector
- DTC – Diagnostic Trouble Code
- DM — Diagnostic Module
- DSTPS — Driver Side Track Position Sensor
- DVOM — Digital Volt/Ohm Meter
- ECM – Engine Control Module
- ELR Sensor – Emergency Locking Retractor
- ECU — Electronic Control Unit
- FCS — Front Crash Sensor
- GEM – Generic Electronic Module
- GTR — Global Technical Reference
- HGI — Heated Gas Inflator
- IC — Instrument Cluster
- IKB — Inflatable Knee Bolster
- IG – Ignition
- ISO — International Standards Organization
- JTIS — Jaguar Technical Information System
- KAM — Keep Alive Memory
- LATCH — Lower Anchors and Tethers for CHildren
- LED — Light Emitting Diode
- LCD — Liquid Crystal Display
- LHD — Left Hand Drive
- MIL — Malfunction Indicator Lamp
- N/A – Not Applicable
- NAS – North American Specification
- OBD – On-Board Diagnostics
- OSM — Occupancy Sensing Module
- PAD — Passenger Airbag Deactivation light
- PCB — Printed Circuit Board
- PCM — Powertrain Control Module
- PJB — Passenger Junction Box
- PSWS — Passenger Seat Weight Sensor
- PWM — Pulse Width Modulation
- RAM — Random Access Memory
- RCM — Restraints Control Module
- ROM — Read Only Memory
- RHD — Right Hand Drive
- RHS — Right Hand Side
- RPDB — Rear Power Distribution Box
- ROW – Rest of the World specification
- SAE — Society of Automotive Engineers
- SBBS — Seat Belt Buckle Sensor
- SCS — Side Crash Sensor
- S/C – Super Charged
- SCP – Standard Corporate Protocol Network
- SPS — Single Point Sensor
- SIMS — Single Impact Module Sensor
- SRS — Supplementary Restraints System
- WDS — Worldwide Diagnostic System
- VEMS — Vehicle Emergency Message System

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JAGUAR RESTRAINT SYSTEMS EVOLUTION

Supplementary Restraint Systems can be classified into 4 main types:

1. Mechanical System.
   These systems are mechanically sensed and mechanically fired. They have no diagnostic capability.

2. Electromechanical System.
   These systems are mechanically sensed but electrically fired. They have electrical diagnostic capability and can store system fault codes.

3. Single Point Sensing System.
   These systems are electronically sensed and electrically fired. They also have diagnostic capability and can store system fault codes.

4. Adaptive Restraints System.
   These electrical systems tailor the deployment response to the severity of the accident and the stature, position and restraints usage of the occupants.

Table 2

MODEL YEAR	MODEL	AIR BAG SYSTEM	SEAT BELT SYSTEM
1988	XJS	N/A	Passive restraint 1988 to 1989 coupe only
1989	XJ6	N/A	Passive restraint 1989 to 1992
1990	XJS	Mechanical driver airbag	1990 Drivers side knee bolster. 1994 Passenger side knee bolster. Active restraints

MODEL YEAR	MODEL	AIR BAG SYSTEM	SEAT BELT SYSTEM
1993	XJ6	Mechanical driver airbag	Active restraints. Seat-belt tear loops
1994	XJ6/XJ12/XJS	Mechanical driver and passenger airbag	
1995	XJ6/XJ12/XJR (X300)	Electromechanical driver and passenger airbag	Active restraint tear loop
1997	XK8 (X100)	Electromechanical driver and passenger airbag	Independent mechanical driver and passenger pre-tensioners
1998	XJ8 (X308)	Single Point Sensing (SPS) Driver and passenger airbag Front driver and passenger side airbag	Electronic front driver and passenger pre-tensioners

MODEL YEAR	MODEL	AIR BAG SYSTEM	SEAT BELT SYSTEM
1999	S-TYPE (X200)	SPS driver and passenger airbag. Front driver and passenger airbag	Electronic front driver and passenger pre-tensioners
2000	XK8 (X100)	Electromechanical driver and passenger airbag	Electronic driver and front passenger seat belt pre-tensioners
2001	XK8 (X100)	Adaptive restraint system. Driver and front passenger selective airbag. Driver and front passenger side airbag	Selective electronic seat belt pre-tensioner driver and front passenger

MODEL YEAR	MODEL	AIR BAG SYSTEM	SEAT BELT SYSTEM
2002	X-TYPE (X400)	Adaptive restraint system. Driver and front passenger selective airbag. Driver and front passenger side airbag. Front and rear curtain airbag	Selective electronic seat belt pre-tensioner driver and front passenger
2003	S-TYPE (X202)	Adaptive restraint system. Driver and front passenger selective airbag. Driver and front passenger selective side airbag. Front and rear curtain airbag	Selective electronic seat belt pre-tensioner driver and front passenger. Electronic rear passenger pre-tensioners. Anti-Whiplash seat System (AWS)

MODEL YEAR	MODEL	AIR BAG SYSTEM	SEAT BELT SYSTEM
2004	XJ (X350)	Adaptive restraint system. Driver and front passenger selective airbag. Driver and front passenger selective side airbag. Front and rear curtain airbag	Selective electronic seat belt pre-tensioner driver and front passenger. Electronic rear passenger pre-tensioners. Anti-Whiplash seat System (AWS).
2004	X-TYPE (X404)	C/O X400 with the introduction of inflatable knee bolster, new PAD light text on deployment door, new generation, seat weight sensor	C/O X400 with introduction of seat belt sensor and reel belt pre-tensioner

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SAFETY PRECAUTIONS WITH AIRBAGS

Overview

Airbags are perfectly safe under normal conditions when handled correctly but should always be treated with respect.

They are pyrotechnic devices that when deployed, will rapidly generate high pressures so care should always be taken to avoid inadvertent deployment.

Testing of airbag systems

- Always disconnect the battery negative cable and wait at least two (2) minutes for the reserve power supply to discharge before starting any work.
- After disconnecting the battery negative cable, ensure it is securely stowed and cannot spring back into contact with the battery terminal.
- Always disconnect and remove airbag modules before starting diagnostics.
- Do not replace system fuses before following the airbag removal process.
- Never probe airbag systems or modules with the airbags connected as only a very small current is required for deployment.

NOTE:

Remember, **NOT** all airbag harnesses and connectors will be identified with yellow sheathing.

Handling undeployed airbags

- Keep away from heat, sparks, and open flames.
- Keep away from electrical equipment.
- Be careful not to generate electricity.
- Do not drop or impact airbag module.
- Do not tamper with the connector on the back of the module or cut any wires.
- Never place anything over the undeployed airbag which could become a projectile in the event of an inadvertent deployment.
- When carrying, do not wrap arms around the module. Always carry with cover and vents facing away from the body.
- Never carry the airbag module by the wires or connector.

WARNING:

Never place a module "cover side down" Apart from the risk of cosmetic damage the module would become a high speed projectile in the event of an inadvertent deployment.

Airbag modules can contain chemicals such as sodium azide which are classified as very toxic. Exposure to these gas generation chemicals is extremely unlikely during normal contact with restraint devices due to their encapsulation within an aluminium or steel container. Users should however be aware of their potentially hazardous nature in the event of any inadvertent release due to damage to the device.

If the gas generator is for some reason damaged or ruptured, it should be examined by trained personnel before any attempt is made to remove and/or deploy it. Full protective clothing should be worn when dealing with any spillage. Refer to the relevant Material Safety Data Sheet.

Ruptured units should be stored away from all liquids, acids, halogens, heavy metals and metal salts.

NOTE:

Airbag modules are not serviceable and must not be dismantled, punctured, incinerated or welded. Do not attempt any repairs.

Storage of pyrotechnic components

- Store modules in a secure, dedicated and properly identified lockable cabinet.
- Store in a dry environment at a temperature range between –35ºC and 85ºC (-31ºF and 185ºF).
- Do not stack more than 1 high on a shelf.

Disposal of live airbag modules using tires

- The deployment procedure should be performed outside, well away from other personnel.
- Appropriate safety equipment, safety goggles, rubber gloves and ear protection should be worn.
- Stack four scrap tires, securing them together with heavy gauge wire or cable.
- While disconnected from any power source, connect the deployment harness from the deployment tool kit and place the airbag adaptor portion under the tire stack, ready for connection to the airbag module.
- Connect the airbag module to the connector, ensuring the connector locking sleeve is retracted prior to first stage connection, then pushed fully home until a click is felt or heard. Ensure the connector is not in contact with the inflator or it will become damaged during deployment.
- Position the airbag with the cover facing upwards. Remove any loose debris from around the airbag and ensure no flammable liquids are present.
- Connect the deployment tool clips to a 12V vehicle battery at least 10m from the tire stack.
- Deploy the module by pressing both switches on the tool.
- Allow the unit to cool for at least 20 minutes. Cooling modules should be continuously monitored to ensure the heat generated does not create a fire with spilled liquids or other debris.
- Remove the airbag from the tire stack and seal in a plastic bag ready for disposal. Deployed airbags should be disposed of as special waste and must comply with local environmental regulations.

Disposal of twin stage airbags

- If a vehicle fitted with twin stage airbags is involved in an impact where the ARM determines that only the first stage deployment is required, the ARM will still deploy the second stage 100ms later. This ensures the airbag is completely deployed prior to the arrival of any rescue services.
- In the event of an electrical failure preventing this second stage deployment, the heat soak from the first stage deployment will always deploy the second stage after a short period.
- When deploying twin stage airbags in a tire stack, both stages should be deployed simultaneously if possible. If not possible, the first stage must be deployed first.
- Always wait at least nine (9) minutes before returning to a deployed bag to ensure both stages have deployed.

Handling deployed airbags

- Ensure modules are cool before handling.
- After deployment, the airbag surface may contain small deposits of sodium hydroxide, a by-product of the gas generant combustion, that may be irritating to the skin and eyes.
- When handling deployed airbags, always wear rubber gloves and chemical resistant goggles.
- After handling deployed airbags, wash hands and exposed skin surfaces immediately with mild soap and water.

Lifespan of airbags

Airbag modules and components are designed to last for the lifetime of the vehicle and do not require routine replacement. This information is provided in the owner's handbook.

NOTE:

Earlier vehicles may have airbags with a limited life-span. In this case the life-span of the airbag will be shown on a label on the actual airbag module.

What to replace after an accident

The following information relates to an XJ8 for an accident with airbag deployment.

Table 3 XJ8 Accident with airbag deployment

COMPONENT	FRONTAL IMPACT	SIDE IMPACT
Single Point Sensor	Check with WDS	Check with WDS
Side Impact Sensor	Check with WDS	Check with WDS
Driver's Airbag	Replace	Check with WDS
Steering Wheel	Replace	Visual/functional check
Passenger's Airbag	Replace	Check with WDS
Fascia	Replace	Visual check
Airbag Mounting Brackets	Replace	Visual check
Harnessing	Replace	Visual check
Deployment door assembly	Replace	Visual check
Glovebox/Kneebolster	Visual/functional check	Visual/functional check
Seatbelt Retractors	Replace	Visual/functional check
Seatbelt buckles	Replace	Visual/functional check
Side Airbag Module	Check with WDS	Replace
Seat Frame/Foams/Covers	Visual/functional check	Replace
Upper Steering Column/Bracket	Replace	Visual/functional check
Steering Column Cowls	Replace	Visual/functional check
Door Trims	Visual check	Visual check
Glass Lift Mechanisms	Functional check	Functional check
ISOfix Anchorages	Visual/functional check	Visual/functional check

The following information, relates to an XJ8 for an accident without airbag deployment.

This information would also be applicable to vehicles with Adaptive Restraints Systems.

However, in modest severity crashes with frontal occupants wearing seatbelts, it is possible for only the seat belt pre-tensioners to fire. Where this has occurred, the entire seat belt system in that seating position should be replaced.

Table 4 XJ8 Without airbag deployment

COMPONENT	FRONTAL IMPACT	SIDE IMPACT
Single Point Sensor	Check with WDS	Check with WDS
Side Impact Sensor	Check with WDS	Check with WDS
Driver's Airbag	Check with WDS	Check with WDS
Steering Wheel	Visual/functional check	Visual/functional check
Passenger's Airbag	Check with WDS	Check with WDS
Fascia	Visual check	Visual check
Airbag Mounting Brackets	Visual check	Visual check
Harnessing	Visual check	Visual check
Deployment Door Assembly	Visual check	Visual check
Glove box/Kneebolster	Visual/functional check	Visual/functional check
Seatbelt Retractors	Visual/functional check	Visual/functional check
Seatbelt Buckles	Visual/functional check	Visual/functional check
Side Airbag Module	Check with WDS	Check with WDS
Seat Frame/Foams/Covers	Visual/functional check	Visual/functional check
Upper Steering Column/Bracket	Visual/functional check	Visual/functional check
Steering Column Cowls	Visual check	Visual check
Door Trims	Visual check	Visual check
Glass Lift Mechanisms	Functional check	Functional check
ISOfix Anchorages	Visual/functional check	Visual/functional check

Control Module Replacement

Depending on the system, control modules for electrical and Adaptive Restraint Systems will support up to five (5) deployment events before a DTC is logged making further use of the module impossible. As long as this threshold has not been reached the module can be re-used as long as no fault codes are stored indicating internal damage to the module.

WARNING:

Do not use impact wrenches or click-type torque wrenches when installing restraint control modules or impact sensors.

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MODEL APPLICABILITY — XJS 1990—1996, XJ6/XJ12 – 1993—1994 MY

System Components and Operation

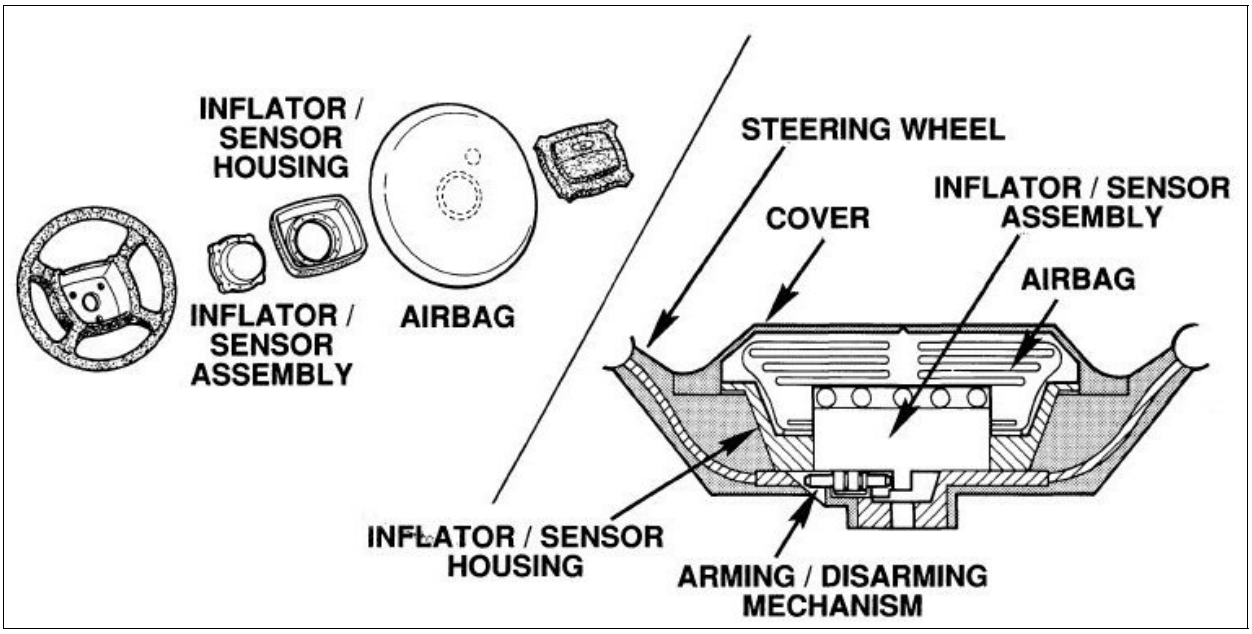

Fig. 1 Driver Airbag components

The airbag assemblies are self contained units incorporating the sensor and inflator assembly. The airbag deploys if the sensor experiences an impact pulse equal to a solid barrier frontal impact at or above 9.5 km/h (6 mph).

Because each airbag triggers individually, vehicles fitted with both passenger and driver side airbags may only deploy one airbag, depending on the force of the impact.

Removal/Refit Procedure

NOTE:

The airbags should always be disarmed before performing any work in the vicinity.

The disarming mechanism allows safe service and maintenance of the steering-related components.

Driver Airbag

The arming/disarming mechanism is built into the inflator/sensing assembly. Arming and disarming are determined by the position of the arming screw in the steering wheel hub.

Removal procedure

- Disconnect the vehicle battery negative lead.
- Tilt the steering wheel fully downwards.
- Rotate the steering wheel 90 degrees from the straight ahead position and remove the airbag nut cover and nut.
- Repeat for the opposite side.
- Rotate the steering wheel 180 degrees from the straight ahead position and open the access cover for the arming screw and the third fixing.
- Using special tool JD 159, rotate the arming pin anti-clockwise for approximately 12 turns or until resistance is felt.
- This action both disarms the module and releases the slide interlock for access to the third fixing, thus ensuring the module cannot be removed from the vehicle in an armed state.
- Remove the third module fixing and remove the module from the vehicle.
- Fitting is the reversal of this procedure, ensuring the arming screw and all fixings are tightened to the correct torque.

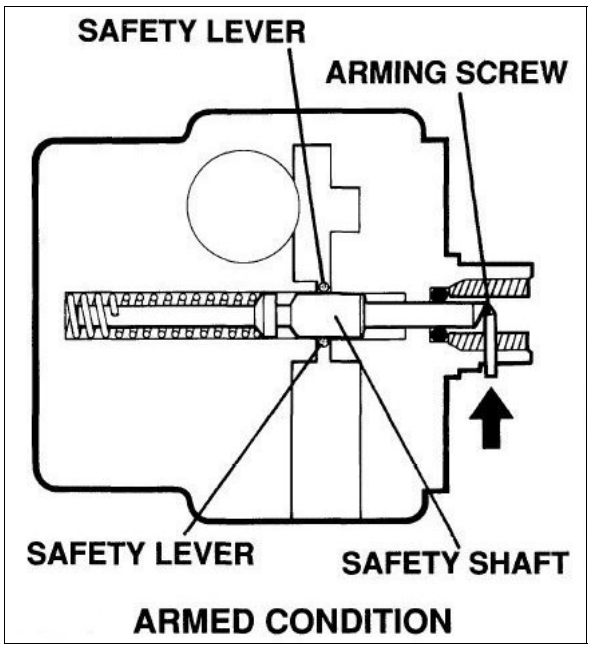

Fig. 2

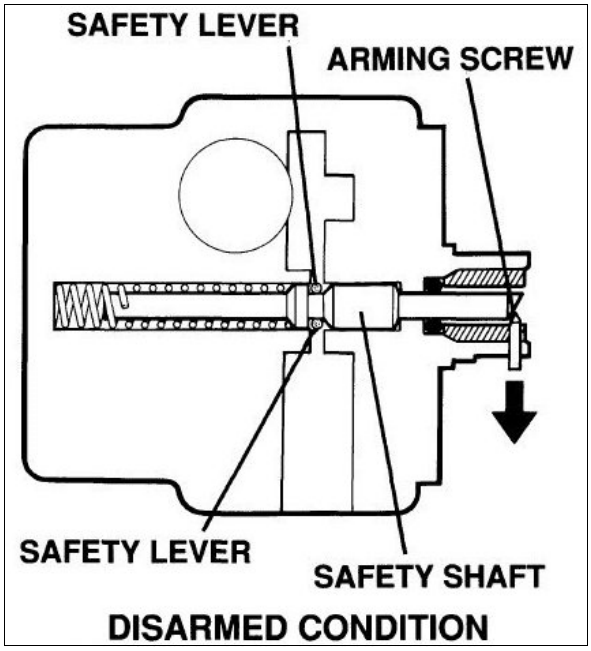

Fig. 3

Passenger airbag (XJS 1994–1996, XJ6/XJ12 1994MY)

The passenger airbag assembly is armed by a separate spring loaded arming mechanism fixed to the back of the airbag module. When the airbag module is rotated into its installed position, a tang on the mounting plate engages with the arming slide. The slide positions the airbag arming pin to its armed position against spring pressure. Catch plates on each side of the module hold the module in the armed position. Armed and disarmed condition is determined by the position of the arming mechanism slide.

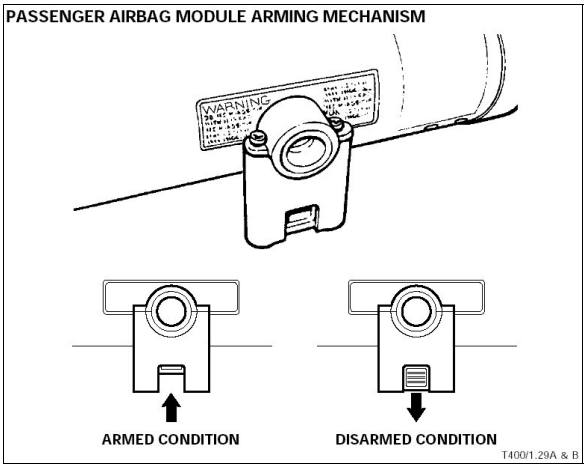

Fig. 4

Passenger Airbag

- Disconnect the vehicle battery negative lead.
- Remove the fascia assembly.
- Slacken the airbag upper M10 fixings (1 each side) and M6 catch plate nuts (1 each side).
- Lift the catch plates and allow the airbag assembly to pivot downwards to the disarmed position (NOTE: care should be taken as the arming mechanism will apply a considerable downward force as the catches are released).
- Remove the fixings retaining the outer bracket to the dash rail and crossbeam assembly.
- Remove the previously slackened M10 and M6 fixings and remove the airbag/outer bracket assembly from the vehicle.
- Check that the arming mechanism slide is fully down in the disarmed position.
- After ensuring the module is disarmed, release the split cap fixings and remove the arming mechanism from the airbag module.
- Remove the outer bracket and anti tamper bracket.
- Fitting is the reversal of this procedure ensuring that:

1. The arming mechanism spigot is fully engaged onto the module.
2. Resistance is felt from the arming mechanism as the module is pivoted back to the armed position.
3. The anti tamper brackets fully obscure the lower outer fixings.
4. All fixings are tightened to the specified torque.

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MODEL APPLICABILITY — XJ6/XJ12/XJR 1995–1997 MY (X300)

Overview

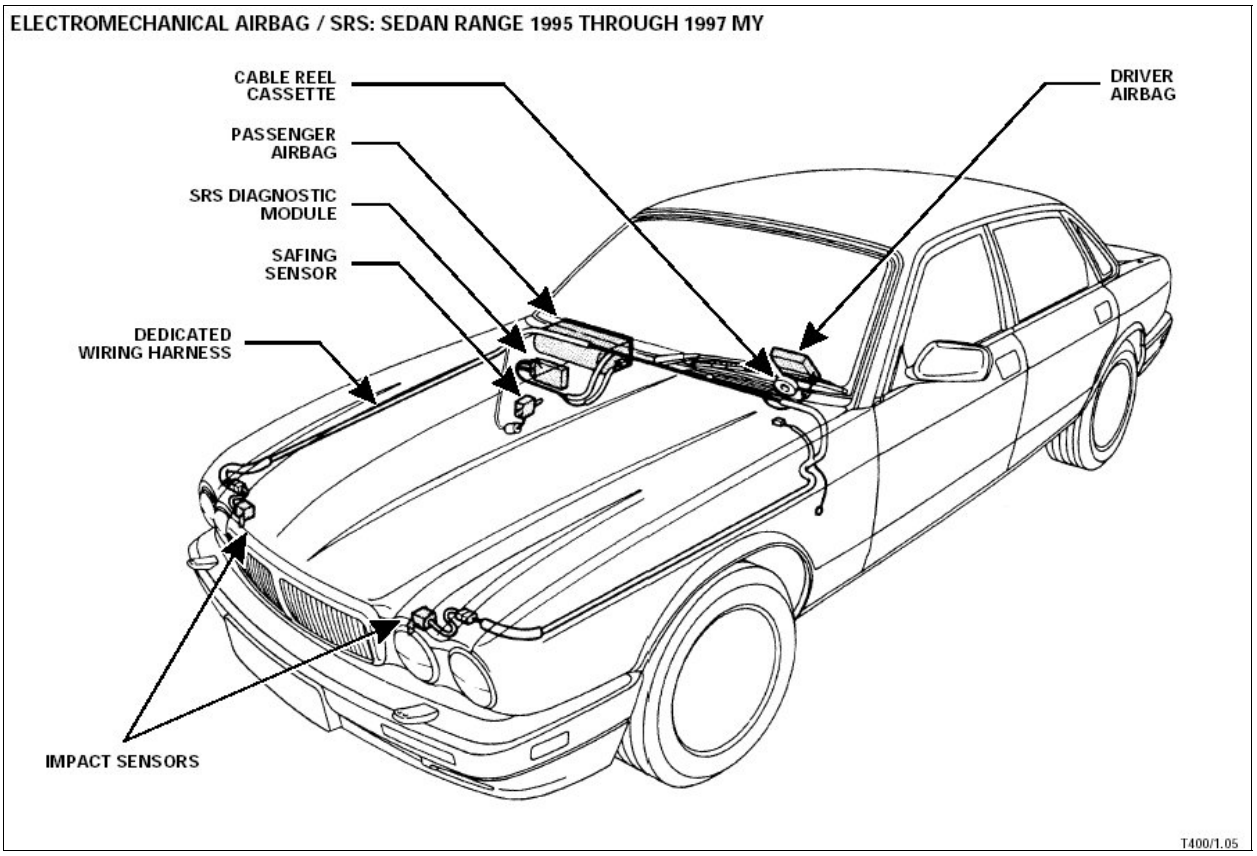

Fig. 5

This occupant protection system consists of electromechanically sensed airbags and three-point tear-loop style active seat belts for both the driver and the front seat passenger positions.

A diagnostic module monitors the airbag system and controls the SRS AIRBAG MIL and the AIRBAG warning for the LCD (liquid crystal display) message display.

The airbag system is powered by a fused battery power supply and a fused ignition auxiliary power supply to the diagnostic module (DM). In the event of a frontal collision with enough force to activate at least one of the front impact sensors plus the safing sensor, both airbags are triggered and deploy within 32 milliseconds. The DM contains a power reserve that can deploy the airbags with all power to the system removed. The system utilizes a dedicated wiring harness, colored yellow for identification.

SYSTEM COMPONENTS AND OPERATION

SRS Diagnostic Module

SRS DIAGNOSTIC MODULE (RHD SHOWN)

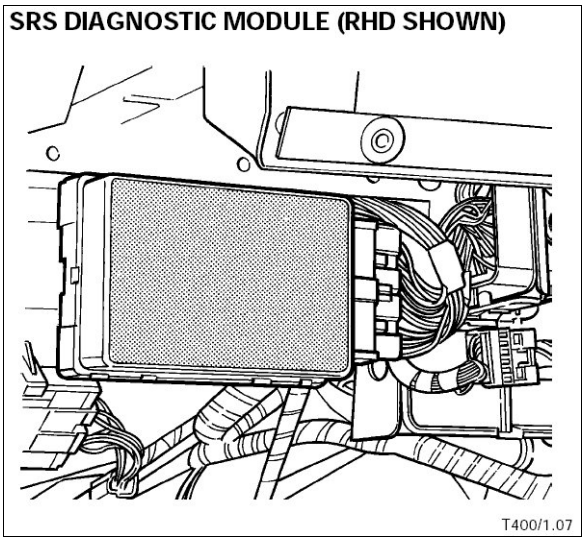

Fig. 6

- Mounted in the fascia behind the passenger's airbag.
- Does not deploy the airbags.
- Monitors the system for faults. Fault codes are stored by the Instrument Cluster (IC), not the Diagnostic Module. The IC can store a maximum of 3 fault codes from the 19 available, highest priority first.
- The Diagnostic Monitor contains an internal thermal fuse to cut the deployment power path if a ground short is detected in the deployment circuit to prevent inadvertent deployment of the airbags (not serviceable).
- The Diagnostic Monitor contains an internal 2200 micro-farad capacitor to permit deployment of the airbags if the battery power supply has been lost during the impact.
- The Diagnostic Monitor contains an internal buzzer to indicate a fault if communication is lost with the IC and an airbag fault exists. The buzzer will sound will sound 5 sets of 5 bleeps when the ignition is turned on, repeated every 30 minutes.

Front Impact Sensors

- Mounted between each headlamp bracket and hood hinge.
- Ball and tube type.
- Correct alignment is critical. Sensors are marked with an arrow to indicate forward direction and "L" and "R" to indicate the side of the vehicle.
- Use fixings once only.

Under normal conditions a permanent magnet holds a metal ball securely at one end of the tube with two open electrical contacts at the other. In the event of a severe impact, the ball detaches itself from the magnet, rolls along the tube and bridges the contacts, thus providing a ground path for the airbag circuit.

FRONT IMPACT SENSOR ORIENTATION

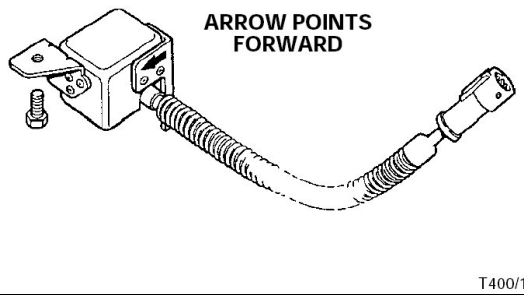

Fig. 7

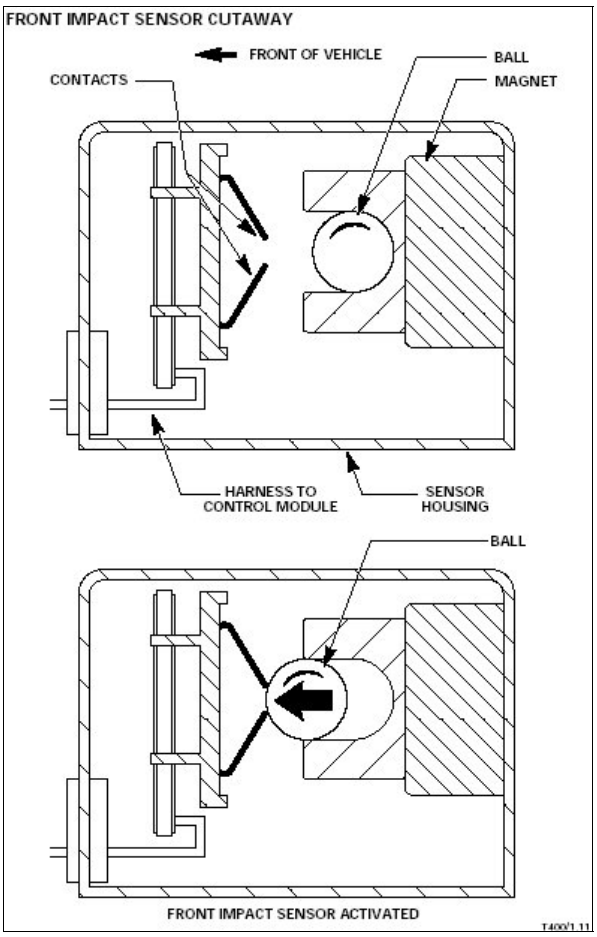

Fig. 8

Safing sensor

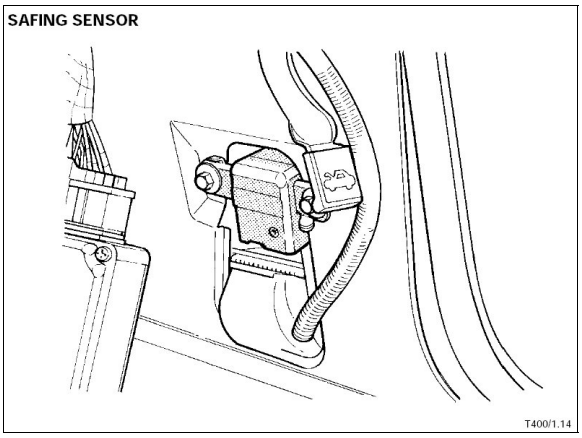

Fig. 9 Safing Sensor

The safing sensor is located in the passenger side footwell on the base of the A post to sense the impact energy in the passenger compartment. When activated, this sensor connects the airbags to the deployment voltage supply. The safing sensor operates on the same principle as the front impact sensors. To trigger airbag deployment, an impact must have enough force to activate the safing sensor plus one impact sensor.

Airbag modules

Non-serviceable, self contained airbag modules are provided for the front seat occupants.

Each module consists of an inflator assembly, airbag, and trim. The inflator assembly contains an igniter and a sodium azide / copper oxide inflation charge. When electrically ignited by the system, the inflation charge generates a volume of nitrogen gas to inflate the airbag. The force of inflation displaces the trim and the airbag deploys in the passenger compartment.

The driver side module is located in the center of the steering wheel; the passenger side module is located in the fascia.

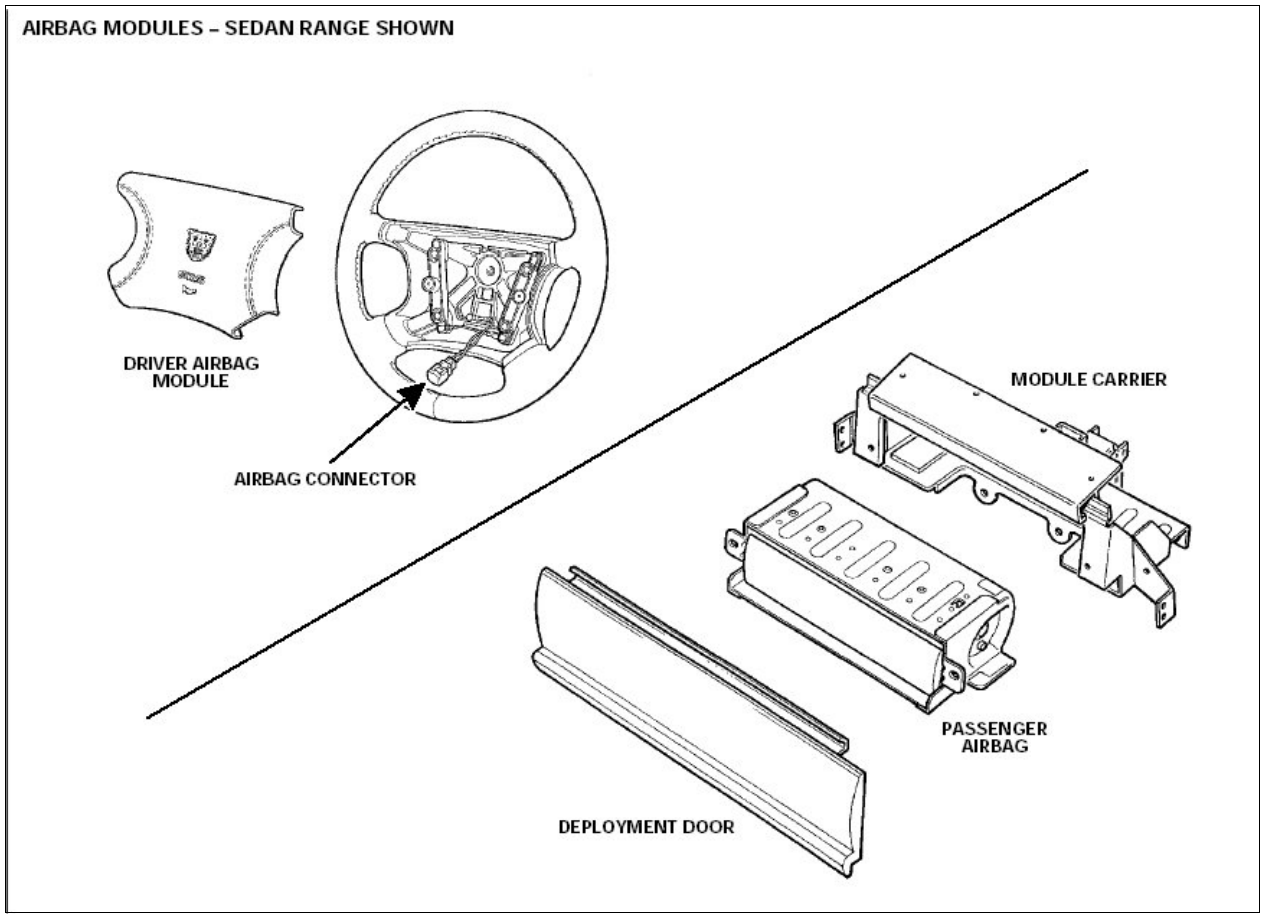

Fig. 10

Cable reel cassette

The cable reel cassette, located behind the steering wheel , is the interface between the wiring harness and the airbag module. The cassette houses the airbag connecting wires and allows for five turns of lock-to-lock steering wheel rotation. When installing the cassette, center the steering and align the cassette center reference marks to provide for steering wheel rotation without damage to airbag circuit wiring.

NOTE:

Do not fit a new cassette if the paper securing tape is broken.

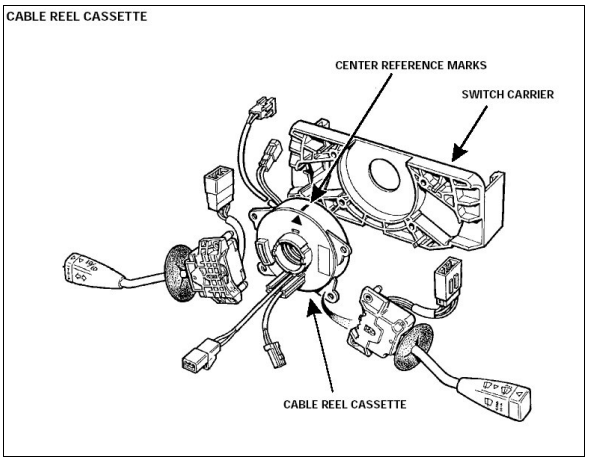

Fig. 11 Cable reel cassette

Wiring harness

The airbag / SRS system uses a dedicated yellow-covered wiring harness that is independent of all other vehicle systems. The dedicated harness electrically connects all airbag / SRS system components. The harness is non-serviceable and must be replaced if faulty. The fly-leads of components that connect to the airbag harness are not colored yellow.

NOTE:

The diagnostic module harness connectors, airbag module and cable reel cassette connectors, are equipped with “shorting bars”. The shorting bars protect against inadvertent airbag deployment by short circuiting the designated circuits when the connector is separated. Refer to the applicable vehicle Electrical Guide for the locations of the “shorting bars.”

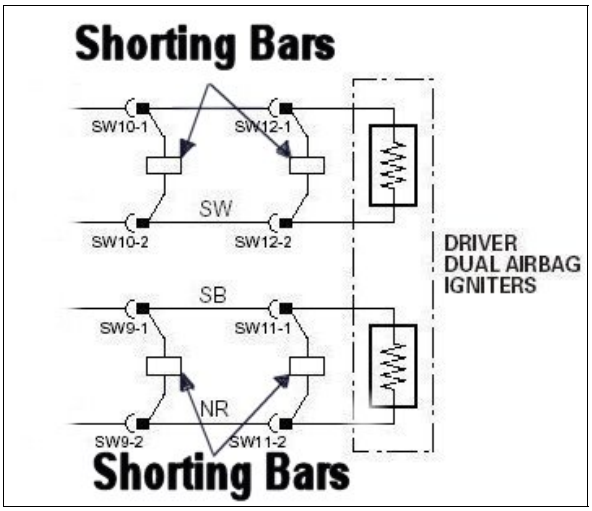

Fig. 12 Electrical guide diagram showing shorting bars

Deployment Scenario

- When the safing sensor plus one impact sensor is activated (contacts closed), the circuit from the DM deployment voltage supply is completed through the safing sensor to each airbag and to ground at the activated impact sensor.
- Current flow triggers the igniter, which in turn ignites the deployment charge. The time from sensor closing to airbag deployment is no greater than 32 milliseconds.
- Both airbags are designed to deploy during impact. If only one airbag is deployed, the undeployed airbag must also be replaced.

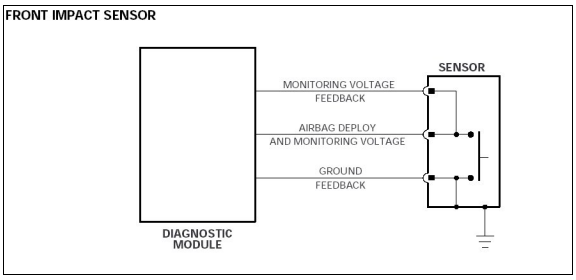

Fig. 13 Front impact sensor electrical diagram

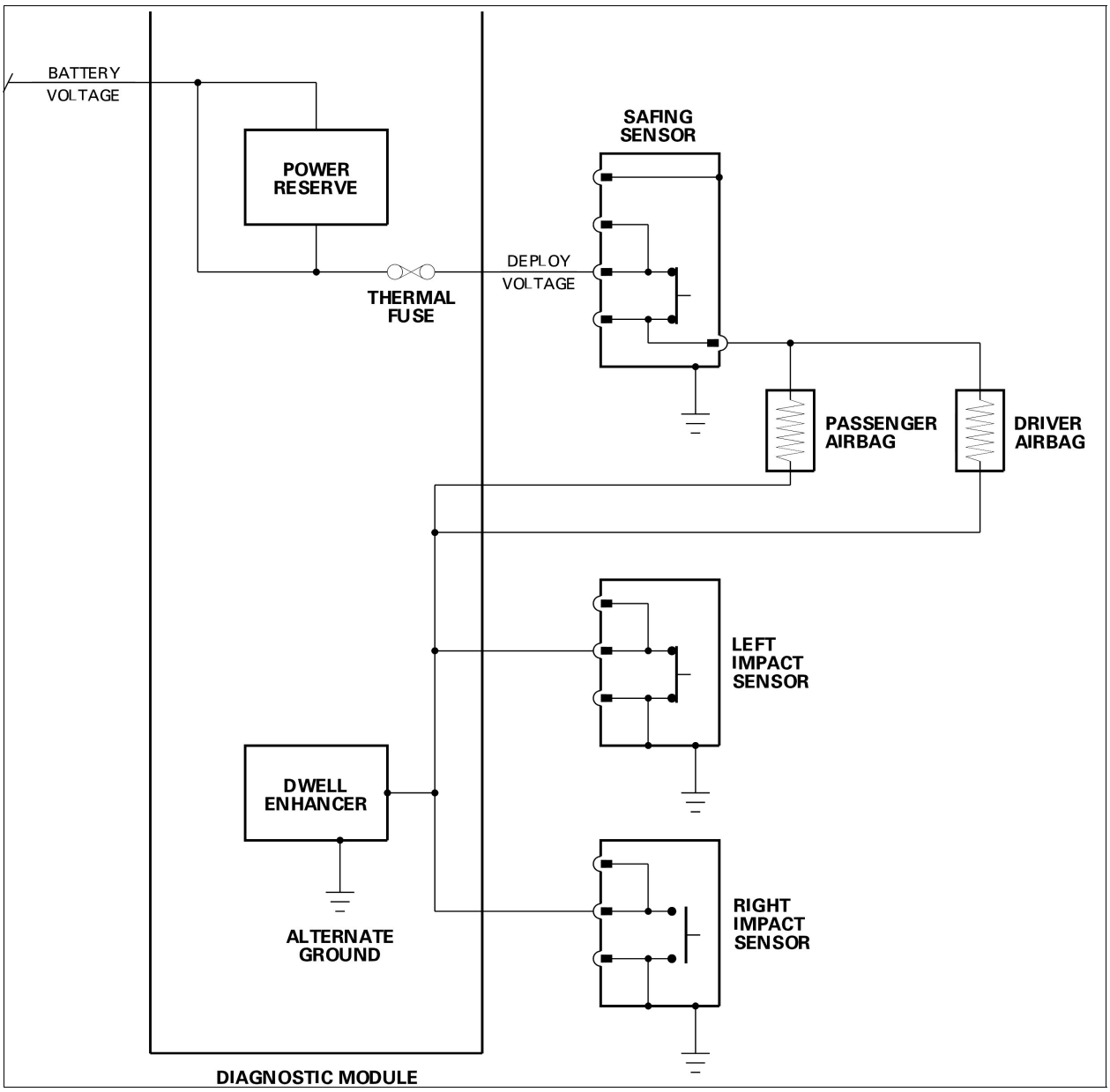

Fig. 14 Electromechanical system electrical diagram

SYSTEM DIAGNOSTICS ELECTROMECHANICAL SYSTEM XJ 1995 — 1997 MY (X300)

Overview

The Diagnostic Module continually monitors the system for open and short circuits and sensor faults. Each time the ignition is switched ON, the SRS airbag MIL is activated by a low voltage signal from the DM via the warning illumination circuit. If the SRS system is functioning correctly, the DM drives the MIL off with a high volage signal after approximately six seconds

If the DM determines a fault within the SRS system, it activates the MIL and provides DTC information to the instrument pack non-volatile memory. If an SRS fault disappears or is repaired, the DM stops transmitting the DTC information. The warning light will go out but the code remains stored and can only be cleared with WDS. Thus the warning light may be witnessed illuminating and extinguishing as a fault comes and goes.

Circuit testing with a DVOM is only permissible after disarming the system and fitting special airbag simulator tool (JAG 7956) to both driver and passenger positions. Be certain to locate and remove any shorting bars that may be found within the harness connectors. Once testing has been carried out refit the shorting bars to their original locations.

NOTE:

DO NOT under any circumstances test the system with the airbag modules connected!

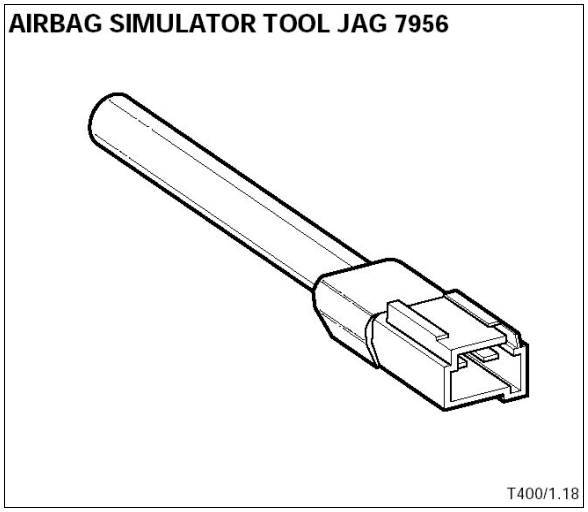

Fig. 15

WARNING:

Do not attempt to measure circuit resistance or continuity through the airbag assembly: the small amount of voltage from the tester may trigger airbag deployment and possibly result in personal injury. IF a resistance or continuity measurement is required, disconnect both airbags from the harness and install tool JAG7956 airbag simulator tool in the airbag connectors before connecting the meter. The airbag simulator tool resistance is 2.5 Ohms.

The following fault codes on the next page are available and can be retrieved using WDS:

Table 5 System Fault Codes

CODE	FAULT DESCRIPTION
12	Low battery voltage.
13	Airbag circuit shorted to ground.
14	Front impact sensor circuit shorted to ground.
21	Safing sensor incorrectly mounted to vehicle.
22	Safing sensor output circuit shorted to battery.
23	Safing sensor input feed/return open circuit.
24	Safing sensor output feed/return open circuit.
32	Driver side airbag circuit high resistance or open circuit.
33	Passenger side airbag circuit high resistance or open circuit.
34	Driver side airbag circuit low resistance or short circuit.
35	Passenger side airbag circuit low resistance or short circuit.
41	Front right impact sensor feed/return open circuit.
42	Front left impact sensor feed/return open circuit.
44	Front right impact sensor incorrectly mounted to vehicle.
45	Front left impact sensor incorrectly mounted to vehicle.
51	Diagnostic module thermal fuse — intermittent short to ground.
52	Back up power supply — voltage boost fault.
53	Front impact sensor circuits resistance to ground or internal Diagnostic Module failure.
99	Rapid continuous flashing of the MIL. Both front impact sensors disconnected. (This is a manufacturing mode that should not occur after initial vehicle production.)

NOTE:

Code 51 indicates that the airbag deployment voltage has intentionally been removed from the circuit due to a potentially unsafe circuit or component fault. This is achieved by the opening of the non-serviceable thermal fuse within the diagnostic monitor. This is most likely caused by a short circuit within the airbag circuit in which case there will be an additional code or codes which must be addressed first. The diagnostic monitor will intentionally blow the fuse after airbag deployment.

Disarming Procedure

Before performing any diagnostic work on the system, the airbags should be disarmed as follows:

- If the vehicle has an electric steering column, power this out and down to allow access to the airbag module.
- Disconnect the battery ground lead. Ensure this lead is securely stowed and cannot accidently spring back and contact the battery terminal.
- Wait a minimum of two (2) minutes to allow the diagnostic module internal power supply to discharge.
- Remove the 2 fasteners retaining the driver's airbag module.
- Disconnect and remove the driver's airbag module.
- Remove the glove box to allow access to the passenger's airbag module.
- Disconnect the passenger's airbag module.
- Fit airbag simulators to the driver's and passenger's airbag connectors.
- Re-connect the battery ground lead.

Arming Procedure

- Disconnect the battery ground lead.
- Wait a minimum of two (2) minutes to allow the diagnostic module internal power supply to discharge.
- Remove the airbag simulators.
- Connect the passenger's airbag and refit the glove box.
- Connect and refit the driver's airbag.
- Re-connect the battery ground lead.
- Switch the ignition on and ensure the airbag warning lamp extinguishes after the 5 second prove out.

SEATBELTS

Front seatbelts

The three-point active seat belts utilize an adjustable shoulder anchor point. Airbag / SRS equipped vehicle seat belts use tear loop units on the airbag equipped position seat belt buckle assemblies to reduce occupant chest loads in the event of a collision. The tear loop unit is designed to absorb energy as the occupant travels forward into the airbag..

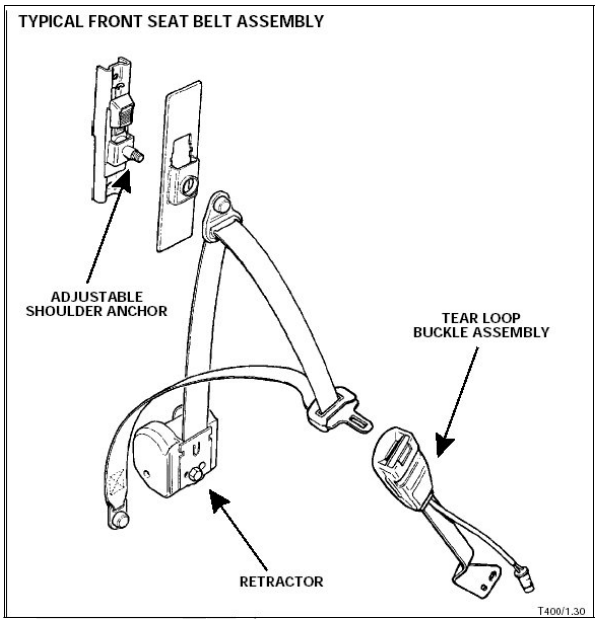

Fig. 16

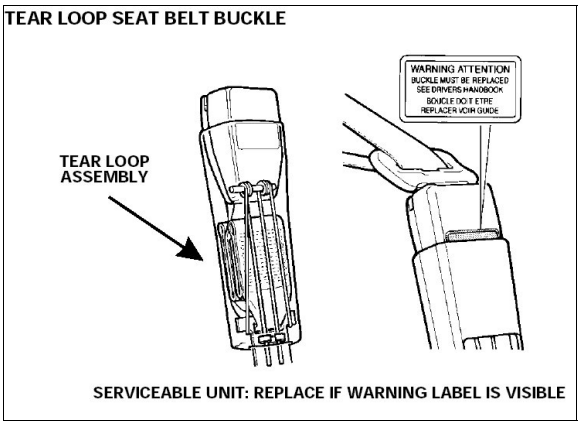

Fig. 17

All seatbelt units will allow the occupants free torso movement while restrained but will lock the retractor during rapid deceleration. This function is called Emergency Locking Retractor (ELR) and can be checked by grasping the belt and pulling rapidly. The front passenger position and rear seat outboard positions incorporate an Automatic Locking Retractor (ALR) function which prevents withdrawal of the belt and allows retraction only. To engage the ALR function, pull the seat belt fully from the retractor. As the belt is fed back into the reel, a ratchet prevents it from reversing direction. To disengage the ALR function, release the belt and allow it to fully retract.

WARNING:

DO NOT INTERCHANGE SEAT BELT COMPONENTS OR ASSEMBLIES. USE ONLY THE SPECIFIED RESTRAINT COMPONENTS FOR THE SYSTEM, POSITION, AND MODEL YEAR. IF THE TEAR LOOP WARNING LABEL IS VISIBLE, THE BELT ASSEMBLY MUST BE REPLACED.

MODEL APPLICABILITY — XK8 1997 — 2000 MY (X100)

Overview

The occupant restraint system introduced in the 1997 MY XK is similar to that of the 1995–1997 MY XJ Sedan system. It incorporates both driver and passenger airbag units which are both electromechanically fired together in a circuit that is completed by weighted mass safing and impact sensors. It includes a diagnostic monitor (control module) that does not control deploy decisions but rather constantly monitors circuit resistances and deployment capabilities and reports failures via warning indicators and fault codes

The XK electromechanical system, however, differs in many subtle yet important ways. Component integration, deployment power control and diagnostic “blink code” capability are just a few of the features. Jaguar's first use of mechanically sensed individually fired pyrotechnic seatbelt retractors in 1997 gave way to an electronic sensing and deployment system exclusive to the 2000 MY XK8. The trend towards creating “safer” airbag systems began when Jaguar introduced “depowered” airbags on the 2000 MY.

The following outlines the differences between the 1995–1997 MY XJ sedan range and the XK8 systems used through the 2000 MY.

SYSTEM COMPONENTS AND OPERATION

Front impact sensors

The front impact sensors are located on the upper front cross member in front of the radiator. The sensor functions identically to the 1995–1997 MY XJ Sedan range impact sensors.

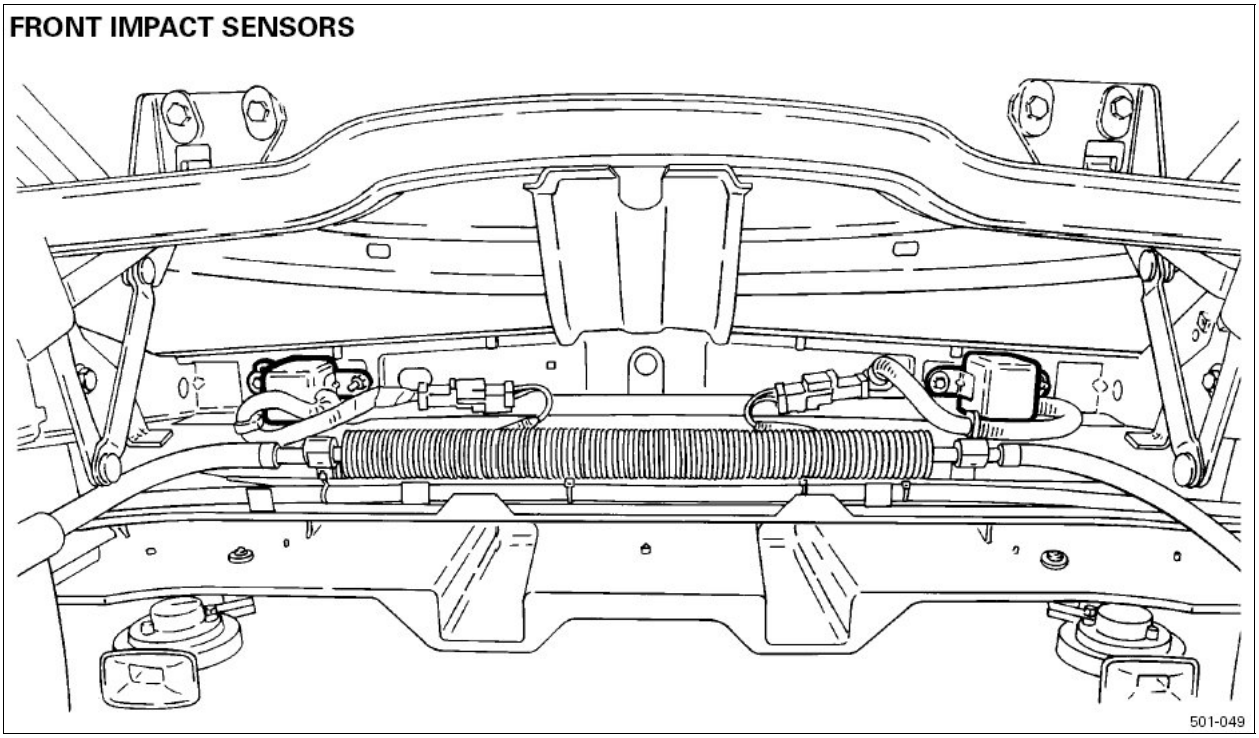

Fig. 18

Safing sensor

The function of the mechanical safing sensor is unchanged from the 1995–1997 XJ sedan. The sensor still provides deployment voltage to both airbags but is integrated into the diagnostic monitor (control module) instead of being a separate component.

Control Module

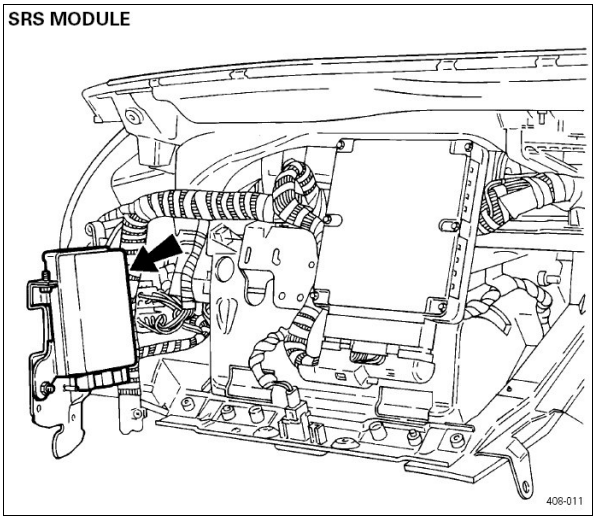

Fig. 19

- The control module is linked to the diagnostic connector and can store its own fault codes in a non volatile memory.
- The mechanical safing sensor is an integral part of the control module and is not serviceable.
- The internal thermal fuse has been replaced with an external fuse. This is fuse number 4 in the driver's side fascia fusebox, rated 10A. If a fault exists that could cause inadvertent deployment of the airbags, the module will close the fuse blow switch to blow this fuse. This will occur only once for any particular fault. If the fuse is simply replaced without the fault being rectified, the system will be at risk.
- Once the fuse has been blown by the Diagnostic monitor, it will not attempt to blow it again until the fault has been rectified and the code has been cleared with WDS.

WARNING:

Always disarm the airbags before replacing this fuse and diagnosing the system fault.

NOTE:

Since the control module stores system faults codes in its non-volatile memory it has the ability to provide a “blink code” via the SRS warning MIL (1998 MY onwards). If a fault is present after the initial 8 second MIL prove-out period the control module will begin flashing a 2–digit code via the MIL indicator. This will be repeated five times. Afterwards, the lamp remains constantly lit. The MIL will remain on until the next key cycle. If that time the fault has disappeared the lamp will remain off after the prove out.

Passenger Airbag

Although the airbag module is a carryover from the 1995 MY sedan, the deployment door is different. The door clips to the front of the fascia and is tethered to the airbag module by two straps. The straps must be fitted to the module prior to the module being fitted to the fascia.

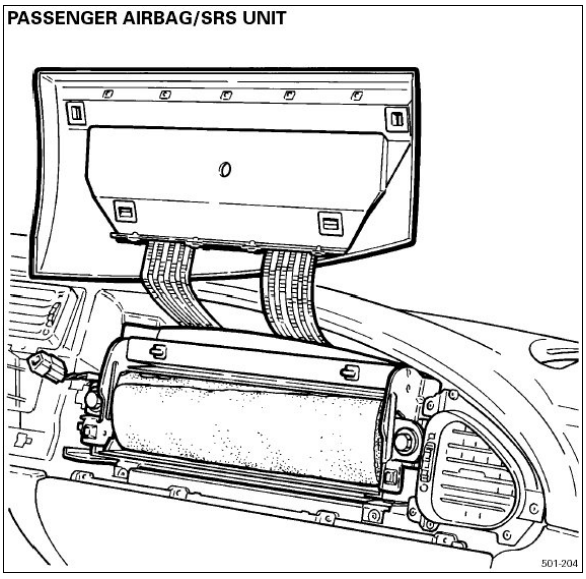

Fig. 20

Depowered airbags

On 2000 MY XK models, depowered driver and passenger airbags were introduced for all XK series range. These airbags use a reduced charge of sodium azide/copper oxide which allows the bags to fill more slowly, giving it a slightly softer impact when deployed. Airbag fittings and operation remain unchanged.

NOTE:

Depowered airbags were also introduced on the XJ Sedan range from VIN 866048. The volume of the passenger's airbag was reduced to 96 liters.

Front Seat Belt Pre-Tensioners

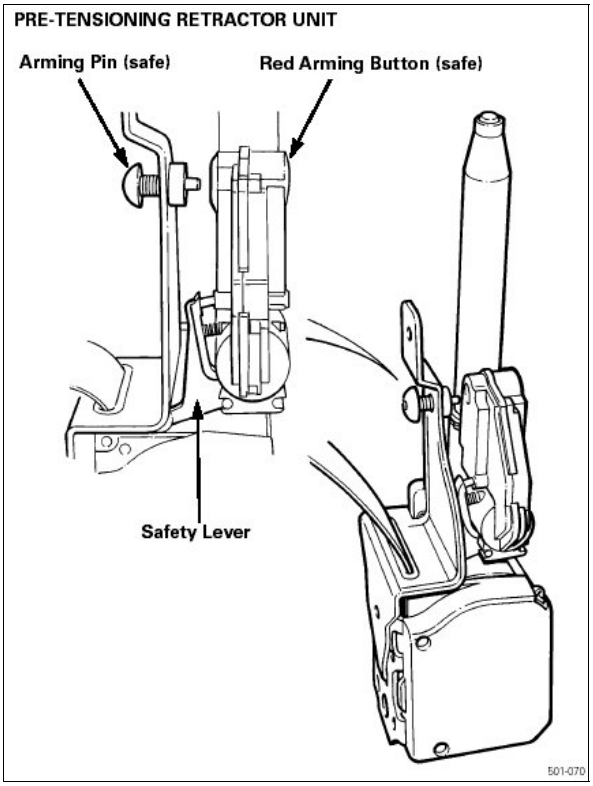

Fig. 21

- The pre-tensioners are mechanically sensed units, independent of the front airbags and each other.
- They are triggered at a lower impact threshold than airbags to remove slack in the belt and correctly position occupant for contact with the bag (tear loops are no longer used).
- Upon activation, a small charge of primer is set off by a firing pin. The subsequent chemical reaction creates gases under pressure firing a lead piston attached to a cable up a cylinder.
- The cable winds back the belt reel approximately 4 inches (10.2 centimeters). Once activated, the belt will be locked in place and will not be able to be wound back or pulled out.

Replacement of the pre-tensioner/belt assembly is required.

- Pre-tensioners have no serviceable parts and replacement units are packaged and shipped in a disarmed condition.
- After mounting the pre-tensioner to the vehicle, the arming pin must be fully screwed in, depressing the red arming button. The safety lever blocks the firing pin from igniting the charge when the belt is not in use, i.e., if the belt is not pulled out from the reel at least 1.5 m)

Front Seat Belt Pre-Tensioners (2000 MY)

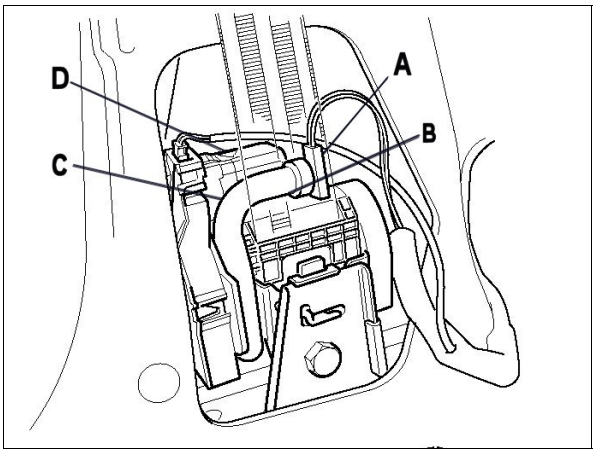

Fig. 22 XK 2000 MY Pre-tensioner

The XK SRS system remained unchanged from launch through the 1999 MY. During the 2000 MY, the mechanical seat belt pre-tensioners were replaced by an electrical system with an independent pre-tensioner control module.

The pre-tensioner control module is bolted to a bracket welded to the top of the transmission tunnel. It incorporates an accelerometer which senses a frontal impact to the vehicle. At a pre-set deceleration level, the control module generates a 12v firing signal to each of the pre-tensioners. The firing signals are fed from a 2 pin connector (A) on the pre-tensioner and directly trigger the pyrotechnic igniter unit (B). Detonation propels a chain of steel balls inside a tube (C) towards a ball trap (D), causing an impeller on the reel spindle to rotate and retract the seat belt which then locks, preventing forward movement of the occupant.

A torsion load limiter is incorporated within the reel spindle. If the impact causes this load to be exceeded after the belt has locked, the belt will slacken to avoid chest injuries to the occupant.

The pre-tensioner operation takes approximately 10ms and occurs at or slightly before airbag deployment.

The pre-tensioner system is totally independent of the airbag system except that it shares the airbag instrument panel warning light.

SYSTEM DIAGNOSTICS XK8 2000 MY (X100)

Overview

The pre-tensioner control module performs self diagnostics, including firing circuit checks (open and short circuits and shorts to battery or ground) but does not generate accessible fault codes.

Faults may be detected during the pre-tensioner self test after ignition switch on or during the drive cycle. In either case, the airbag warning indicator will illuminate. With the warning light on, the fault may be due to either the pre-tensioner or the airbag system.

The pre-tensioner system is not linked to the vehicle diagnostic connector or communication bus systems and cannot therefore be accessed with WDS.

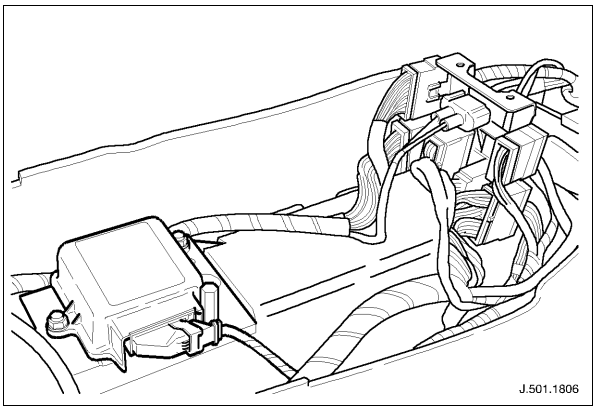

Fig. 23 Pre-tensioner control module

TRAINING PROGRAM

JAGUAR SUPPLEMENTARY RESTRAINT SYSTEMS

PUBLICATION CODE – 620

MODEL APPLICABILITY — XJ/XJR 1998–2003 (X308)

Overview

Introduced in 1998 for the newly engineered XJ8 Sedan the new fully electrical airbag system (commonly referred to as the Single Point Sensor Systems or SPS) changed the way Jaguar monitored and deployed airbags. It was also the first Jaguar vehicle to feature side airbags and incorporated electronic pyrotechnic seatbelt pre-tensioners into the system.

Previous electromechanical systems used safing and crash sensors with mechanical weighted masses that needed to physically dislodge from their magnetic perches to complete the igniter circuits. In those systems the control module did not make deployment decisions but merely kept an electrical vigil over the circuits.

The Electronic Single Point Sensor system used in the XJ8 sedan from 1998-2003MY employs a "single" centrally mounted control module that incorporates newly designed sensors within. These sensors and the individual side impact sensors, signal crash severity data to the processor (control module). The processor makes the deployment decision based on a programmed deceleration threshold. If the vehicle impact (frontal or side) exceeds the pre-programmed amount then the control module outputs deployment current to the appropriate safety devices.

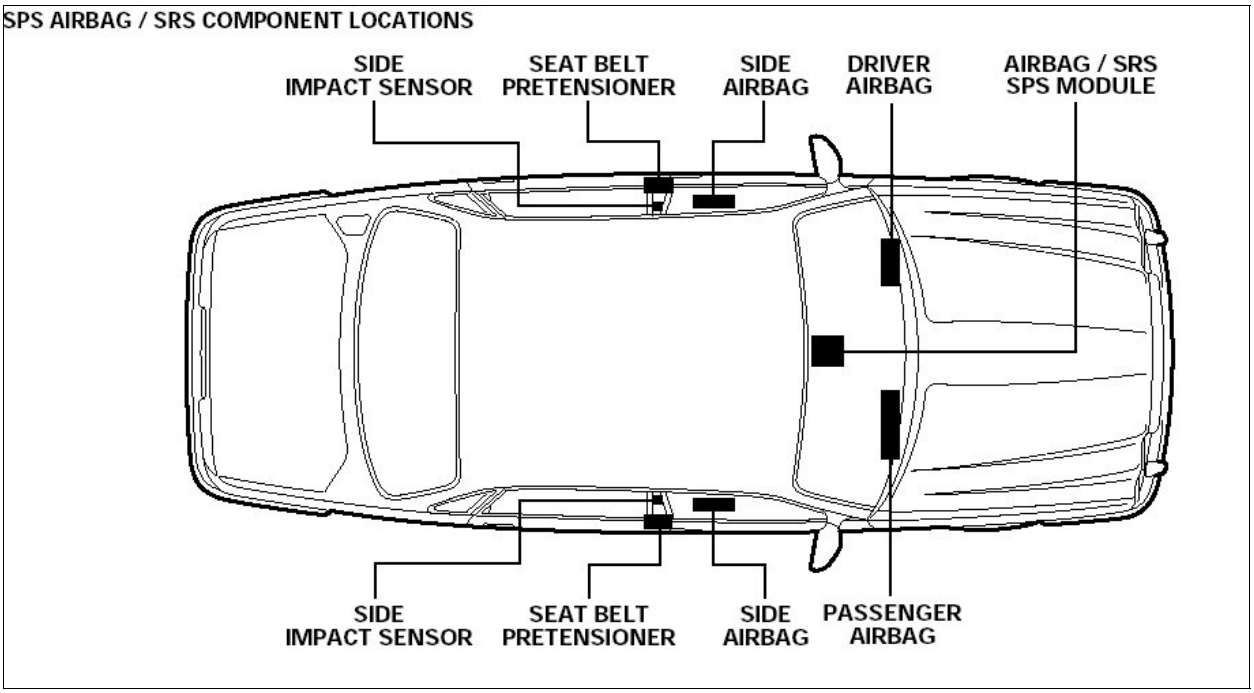

Fig. 24 XJ Component locations

COMPONENTS AND SYSTEM OPERATION X308

Single point sensor module

- The SPS module is located on top of the tunnel below the radio.
- It contains an internal accelerometer for sensing frontal impacts.
- It also contains an internal mechanical safing sensor.
- It supplies power and ground to the side impact sensors and receives back status information.
- It deploys the airbags and pre-tensioners as required: Frontal Impact: Driver's and passenger's airbags and both pre-tensioners. Side Impact: Side airbag on side of impact only.
- It monitors the system for faults and stores system fault codes.
- Stores historical fault code data (intermittent faults).
- It cannot deploy any system component unless the ignition is switched on.
- It contains an internal reserve power supply to allow the system to deploy if the battery supply is lost.
- The torque ratings of the fixings are critical.

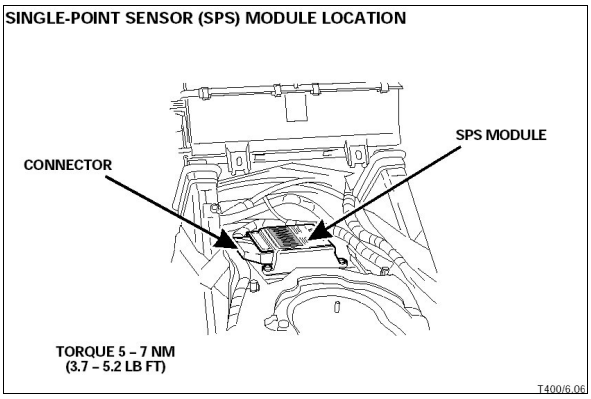

Fig. 25

NOTE:

The wiring for the system is integrated into the vehicle harness with yellow sleeving on the wires where they leave the harnesses to connect to the individual components.

Side impact sensor module

The Side Impact Sensor Modules (SISM) are located in the B/C posts. Each module detects any impact that occurs on that side of the vehicle. If the impact is also detected by the side impact safing sensor in the SPS module, the SPS module fires the side airbag on the impacted side. Side impact sensors perform their own diagnostics and report faults to the SPS module, which logs a DTC and activates the AIRBAG / SRS MIL.

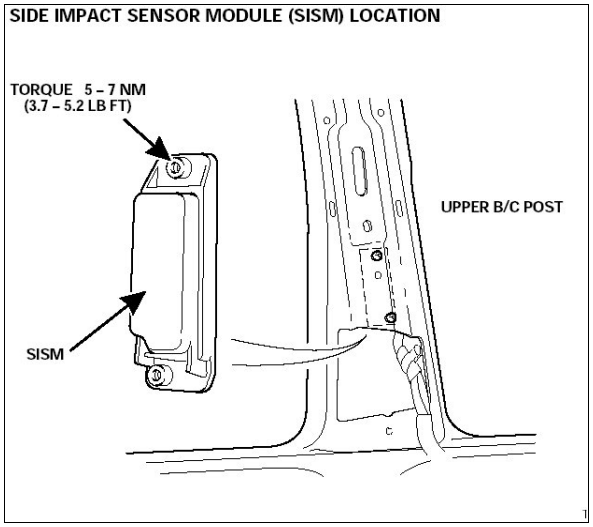

Fig. 26

Driver airbag

The driver airbag has a repositioned connector and different type of igniter. Cut outs are incorporated into the airbag cover to accommodate the steering wheel switches and there are minor changes to the badge on some models.

WARNING:

Never test airbag ignitor resistance.

Passenger airbag

The passenger airbag module is revised to incorporate a tethered deployment door, a new electrical connector and new igniter.

The deployment door is similar to that on the XK8. Two webbing straps are attached between the door and the anchor bracket of the airbag module. Four integral pegs retain the door in clips in the fascia. Note that the clips should be replaced each time the door is removed.

The electrical connector is a gray 2–pin connector located on the left side of the airbag module immediately behind the deployment door. After deployment of the airbags, the steering wheel and driver's airbag module, and/or the fascia and the passenger's airbag module must be replaced.

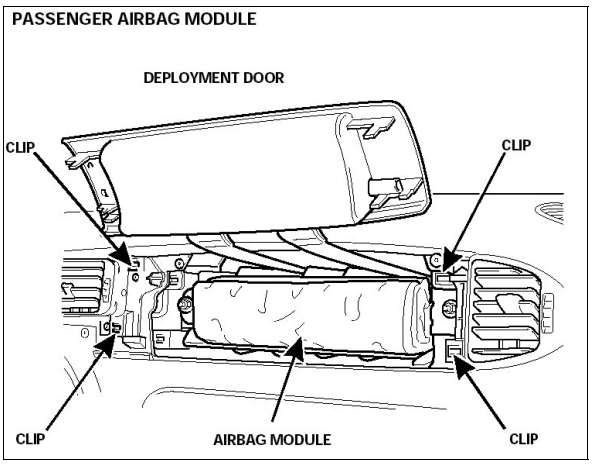

Fig. 27

NOTE:

De-powered airbags were fitted to 1999 MY XJ sedan vehicles as a running change from VIN 866048 onwards. Do not fit de-powered airbags to earlier vehicle or vice-versa.

Side airbags

- The side airbags are attached to the outboard side of the seat back frame.
- They incorporate a pressurized cylinder of argon gas at 2500 psi.
- The airbag in an non-vented permeable bag with a 10 liter capacity
- It inflates to protect the occupants torso only
- The seat must be replaced after deployment
- Seat covers must not be fitted other than polyethylene valet covers.

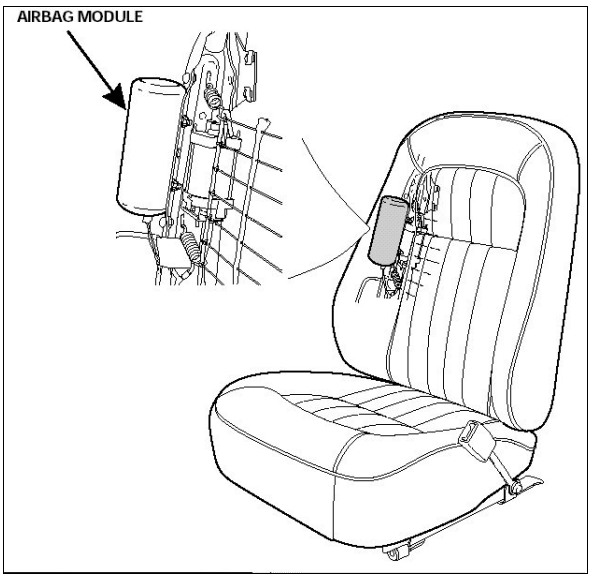

Fig. 28 Side airbag

WARNING:

AFTERMARKET SEAT COVERS MUST NOT BE INSTALLED ON SIDE AIRBAG EQUIPPED SEATS BECAUSE THEY MAY INTERFERE WITH AIRBAG DEPLOYMENT. JAGUAR APPROVED SEAT COVERS CAN BE USED WITHOUT AFFECTING SIDE AIR BAG OPERATION.

Side airbag module operation

The module contains the airbag and an inflator assembly. The inflator assembly consists of an igniter and a vessel containing the pressurized argon gas that is used as the propellant. When activated, the small pyrotechnic charge in the igniter bursts a disc allowing the pressurized argon to inflate the airbag. The hot gasses from the igniter charge mix with the inert argon gas to increase the flow energy. The expanding airbag splits the seat bolster seam and deploys between the occupant and the door at approximately occupant chest level.

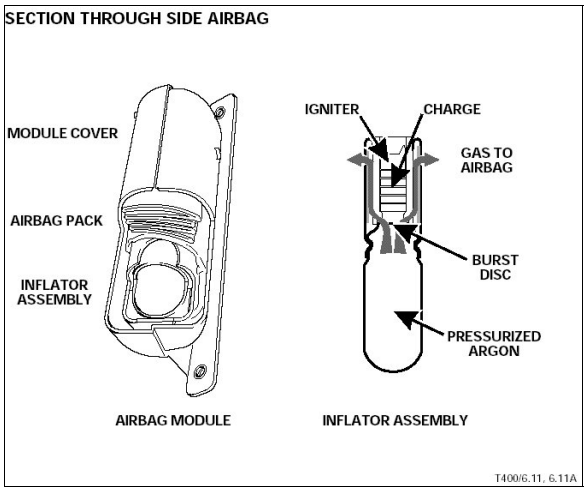

Fig. 29

Seatbelt pre-tensioner

- lntegral to the SPS system
- Electronically triggered together by SPS module whenever front bags are activated, regardless of seat occupancy or belt usage.
- Piston/cable type.
- Once deployed, retractor spindle will be locked preventing belt movement.

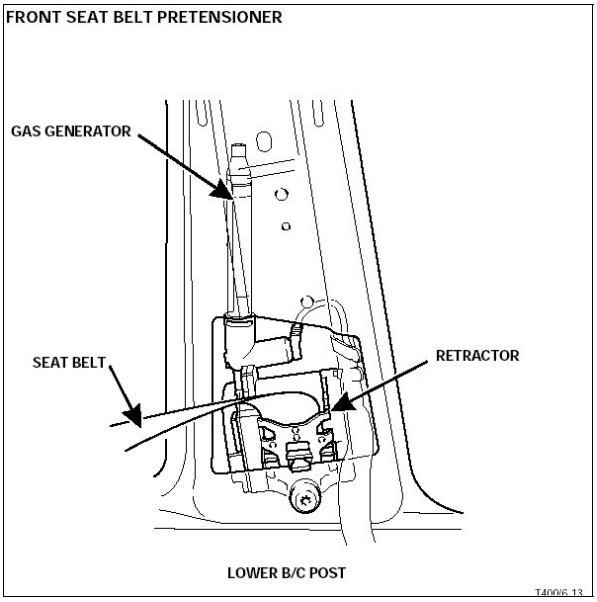

Fig. 30

SINGLE POINT SENSOR SYSTEM OPERATION (SPS)

System Operation

The Single Point Sensor system is controlled entirely by the centralized Single Point Sensor Module. The SPS Module contains the front impact safing sensor, front safing sensor, and side impact sensor thus eliminating the need for additional components. The SPS Module is connected to the Side Impact Sensors (SIS) which are provided power and ground by the SPS Module and continually report back their individual "health" status.

The SPS Module receives power from an ignition switched 5 amp fused supply via the left hand heelboard fuse box. It contains a capacitor that will maintain power for output deployment in the event the vehicle's power is lost during an impact.

The SPS Airbag SRS system is active only when the ignition is switched ON and the inertia switch is in its normal state providing a ground signal to the heelboard ignition positive relay. A reserve voltage supply in the SPS maintains system power for approximately two (2) minutes after B+ power is disconnected or the inertia switch is activated.

The detection and response to frontal and side impacts is entirely separate.

NOTE:

To disarm the SRS system disconnect the negative battery cable and wait a minimum of two (2) minutes for the reserve power to dissipate.

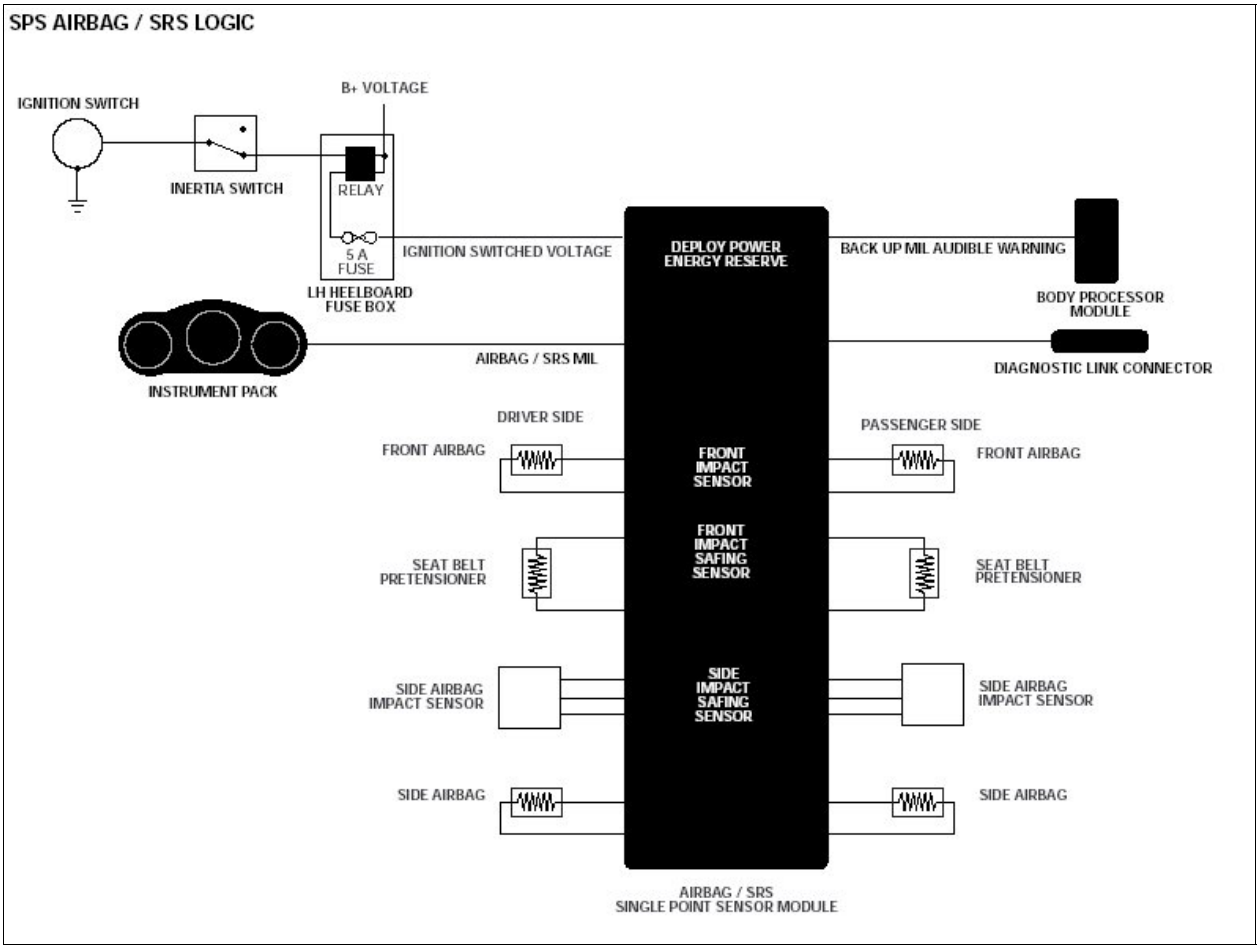

Fig. 31

If the impact sensor in the SPS module detects a frontal impact above a certain threshold and the impact is also detected by the safing sensor in the SPS module, the module fires both front seat belt pretensioners and both front airbags. The side airbags are not fired during frontal impacts.

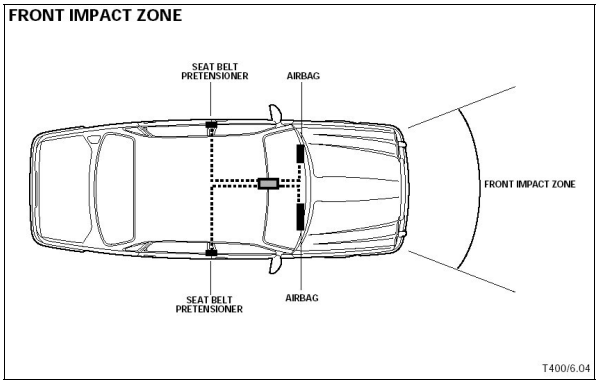

Fig. 32

If a side impact sensor module in the B/C post detects a side impact above a certain threshold and the impact is also detected by the side impact safing sensor in the SPS module, the module fires the side airbag on the impacted side of the vehicle. The front airbags, seat belt pretensioners, and the airbag on the other side of the vehicle are not fired.

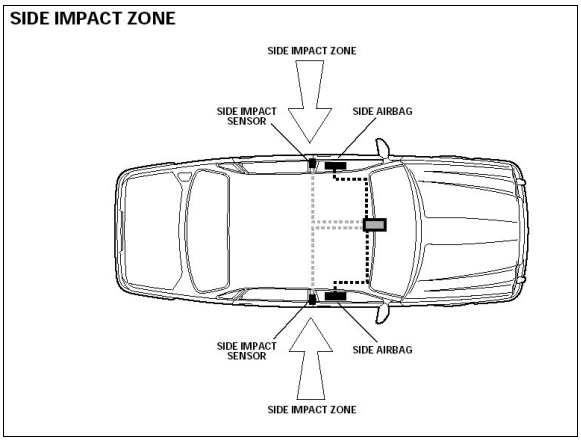

Fig. 33

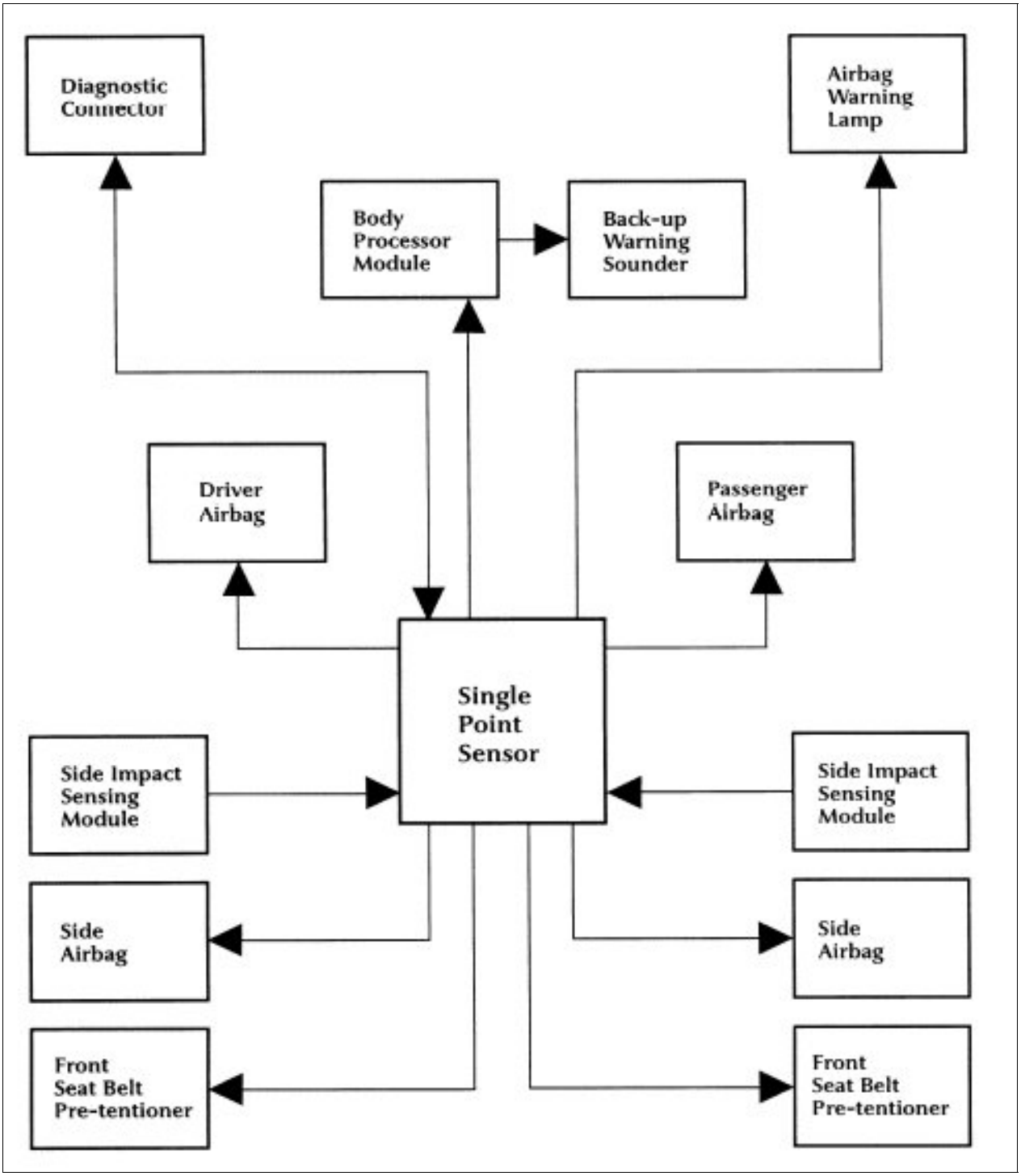

Fig. 34 SPS Operation Overview

SYSTEM DIAGNOSTICS SINGLE POINT SYSTEM XJ 1998 — 2003MY (X308)

Overview

The side impact sensor modules conduct their own diagnostic routines and output a status signal to the SPS module.

When the key is turned on (position II) the SPS module continually performs all circuit integrity checks and has the ability to shut down individual circuits which could otherwise be inoperable or pose a dangerous condition while at the same time keeps the remaining circuits ready for deployment. System faults are stored in the module's non-volatile memory and can only be accessed through the DLC using WDS.

Prove out and integrity monitoring of the SRS MIL indicator circuit is consistent with previous systems. The SRS MIL will remain on continually through the remainder of the key cycle or after the 8 second prove out period if a fault exists. In the event that there is a fault with the SRS MIL circuit and an additional fault is sensed, the SPS module will output a request for the body processor module (BPM) to begin 5 sets of 5 beeps to attract attention to the failure. This series of bleeps will be repeated at every subsequent key cycle and every 30 minutes of vehicle operation.

Guided diagnostic routines, components resistance values and number of deployment events can be accessed with the WDS.

NOTE:

Use of a DVOM to complete circuit diagnosis must only be performed after disarming the system, disconnecting all airbags and pre-tensioners and installing the red airbag simulator tools 105–R0012 (ROTUNDA) for the airbags and/or the blue pre-tensioner simulator tools 418–F395 (OTC) for the pretensioners.

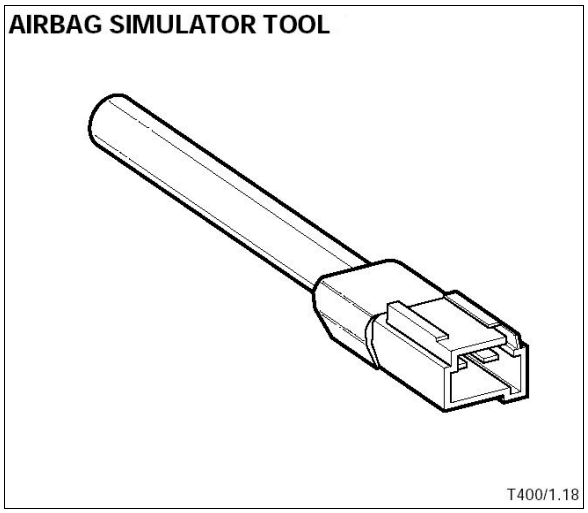

Fig. 35

MODEL APPLICABILITY — S-TYPE 2000 – 2002 MY (X200)

Electronic Single Point Sensor Airbag/SRS

Introduced in the 2000 MY S-TYPE model launch, Jaguar's second Generation of single point sensing supplemental restraint systems incorporated many design improvements over the 1998 MY XJ system. The improved system remained unchanged until the 2003 MY when yet again advances in technology brought more improvements. Although the deployment strategy and system functionality are inherently the same, newer technology yielded more advanced components which enhanced the overall safety of the occupants.

The specific differences between the 2000 — 2002 MY S-TYPE and the 1998 — 2003 XJ sedan are highlighted in this section.

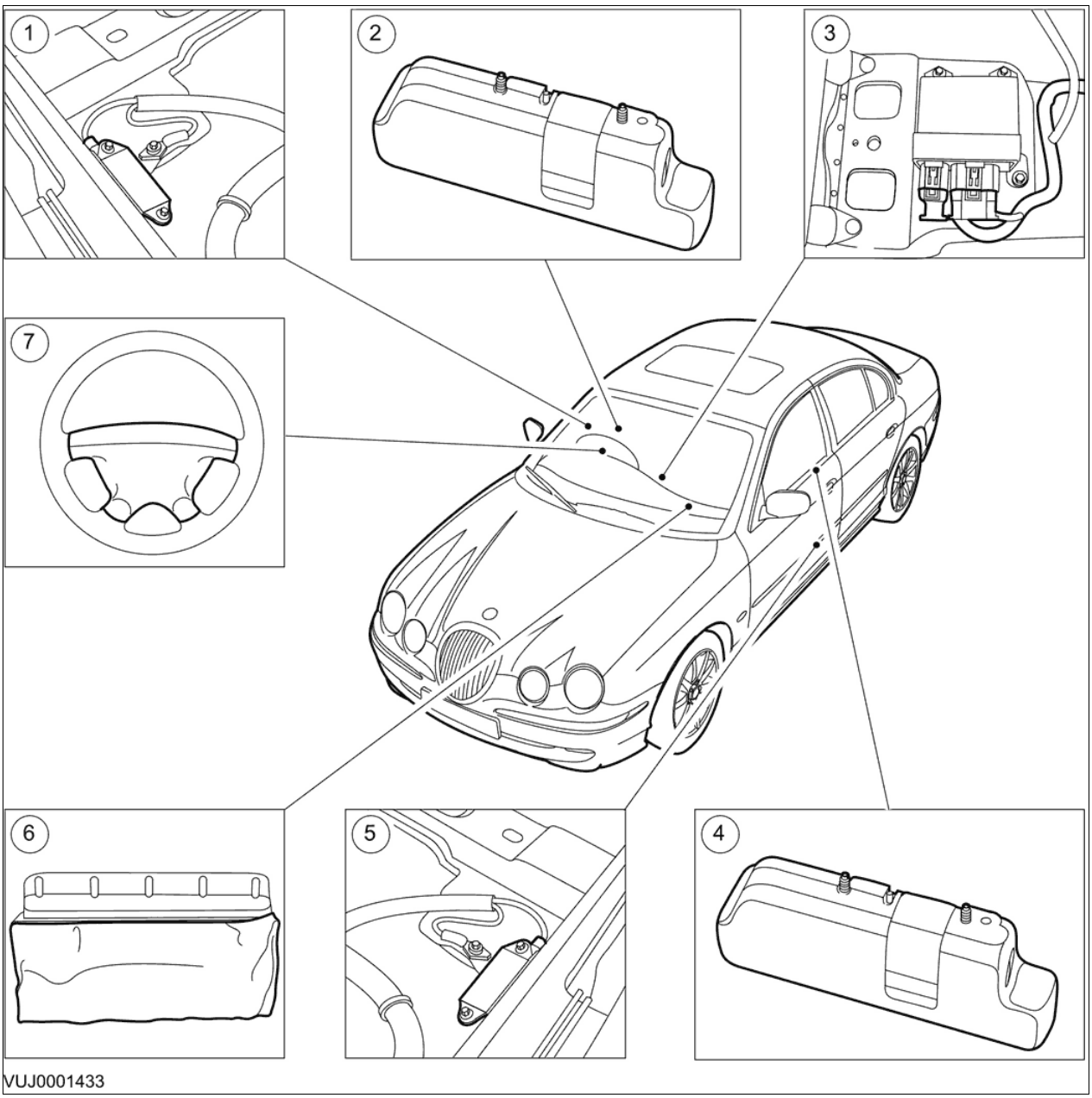

Fig. 36 X200 Air Bag Supplemental Restraint System (SRS) Components (RHD shown)

1. Electronic Crash Sensor (Restraints control module RCM)
2. Driver Side Air bag Module
3. Air Bag Electronic Crash Sensor Module
4. Passenger Side Air bag Module
5. Electronic Crash Sensor
6. Passenger Air Bag Module
7. Driver Air Bag Module

SYSTEM COMPONENTS AND OPERATION X200

Restraint Control Module (RCM)

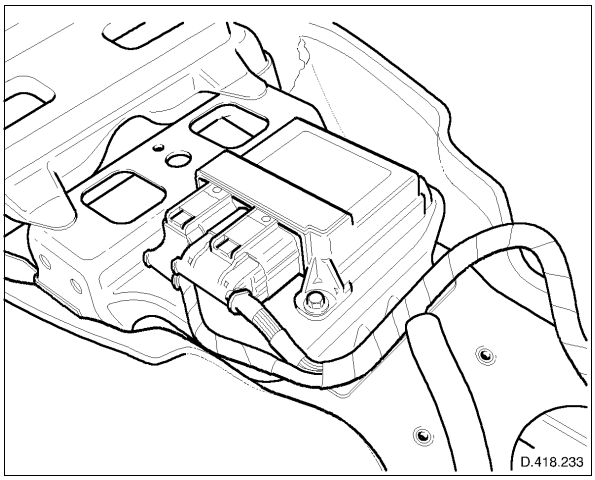

Fig. 37 RCM

The RCM:

- Is bolted to the top of the transmission tunnel below the fascia center console stack.
- It houses the electronic discrimination crash sensor and electro-mechanical safing sensor for frontal impact detection.
- It houses the electronic discrimination safing sensor to detect a side impact in conjunction with the remotely mounted side impact sensors.
- It identifies severity and direction of impact and makes decision on deployment of airbags and pre-tensioners.
- Provides firing signals to all airbags and pre-tensioners.
- Performs on board testing of the airbag and pre-tensioner firing circuits, warning indicator circuits and module status (side impact sensor performs its own internal checks).
- Drives the airbag warning light on the instrument pack: if the warning lamp is faulty (fault code is recorded) and audible warning tone is sounded by the speaker housed inside the instrument pack.
- In the event of an impact, it sends a signal to the vehicle emergency message system (VEMS), also known as JaguarNet, and the PCM to indicate that a crash has occurred.
- Is connected the data link connector via the ISO 9141 (serial data link) network to enable communication with the WDS or scan tool.
- It provides temporary back-up power to operate the airbags in the event of a loss of battery supply during a severe collision.

Side Impact Sensors

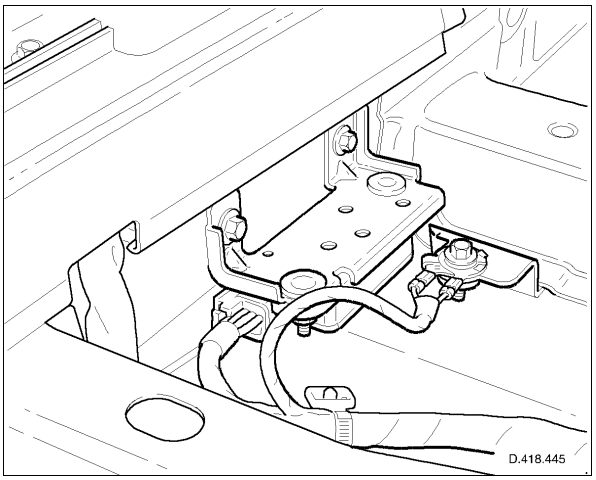

Fig. 38 Side impact sensor

The side impact sensors:

- Are mounted on a bracket attached to each inner sill.
- Contain an electronic sensor for detecting side impacts.
- Send a deployment request to the RCM. Deployment only occurs if the safing sensor in the RCM confirms the impact.
- Monitor their own internal state, including correct ground connection and sends a regular signal to the RCM indicating that it is available and functioning correctly.
- Are connected to the RCM by 2 wires. This connection has 2 functions; supplying power to the sensor and transmitting digital data to the RCM.

Driver airbag

The airbag:

- Is of the conventional design (potassium Nitrate) solid propellant.
- Has a reduced charged (de-powered).

Passenger airbag

The passenger airbag:

- Has a heated gas inflator (HGI) type. Mixture of 12% hydrogen and 88% nitrogen pressurized to 2600 psi within an aluminum vessel.
- Is not classified as an explosive but same care should be followed as on conventional airbags.
- Has a pressurized vessel fitted with a pyrotechnic igniter assembly, a burst disc, and a high speed “dart”.

The igniter is electrically triggered from the RCM. When triggered, the igniter fires a high speed “dart” along the length of the pressurized cylinder, producing a heated trail (due to friction which causes rapid and even combustion of the gas throughout the cylinder. The igniter also ruptures the burst disc in the end plug. allowing the expanding gases from the pressure vessel to inflate the airbag.

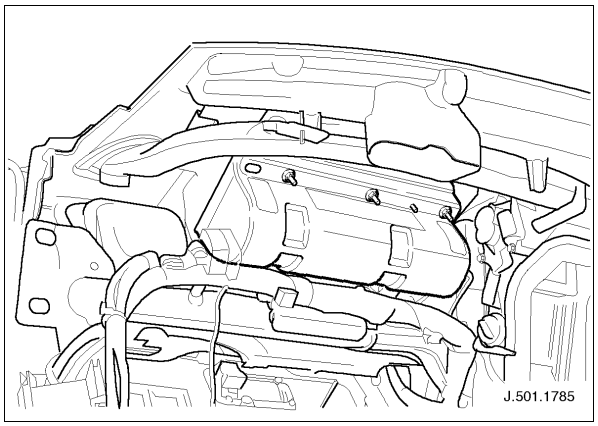

Fig. 39 Passenger airbag

Side Airbags

The side airbags:

- Use compressed argon propellant.
- Are larger bag than XJ models and protect both head and torso instead of just the torso.
- Are located in a fabric deployment chute stitched to the seat cover seam.
- Require that after deployment, the seat must be replaced.

NOTE:

If a seat cover is replaced, the airbag must be removed and re-fitted in the deployment chute of the new seat cover.

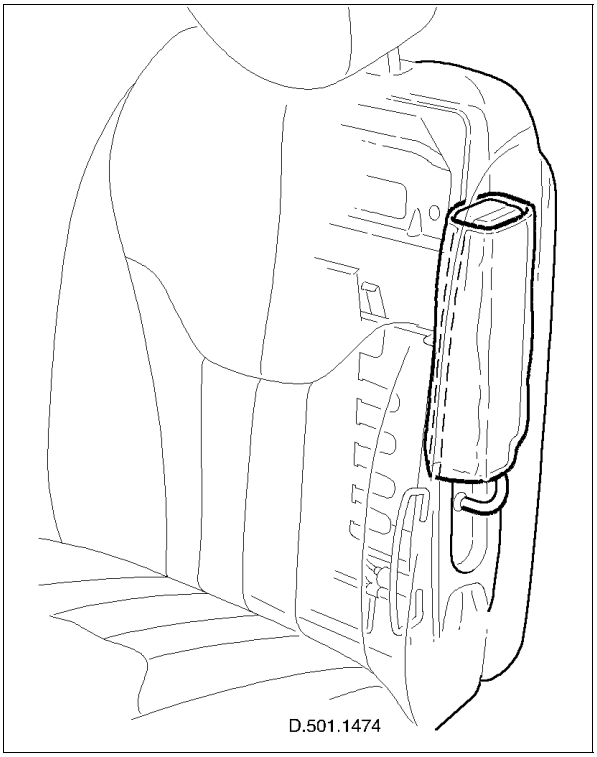

Fig. 40

Seat belt pre-tensioners

The seat belt pre-tensioners:

- Have an operation strategy similar to XJ series sedan 1998 — 2003 MY.
- Are compact in size due to rack and pinion gear mechanism instead of piston/cable setup.
- Once deployed and locked, the belt reel employs a torsion bar to alleviate detrimental chest loads.

NOTE:

Plastic belt guides are fitted to the B-posts. These guides will fracture upon pre-tensioner activation and will need to be replaced.

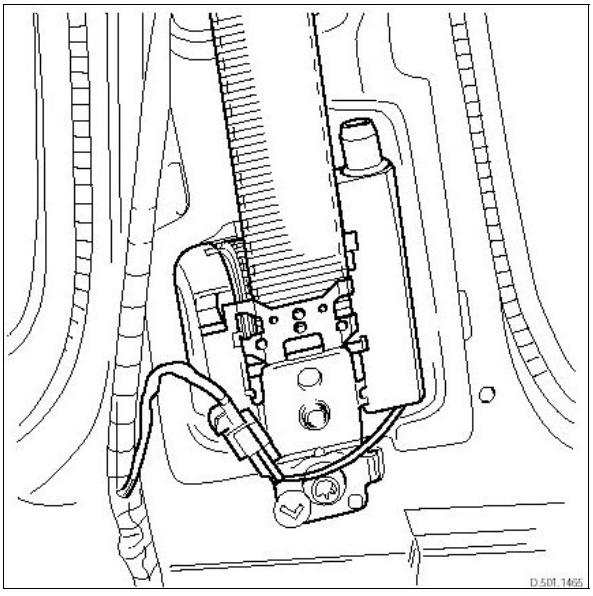

Fig. 41 Rack & Pinion Pre-tensioner with torsion bar

SRS Operation

A front impact triggers the driver and passenger airbags and both pre-tensioners provided the impact is above a set threshold as detected by the two longitudinal sensors in the RCM. When a side impact occurs, the lateral safing sensor in the RCM must also agree with an impact detection signal received from either the LH or RH side impact sensor in order to deploy the corresponding airbag.

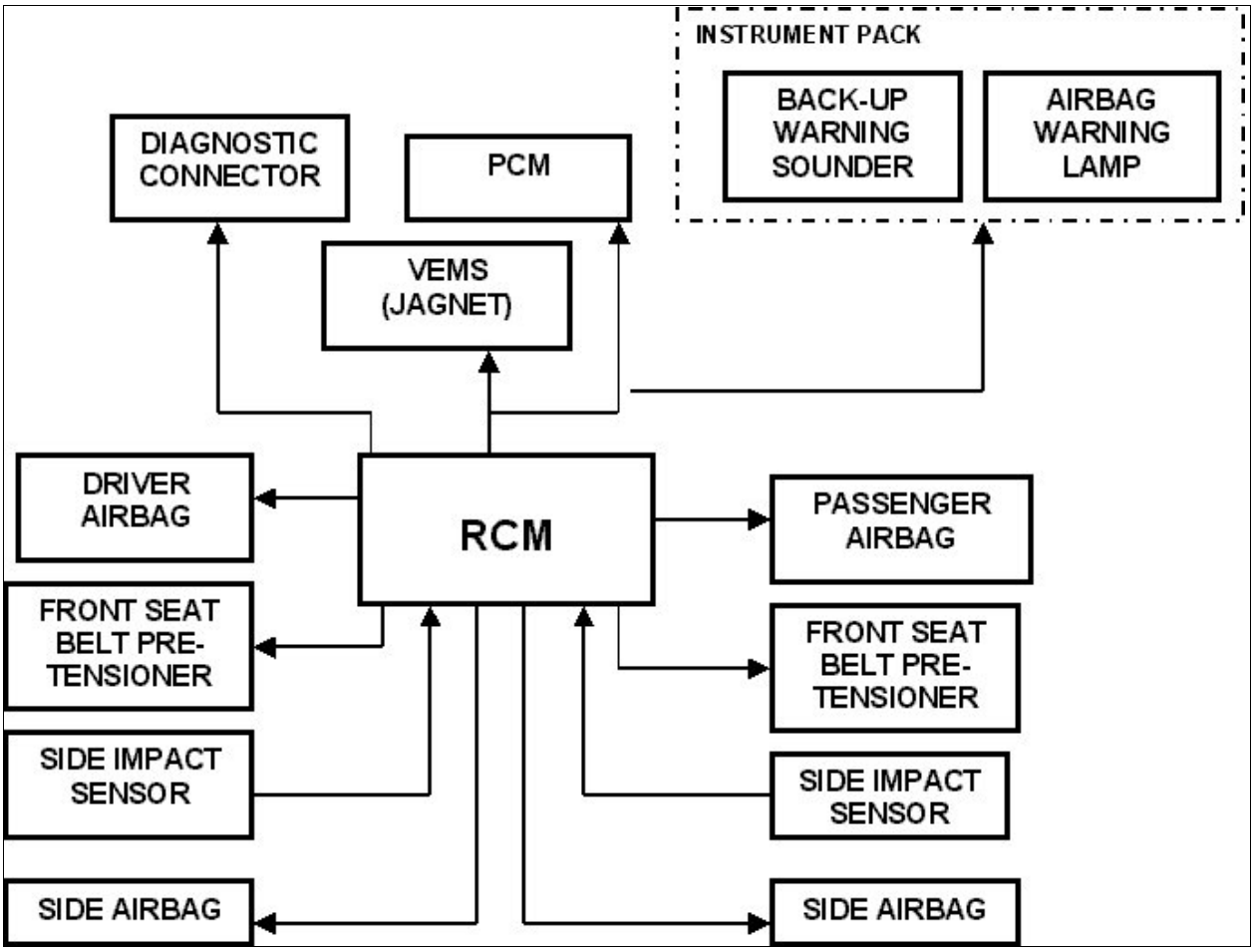

Fig. 42 SRS Overview S-TYPE 2000 —2002MY

SYSTEM DIAGNOSTICS SINGLE POINT SENSOR S-TYPE 2000 — 2002 MY (X200)

Overview

- The RCM performs all system diagnostics except those relating to the side impact sensors.
- When the ignition is switched on, the RCM carries out an 8 second system prove out during which the airbag warning lamp on the IC is illuminated for the first 6 seconds.
- During the prove out, all circuits connected to the RCM are tested along with the RCM itself and the state of the side impact sensors (including ground resistance and supply voltage).
- If no faults are detected the warning lamp remains off after the 8 second period.
- If a fault is detected, the warning lamp flashes a 2 digit fault code 5 times and then remains lit until the ignition is switched off. This is repeated on each ignition cycle until the fault is rectified.
- Fault codes are allocated a priority and if more than one code is stored in the RCM, the highest priority code is flashed. When this fault is rectified the next priority code is indicated.
- If the warning lamp is inoperative and a system fault exists, a 5 bleep audible warning is sounded 5 times with 5 second intervals. This is repeated every 30 minutes and on each subsequent ignition cycle.

Guided diagnostic routines, component resistance values and number of deployment events can be accessed with WDS.

NOTE:

Use of a DVOM to complete circuit diagnosis must only be performed after disarming the system, disconnecting all airbags and pre-tensioners and installing the simulator tools. Tool 105–R0012 (Rotunda) is red in color and used for the airbags at either side of the fascia and the side air bag connector under the seat. The blue simulator tool 418–F395 (OTC) can be used for the pretensioners and airbags and directly at the side airbags. Removal of shorting bars within system connectors may be necessary to check circuit properly.

WARNING:

Disconnect all airbags and pre-tensioners and install the simulator before using a DVOM to perform any circuit diagnostics.

System Trouble Codes (Blink codes)

Table 6

BLINK CODE	DESCRIPTION
14	External crash sensor shorted to ground
15	Driver airbag squib circuit shorted to ground or battery
16	Passenger airbag squib circuit shorted to ground or battery
17	Driver pre-tensioner squib circuit shorted to ground or battery
18	Passenger pre-tensioner squib circuit shorted to ground or battery
19	RCM crash data memory full
21	RCM bracket ground resistance high
24	RCM internal fault
25	PAD or passenger weight sensor module fault
27	PAD warning indicator inoperative
29	Incorrect vehicle identification code
32	Driver airbag squib resistance high
33	Passenger airbag squib resistance high
34	Driver airbag squib resistance low
35	Passenger airbag squib resistance low
36	Driver side airbag fault
37	Passenger side airbag fault
41	External crash sensor circuit open or shorted to battery
42	Driver side crash sensor mounting failure
43	Passenger side crash sensor mounting failure
44	Driver side crash sensor communication fault
45	Passenger side crash sensor communication fault
46	Driver pre-tensioner squib resistance fault
47	Passenger pre-tensioner squib resistance fault

BLINK CODE	DESCRIPTION
48	Driver side crash sensor internal fault
49	Passenger side crash sensor internal fault

TRAINING PROGRAM

JAGUAR SUPPLEMENTARY RESTRAINT SYSTEMS

PUBLICATION CODE – 620

MODEL APPLICABILITY — XK8 2001 MY-ONWARDS (X100, X103, X105)

ARTS

The introduction of the XK8 2001 MY brought the introduction of the Adaptive Restraints Technology System (ARTS) which featured a Jaguar-only world-class technology with many additional features and benefits:

- Passenger occupancy sensing system.
- All electronic impact sensing.
- Two stage inflation for driver's and passenger's airbags.
- Seat belt system including front belt use detection load limiting and electrical comfort system.
- Front seats including driver's seat track position sensor and front passenger seat weight sensing.
- ISOfix child seat anchorages in rear seats (2003 MY-onwards)
- Front seat mounted head and thorax side airbags.

NOTE:

The advanced restraints system does not comprise any components that are interchangeable with components from previous model years.

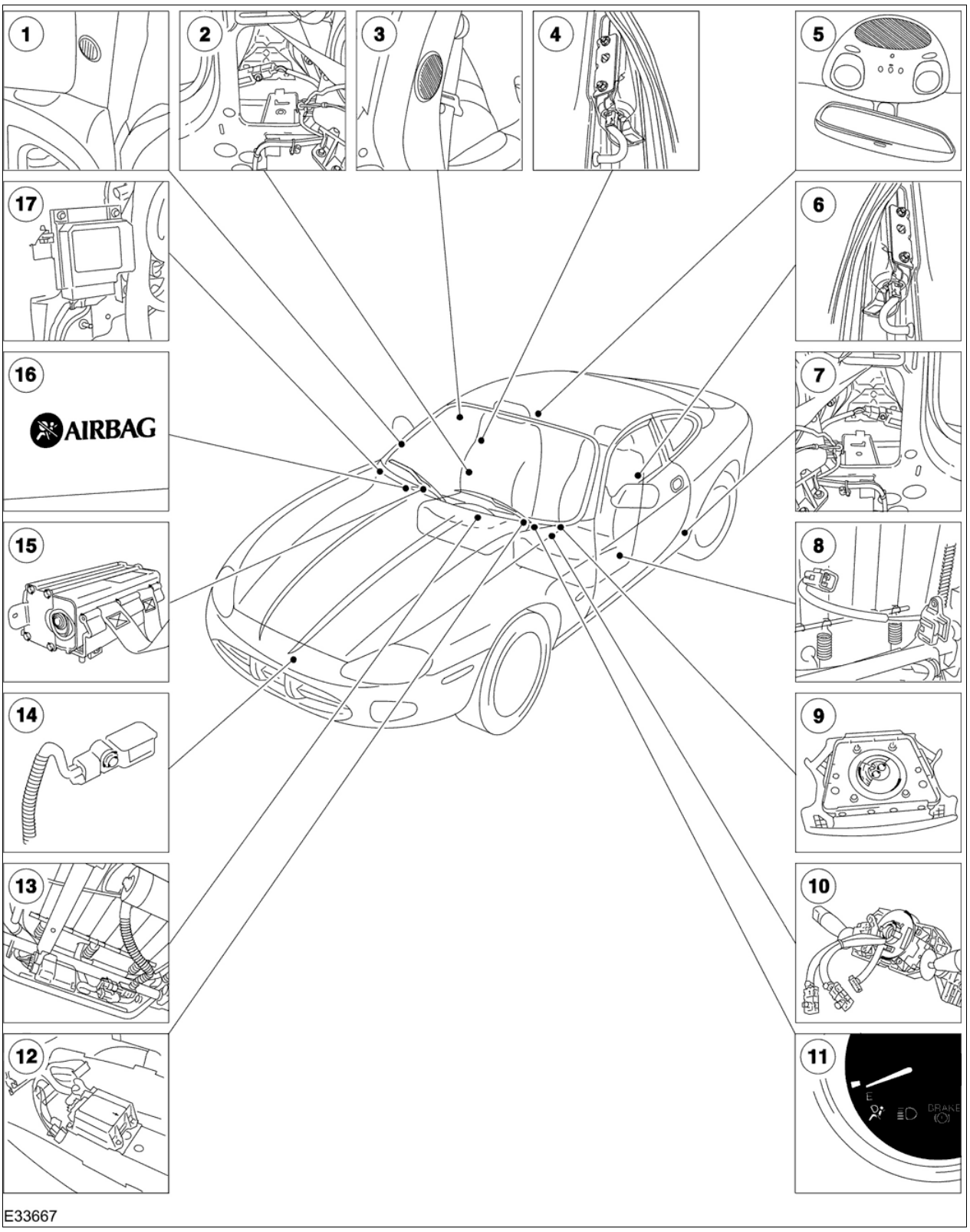

Fig. 43 X100, X103, X105 Air Bag Supplemental Restraint System (SRS)

1. A-Pillar occupancy sensor
2. Side impact sensor
3. B-Pillar occupancy sensor
4. Side air bag module
5. Overhead console occupancy sensor
6. Side air bag module
7. Side impact sensor
8. Driver seat track position sensor
9. Driver air bag module
10. Clock spring
11. Air bag supplemental restraint system (SRS) indicator
12. Restraint control module (RCM)
13. Front passenger seat occupant classification sensing system
14. Front crash sensor
15. Passenger air bag module
16. Passenger air bag deactivation (PAD) indicator
17. Air bag control module

Adaptive Restraints System Overview

The Adaptive Restraints System incorporates all of the safety benefits of previous systems. Like other systems, it determines crash severity and decides whether or not to deploy restraints for either a frontal or side impact.

But unlike other systems the Adaptive Restraints System has two major improvements:

- Fully powered or De-powered airbag deployment. To better protect a larger cross section of the population (taking into account the different sizes and body mass of individuals) the system, through the use of various new inputs such as seat position, passenger weight, belt usage, and even the proximity of the occupant to the airbag, customizes the "firmness" of the airbag by choosing to fire the two stages of each airbag together or slightly staggered (100 milliseconds apart).
- Independent restraint deployment selection. Based on the previously mentioned new inputs, the system only deploys the necessary restraint components.
- For example, if the system detects that there is no passenger or the passenger is either too lightweight or leaning too close to the deployment door, the passenger airbag will not deploy. However, if the seat belt is in use then the pre-tensioner will be deployable in a frontal collision.

SYSTEM COMPONENTS AND OPERATION X100, X103, X105

Front Crash Sensor (FCS)

- Located on a bracket on the left hand side of the radiator upper mounting crossmember.
- Collects acceleration data from the front of the vehicle and sends it to the Restraints Control Module (ARM) as an analogue signal. This is the ARM's main source of data for gauging the severity of a frontal impact.
- Connected to the ARM by 2 wires. The ARM provides power and ground to the FCS.

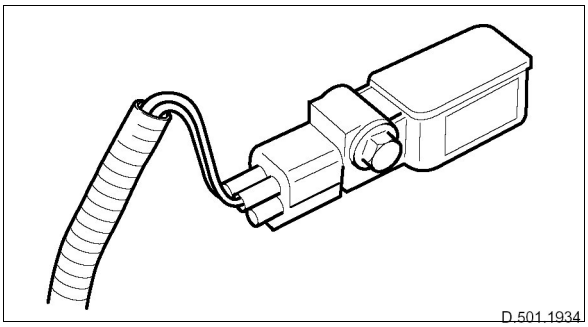

Fig. 44 Front Crash Sensor

Side Crash Sensors

- Located on a bracket mounted behind each front seat belt retractor.
- Connected to the ARM by 2 wires in the same manner as the FCS.
- Sends acceleration data to the ARM. Unlike XJ and S-TYPE, the SCS does not contain an algorithm to make a deployment decision. This is done by the ARM.

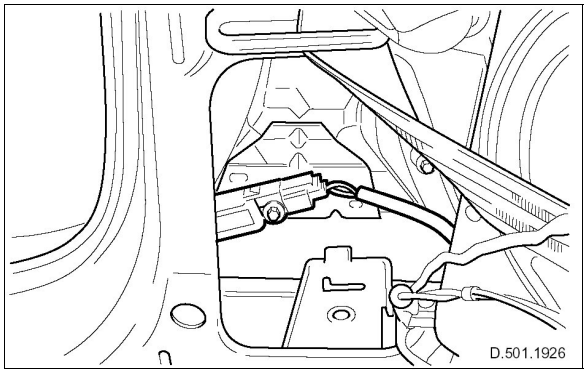

Fig. 45 Side Crash Sensor

NOTE:

The front crash sensor as well as the side crash sensors do not perform self-diagnostics.

Driver's Airbag

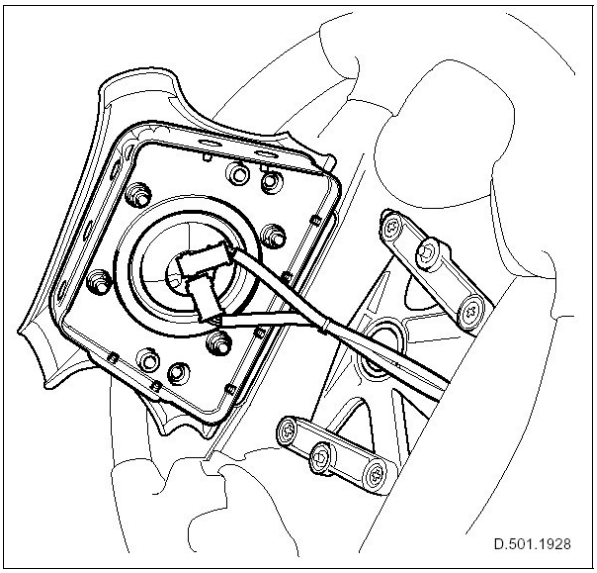

Fig. 46 Driver's Airbag

- Two stage inflator of a non-azide propellant type.
- The chambers for stages 1 and 2 are separate entities which are activated independently by the ARM which decides which of the 2 pre-set intervals to use.
- The two airbag igniter connectors are color coded and keyed to their respective plugs on the inflator (stage 1 — Gray, stage 2 — Black)
- Deploys radially to reduce the risk of airbag induced injury to a driver that is positioned close to the steering wheel.
- Connected to the ARM by 4 wires (2 per stage), providing firing when required and a diagnostic link.

Passenger's Airbag

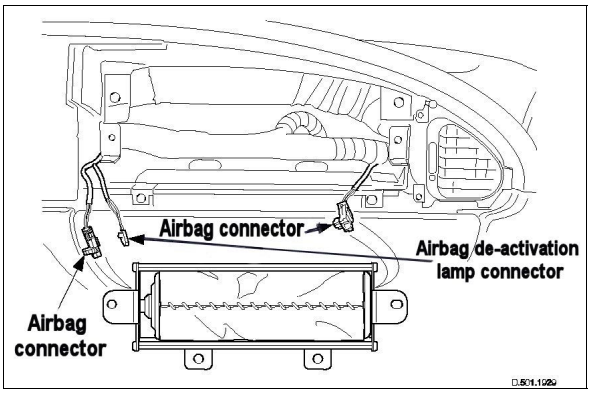

Fig. 47 Passenger's Airbag

- Heated gas inflator (HGI) type.
- Pressure vessel contains a mixture of clean air and hydrogen, triggered by 2 separate ignition squibs.
- The rate of gas generation can be controlled by the sequenced triggering of the 2 ignition squibs.
- LED indicator lamp on the Passenger Airbag Deployment (PAD) door indicates when the passenger airbag has been de-activated by the occupant sensing system.
- Connected to the RCM by 4 wires in the same manner as the driver's airbag.

NOTE:

Heated gas inflator (HGI) replaces conventional sodium azide/copper oxide solid propellant used previously on XK vehicles.

Side Airbags

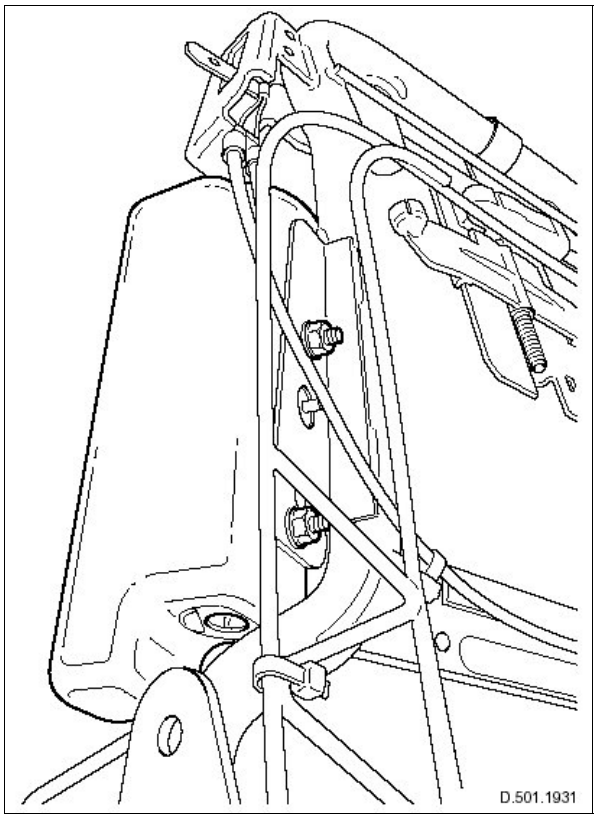

Fig. 48 Side Airbag

- Carry over module from S-TYPE, located in the front seat squab.
- Inflated with compressed argon.
- Protect the head and upper torso.
- Connected to the RCM by 2 wires providing firing when required and a diagnostic link.

NOTE:

In the event of a side impact that is sufficient to deploy the bag, it will be necessary to replace the complete seat.

WARNING:

During service, the module must be correctly located in the chute. Failure to follow the procedure could result in incorrect airbag deployment. Refer to JTIS for mode information.

Passenger Airbag Deactivation Warning Lamp (PAD)

The airbag warning lamp located on the passenger airbag door indicates the deployment state of the passenger airbag.

- If the passenger front seat is empty the passenger airbag will not be active and the warning lamp will not be illuminated
- If the passenger front seat is occupied by a small child the airbag will not be active and the warning lamp will not be illuminated
- If the passenger front seat is occupied by a larger child or an adult seated in the 'in position' then the airbag will be active and the warning lamp will be illuminated
- If the passenger front seat occupant adopts a posture or position into the Keep Out Zone 'out of position', then the airbag will be deactivated and the warning lamp will be illuminated.

NOTE:

Whenever the airbag warning light, located on the airbag door, remains illuminated, the front passenger airbag will not deploy if required in the event of an impact.

NOTE:

The passenger airbag door is attached to an energy-absorbing device, designed to provide a progressive deceleration force from the door during deployment. The deceleration is achieved by manufacturing the door tethers so that the stitching will yield during deployment. The torn stitching apparent after deployment is the intentional and obvious result of such a design.

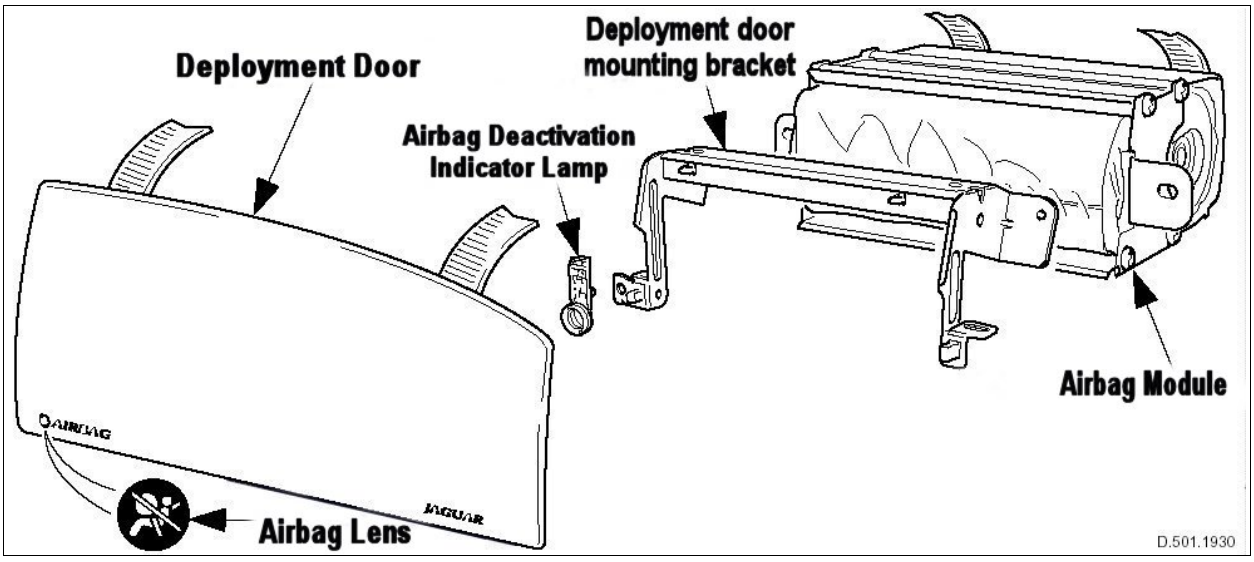

Fig. 49 Passenger Airbag Deactivation Warning Lamp (PAD)

Seat Belt Pre-Tensioners

- The restraints control module incorporates the functionality of the seat belt pre-tensioners, resulting in the deletion of the pre-tensioner control module.
- The reel is retracted by a train of steel balls (Refer to XK 2000 MY pre-tensioner).
- The pre-tensioner also features a torsion load limiter incorporated within the reel spindle and it includes the new components of the electrical comfort system (seat belt reel rewind spring selective feature).
- Pre-tensioner operation and electrical comfort system operation is dependant on the shared “hall-effect” sensor within the female belt buckle.

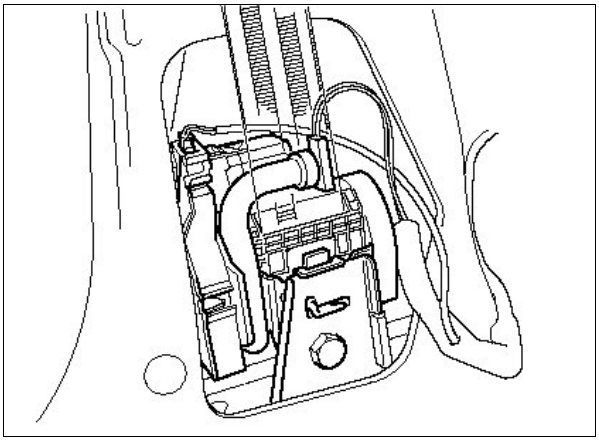

Fig. 50 Seat Belt Pre-Tensioners

Safety belt buckle sensor

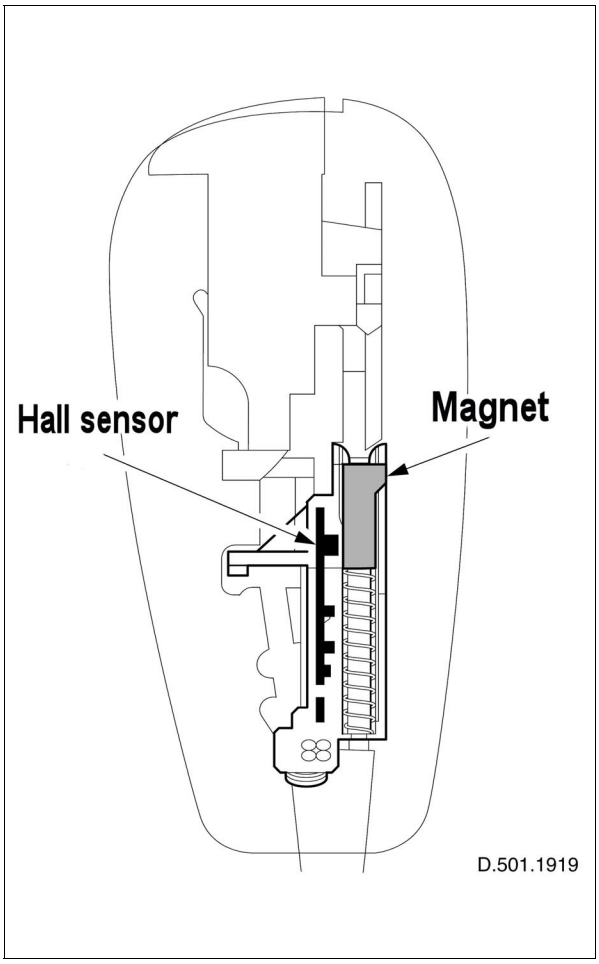

Fig. 51 Safety belt buckle sensor

- The safety belt buckle sensor uses a “hall-effect” type sensor which provides an output signal in response to the magnetic field disturbance caused by the insertion of the safety belt tongue into the buckle.
- The signal is used by the restraints control module to determine airbag firmness selection and pre-tensioner deployment decision. The switch completes the circuit for the comfort solenoid of the electrical comfort system.

Seat Track Position Sensor

- Driver's seat only
- Hall effect type sensor activated by a steel blade attached to the seat slide.
- Allows the ARM to know when the seat is passed a defined point in its travel. This point is defined to minimize injuries to small stature drivers.
- The ARM delays the 2nd stage output of the driver's airbag when the seat is forward of this position.
- Upon receipt of signal, approximately 2/3 of full forward travel, the ARM will select a de-powered deployment of the driver's airbag.

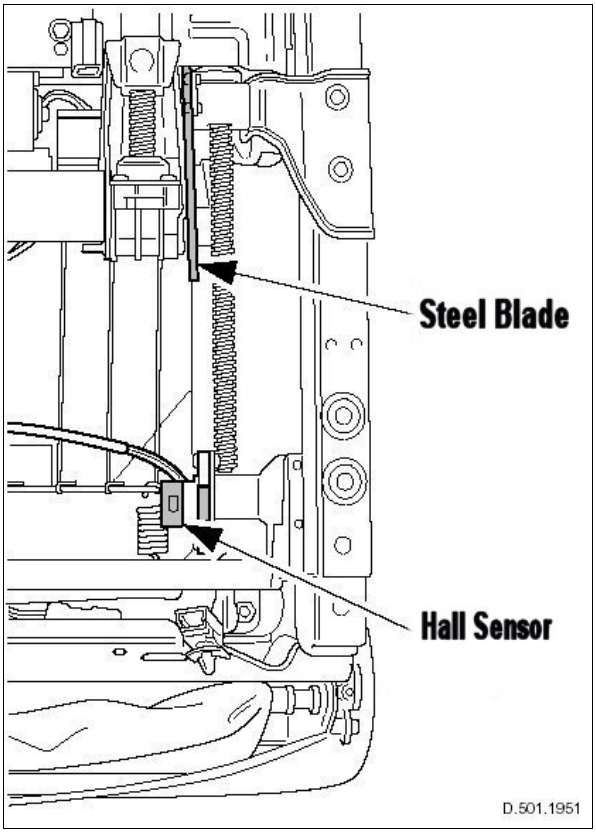

Fig. 52 Seat Track Position Sensor

Passenger seat weight sensing system

- Sub-system of the adaptive restraints system
- Passenger side only
- Located on seat frame
- Linked to the ARM by a dedicated CAN bus.
- Linked to a pressure sensor and silicone filled bladder in the seat cushion. This is a threshold device which classifies the seat occupancy as empty, small child or adult.
- The ARM uses this information to decide the deployment strategy for the front and side passenger airbags and activates the PAD lamp accordingly
- No individual seat weight sensing components are replaceable separately. The entire seat bottom cushion (excluding seat cover) is replaced as a pre-calibrated unit and configured to the adaptive restraint system using WDS.
- The seat weight-sensing system responds to the occupancy of the front passenger seat in accordance with the following table.
- The advanced restraints systems via the ARM monitor and processes the data from the seat weight —sensing system and several other sensors before making a deployment decision.

Table 7 Passenger Airbag Strategy

WEIGHT	CLASSIFICATION	PAD LAMP	DEPLOY-MENT
0–10lbs (0–4.5 Kg.)	Empty	Off	No
10–47lbs (4.5–21 Kg.)	Small Child	On	No
>55lbs (25 Kg.)	Adult	Off	Yes

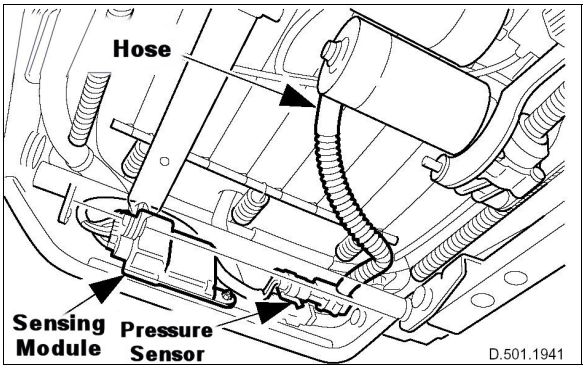

Fig. 53 Seat weight sensing components

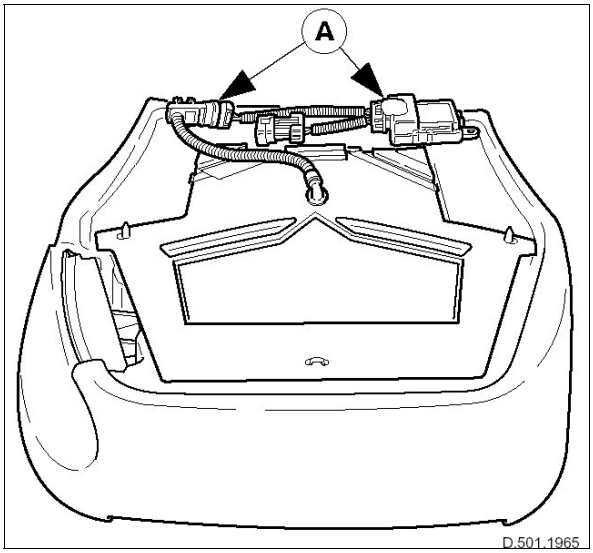

Fig. 54 Connectors

Seat weight sensor service kit

Individual components of the seat weight-sensing system are not serviceable; the system must be replaced as a complete unit.

Due to the sophistication of the weight sensing system, each replacement system requires calibration. To avoid the need to provide calibration equipment to each dealer, a pre-calibrated service kit assembly is available. The kit has two fixed connectors (A) and a single connector to interface with the vehicle harness. After installation, the system will require initialization by WDS; refer to JTIS for further information.

OCCUPANCY SENSING SYSTEM

Overview

- Sub-system of the Adaptive Restraints System.
- Used to detect a large obstruction (i.e. occupant's head) blocking the passenger's airbag deployment door.
- Consists of a control module and four ultrasonic sensors operating at 40 kilohertz monitoring passenger seat occupancy.
- Sensors are positioned to apex just behind the passenger's airbag deployment door and can discern between the occupant's extremities (hands, feet) and head.
- The Occupancy Sensing Control Module (OSM) constantly monitors and processes signals from the occupancy sensors.
- The OSM, located within the fascia to the right of the glove box, connects to the Adaptive Restraints Control module (ARM) via a dedicated restraints CAN bus (Controller Area Network).
- The OSM will output a "Deploy - NO Deploy" signal to the ARM based on the position of the passenger.
- The ARM will render the passenger's airbag inoperable based on the signals from the Occupancy Sensing System and the Passenger's Seat Weight Sensing System and indicates the status via the passenger's airbag de-activation indicator lamp.
- Any malfunction of the Occupancy Sensing System will cause the Adaptive Restraints Control Module to illuminate the SRS MIL and flag a code for the subsystem.

The occupancy sensor system uses ultrasound at an operating frequency of 40 kilohertz to monitor passenger seat occupancy.

NOTE:

Medical studies have shown that frequencies within this range do not present any danger or discomfort.

The advanced restraints system uses four ultrasonic sensors, one at the A-post, one at the B-post and two in the roof console.

The sensors:

- Determine the presence and position of the front seat occupant with respect to the passenger air bag deployment door.
- Determine air bag deployment decisions by classifying occupants as either in position or out of position.
- Are part of a system that is sophisticated enough to be unaffected by body extremities.
- The sensor positions are identical for the coupe and convertible, except that, since the convertible has no B-post, the equivalent sensor is mounted in the rear quarter trim capping
- The four sensors are strategically placed to detect the presence and movement of the front passenger seat occupant.
- The occupancy sensing module constantly monitors and processes the signals received from the occupancy sensors. The ARM uses the data received from the occupancy sensing module, in conjunction with data from other sensors in the system, to make deployment decisions.

- Data from the sensors is correlated by the occupancy sensing module and used to decide when the front passenger seat occupant has leaned into an area in front of the passenger air bag door, known as the keep-out zone.
- The system is designed to ignore body extremities (hands, feet) and respond only to head or body movements. When the passenger leans forward into the zone, the system will disable the passenger air bag and provide visual confirmation by illuminating the passenger air bag deactivation indicator lamp.
- Obstruction of any sensor can cause the system to log a code and will illuminate the SRS indicator lamp. Subsequent clearance of the obstruction will extinguish the SRS indicator lamp, but the code will remained logged.

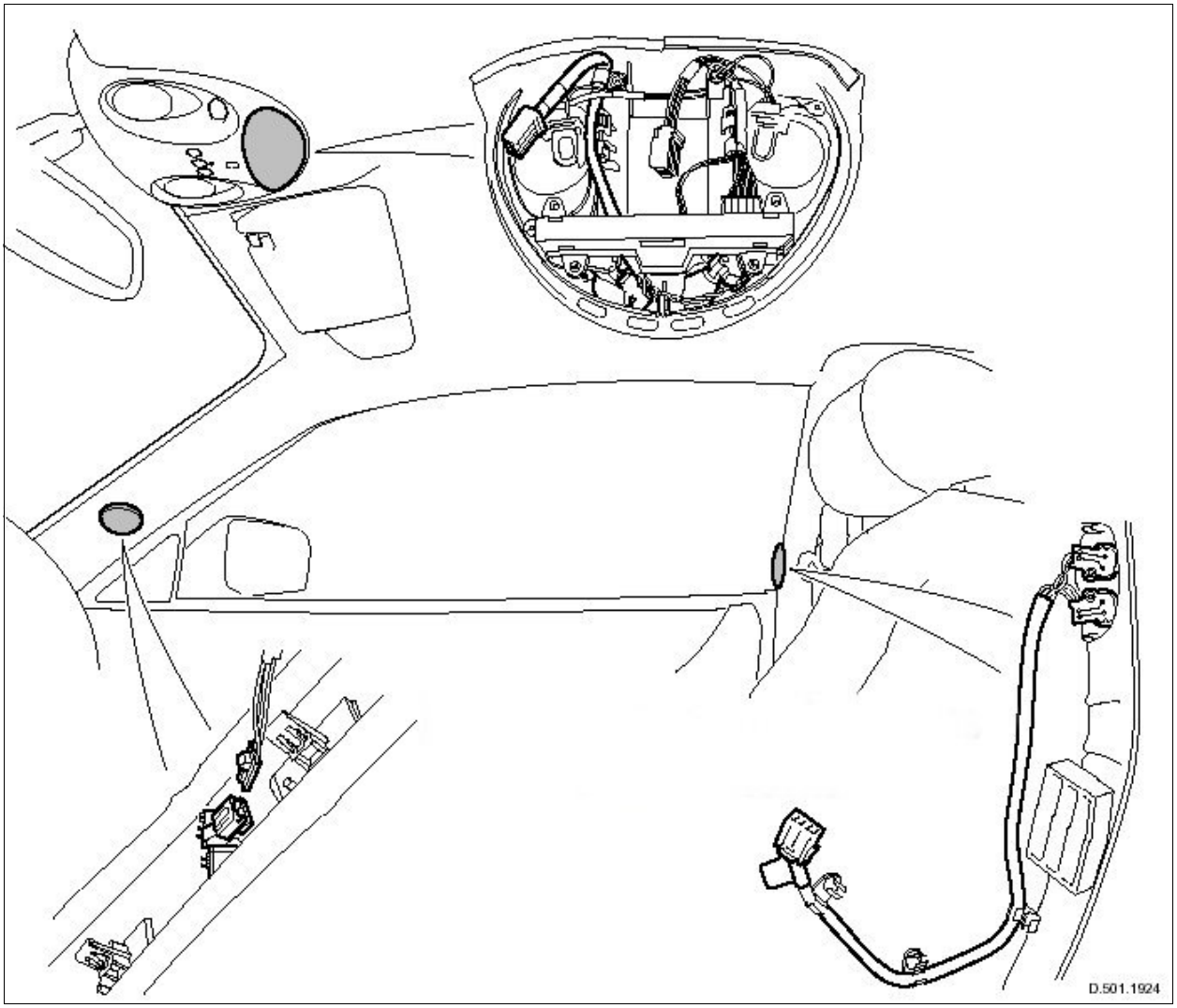

Fig. 55 Sensor Locations (Coupe shown)

The system will continue to function when sensors are blocked or malfunctioning, but with reduced efficiency, due to the loss of coverage. Refer to JTIS for sensor servicing information.

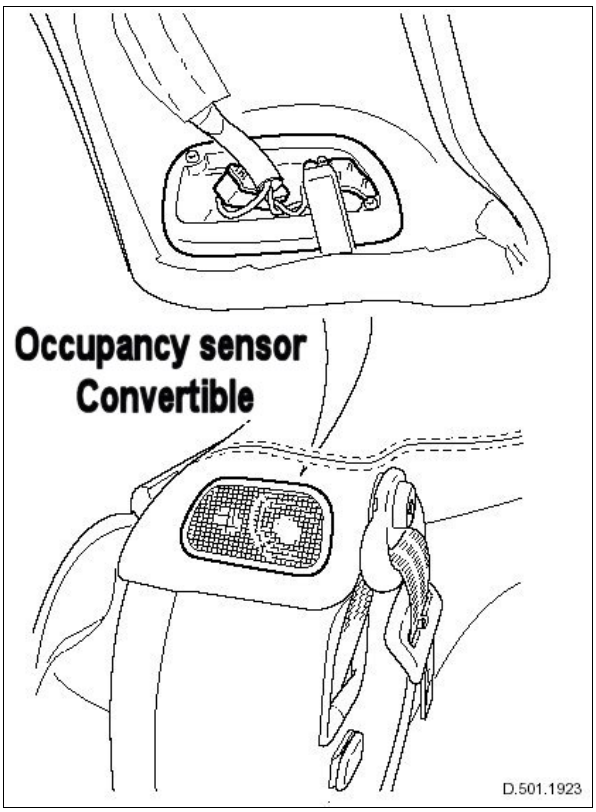

Fig. 56 Sensor Location (Convertible)

Occupancy sensing module

The module is located on the right-hand side glove box enclosure and processes signals received from the occupancy sensors and makes data available to the ARM, via the CAN network.

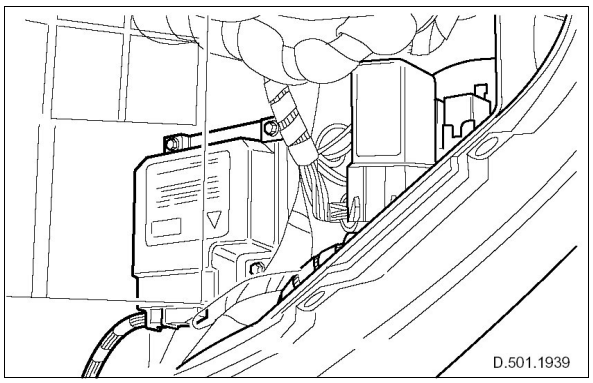

Fig. 57 Occupancy sensing module

Adaptive Restraints control Module (ARM)

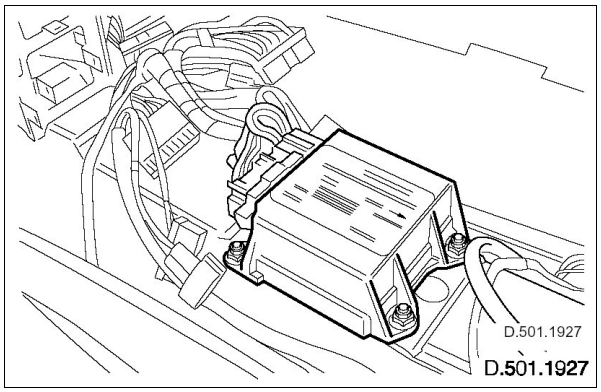

Fig. 58 Adaptive Restraints control Module (ARM)

- Located on top of the tunnel.
- Contains an internal accelerometer to detect impacts in conjunction with the external sensors.
- Has 2 internal areas of control to decide which restraints systems should be deployed in a frontal impact. The first is the crash severity algorithm. This uses data from the ARM's internal accelerometer, the FCS and the seat belt buckle sensor (SBBS) to determine the severity of the impact. A decision is made on which level of airbag deployment is required based on this. This decision is passed to the second

area, the deployment handler. This looks at the status of the Driver's Seat Track Position Sensor (DSTPS), the passenger Occupant Spatial Sensor (OSS), the Passenger Seat Weight Sensor (PSWS) and the seat belt buckle switches to then decide which restraints should finally be deployed. For example, if the OSS and PSWS indicate the passenger seat is empty then no restraint deployment will take place on the passenger side, even if full deployment takes place for the driver.

- For a side impact, the RCM uses an internal accelerometer and the side crash sensors to make a deployment decision. The decision is then sent to the deployment handler. If the PSWS is indicating a small occupant or empty seat, the passenger's airbag will be disabled.
- The ARM is connected to the seat belt buckles by a single wire. The ARM measures the current level every 200ms to determine the status of the buckles:
- The ARM is connected to the passenger seat weight sensor control module by the 2 wires of a dedicated CAN bus. The ARM receives constantly updated messages on the status of the passenger seat and the health of the system.
- The ARM is connected to the passenger occupant spatial sensor control module by the 2 wires of the dedicated CAN bus. The RCM receives constantly updated messages on the status of the keep out zone.
- The ARM is connected to the seat track position switch by 2 wires. The ARM provides power and measures a current drop to gauge the position of the seat:
- The ARM is connected to the Passenger Airbag Deactivated (PAD) lamp by a single wire. The ARM drives this lamp on for 2 scenarios:
  - During the 6 second prove out period at ignition on.
  - When the passenger airbag is disabled by the ARM (if the seat is occupied).
- The ARM is connected to the Body Processor Module by a single wire. If a fault exists on the restraints system and the SRS lamp is inoperable, the ARM will send a pulse width modulated signal to the BPM which in turn produces an audible back up tone.
- The ARM is connected to the SRS warning lamp on the IC by a single wire. The ARM drives this lamp on for 2 scenarios:
  - During the 6 second prove out period at ignition on.
  - When a fault code on the restraint system is logged. A coded flash of the lamp will take place identifying the particular fault. The code will be flashed 5 times before the lamp is turned on permanently for that ignition cycle.

System Diagnostics

The RCM can generate and store system fault codes which can be read with the WDS. The airbag warning lamp on the instrument cluster will also flash a 2–digit fault code.

SEATBELTS

Seatbelt electrical comfort system

In addition to the standard retraction, the front safety belts have an electrical comfort system, designed to reduce the force exerted on the occupant, by the safety belt webbing under typical driving conditions. The system utilizes a mechanism in the retractor to keep the belt force at a controlled and pre-defined level.

The safety belt, on initial extraction of the webbing, is controlled by the retraction spring (B). Whenever the front safety belt tongue, engages with the safety belt buckle, the comfort system solenoid (C) actuates the comfort switch (D) causing the comfort spring (A) to change the force exerted on the occupant.

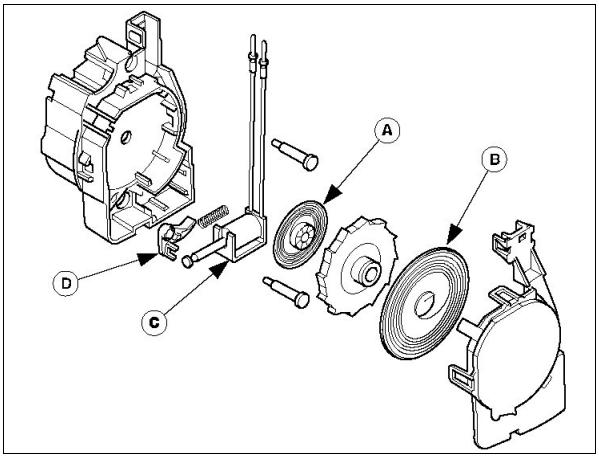

Fig. 59 Seatbelt electrical comfort system components

NOTE:

The Seatbelt electrical comfort system illustration is provided as an aid to understanding only. The comfort system does not comprise any serviceable components.

After the buckle tongue is inserted into the buckle (A), the comfort solenoid, switches operation to the comfort spring. During the period that the buckle remains engaged, the comfort system is in operation, reducing the force exerted on the occupant by the safety belt webbing, in accordance with the extraction curve (B) and the retraction curve (D). When the tongue is released from the buckle (C), the comfort solenoid disengages the comfort spring, re-engages the retraction spring and causes the force on the webbing to immediately revert to the standard retraction mode.

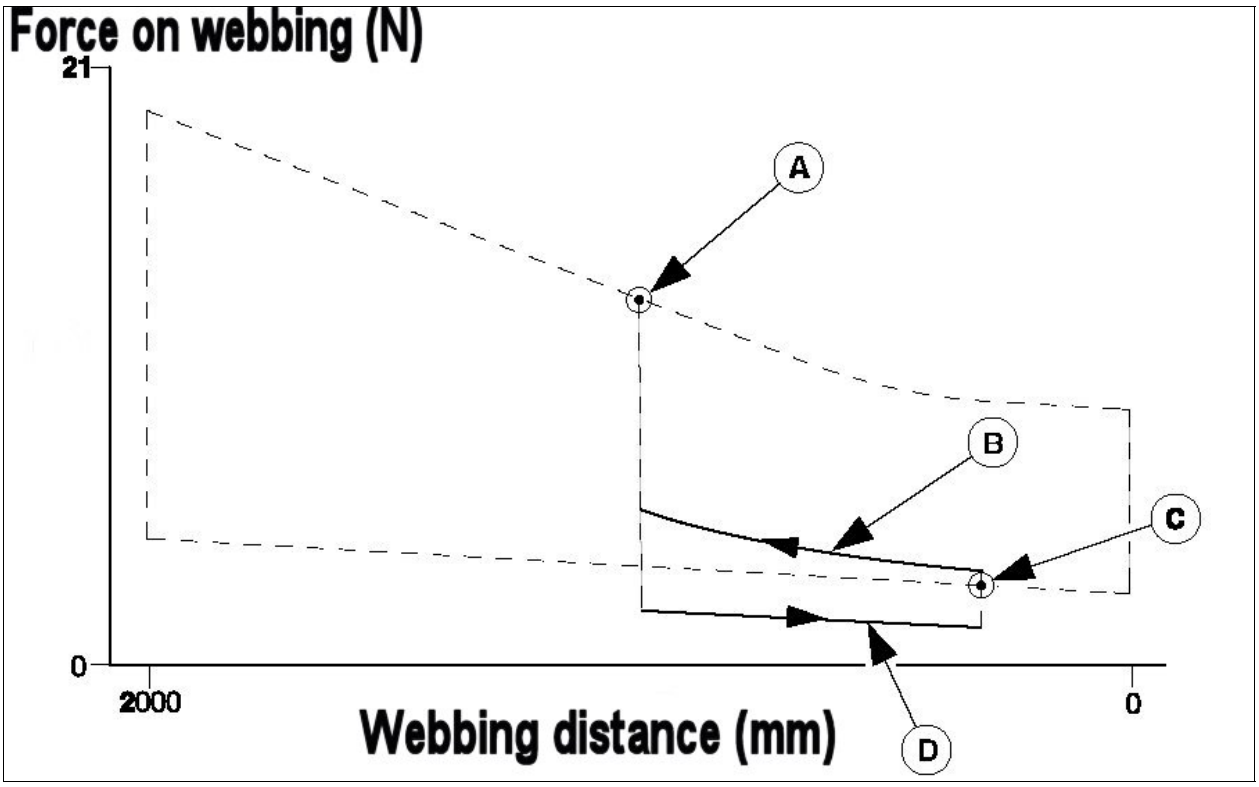

Fig. 60 Seatbelt electrical comfort system operating parameters

WORKSHEET – ADAPATIVE RESTRAINT SYSTEMS #1

1. When replacing a side air bag on a 2002 XJ8 what must be remembered about the multiplug connector?

2. A Single Point Sensor Module is being replaced in a 1999 XJ8. What is the torque setting for the retaining screws?

3. What is the purpose for the template included with the passenger seat weight sensing service kit for a 2002 XK8?

4. While replacing a cosmetically damaged driver's airbag module on a 2002 XK8, a postcard is found in the box with the replacement airbag. What should be done with it?

5. What is the tightening torque for a side impact sensor on a 2001 MY S-TYPE?

6. While performing service work on a 2000 S-TYPE, the clockspring (cassette ribbon) is removed. Upon installation the technician notices that the service lock, which prevents rotation of the airbag sliding contact, is missing. Must the technician replace the clockspring or may the airbag sliding contact be re-aligned?

MODEL APPLICABILITY — X-TYPE 2002 MY ONWARDS (X400)

Overview

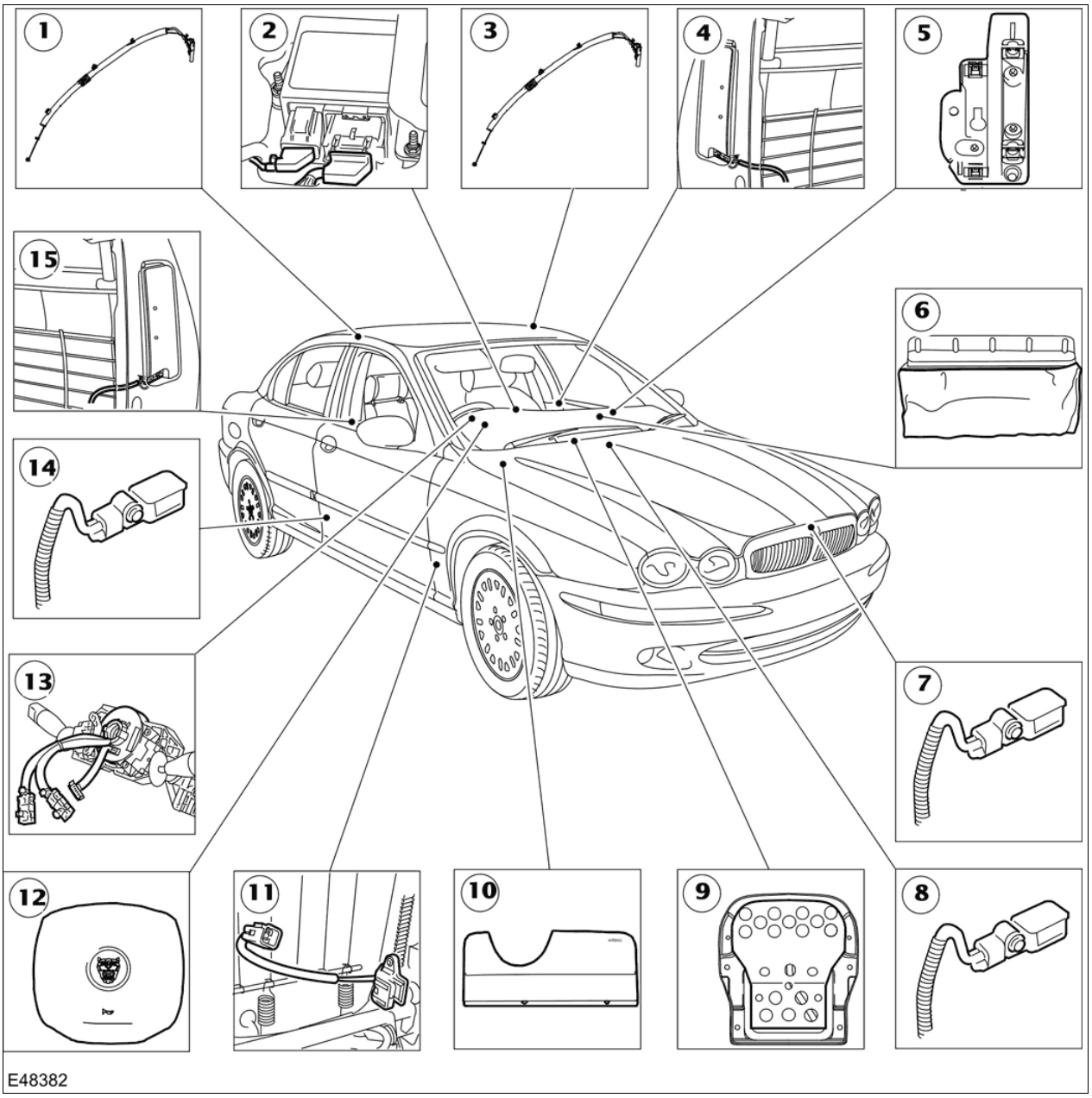

Fig. 61 X400 Air Bag Supplemental Restraint System (SRS) Components

1. Side air curtain module
2. Restraints control module (RCM)
3. Side air curtain module
4. Side air bag module
5. Passenger air bag deactivation (PAD) indicator

6. Passenger air bag module
7. Crash sensor
8. Side impact sensor
9. Passenger weight sensor
10. Driver lower air bag module
11. Seat track position sensor
12. Driver air bag module
13. Air bag sliding contact
14. Side impact sensor
15. Side air bag module

The X-TYPE Adaptive Restraints System is very similar to the XK 2001MY system and offers the following features:

- Two-stage inflation for driver and passenger airbag
- Side airbags and roof mounted curtain airbags to protect the head and thorax of both the front and rear occupants
- Adaptive restraints module to determine crash severity and make the deployment decision
- Driver's seat position sensor to determine the position of the driver
- Passenger's seat weight sensor to determine the stature of the passenger
- Front and side crash sensors to provide crash severity data to the ARM
- Seat belt buckle switches to provide belt usage information to the ARM

SYSTEM COMPONENTS AND OPERATION X400

Adaptive restraints module (ARM)

The ARM is located on top of the tunnel. It contains an internal accelerometer that determines the crash severity in conjunction with signals received from the external front crash sensor and side crash sensors. It also makes a decision on which restraints to deploy based on this information.

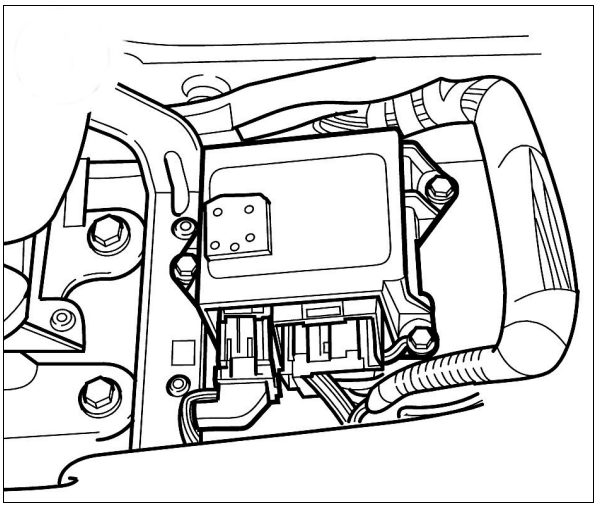

Fig. 62 Adaptive restraints module (ARM)

Front crash sensor

The front crash sensor is mounted to the hood safety catch bracket. It provides frontal crash severity data to the ARM.

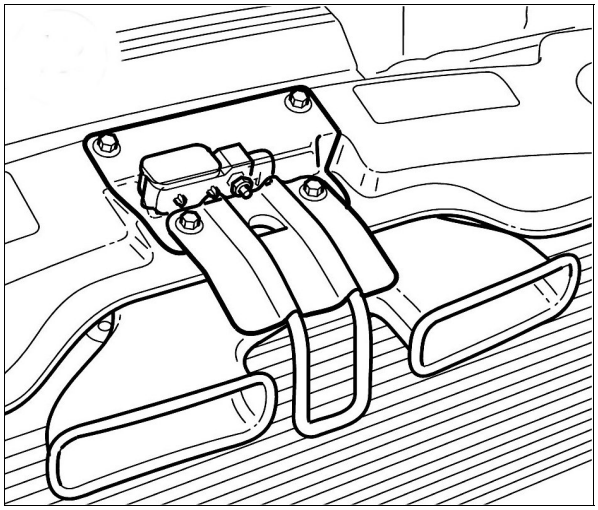

Fig. 63 Front crash sensor

Side crash sensors

Two side crash sensors are used on each side of the vehicle. One is located on the bottom of the B/C pillar and the second is located rearward of the door aperture. They provide side crash severity data to the ARM.

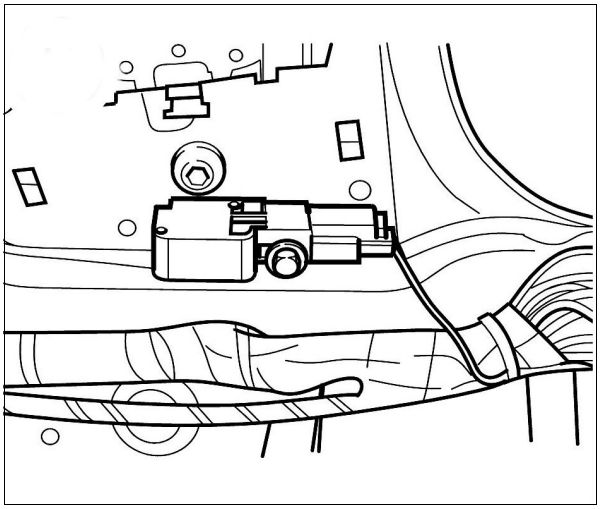

Fig. 64 Side crash sensor B-Post

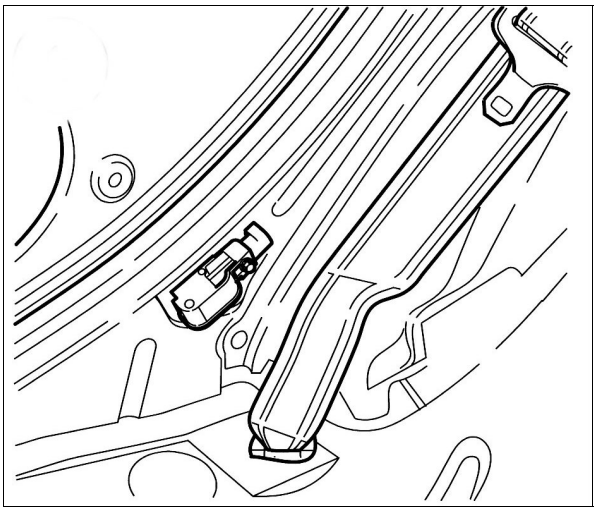

Fig. 65 Side crash sensor D -Post

Occupant Position Sensing

The X-TYPE does is not fitted with the ultrasonic occupant position sensing system.

Driver's Airbag

Two-stage inflation controlled by the ARM with separate igniters and connectors. Both stages will always deploy but the time interval will be varied by the ARM.

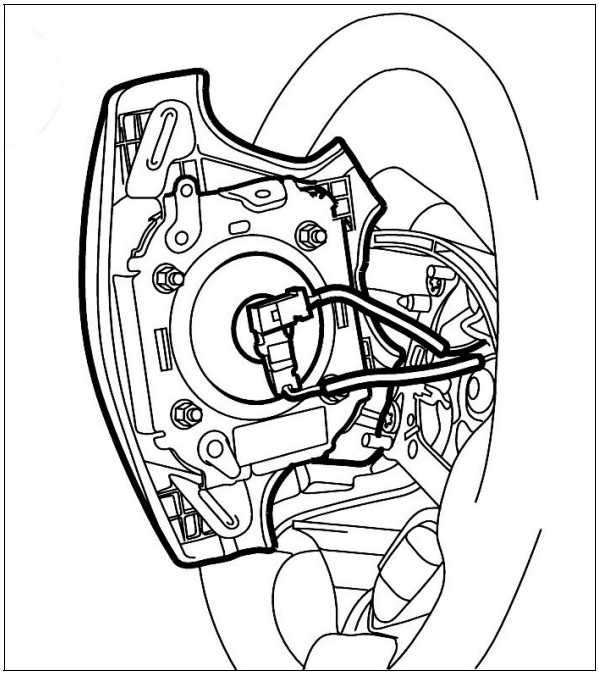

Fig. 66 Driver's Airbag

Passenger's Airbag

Two-stage inflation similar to the driver's airbag. Can be removed through the glove box aperture. Deployment door contains an integral passenger airbag deactivation lamp, which will illuminate when the airbag is deactivated.

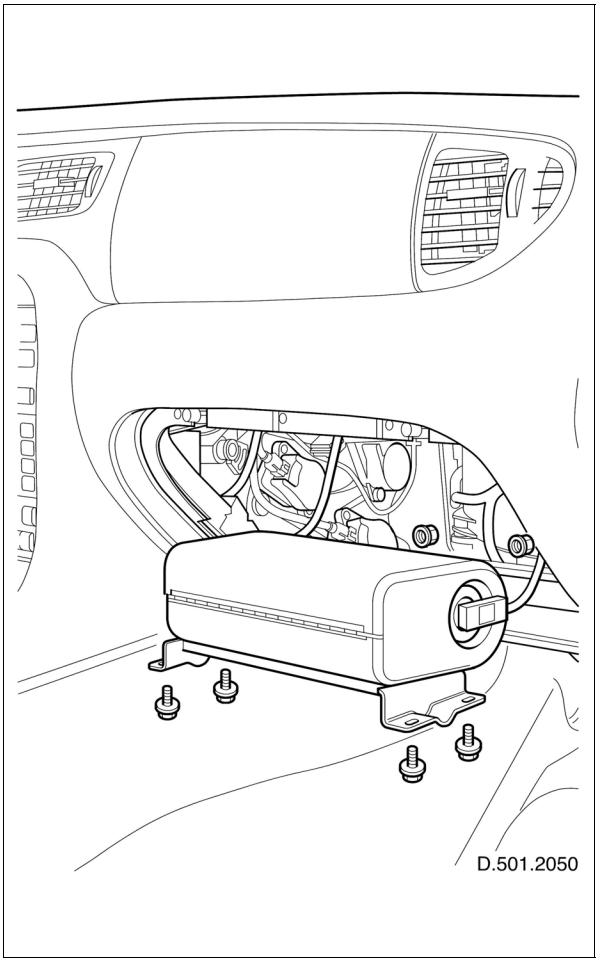

Fig. 67 Passenger's Airbag

Side Airbags

Located in a pocket sewn into the seat cover to guide deployment .

WARNING:

If serviced, the module must be correctly located in the chute. Failure to follow this service procedure could result in incorrect airbag deployment. Refer to JTIS for more information.

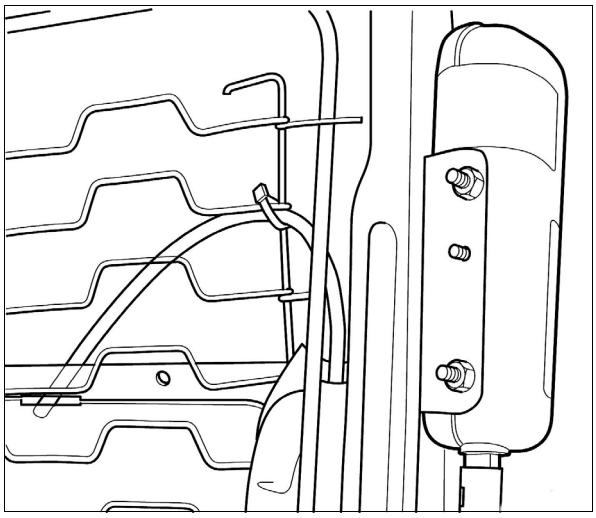

Fig. 68 Side Airbag

Curtain Airbags

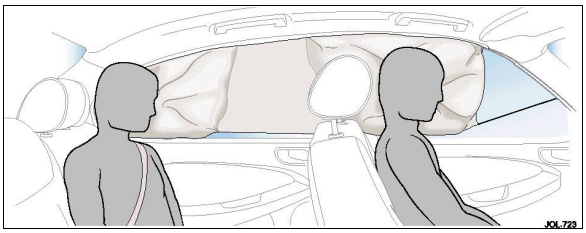

Fig. 69 Curtain Airbag

- Provides side impact head protection for both the front and rear occupants.
- Inflated by compressed argon gas.
- Gas cylinder and electrical connector are mounted on the "D" post.
- Will deploy with the seat mounted airbags on the struck side only. If the passenger's airbag has been disabled by the ARM, the passenger's seat mounted airbag will also be disabled. However the passenger side curtain airbag will still deploy in the event of an impact on that side of the vehicle to protect any occupant sitting in the rear.
- If the vehicle has been involved in an accident of sufficient severity to deploy the curtain airbag, it is unlikely that the body shell will be repairable.
- Correct handling is important due to the shape and weight distribution of the component. Always carry with 2 hands, ensuring an even distribution of weight. Failure to observe this precaution can result in twisting of the gas fill tube.

WARNING:

The headlining and adjacent tethered trim components are an important part of the curtain airbag system. When replacing any of these components, ensure they are correctly fitted to permit effective airbag deployment.

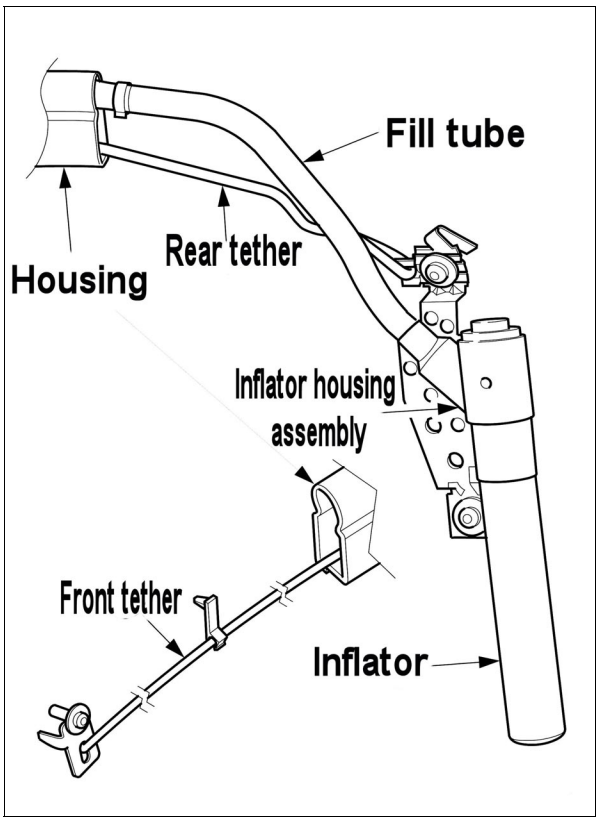

Fig. 70 Curtain Airbag components

Seatbelt pre-tensioners

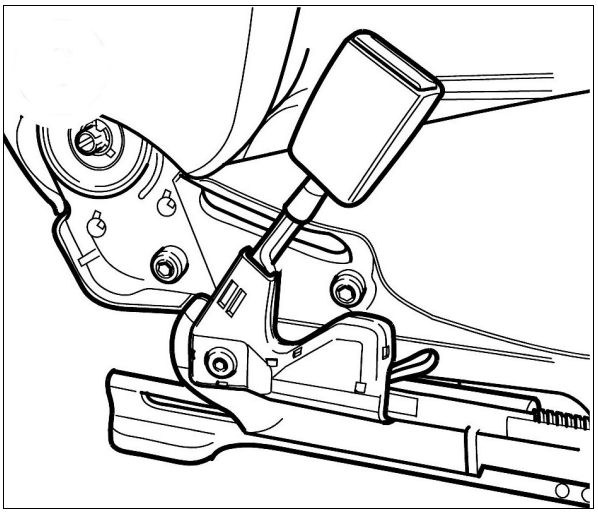

Fig. 71 Seatbelt pre-tensioner

The seatbelt pre-tensioners deploy with the front airbags and are incorporated into the seat buckle assembly.

Seatbelt buckle switch

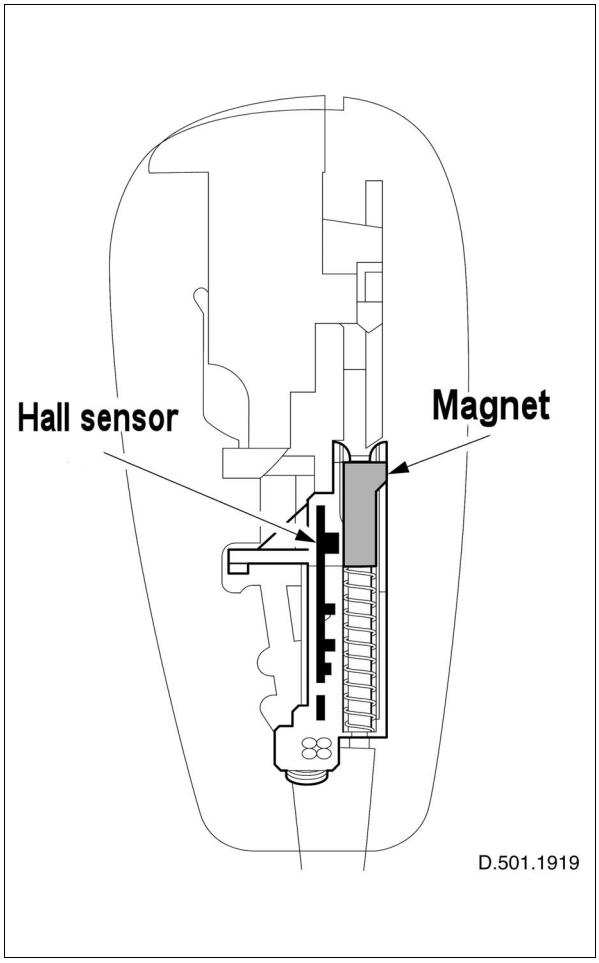

Fig. 72 Seatbelt buckle switch

The belt buckle switches indicate to the ARM whether the seat belts are being worn.

Driver's seat position switch

When the seat is forward of a set position, the ARM will increase the time interval between deployment stages of the driver's airbag to reduce airbag induced injuries to drivers sitting to close to the steering wheel.

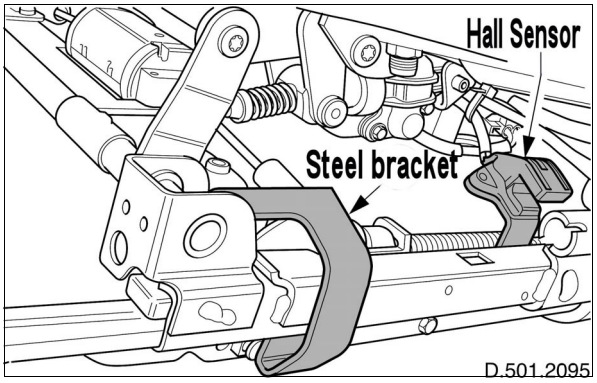

Fig. 73 Driver's seat position switch

Passenger seat weight sensor

This sensor is a silicone bladder with a pressure transducer and control module located on the seat bottom cushion. When replacing the sensor, the bladder is supplied with the cushion and needs to be calibrated using WDS for correct operation.

The seat weight sensing module, processes the input signal received from the pressure sensor and makes it available to the ARM via a dedicated SRS-controller area network (CAN).

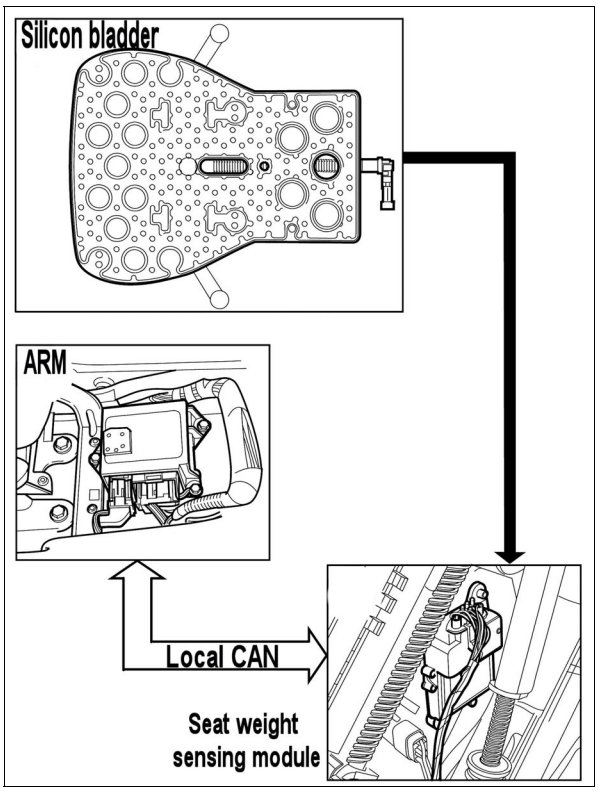

Fig. 74 Passenger seat weight sensor

Front safety belts

The front safety belts retractors incorporate a load limiting device that allows progressive “payout” of additional safety belt webbing when the force exerted exceeds a predetermined limit.

Rear safety belts

The rear safety belts retractors and buckles are of the conventional type.

SYSTEM DIAGNOSTICS X-TYPE 2002 —2003 (X400)

Overview

When the key is turned to the ignition position, the system will carry out a self test. The airbag warning light should illuminate for 6 seconds during this test. If no faults are found the light should then extinguish. If system faults are present the light will flash a 2 digit code to indicate the area of the fault. These codes are shown below:

Table 8

DTC	LAMP CODE	DESCRIPTION
C1414	15	Incorrect module design level. This DTC will be logged if an incorrect ARM has been fitted. There are unique ARM's for XK8 coupe and convertible and fitting the wrong one will cause this DTC to be logged. This DTC will also be logged if there is a fault with the XK8 vehicle harness at either pin 20 or 21 on the 24–way ARM connector. Check by disconnecting the 24–way ARM connector and measure on the harness side. For a coupe, pin 20 should measure 12V and pin 21 should have no connection. For a convertible, pins 20 and 21 should both measure 0V.
B1231	13	Longitudinal acceleration threshold exceeded (crash data memory full). This DTC will be logged if a significant vehicle impact has been detected by the ARM.
B1342	12	Defective control module. This DTC will be logged if either there is an internal fault with the ARM or if the vehicle battery voltage drops below 10V. If this DTC is logged, ensure the vehicle battery is good and re-test before replacing the ARM.

DTC	LAMP CODE	DESCRIPTION
B1869	N/A	Air bag warning lamp open circuit or short to ground. If this DTC is logged and the lamp is permanently off, then the wire between the ARM and the IC is open circuit or the bulb has blown. If the lamp is permanently illuminated then the wire is shorted to ground.
B1870	N/A	Air bag warning lamp short to battery.
B1884	18	PAD warning lamp open circuit or short to ground. If this DTC is logged and the lamp is permanently off, then the wire between the ARM and the PAD lamp is open circuit or the bulb has blown. If the lamp is permanently illuminated then the wire is shorted to ground.
B1890	18	PAD warning lamp short to battery. If this DTC is logged, the PAD lamp will be permanently off and may not reflect the correct status of the de-activation system.
B1921	14	Air bag diagnostic monitor ground circuit open. This DTC will be logged if the ARM has not been correctly bolted down to the vehicle body. Check that the ARM is sitting correctly on its weld studs and that the paint has been cleared from the studs.
B2691	51	Driver's seat belt buckle switch open circuit or short to battery. If this DTC is set, either the wire from the buckle to the ARM is open circuit or short circuit to battery, or there is a fault with the seat belt buckle switch. Check the potential and continuity of the wire disconnected at both ends. It is not possible to measure any electrical characteristics of the buckle switch in isolation as it requires power to operate correctly.
B2434	51	Driver's seat belt buckle switch short to ground. Diagnosis is as for B2691.

DTC	LAMP CODE	DESCRIPTION
B2435	51	Driver's seat belt buckle switch resistance out of range. Check the continuity and potential of the input wire and, if correct, check the ground feed to the buckle switch. If correct, replace the seat belt buckle assembly.
B2692	52	Passenger's seat belt buckle switch open circuit or short to battery. Diagnosis is as for B2691.
B2438	52	Passenger's seat belt buckle switch short to ground. Diagnosis is as for B2691.
B2439	52	Passenger's seat belt buckle switch resistance out of range. Diagnosis is as for B2435.
B2477	54	Module configuration failure (module option content not/incorrectly programmed).
C1981	49	Driver's seat track position switch open circuit or short to battery. Like the seat belt buckle switches, it is not possible to measure the analogue feedback current to the ARM or any electrical characteristics of the switch in isolation. Disconnect the switch and the ARM and check the potential and continuity of each wire. If no fault is found, replacement of the switch may be necessary.
C1947	49	Driver's seat track position switch short to ground. Disconnect the switch and ARM and check both wires for a short to ground. If no fault is found, replacement of the switch may be necessary.

DTC	LAMP CODE	DESCRIPTION
C1948	49	Driver's seat track position switch resistance out of range. Disconnect the switch and the ARM and check both wires for a short or open circuit. If no fault is found, replacement of the switch may be necessary.
B1891	N/A	Airbag tone warning indicator short to battery. This is an output line from the ARM to the GEM. Check the potential of the wire after disconnecting from both the ARM and the GEM. There is no corresponding blink code for this DTC.
B1892	53	Airbag tone warning indicator open circuit or short to ground. Check the potential and continuity of the wire after disconnecting from both the ARM and GEM.
B2290	16	Front passenger classification system. This DTC will be logged if one or more of the following fault conditions has occurred: The Seat Weight Sensing Module has an internal fault requiring module replacement. There is a hardwired CAN fault between the Seat Weight Sensing Module and the ARM. Vehicle battery voltage is or has been approximately 7.5V-8.0V for a considerable time. A failed attempt has been made to re-calibrate the Seat Weight Sensor with WDS due to excessive weight being placed on the seat. A fault exists with the sensing element, the connector or the 3 associated wires.

DTC	LAMP CODE	DESCRIPTION
B2291	17	Front passenger position system. This DTC will be logged if one or more of the following fault conditions has occurred: The Occupant Position Sensing Module has an internal fault requiring module replacement. There is a hardwired CAN fault between the Occupant Position Sensing Module and the ARM. Vehicle battery voltage is or has been approximately 7.5V-8.0V for a considerable time. Any of the sensors are faulty. Either the sensor is not connected or any of the 4 wires to the sensor are short/open circuit or the sensor itself is faulty. Normal continuity and short circuit diagnosis of the 4 wires or sensor substitution can be carried out. The OPS module can detect if either the "A" pillar or "B" pillar sensors are obstructed with a physical object. If this is detected for 5 ignition cycles or for 30 minutes within 1 ignition cycle the DTC will be logged. A fault with the receivers of these 2 sensors will also be interpreted as a physical obstruction.
B2292	33, 34	Seat belt pre-tensioner status. Blink code 33 is a driver side fault. Blink code 34 is a passenger side fault. This DTC will be logged if the pre-tensioner circuit is short to battery or ground, open circuit or low resistance. Follow the diagnostic procedures in JTIS and do not attempt to probe the pre-tensioner itself.
B2293	19, 21	Front airbag status. Blink code 19 is a driver airbag fault. Blink code 21 is a passenger airbag fault. Diagnostic procedure is as for B2292.
B2294	24, 25	Curtain airbag status. Blink code 24 is a driver side fault. Blink code 25 is a passenger side fault. Diagnostic procedure is as for B2292.

DTC	LAMP CODE	DESCRIPTION
B2295	22, 23	Side airbag status. Blink code 22 is a driver side fault. Blink code 23 is a passenger side fault. Diagnostic procedure is as for B2292.
B2296	42, 43, 44, 45, 46	Impact sensor status. Blink code 42 is a front sensor fault. Blink code 43 is a driver side sensor fault. Blink code 44 is a passenger side sensor fault. Blink code 45 is a driver rear side sensor fault. Blink code 46 is a passenger rear side sensor fault. This DTC will be logged if any of the following fault conditions occur: The sensor has an internal fault that requires sensor replacement. The sensor has become totally detached from its fixing such that there is no electrical contact between the sensor and the vehicle body. There is no communication between the sensor and the ARM. This could be caused by damage to the 2 wires from the ARM to the sensor.

2004 X-TYPE (X404) RUNNING CHANGES

The restraints system has been extensively modified to meet the new Federal Legislation for restraints system.

The following are the items that are new, modified or redesigned:

- New driver airbag
- Inflatable Knee Bolster (airbag) on the driver's side
- Dash modifications for Inflatable Knee Bolster
- New front seatbelt retractor pretensioners
- New passenger seatbelt tension sensor
- New passenger seatbelt tension sensor
- New passenger seat weight sensor
- Revised Restraints Control software
- Revised front seat foams
- New sunvisor label to meet revised text requirements
- New passenger air bag deactivation light symbol
- Estate specific items such as new seat belts and child restraint tethers (Canada only)

NOTE:

All of the above new supplementary restraint features were introduced as running changes during the 2004 model year cycle.

Driver Air Bag Module

NOTE:

The driver air bag module is a snap-fit design. Access to release the snap-wire is through the service apertures; refer to "JTIS / GTR" .

The module is a unique style designed to suit the new steering wheel; refer to "JTIS / GTR" .

The driver air bag module is controlled by the restraints control module RCM , which chooses between first or second stage deployment, depending on driver seat buckle usage, the seat position and crash severity.

Variation in driver air bag deployment is determined by the timing of the first and second stage ignition signals. This facilitates adaptation of the stiffness and timing of the air bag to optimize occupant protection.

The module comprises:

- A twin stage inflator.
- Separate chambers for the two inflation stages, each independently activated by the RCM.
- Two air bag connectors that have fool-proof mechanical keying and are color-coded to the respective plug on the inflator.
- A non-azide propellant that reduces particulates and effluents.

The air bag deploys radially, to reduce the risk of air bag induced injury to a driver that is positioned close to the steering wheel.

Disposal of twin stage air bags is different to single stage air bags; refer to "JTIS / GTR" .

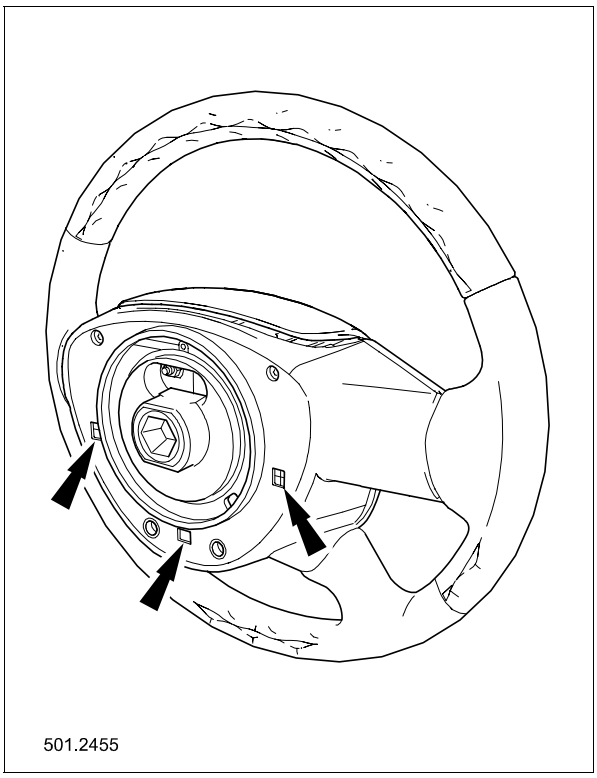

Fig. 75 Driver air bag service apertures

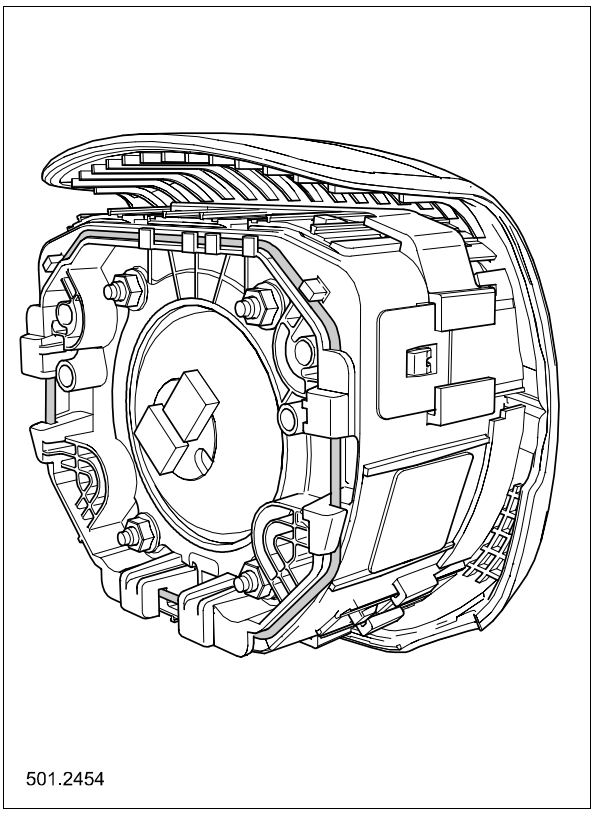

Fig. 76 Snap-wire - driver air bag module

Inflatable Knee Bolster (IKB)

The 2004 MY X-TYPE Inflatable knee bolster (IKB) is one of several modifications necessary to meet the new Federal standards.

The Inflatable Knee Bolster is fitted to all AWD vehicles (2.5 and 3.0L), all markets and body styles. It replaces current driver side lower panel.

The IKB has a single stage inflation: One airbag connection to be made.

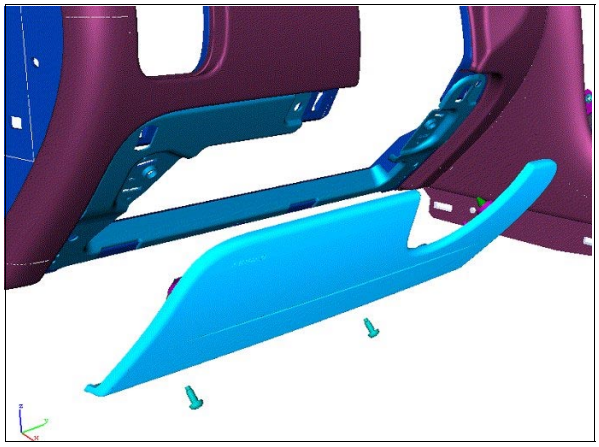

Fig. 77 IKB assembly

The same safe working procedures apply to this air bag as to any other air bag fitted to the vehicle. Refer to "JTIS / GTR" .

Deployment logic

The logic for IKB deployment is simultaneous with "stage 1" of the driver airbag, for occupants seated rearward of seat track position sensor. When the occupant is seated further forward, IKB would not be a benefit and so is deactivated.

Service

There are 8 variants of IKB: LHD and RHD versions, each in four colors. Ivory (NED), Champagne (SEL), Stone (LJE), Warm Charcoal (LEG).

Removal of IKB should only be necessary to service the module itself. Service of most column and instrument panel hardware can be accomplished with IKB still in place.

Passenger Air Bag Deployment Door

In addition to the lens that displays the air bag deactivated symbol, the deployment door now carries the wording "PASS AIR BAG OFF" .

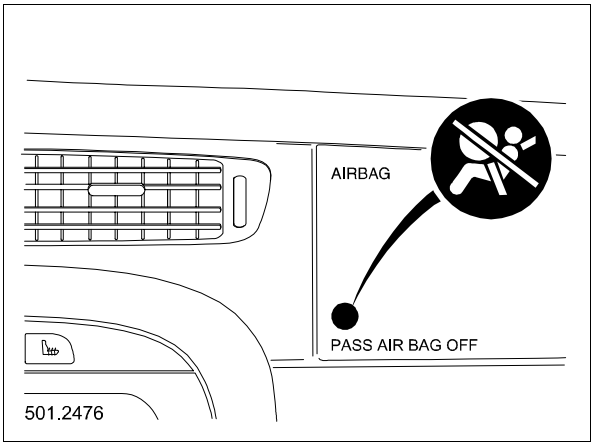

Fig. 78 Passenger air bag deployment door

NOTE:

This change also applies to all 2005 MY— onwards Jaguar models (XJ, XK and S-TYPE)

Seat Weight Sensor

The seat weight sensor, part of the passenger seat weight sensing system, is replaced with a new generation type weight sensor.

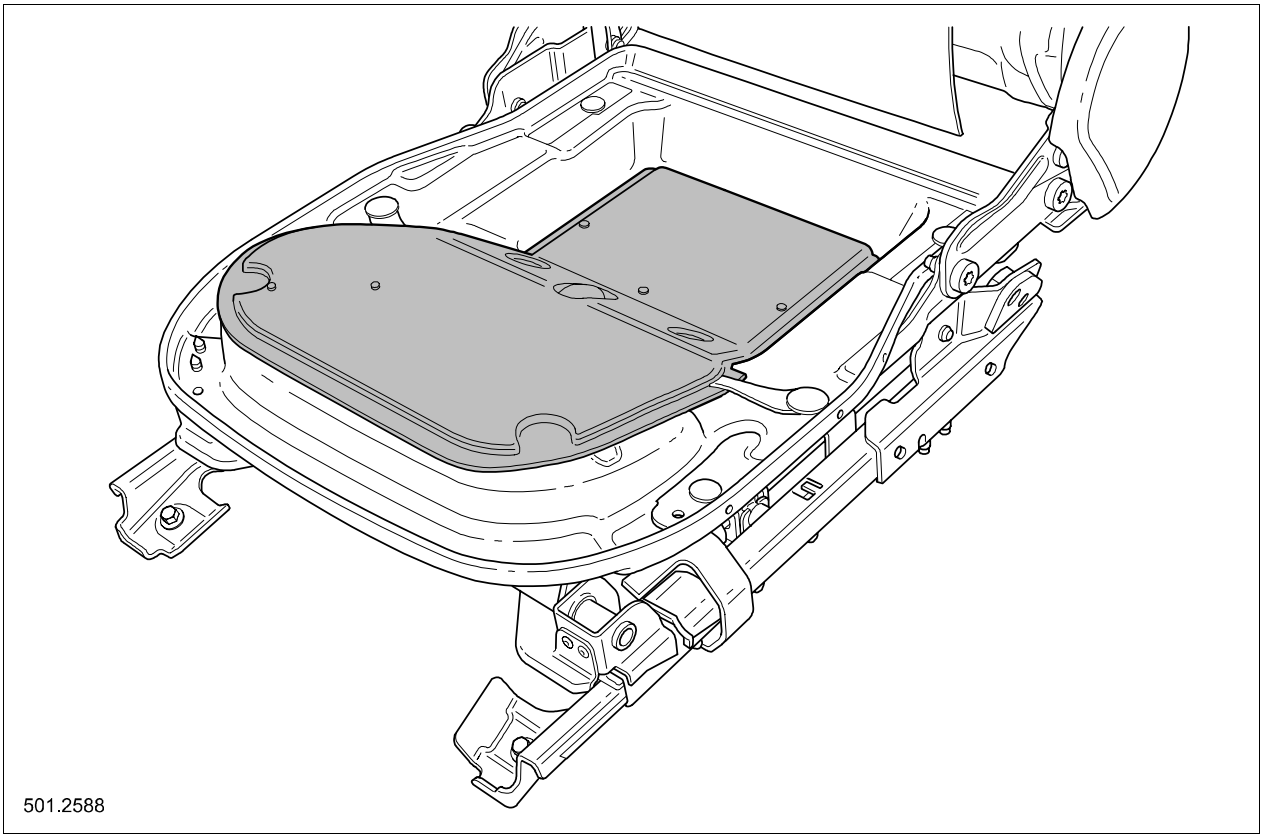

Fig. 79 Seat weight sensor

Seat belt reel pre-tensioners

NOTE:

The seat belt pre—tensioner technology will be introduced during the 2004/2005 model year. It will not be available on early 2004MY X-TYPE models.

To meet the new advanced restraints federal legislation, the 2004MY X-TYPE is fitted with seat belt reel pre-tensioners. The reel pre-tensioners are used in addition to the seat belt buckle pre-tensioners.

The operation of the reel pre-tensioner is the same as the buckle pre-tensioner, that is, using electrically triggered pyrotechnics that tighten the seatbelt a prescribed amount upon sensing a crash event.

In the event of a frontal impact, the reel pre-tensioners deploy first, followed by the buckle pre-tensioners 4ms later.

Passenger Belt Tension Sensor

The belt tension sensor is a strain-gauge type encapsulated within the passenger safety belt anchor.

The sensor converts the force applied to the belt into an electrical signal. In the event that a child-seat is installed onto the front passenger seat (not recommended), the force applied to the passenger safety belt is reflected by the output signal from the sensor, which provides data to supplement that received from the silicon bladder. The passenger seat weight-sensing module processes the input data and makes it available to the restraints control module which then makes the necessary adjustments in respect of passenger air bag deployment.

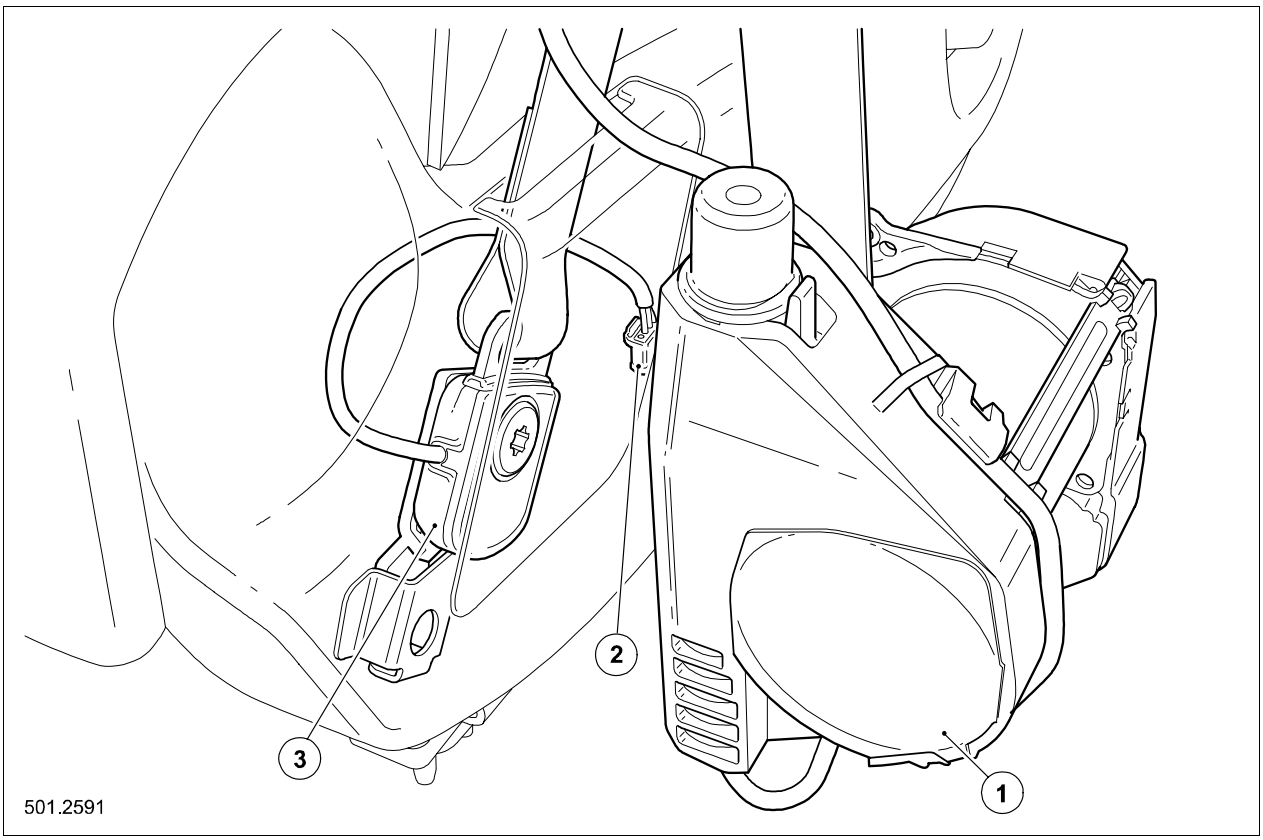

Fig. 80 Front seat belt with pre-tensioner and belt tension sensor

1. Retractor with pyrotechnic pre-tensioner
2. Belt tension sensor connector
3. Passenger belt anchorage with belt tension sensor

Seat Track Position Sensor

A front passenger's seat-track position sensor is introduced which is similar to the existing driver's side and is located on the seat track. There are two versions: one for 8-way movement seats and one for the 10-way movement seats.

The sensor is actuated by the magnet that is attached to the seat slide. The magnetic field disturbance caused when the magnet passes the sensor, creates an output signal for the RCM. On receipt of this signal, which indicates when the seat is forward of a defined point in its travel, the RCM disables the second stage output of the driver air bag.

Malfunction of the sensor or associated circuits will cause the SRS indicator lamp to illuminate. Diagnosis must be undertaken using WDS.

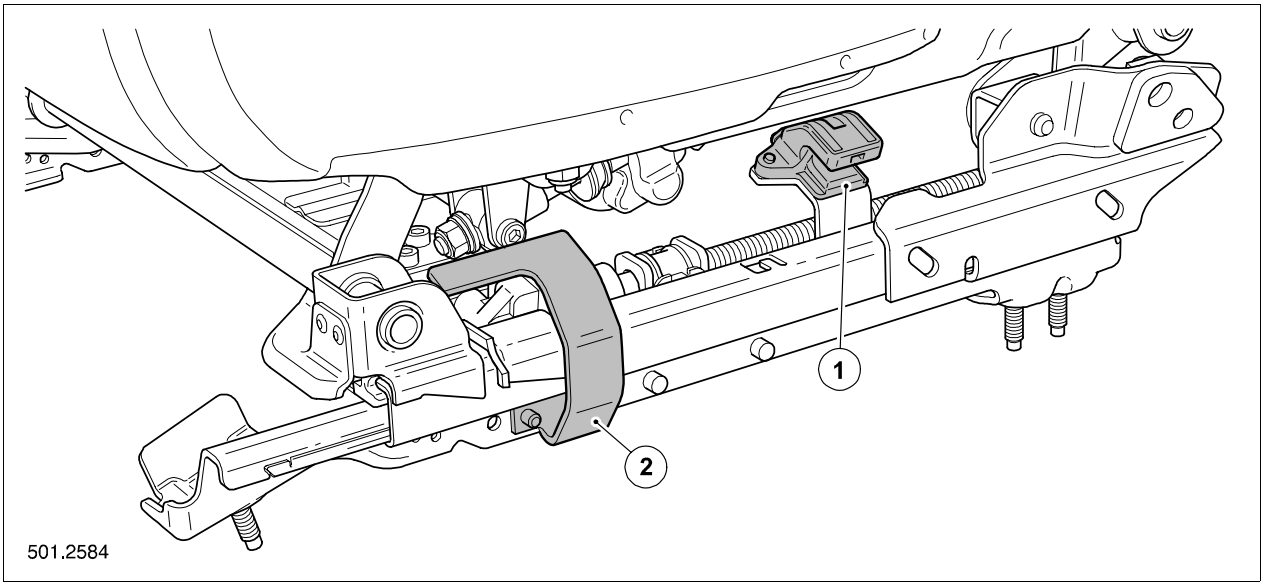

Fig. 81 Front passenger seat track position sensor

1. Hall effect sensor
2. Steel bracket

Rear Safety Belts (Estate-Canada)

Due to the absence of a rear parcel shelf on the estate, the rear outer seat belt retractors are mounted to the wheel housing quarter strengtheners (turrets). The center belt retractor is mounted inside the seat squab.

Child Restraint Top Tether Anchorages (Estate —Canada)

Rear seats for the Canadian market have top tether anchorages fitted to the rear of the squab, one for each seat position. Should a child seat with a top tether be fitted into the vehicle, the top tether must not be routed over the luggage cover. It must pass between the luggage cover and the seat back.

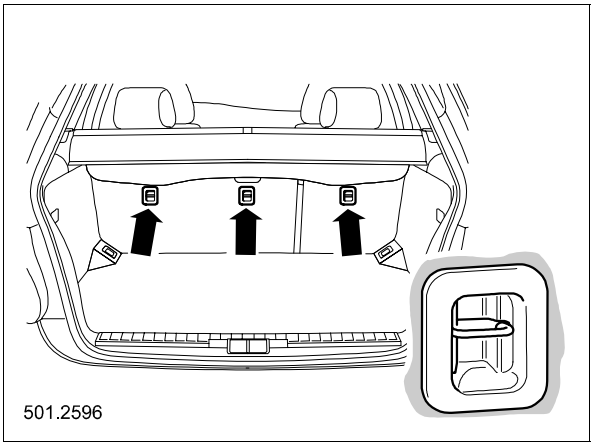

Fig. 82 Child restraint top tether anchorage

Side Curtain Air Bag (Estate-Canada)

Whereas the side curtain inflator in the sedan is routed from the roof-line down the "D" pillar, for the estate the route for the inflator remains at roof level.

System Diagnostics X-TYPE 2004 —Onwards (X404)

NOTE:

The following table was current at the time of print. **ALWAYS** refer to the appropiate service literature for the most current DTCs and service information.

Table 9 Service Faults X404 – Flash Codes/DTCs

Flash Code / DTC (WDS displayed)	Component	Fault Description
No prove out lamp	Airbag Warning Lamp	Short to battery or open circuit (Tone sounds if other fault present)
Constant lamp	RCM disconnected, inoperative, lost / low ignition feed	RCM disconnected from vehicle wiring harness Airbag Warning Lamp short to ground (tone sounds if other fault present) RCM ignition or ground circuit is open RCM is inoperative
Constant Lamp / B1317	Battery voltage high	Module input voltage greater than 15v +/- 8%
Constant Lamp / B1318	Battery voltage low	Module input voltage less than 10.4v +/- 8%
Constant Lamp / B2477	RCM module configuration failure	Unconfigured/rejected/in-correct vehicle build vs. programme content
12 / B1342	RCM internal fault	RCM component failure – Replace module
13 / B1231	RCM crash data memory full	Crash event data storage at capacity – Replace module
14 / B1921	RCM bracket ground resistance high	RCM has detected a fault with bracket ground resistance

15 / C1414	Incorrect vehicle identification code	Wrong RCM module fitted – Check module design level Wrong OCS module fitted – Check module design level Wrong vehicle harness fitted – Check design level
16 / B2290	Occupant Classification Sensor fault	Pressure sensor fault – Replace OCS system ECU fault – Replace OCS system Communications fault – Check harness wiring and connectors Calibration fault – Seat requires calibration at Lear
16 / B2909	Belt Tension Sensor fault	BTS circuit fault – Check harness wiring and connectors
17 / B2291	Occupant Position Sensor fault	ECU fault – Replace module Communications fault - Check harness wiring and connectors Calibration fault – Refer to WDS Sensor fault – Check harness wiring and connectors
18 / B1884	PAD Warning Indicator Inoperative	Open circuit or short to ground
18 / B1890	PAD Warning Indicator Inoperative	Short to ignition/battery or feature present but not expected.
19 / B2293	Driver Frontal Airbag	Device or circuit fault – Check harness wiring and connectors

21 / B2293	Passenger Frontal Airbag	Device or circuit fault – Check harness wiring and connectors
22 / B2295	Driver Side Airbag	Device or circuit fault – Check harness wiring and connectors
23 / B2295	Passenger Side Airbag	Device or circuit fault – Check harness wiring and connectors
24 / B2294	Driver Side Curtain	Device or circuit fault – Check harness wiring and connectors
25 / B2294	Passenger Side Curtain	Device or circuit fault – Check harness wiring and connectors
28 / B2988	Inflatable Knee Bolster	Open circuit / high resistance
28 / B2989	Inflatable Knee Bolster	Short to ignition/battery
28 / B2990	Inflatable Knee Bolster	Short to ground
28 / B2991	Inflatable Knee Bolster	Resistance low or shorted across airbag
33 / B2292	Driver Buckle Pretensioner	Device or circuit fault – Check harness wiring and connectors
34 / B2292	Passenger Buckle Pretensioner	Device or circuit fault – Check harness wiring and connectors

35 / B2292	Row 2 Driver Buckle Pretensioner	Device or circuit fault – Check harness wiring and connectors
36 / B2292	Row 2 Middle Buckle Pretensioner	Device or circuit fault – Check harness wiring and connectors
37 / B2292	Row 2 Passenger Buckle Pretensioner	Device or circuit fault – Check harness wiring and connectors
38 / B2292	Driver Reel Pretensioner	Device or circuit fault – Check harness wiring and connectors
39 / B2292	Passenger Reel Pretensioner	Device or circuit fault – Check harness wiring and connectors
42 / B2296	Front Crash Sensor	Device or circuit fault – Check harness wiring and connectors
43 / B2296	Driver Side Crash Sensor	Device or circuit fault – Check harness wiring and connectors
44 / B2296	Passenger Side Crash Sensor	Device or circuit fault – Check harness wiring and connectors
45 / B2296	Row 2 Driver Side Crash Sensor	Device or circuit fault – Check harness wiring and connectors
46 / B2296	Row 2 Passenger Side Crash Sensor	Device or circuit fault – Check harness wiring and connectors
48 / C2200	Passenger's Seat Track Position Switch	Open circuit or short to battery
48 / C2202	Passenger's Seat Track Position Switch	Short to ground
48 / C2204	Passenger's Seat Track Position Switch	Current out of range - feature present but not expected

49 / C1981	Driver's Seat Track Position Switch	Open circuit or short to battery
49 / C1947	Driver's Seat Track Position Switch	Short to ground
49 / C1948	Driver's Seat Track Position Switch	Current out of range - feature present but not expected
51 / B2691	Driver Seat Belt Buckle Switch	Open circuit or short to battery
51 / B2434	Driver Seat Belt Buckle Switch	Short to ground
51 / B2435	Driver Seat Belt Buckle Switch	Current out of range - feature present but not expected
52 / B2692	Passenger Seat Belt Buckle Switch	Open circuit or short to battery
52 / B2438	Passenger Seat Belt Buckle Switch	Short to ground
52 / B2439	Passenger Seat Belt Buckle Switch	Current out of range - feature present but not expected
53 / B1891	Belt / Tone Module Interface Fault	Short to ignition/battery
53 / B1892	Belt / Tone Module Interface Fault	Short to ground or open circuit

WORKSHEET – ADPATIVE RESTRAIN SYSTEMS #2

Perform the following tasks on the vehicle assigned to your group. Record your findings in the spaces provided. Be prepared to discuss your specific results as well as the methods you used (to find the answers) with the other students in class.

1. Enter the vehicle information into the WDS. What software version is loaded?

2. From the Content Model main tab locate and highlight Restraint Systems. Does the yellow Guided Signpost appear at the top of the screen?

3. List all of the specific guided diagnostic checks that can be performed on the vehicle by selecting each sub-group area in Content Model and then selecting the guided diagnostic Signpost.

Your Instructor may wish you to perform a particular guided routine.

4. Return to the Content Model main tab and ensure the selection Restraint Systems is highlighted. Select the Datalogger main tab from the top of the screen. Which parameters have been pre-selected?

5. Now select all of the parameters and view them within the Datalogger Live Display sub-tab. List the values shown for each parameter in the spaces provided.

6. Did you find the Driver's Airbag resistance values to be higher than the other airbags? If so, what could be the reason?

Your Instructor may wish you to disarm the system and install resistance simulators at this time.

7. When would the Airbag Audible Warning become active?

8. On the vehicle you have been assigned what component directly controls the audible warning speaker. Describe the type of signal sent from the Restraints Module

9. How many "shorting bars" are located in your system?

10. Identify the fuse information (including number designation, amperage, and location) associated with your system.

11. Identify the system ground information (including number designation, type of ground, and location).

What Restraint fault code(s) would be a result of:

12. a short in the driver's pretensioner circuit?

13. a fault with the passenger side impact sensor(s)?

14. high resistance in the driver's airbag circuit(s)?

15. low alternator charging voltage?

16. too many impact events logged?

17. an internal module failure?

MODEL APPLICABILITY — S-TYPE 2003 MY ONWARDS (X202)

Overview

The 2003 MY S-TYPE benefited from all the latest and most advanced SRS technologies available to Jaguar. In order to support the advanced SRS requirements of the 2003 MY S-TYPE, a restraint control architecture was introduced comprising the following systems or components:

- Passenger occupancy sensing system
- All-electronic crash sensing including frontal crash severity sensing and advanced restraints management
- Driver airbag with twin stage inflator
- Passenger airbag with twin stage inflator
- Child seat lower ISOfix anchors for the rear seats
- Safety belt system including: front seat belt use detection, load limiting retractors and pre-tensioners
- Rear safety belts with pre-tensioners (all three belts)
- Front seats including: driver seat-track position sensor and passenger seat weight-sensing system
- Front seat mounted side airbags
- Side curtain airbags.

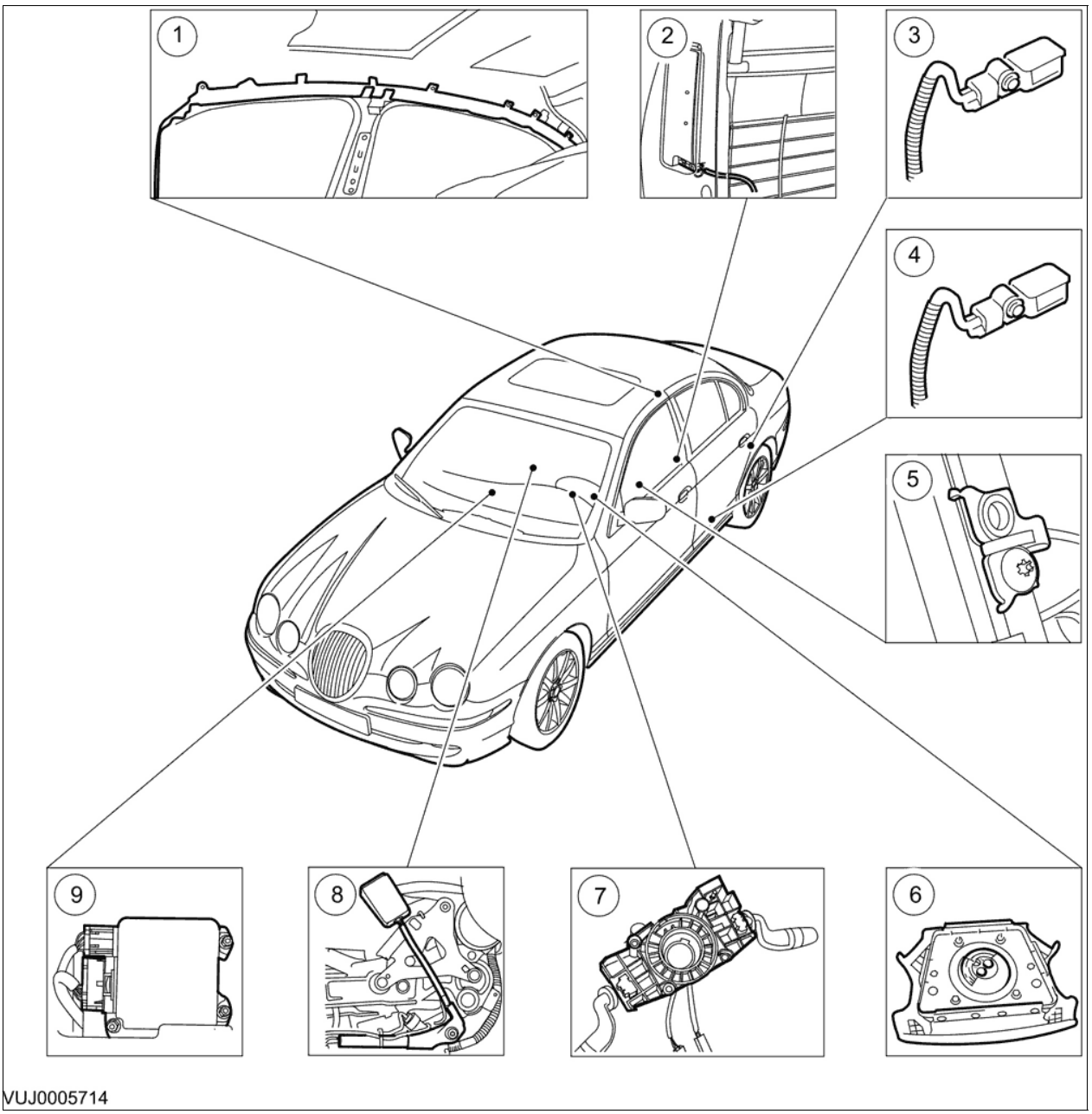

Fig. 83 X202 Air Bag Supplemental Restraint System (SRS) Components

1. Side air curtain module
2. Side air bag module
3. C-Pillar side impact sensor
4. B-Pillar side impact sensor
5. Seat position sensor
6. Driver air bag module
7. Clockspring
8. Safety Belt pretensioner
9. Restraints control module (RCM)

SYSTEM COMPONENTS X200

Pre-tensioners

The 2003 MY S-TYPE is the first vehicle in its class to offer pre-tensioner for all occupants. The front safety belts employ buckle type pre-tensioners while the rear seats use the retractor type.

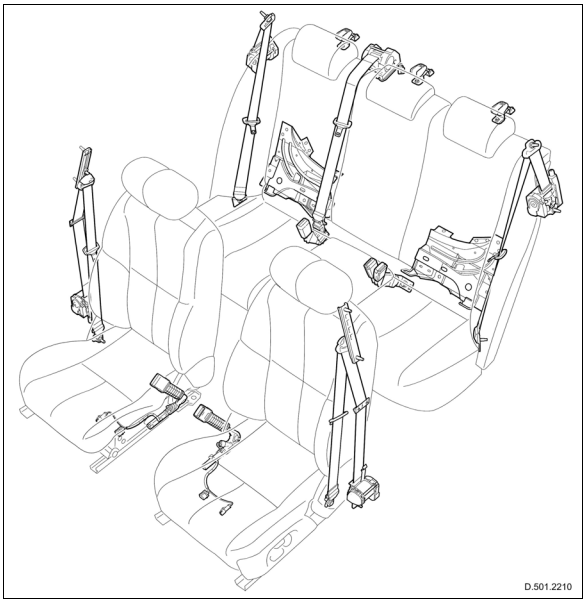

Fig. 84 S-TYPE Pre-tensioner locations

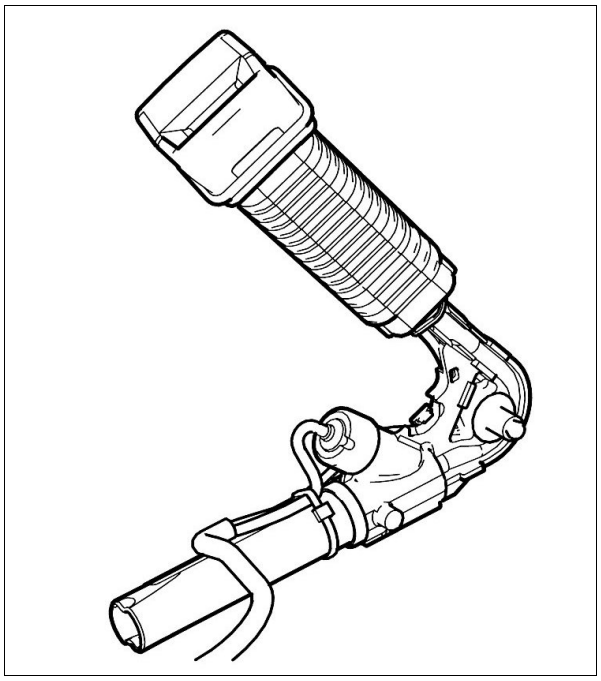

Fig. 85 Front seat belt pretensioner

Front crash sensor

The front crash sensor is mounted on a bracket which is located in the center of the upper mounting front crossmember. The sensor collects acceleration data from the front of the vehicle and sends it back to the ARM as an analogue signal. In addition it also provides the main source of data that enables the ARM to gauge the severity of a frontal impact.

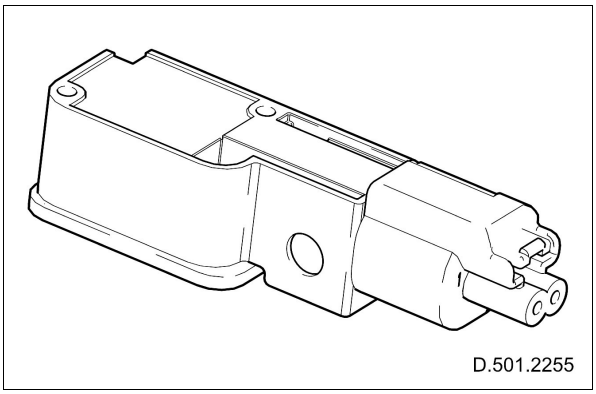

Fig. 86 Front crash sensor

Seat-track position sensor

The seat track position sensor is a Hall-effect type of sensor that is fitted to the underside of the driver's seat. The sensor is actuated by the magnet that is attached to the seat slide. The magnetic field disturbance caused, when the magnet passes the sensor, creates an output signal for the ARM.

On receipt of this signal, which indicates when the seat is forward of a defined point in its travel, the ARM delays the second stage output of the driver airbag. Malfunction of the sensor or associated circuit will cause the SRS indicator lamp to illuminate.

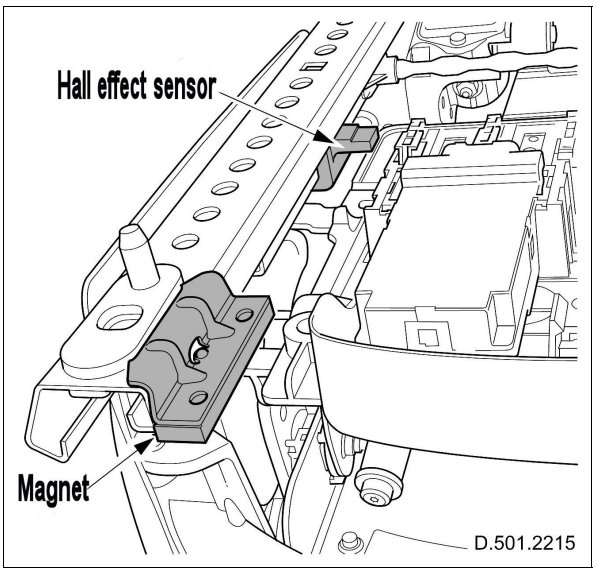

Fig. 87 Seat-track position sensor

Safety buckle sensor

The safety belt buckle sensor is a “hall-effect” type sensor, which provides an output signal in response to the magnetic field disturbance caused by the insertion of the safety-belt tongue into the buckle. The output signal from the sensor is used by the ARM to determine whether the front seat occupants are correctly restrained.

Malfunction of the sensor or associated circuits will cause the SRS indicator lamp to illuminate.

Passenger seat weight-sensing system

The seat weight-sensing system responds to the occupancy of the front passenger in accordance with the specified passenger weight ranges (refer to XK section). The advanced restraints system via the ARM, monitors and processes the data from the seat weight-sensing system and several other sensors, before making a deployment decision.

NOTE:

The seat weight-sensing system cannot discriminate between a passenger and an object.

Occupancy sensors

The occupancy sensor system uses ultrasound at an operating frequency of 40kHz to monitor passenger seat occupancy. The systems uses the same principle of operation as the one used on the XK series. Nevertheless, the sensor locations are different on the S-TYPE.

The system uses four sensors, one at the passenger side A-post, one in the center console and two in the headlining assembly.

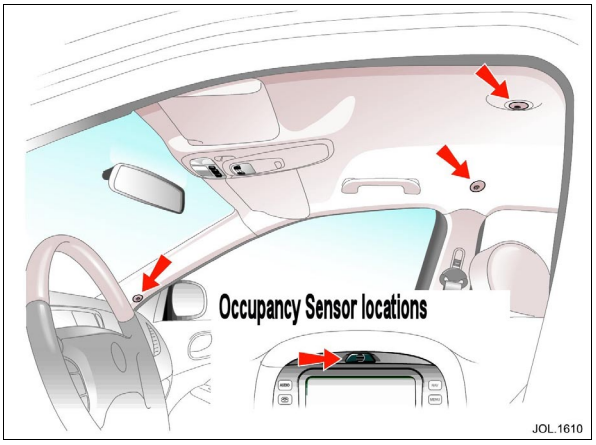

Fig. 88 Occupancy sensor locations

Driver's airbag

The driver airbag module is controlled by the RCM which chooses between first or second stage deployment, depending on driver seat buckle usage, the seat position and crash severity.

The module comprises:

- A twin stage inflator
- Separate chambers for the two inflation stages, each independently activated by the ARM
- Two air bag connectors that have foolproof mechanical keying and are color coded to the respective plug on the inflator
- A non-azide propellant that reduces particulates and effluents.

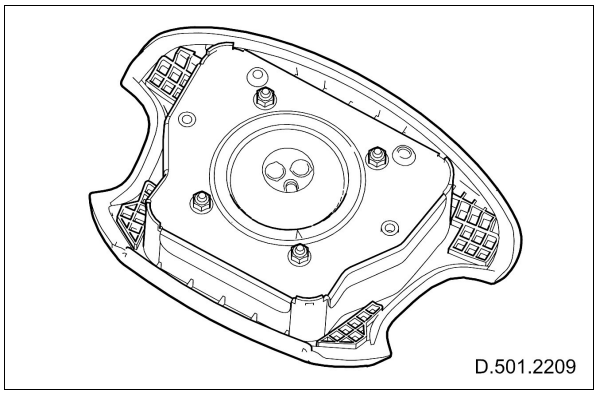

Fig. 89 Driver's airbag

Passenger airbag

The passenger air bag module is attached to a mounting bracket which is in turn attached to the cross car beam.

The module comprises:

- A twin stage inflator
- Two air bag connectors that have foolproof mechanical keying and are color coded to the respective plug on the inflator

The heated gas inflator:

- Comprises a high pressure mix of clean air and hydrogen gas triggered by two separate igniters.
- Generates clean gas to rapidly fill the air bag.
- Is classified as a stored flammable gas (not as an explosive) and as such, has less restrictive storage and transportation requirements.
- Produces a very clean burn and almost no particulates

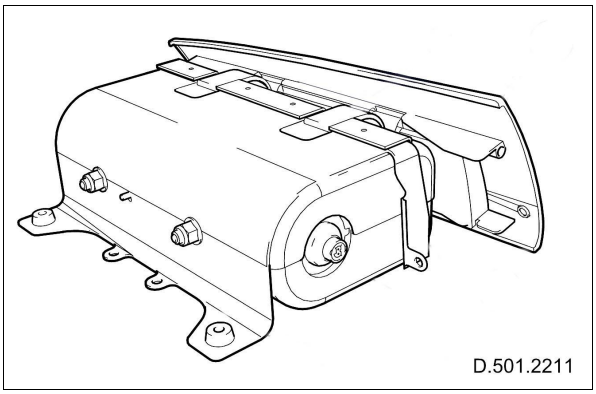

Fig. 90 Passenger airbag

Passenger Airbag Deployment (PAD) door

The passenger airbag deployment door is clipped into the fascia and tethered to the mounting bracket via webbing straps.

NOTE:

Removal of the door complete with webbing straps and tether bar can only be achieved after removing the passenger airbag module.

The passenger airbag deployment door incorporates a lens that displays the airbag deactivated symbol. The symbol is backlit by the airbag deactivation indicator lamp, which is mounted in a separate housing attached to the instrument panel.

The illumination of the symbol is designed to inform the front seat occupant whether or not the passenger airbag has been deactivated.

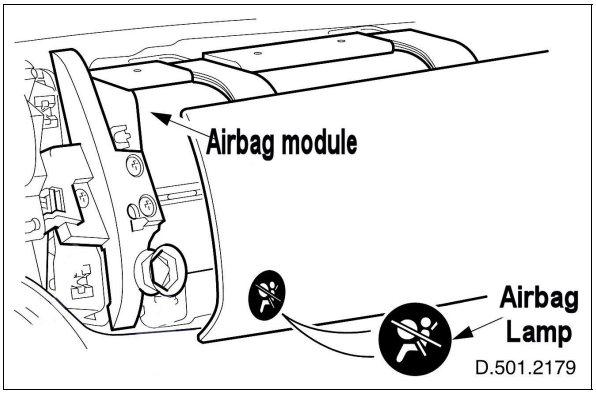

Fig. 91 Passenger Airbag Deployment (PAD) door

NOTE:

The lamp is not a serviceable item. The complete housing must be changed. Refer to JTIS for more information.

Side-curtain airbags

The side-curtain airbags comprises:

- Attachments brackets (P-clips)
- Fill tube
- Airbag
- Housing
- Inflator
- Front/rear tethers

The side curtain airbag:

- Is standard fit specification on all 2003 MY S-TYPE models
- Is located under the headliner and stabilized at the A-post and C-Post by tether straps
- Does not require routine maintenance
- Has no serviceable parts
- Uses compressed argon to inflate the airbags
- Deploys to coincide with seat mounted side airbag deployment.

NOTE:

If the passenger airbag is deactivated, the corresponding seat mounted side airbag is also deactivated, however, the side curtain airbag will still deploy to afford protection to any corresponding rear occupant.

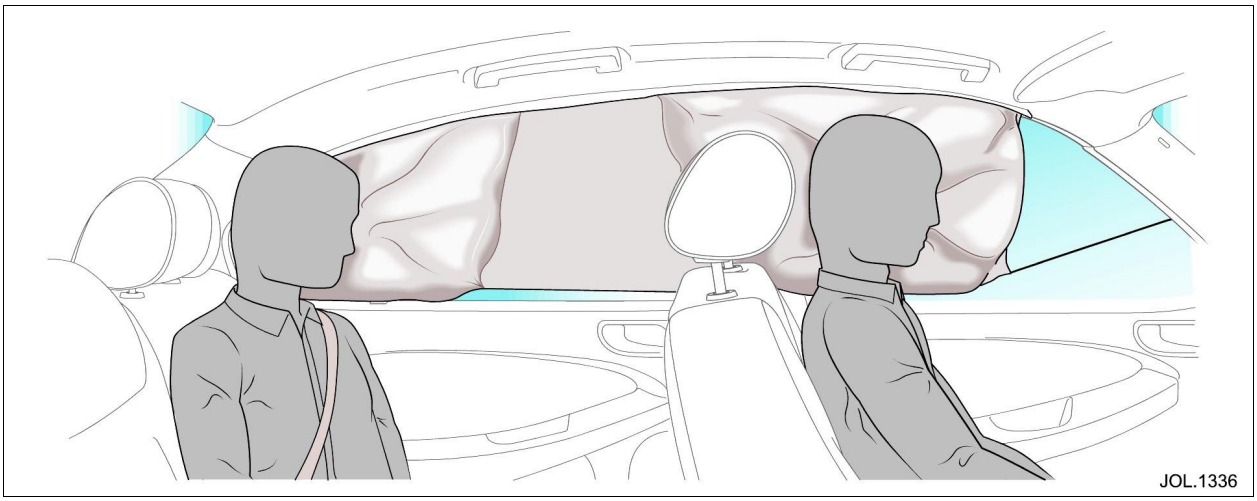

Fig. 92 Side-curtain airbag

After deployment, the side curtain airbag extends down to approximately shoulder height providing head protection for both front and rear occupants.

The inflator:

- generates the gas needed to fill the airbag
- consists of a high strength steel casing filled with a solid propellant charge, an electrically activated igniter and a cold gas bottle containing pressurized gas.

Restraints control module

The restraints control module is fixed to the top of the driveshaft tunnel below the center console.

NOTE:

Due to the importance of the module being securely fixed to the vehicle body, the ground connection is made via the fixings and is monitored by the diagnostic system. A bad connection will cause a DTC to be logged. Refer to JTIS for more information on torque figures.

Occupancy sensing module

The occupancy sensing module:

- Is located beneath the front passenger seat
- Processes signals received from the occupancy sensors
- Makes data available to the ARM via a local SRS—dedicated Controlled Area Network (CAN)

Control and Processing

The following illustration shows an overview of the SRS control and processing required on the S-TYPE 2003 MY- Onwards.

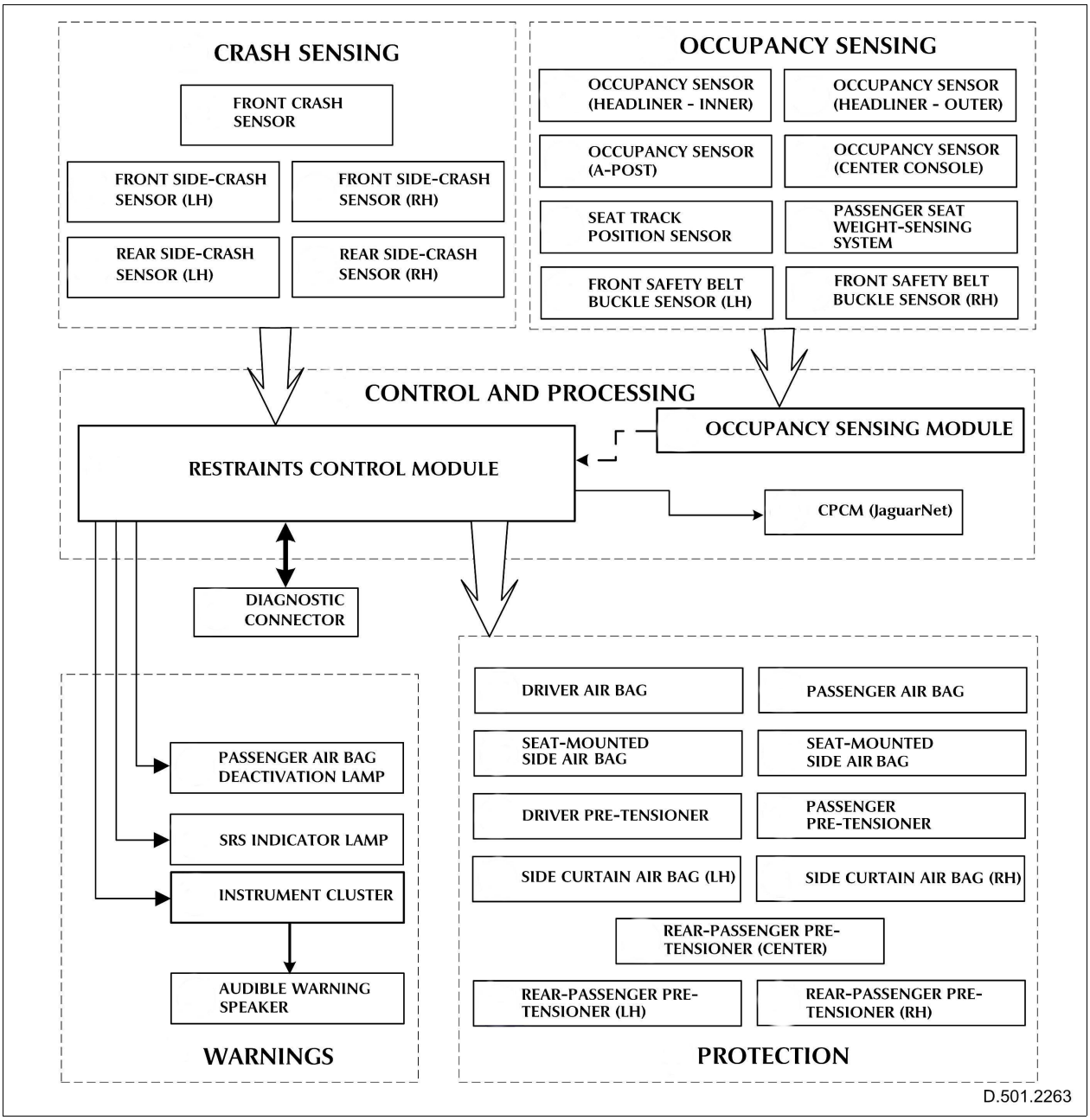

Fig. 93

MODEL APPLICABILITY — XJ 2004MY ONWARDS (X350)

System Overview

The SRS system on the 2004 MY XJ-range is basically carry over from S–TYPE 2003 MY.

The main changes are:

- Increased volume of passenger air bag
- The inflators of the side curtain air bags are located on the D-E pillars
- Rear outer seat belt retractors have a comfort feature which reduces the retraction tension of the seat belt when it is fastened. (Vehicles fitted with rear electric seats only)
- Front passenger seat belt retractor has automatic locking retraction (ALR) and a seat belt tension sensor.

The supplementary restraint system (SRS) is designed to provide increased collision protection for vehicle occupants in addition to that provided by the three-point safety belt system. Safety belt use is necessary to obtain the best occupant protection and to receive the full advantages of the SRS.

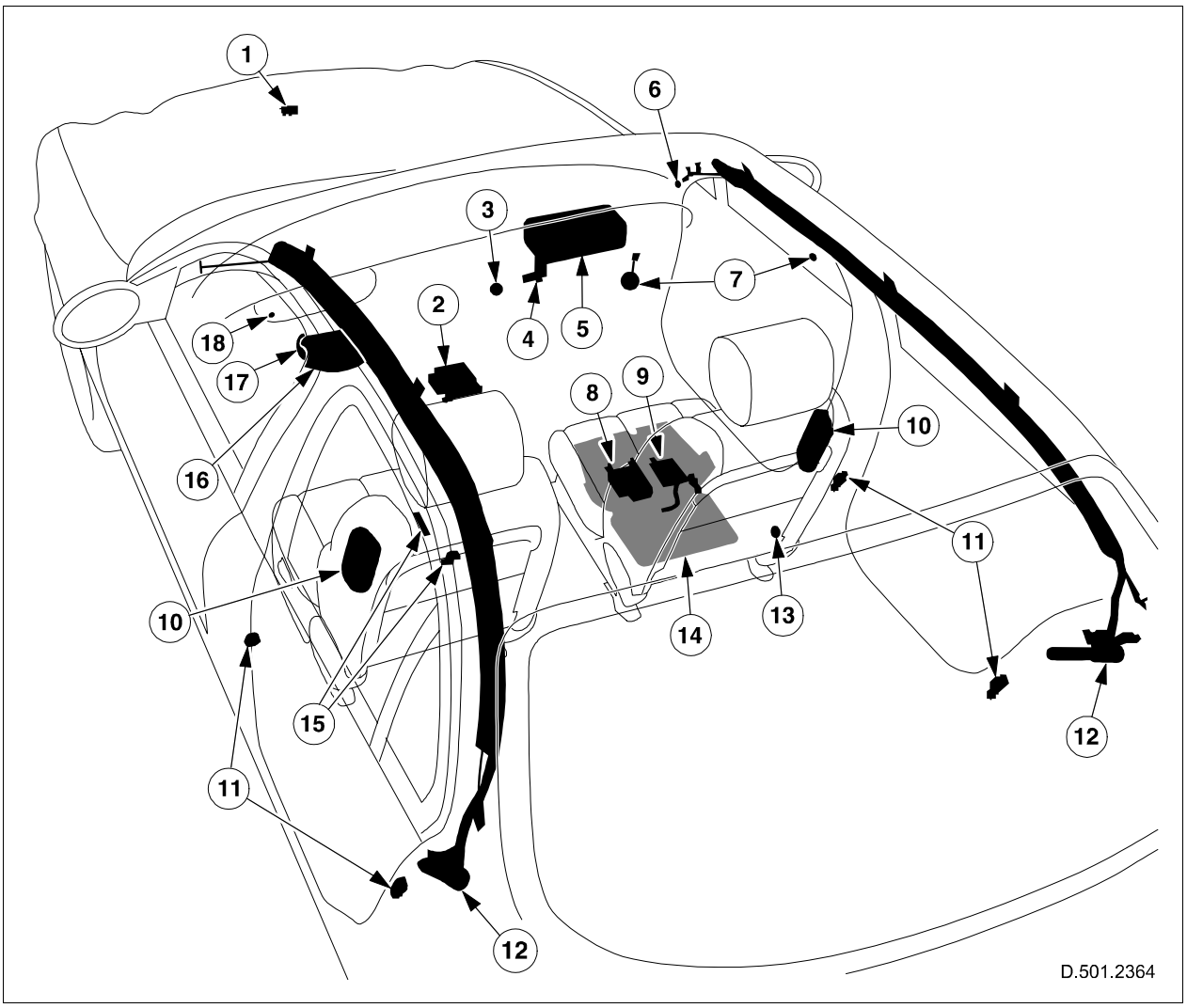

Fig. 94 SRS component locations

1. Front crash sensor
2. Restraint control module
3. Occupancy sensor - center console
4. Passenger air bag deactivation indicator lamp
5. Passenger air bag module
6. Occupancy sensor - A-post
7. Occupancy sensors - headlining
8. Occupancy sensing module
9. Passenger seat weight-sensing module
10. Seat-mounted side air bag module
11. Side-impact sensors
12. Side-curtain air bag
13. Belt tension sensor (where applicable)
14. Passenger seat weight-sensing bladder
15. Seat-track position sensor
16. Driver air bag module
17. Clock spring
18. SRS indicator lamp

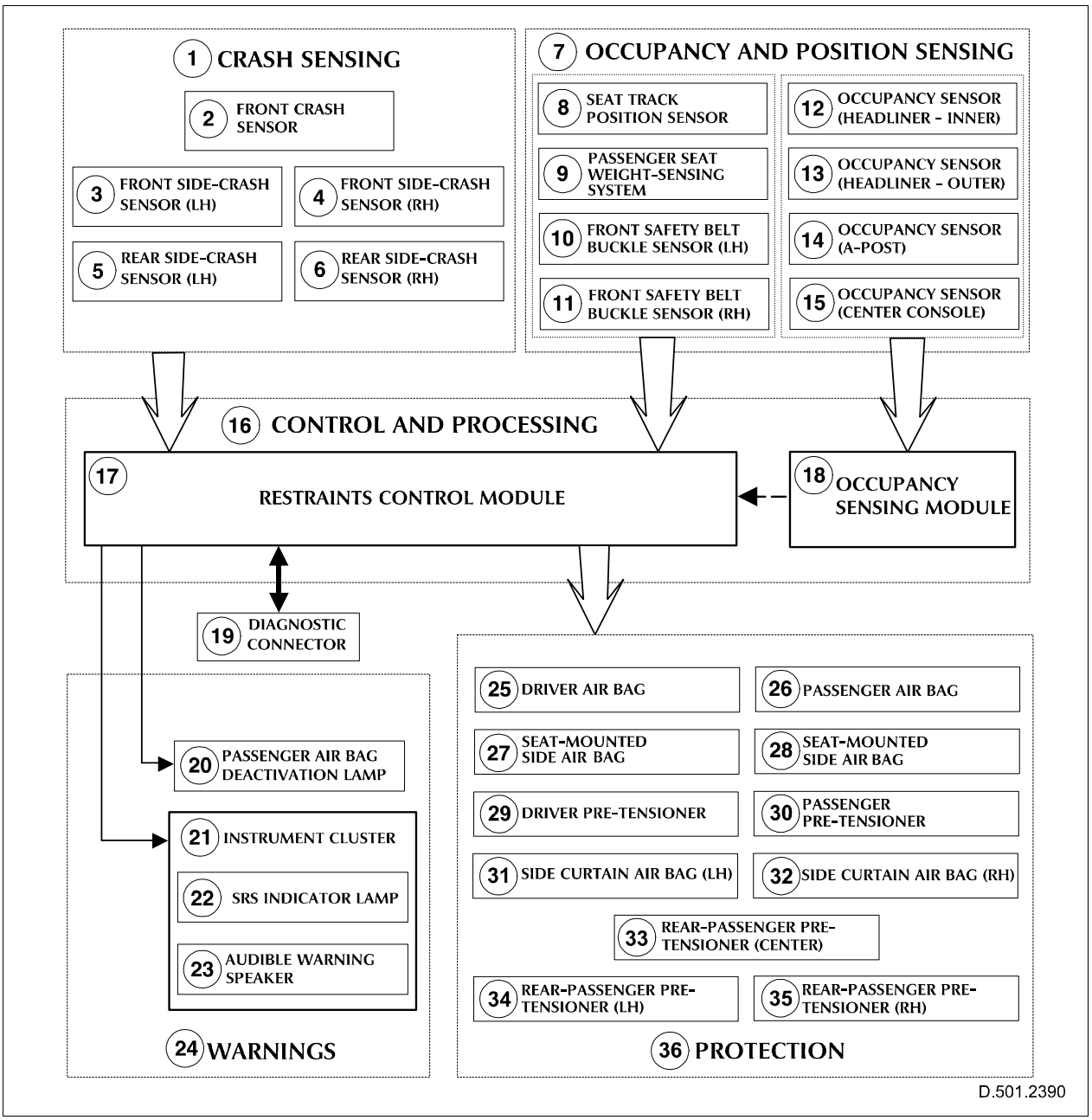

Fig. 95 XJ 2004MY Advanced restraints system diagram

1. Crash sensing
2. Front crash sensor
3. Front side crash sensor (LH)
4. Front side crash sensor (RH)
5. Rear side crash sensor (LH)
6. Rear side crash sensor (RH)
7. Occupancy sensing
8. Seat track position sensor
9. Passenger seat weight sensing system
10. Front safety belt buckle sensor (LH)
11. Front safety belt buckle sensor (RH)
12. Occupancy sensor (headliner-inner)

13. Occupancy sensor (headliner-outer)
14. Occupancy sensor (headliner A-post)
15. Occupancy sensor (center console)
16. Control and processing
17. Restraints control module
18. Occupancy sensing module
19. Diagnostic connector
20. Passenger air bag deactivation lamp
21. Instrument cluster
22. SRS indicator lamp
23. Audible warning speaker
24. Warnings
25. Driver air bag
26. Passenger air bag
27. Seat mounted side air bag
28. Seat mounted side air bag
29. Driver pre-tensioner
30. Passenger pre-tensioner
31. Side curtain air bag (LH)
32. Side curtain air bag (RH)
33. Rear passenger pre-tensioner (middle)
34. Rear passenger pre-tensioner (LH)
35. Rear passenger pre-tensioner (RH)
36. Protection

WARNING:

Prior to removal of any SRS components and before disconnecting any SRS sensor electrical connectors, the battery ground cable should be disconnected and a period of two minutes allowed to elapse.

SYSTEM COMPONENTS AND OPERATION X350

Occupancy sensing system

The front passenger seat is continually monitored by four ultrasonic sensors and a seat weight sensor to determine the seat occupancy. Where no seat occupancy is determined then the passenger seat airbag will be deactivated.

Occupant position sensors

There are four occupant position sensors strategically placed to confirm that the front passenger is properly seated as recommended. They will detect movement of the passenger front seat occupant.

The occupant position sensor system uses ultrasound at an operating frequency of 40 kHz to monitor the seating position of the passenger front seat occupant.

The recommended seating position of the front passenger occupant is:

- Always sit centrally in the seat, remaining in contact with the back of the seat
- Adjust the seat as far back from the instrument panel as is practical
- Always wear a seat belt.

The SRS occupant position sensors are located as follows:

- One in the passenger A-pillar
- One at the top of the instrument panel console
- Two in the headliner.

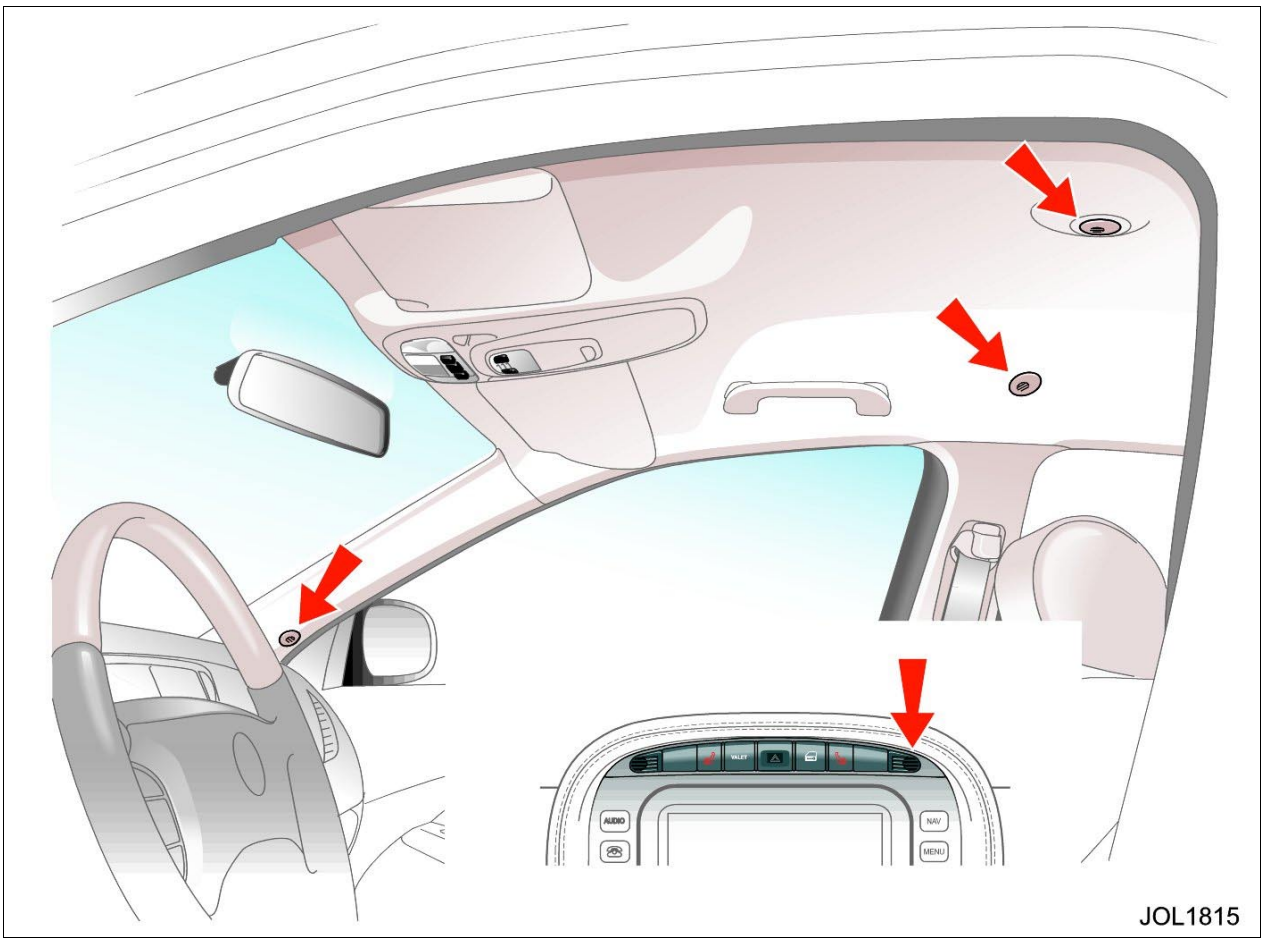

Fig. 96 Occupant position sensor locations

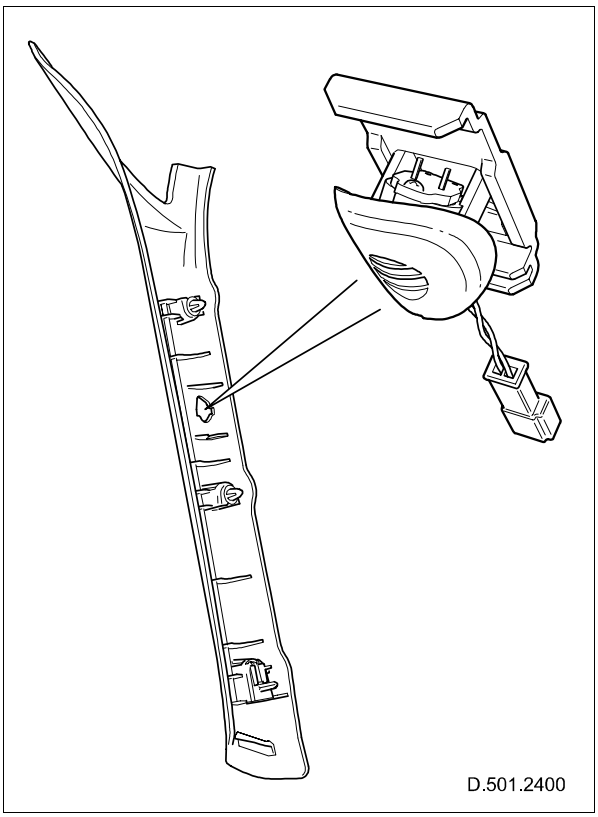

Fig. 97 Occupancy sensor A-post

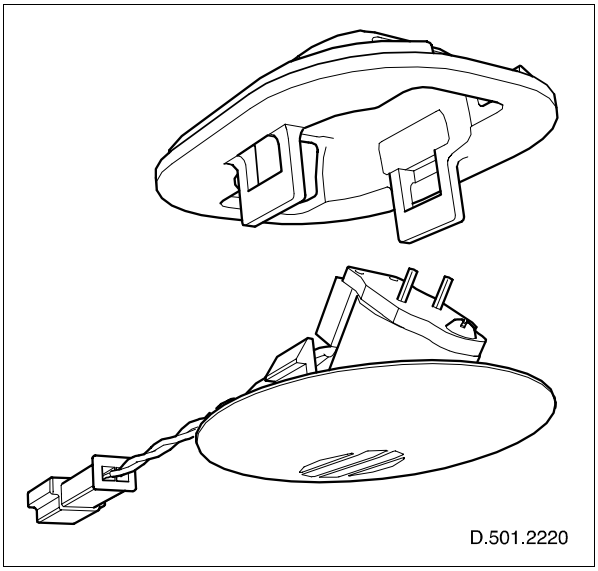

Fig. 98 Occupancy sensors — headliner

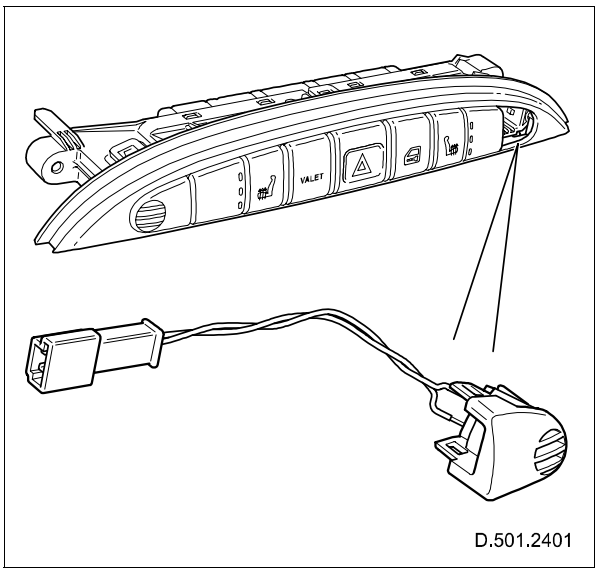

Fig. 99 Occupancy sensor — center console

Front Passenger Seat Occupant Classification Sensor (Seat weight sensor)

NOTE:

The front seat occupant classification sensor is serviced as a calibrated assembly

The system must be replaced as a complete unit and due to its sophistication, each replacement system requires calibration. To avoid the need to provide calibration equipment to each dealer, a pre-calibrated service kit is available. The following components are combined and calibrated during manufacture to form the front seat passenger weight sensing system:

- Passenger seat cushion
- Silicone filled bladder
- Weight sensing control module
- Pressure sensor

The weight sensing control module is mounted under the passenger front seat. The silicone filled bladder is integrated into the seat cushion and the pressure sensor, which is attached to the bladder, is mounted under the seat.

The silicone filled bladder responds to weight changes on the passenger front seat. The pressure sensor responds to these pressure changes and provides an appropriate signal to the weight sensing control module. The weight sensing control module processes the input signal received from the pressure sensor and makes it available to the ARM via the CAN bus. In addition, the weight sensing control module performs self-diagnostic functions on the system, with any malfunctions being notified to the ARM accordingly.

The front seat, passenger weight sensing system responds to the occupancy of the passenger front seat in accordance with the following:

- Passenger front seat status empty - Passenger air bag deactivated - Passenger air bag deactivation (PAD) indicator off
- Passenger front seat status occupied (small occupant) - passenger air bag deactivated - PAD indicator on
- Passenger front seat status occupied (large occupant) - Passenger air bag active - PAD indicator off

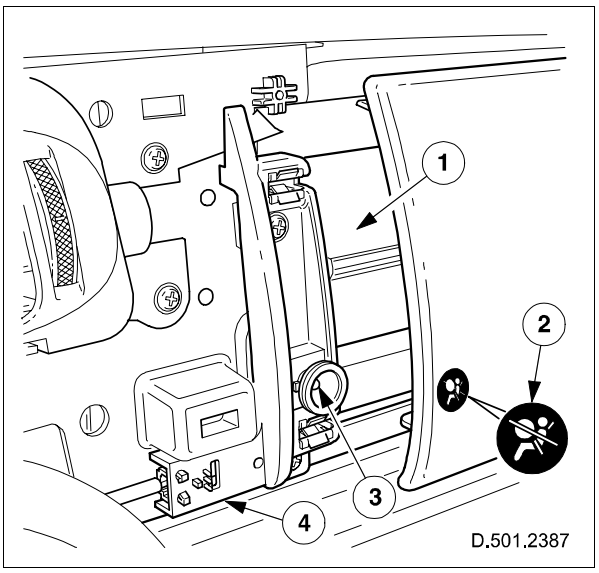

Fig. 100 Passenger air bag deactivation

1. Air bag module
2. Airbag deactivation indicator lens
3. Air bag deactivation indicator lamp
4. Air bag deactivation indicator lamp housing

The SRS via the ARM monitors and processes data from the front seat passenger weight sensing system and several other sensors before making a deployment decision. Malfunction of the sensing system or associated circuits will cause the SRS indicator to illuminate.

Crash sensors

The crash sensor is attached to the body behind the radiator grille. The restraints control module (ARM) processes the crash data sent by the crash sensor against stored data, and deploys the front air bags and the seat belt pre-tensioners as required.

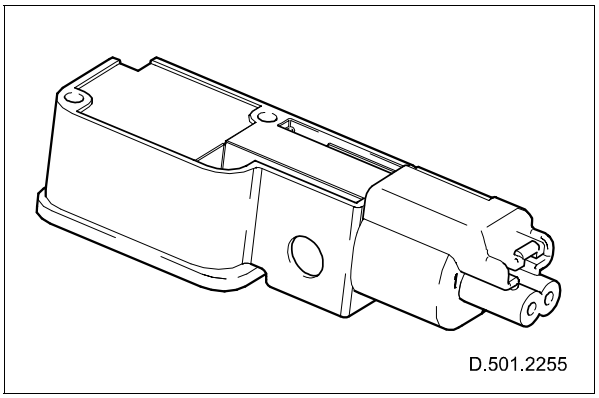

Fig. 101 Front Crash Sensor

Side impact sensors

The side impact sensors are mounted at the base of the B-C pillars and D-E-pillars to facilitate lateral impact sensing. In case of a side impact, the RCM processes the crash data against the stored data. The ARM will deploy the side air bag module, safety belt pre-tensioners and side air curtain module on the side the deployment request was initiated.

Seat track position sensor

The seat track position sensor is located under the driver seat track. The seat position sensor determines the position of the driver seat, which is then communicated to the ARM. If the drivers seat is in the forward position, the driver air bag module second stage is delayed.

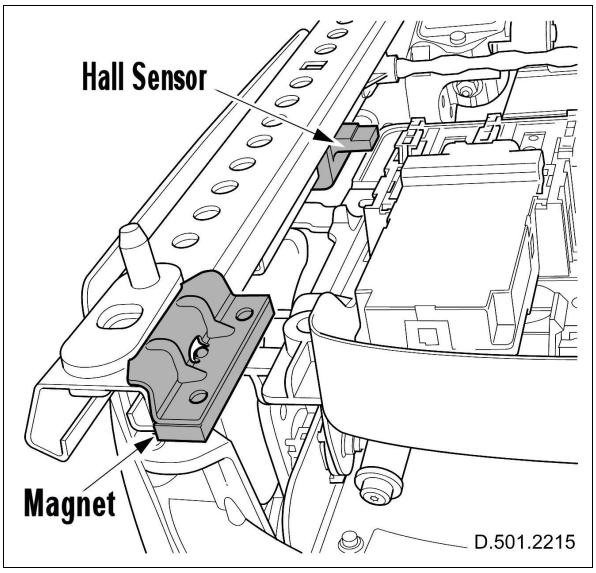

Fig. 102 Seat Track Position Sensor

Front safety belt buckle sensors

The safety belt buckle sensor is a 'Hall effect' type sensor, which provides an output signal in response to the magnetic field disturbance, caused by the insertion of the safety belt tongue into the buckle. The output signal from the sensor is used by the ARM to determine whether the front seat occupants are correctly restrained. The information from the buckle sensors is used in conjunction with other components of the SRS to make sure air bag module and safety belt pre-tensioner deployment only occurs where necessary.

Driver Air Bag Module

The driver air bag module is controlled by the ARM, which chooses between first or second stage deployment, depending on the occupant position and the crash severity. To reduce the risk of an air bag module induced injury to a driver that is positioned close to the steering wheel, the air bag module deploys radially. It has a non-azide propellant that reduces particulates and effluents. It consists of a two-stage inflator with separate chambers for the two inflation stages, each being independently activated by the ARM. It has two electrical connectors that are color coded to the respective connector on the inflator.

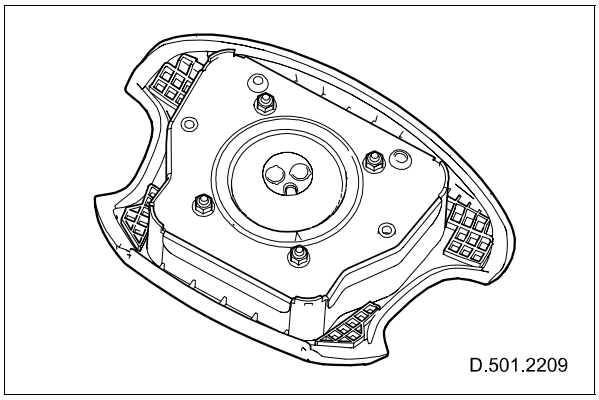

Fig. 103 Driver Air Bag Module

Passenger Air Bag Module

The passenger air bag module is controlled by the ARM, which chooses between first or second stage deployment, depending on the occupant status and the crash severity. It consists of a two-stage inflator with two air bag electrical connectors to accommodate the two-stage inflation.

The heated gas inflator consists of a high-pressure mix of clean air and hydrogen gas, triggered by two separate ignition squibs. It produces a controlled generation of clean gas to rapidly fill the air bag. It is classified as a stored flammable gas (not as an explosive) and as such, has less restrictive storage and transportation requirements. It produces a very clean burn and almost no particulates and is almost free of any toxins, making disposal or recycling much easier.

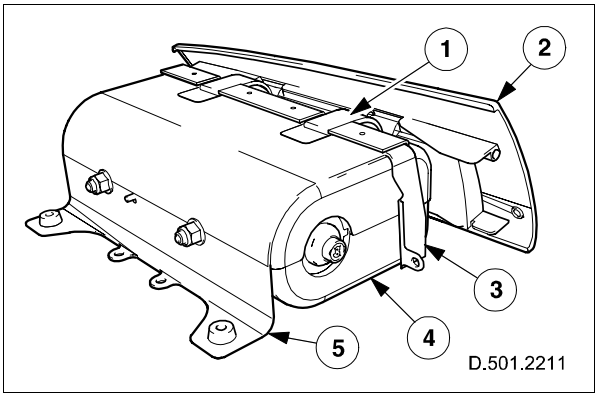

Fig. 104 Passenger Air Bag Module

1. Webbing straps
2. Airbag deployment door
3. Tether bar
4. Passenger airbag module
5. Mounting bracket

Side Air Bag Modules

The side air bag module is mounted in the outboard bolster of each front seat and is inflated using mainly compressed argon. It provides protection for the thorax (the part of the trunk between the neck and the abdomen). In an air bag deployment situation, it deploys through the front stitch seam in the side bolster. To ensure the air bag always emerges at the same point, a chute is attached to the inside of the trim cover and wrapped around the air bag module.

Side Air Curtain Module

The side air bag curtain module is similar to X–TYPE with the inflator mounted at the base of the D-E pillar.

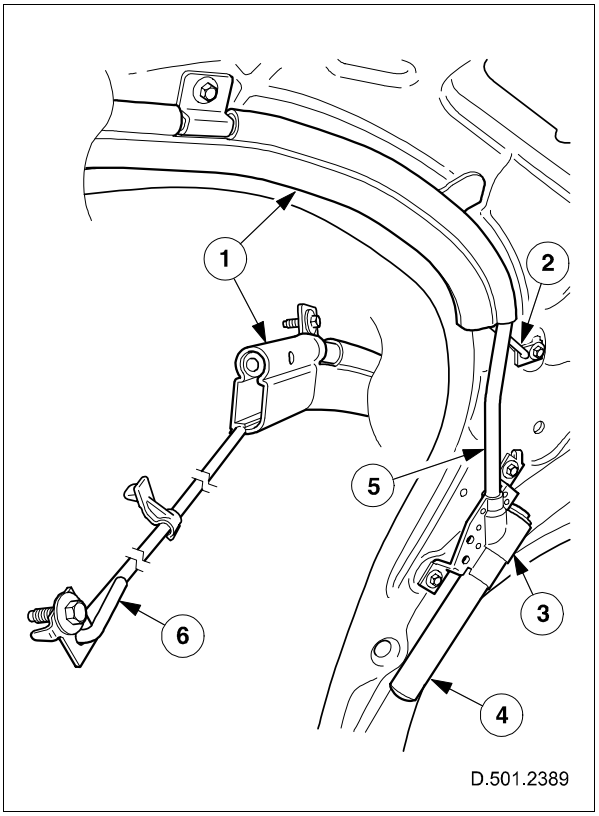

Fig. 105 Side curtain airbag

1. Housing
2. Rear tether
3. Inflator housing assembly
4. Inflator
5. Fill tube
6. Front tether

The side air curtain modules are located under the headliner between the A and D-E-pillar and deploy at the same time as the corresponding seat side air bag module. If the passenger air bag module is deactivated (due to the seat weight sensor showing either no occupancy of the seat or that a small occupant is present) the corresponding side air bag module is also deactivated.

The side air bag curtain however will still deploy to afford protection to any corresponding rear occupants. When deployed the side air curtain extends down to approximately shoulder height to protect both the front and rear occupant heads. Both the front and rear of the side curtain modules are retained to the A and D-E pillars respectively by tethers.

NOTE:

In the event of a side impact that is sufficient to deploy the side air curtain module, it will be necessary to replace the headliner, A-pillar, B-C and the D-E pillar trim panels.

CAUTION:

If on removing or refitting the curtain module any damage is found to the tethers or the tape retaining the fasteners, the curtain module must be replaced.

Belt tension sensor

The belt tension sensor is a strain-gauge type encapsulated within the passenger safety belt anchor. The sensor converts the force applied to the belt into an electrical signal. In the event that a child-seat is installed onto the front passenger seat (not recommended), the force applied to the passenger safety belt is reflected by the output signal from the sensor, which provides data to supplement that received from the silicon bladder. The passenger seat weight-sensing module processes the input data and makes it available to the restraints control module which then makes the necessary adjustments in respect of passenger air bag deployment.

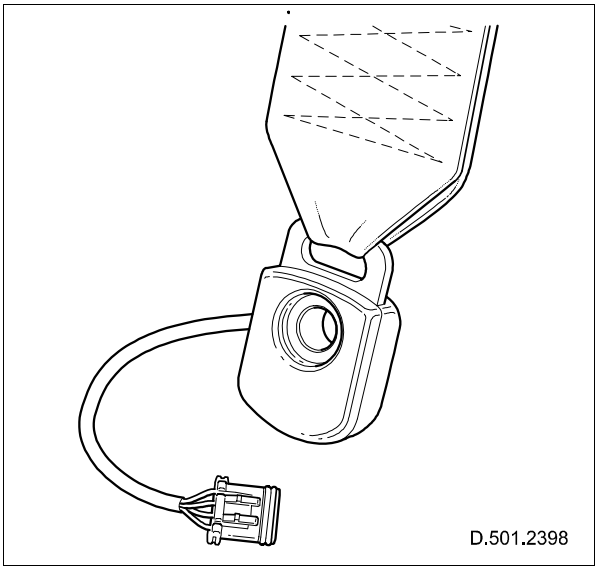

Fig. 106 Belt tension sensor

Seat Belt Warning Reminder

There are two seat belt warning reminders:

- Seat belt warning reminder lamp
- Audible seat belt reminder warning tone

The new seat belt warning reminder lamp will allow the seat belt warning lamp to constantly illuminate if either or both of the front seat occupants do not fasten their seat belts.

Seat belt warning reminder lamp

The seat belt warning reminder lamp will be constantly illuminated if either or both of the front seat occupants do not fasten their seat belts.

If only the driver is present the seat belt warning reminder lamp will pertain only to the driver and extinguish when the driver seat belt buckle becomes fastened.

If the front passenger is present also, the warning lamp will pertain to both front occupants and the warning lamp will only extinguish when both the driver and front passenger seat belts become fastened.

In addition the seat belt warning reminder lamp there is a audible seat belt reminder.

The passenger seat weight sensor will be used to determine whether the front passenger seat is occupied.

Seat belt reminder audible warning Tone

When the ignition switch is in position II with the driver's seat belt not fastened, the seat belt warning reminder lamp will be constantly illuminated for 60 seconds and a single warning tone will be sounded for six seconds.

The warning tone and the warning lamp will be extinguished before these time periods, once the driver's seat belt is fastened.

If the driver's seat belt remains unfastened, after 75 seconds the intermittent warning tone will start or resume, accompanied by the seat belt warning lamp flashing. The intermittent tone and flashing warning lamp will last for 10 seconds and repeat every 30 seconds for a period of five minutes, or until the drivers seat belt becomes fastened.

Front Safety Belt Buckle Pre-tensioners

The front safety belt buckle and pre-tensioners are seat mounted and incorporate a safety buckle switch. In case of a front impact the RCM will deploy the pre-tensioners provided the safety belt buckles are fastened. The safety belt buckle pre-tensioners have a lower deployment threshold than that required by the air bags. Hence, it is possible during a minor collision, which exceeds the deployment threshold that only the safety belts buckle pre-tensioners will deploy.

The RCM receives information on the status of the safety belt buckles from a switch contained in the buckle.

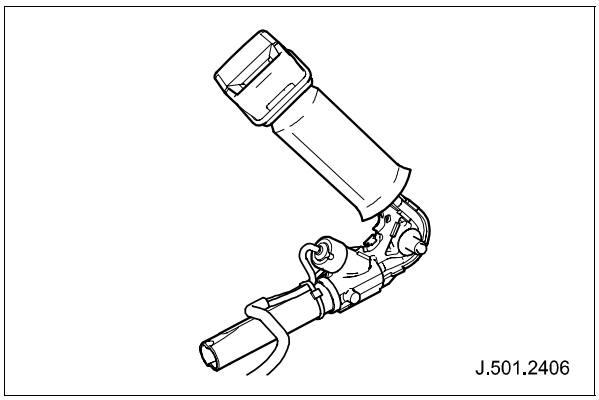

Fig. 107 Front buckle type pre-tensioner

Front Passenger Safety Belt Retractor

The front passenger safety belt is now fitted with ALR and a seat belt tension sensor. When ALR is active, the increased tension on the belt webbing is detected and the passenger air bag is de-activated. This will prevent the passenger air bag from being deployed in the event of an impact when a child seat is installed in the front passenger seat.

Rear Safety Belt Pre-tensioners (Retractor)

Each rear safety belt incorporates a pre-tensioner device. In case of a low or high speed frontal impact, these provide additional occupant protection by removing any slack from the safety belts.

The rear safety belt pre-tensioners activate when a frontal impact of sufficient force occurs. Under such an impact, the ARM sends a firing signal to each pre-tensioner. The pre-tensioner then works to remove any slack seatbelt webbing in the seatbelt system.

NOTE:

All of the rear seat belt pre-tensioners will deploy regardless of whether the belt is fastened or not. (All three rear belts will require changing if they have been deployed).

The rear seat belt pre-tensioners are incorporated into the belt reel (retractors).

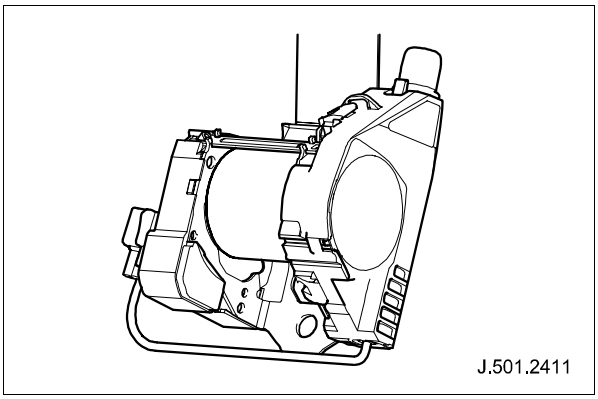

Fig. 108 Retractor type pre-tensioner (rear center)

The rear outer safety belt retractors have a comfort feature which reduces the retraction tension of the seat belt once it is fastened.

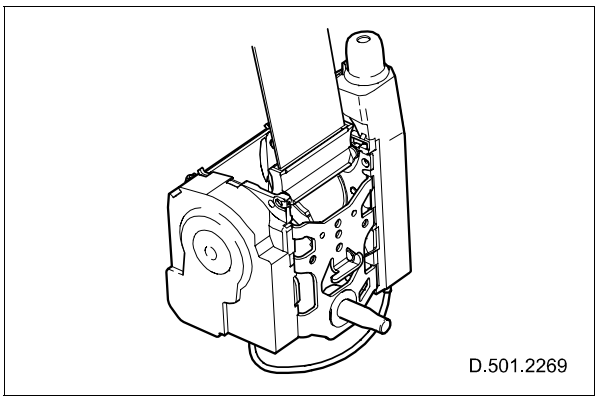

Fig. 109 Retractor type pre-tensioner (rear LH)

NOTE:

Early 2004 MY XJ models were fitted with three (3) rear seat belt retractors. The rear center seat retractor was deleted as a running change.

Clockspring

The clockspring is designed to carry signals between the ARM and the drivers air bag module. The clock spring is fitted to the steering column, which consists of fixed and moving parts. The clock spring contains a coiled tape with integral conducting tracks.

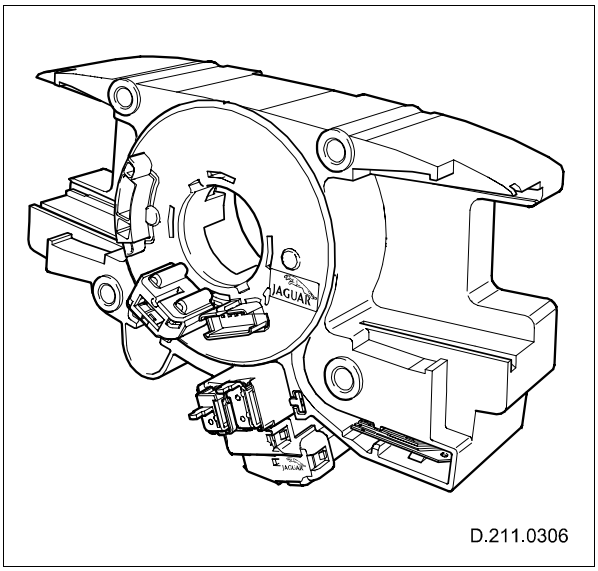

Fig. 110 Clockspring

The tape is able to wind up and unwind as the steering wheel is turned, maintaining electrical contact at all times between the ARM and driver air bag module. To cater for the electrically heated steering wheel, a housing containing set of spring loaded contacts are attached to the clockspring cassette.

NOTE:

Always follow the correct removal and fitting instructions as outlined in JTIS. A replacement clockspring is held in the midway position by a plastic holding tool in order to prevent damage to the clockspring tape during transit.

WORKSHEET – SEAT BELT WARNING AND BELT MINDER

The beltminder may be disabled if required.

1. Make sure that the passenger front seat is unoccupied

   NOTE:

   The following procedure must be completed within 60 seconds.

2. Sit in the driver's seat and turn the ignition switch to position II. (Do not start the engine)
3. Make sure that the seat belt warning lamp is illuminated in the instrument cluster
4. Fasten the driver's seat belt buckle and wait for the seat belt warning lamp to be extinguished
5. Once the seat belt warning lamp has extinguished, unbuckle the driver's seat belt and wait until the seat belt warning lamp illuminates
6. Once the seat belt warning lamp illuminates, repeat steps 4 and 5 a further eight times
7. When the seat belt is unbuckled for the ninth time, a chime will be exhibited from the instrument cluster to confirm that the beltminder has been disabled

   NOTE:

   To enable the beltminder function, repeat steps 2 to 6.

WORKSHEET – REAR OUTER SEAT BELT RETRACTION TENSION

This worksheet will demonstrate the change in the rear outer seat belt retraction strategy.

Make sure that the ignition key is removed from the ignition switch before commencing the following procedure.

Sit in the rear seat.

1. Fasten the rear outer seat belt
2. Lean forward so that the seat belt webbing extends.

   NOTE:

   Do not pull out the seat belt webbing to the limit of its travel

3. Lean back in the seat to allow the seat belt webbing to be retracted by the seat belt mechanism, while observing the tension with which it is returned
4. Ask an assistant to insert the ignition key and turn the ignition switch to position II
5. Repeat steps 2 and 3
6. Ask an assistant to remove the ignition key
7. Pull out the seat belt webbing to the limit of its travel
8. Allow the "slack" of the seat belt webbing to be retracted by the mechanism
9. Attempt to pull out the seat belt webbing once more
10. Release the seat belt buckle and allow the seat belt webbing to return

1. After carrying out step 5, what did you observe with the operation of the seat belt?

2. After carrying out step 8, what did you observe with the operation of the seat belt?

3. Were you able to pull out the seat belt webbing during step 9?

4. After carrying out step 10, did the seat belt webbing return normally?

5. What benefits do you consider that the seat belt retraction system provides?

TRAINING PROGRAM

JAGUAR SUPPLEMENTARY RESTRAINT SYSTEMS

PUBLICATION CODE – 620

ISOFIX

Overview

The ISOFix standardized child-seat anchorage system also known as LATCH (Lower Anchors and Tethers for CHildern) is a universal system used on the complete current Jaguar model range. This system allows the child seat to be secured directly and easily to the vehicle body without the use of adult safety belts.

For each outboard seat position, the ISOFix system uses two lower anchors bolted to the body in the seat pan area. To ensure universal compatibility, the size, position and orientation of the lower anchors are controlled by an ISO standard specification.

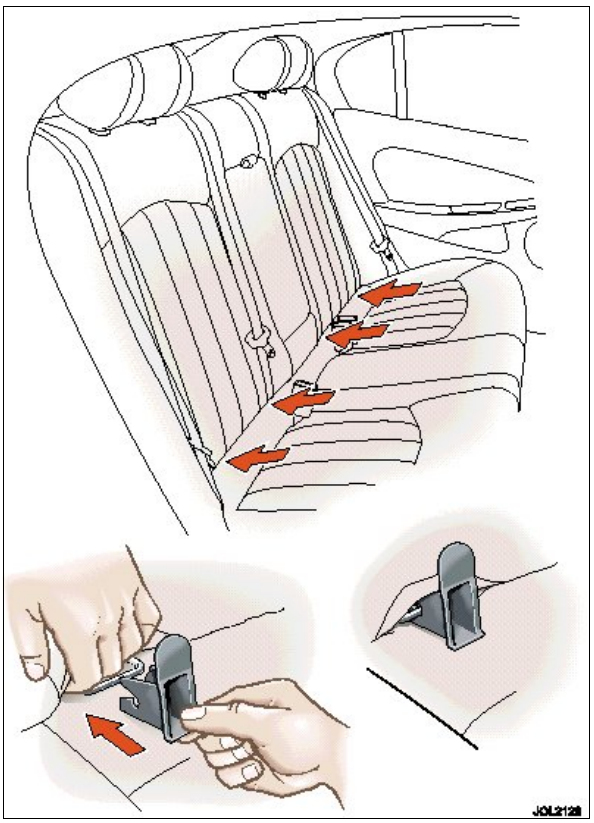

Fig. 111

The upper anchors are used in conjunction with the lower anchors to secure the child seat.

WARNING:

The tether must always be used to secure forward facing child seats.

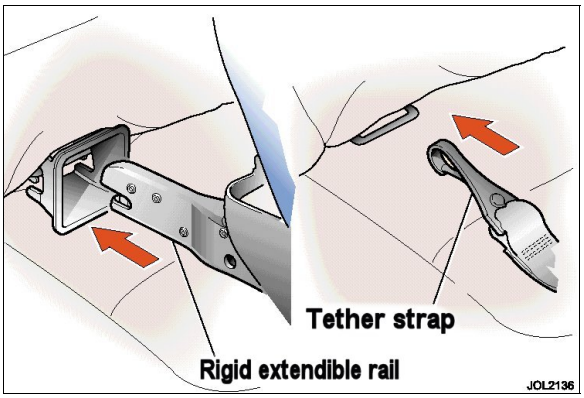

Fig. 112

ANTI-WHIPLASH SYSTEM (AWS) X202, X350

Overview

Most whiplash injuries occur at less than 20 mph (32 kmh). 50% of all vehicle crash injuries are whiplash complaints. Whiplash injuries occur when the seat assembly force is imposed onto the occupant, the torso moves forward with the seat back and the unrestrained head lags behind. The occupant's neck changes shape, firstly into an 'S' then bending backwards. Eventually the forces on the neck accelerated the head and the head catches up with and then passes that of the torso.

The Anti-whiplash system (AWS) used on the X202 and X350 models is designed to reduce the risk of neck injuries in rear end collisions. The AWS is based on an energy-absorbing element, which is integrated into the recliner. AWS gives a controlled rearward motion of the seat back; this motion is divided into two phases.

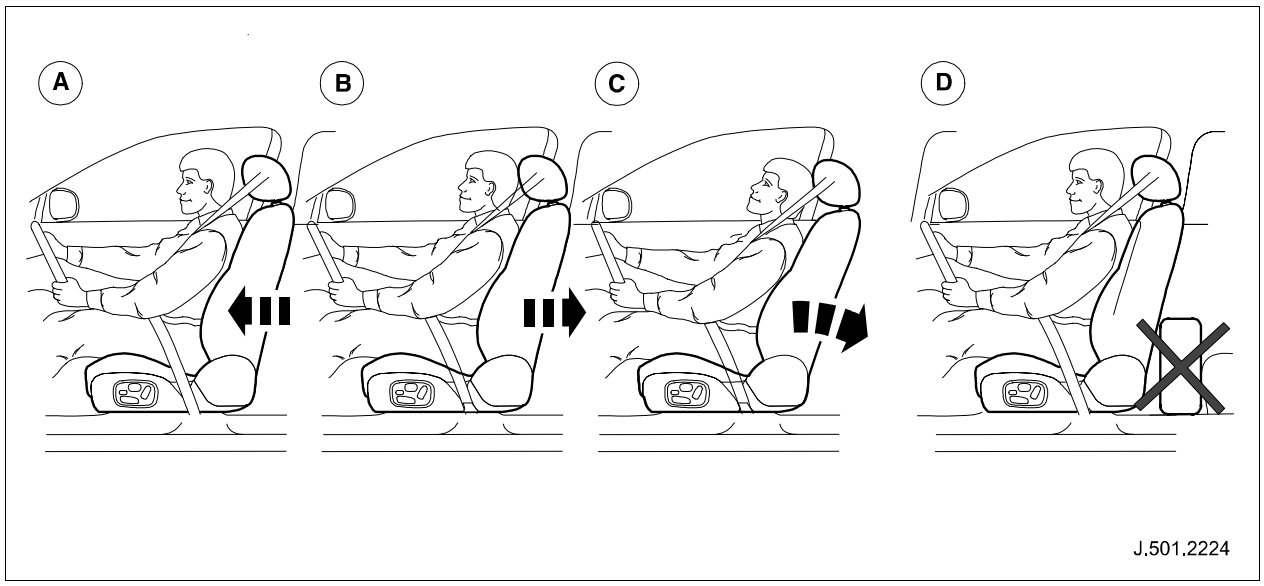

Fig. 113 AWS feature

Phase one The lower part of the backrest moves rearward. The purpose is to reduce the distance between the occupant's head and reduce the acceleration of the occupant's head relative to the torso during impact.

Phase two The backrest folds rearwards. The purpose is to keep the acceleration of the occupant at a low level and to absorb energy in a controlled way.

The two phases overlap to some extent and are dependant on such factors as the occupant's weight, posture and the impact severity.

In phase one the AWS is controlled by two links which rotate around the two pivots. In the second phase the forward link deforms while absorbing energy. The shape of the forward link progressively deforms in relation to the severity of the impact, the occupant size and weight. A guide pin on the moving bracket moves within the bracket window and controls the mix of the two phases.

The AWS is prevented from being activated during normal driving by the shape of the window, the angle between the two links and the return spring.

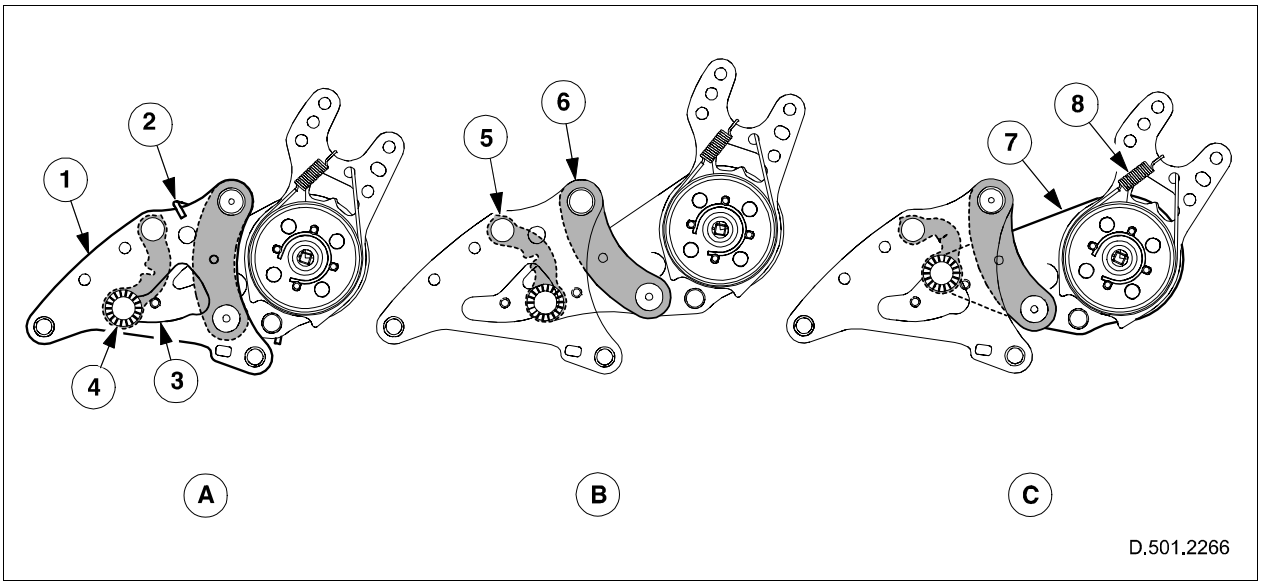

Fig. 114 AWS mechanism

Table 10

A	B	C
1. Outer side plate	5. Deformation link	7. Recliner plate
2. Return spring	6. Rear link	8. Brake spring
3. Window		
4. Guide pin		

NOTE:

In the event of the AWS system operating, there are no serviceable components within the mechanism. The amount of backrest movement depends on the severity of the impact and for a minor collision there may be no apparent change to the seat even where the protective system has been activated. After any rear collision, therefore, the seat must always be inspected.

AWS System Inspection

The AWS system must be inspected following any rear collision of the vehicle:

- Remove the front seat. For additional information, refer to JTIS
- Remove the AWS seat trim covers
- Visually inspect the AWS mechanism. If any clearance is found between the pin and the bracket then the AWS system has been deployed

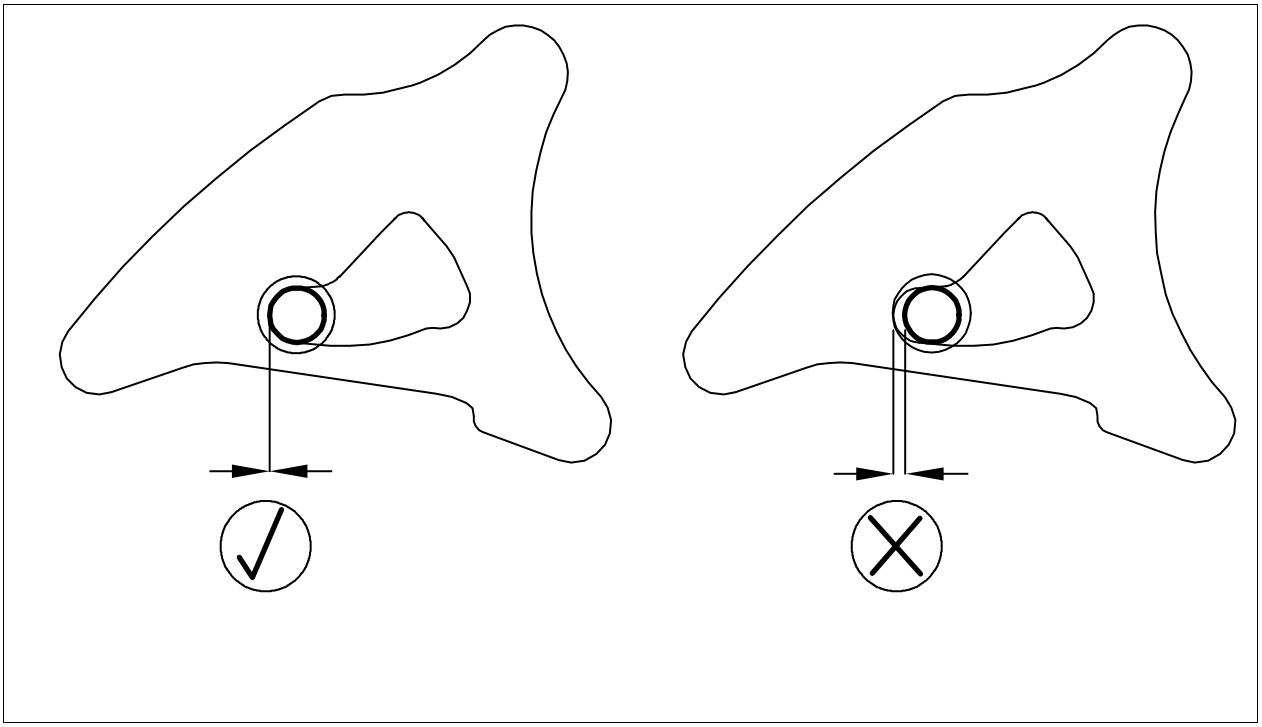

Fig. 115 AWS inspection

NOTE:

If the AWS system has been deployed, (regardless of the how slight) the seat back frame and the two AWS mechanisms must be replaced.

TRAINING PROGRAM

JAGUAR SUPPLEMENTARY RESTRAINT SYSTEMS

PUBLICATION CODE – 620

Activity 9.1

JAGUAR SUPPLEMENTARY RESTRAINT SYSTEMS COURSE CODE 620

Read each question and its answers carefully. Each question has only one answer that is correct. Circle or mark the most correct answer.

1. The side impact sensors on a 2001 MY XK8 send a signal to the Adaptive Restraint Module (ARM) to indicate that they are functioning correctly.

   a. True

   b. False

2. Which of these vehicles DOES NOT incorporate a pre-tensioner torsion load limiter.

   a. 2000 XK8

   b. 2002 X-TYPE

   c. 2001 S-TYPE

   d. 2003 XJ8

3. Which of the following statements is true regarding the Diagnostic Monitor on a 1997 MY XK8?

   a. It is linked to the diagnostic connector and can store it's own fault codes in a volatile memory

   b. It contains an internal thermal fuse to cut the deployment power path if a ground short is detected

   c. It contains an integral mechanical safing sensor

   d. It has the ability to provide a "blink code" via the SRS warning MIL

4. Technician A states that beginning with 2000 MY, de-powered driver and passenger airbags were introduced for all XK models. Technician B states that certain 1999 MY XJ8's were fitted with de-powered airbags as a running change.

a. A only

b. B only

c. Both A and B

d. Neither A or B

5. De-powering of airbags is achieved by:

a. Increasing the amount of propellant

b. Reducing the size of the airbag exhaust vents

c. Providing a time interval of ignition between two separate pyrotechnic charges

d. D) Neither A or B

6. Technician A states that it is possible for the airbags to deploy on a 1999 MY XK8 without the pre-tensioners deploying. Technician B states that the pre-tensioners on a 2000 MY XK8 deploy upon or slightly before airbag deployment.

a. A only

b. B only

c. Both A and B

d. Neither A or B

7. Technician A states that WDS must be used to retrieve fault codes on a 2000 MY XK8 pre-tensioner system. Technician B states that the datalogger function of WDS can be used to check the pre-tensioner circuits.

a. A only

b. B only

c. Both A and B

d. Neither A or B

8. The Single Point Sensor (SPS) Control Module used on 1998-2003 MY XJ range vehicles will output a signal to the Engine Management System upon airbag deployment.

a. True

b. False

9. Which of the following statements is NOT true concerning the Restraints Control Module (RCM) fitted to a 2001 MY S-TYPE?

a. The RCM contains a frontal electronic discrimination impact sensor and an electromechanical safing sensor

b. The RCM contains an audible fault warning buzzer

c. It will function for five impact events

d. In the event of an impact, it sends a signal to the Vehicle Emergency Message System (VEMS) and the Powertrain Control Module (PCM)

10. Technician A states that the side airbags in a 2002 MY S-TYPE deploy whenever the front airbags deploy. Technician B states that the pre-tensioners in a 2002 MY S-TYPE deploy anytime the front airbags deploy, regardless of belt usage.

a. Technician A only

b. Technician B only

c. Both A and B

d. Neither A or B

11. 11. Technician A states that after a rear collision, a clearance check must be performed to the Anti-Whiplash System (AWS) mechanisms. Technician B states that if the system had actually been activated there will be obvious displacement of the backrest relative to the bottom cushion.

a. Technician A only

b. Technician B only

c. Both A and B

d. Neither A or B

12. Which of the following statements is NOT true regarding the Occupancy Sensing System (OSS)?

a. It consists of a control module and ultra-sonic sensors

b. It is connected to the Adaptive Restraint Module (ARM) via a dedicated CAN network

c. The OSS Module will signal to the ARM whether there should be a fully powered or de-powered airbag event

d. The passenger side airbag can deploy even when sensors are blocked but with reduced power

13. Which of the following statements is true concerning the Passenger Seat Weight Sensing System?

a. It detects the position of the seated occupant

b. Based on the weight of the occupant, the Seat Weight Sensing Control Module will output a fully powered or de-powered deploy airbag signal to the Adaptive Restraint Module

c. It only becomes active when the passenger has their seatbelt buckled

d. D) The seat bottom cushion is a pre-calibrated unit and is configured to the Adaptive Restraint system with WDS

14. Technician A states that an X-TYPE passenger side curtain airbag will not deploy during a passenger side impact if the Passenger Seat Weight Sensing System detects a small child as an occupant. Technician B states that as long as there are no warning lamps illuminated when the passengers seat is occupied, the passenger seat pre-tensioner will be armed and ready for deployment.

a. Technician A only

b. Technician B only

c. Both A and B

d. Neither A or B

15. 15. Technician A states that a faulty ALR switch in the front passenger safety belt retractor of a 2004 MY New XJ vehicle could prevent the passenger airbag from deploying. Technician B states that all three rear seat belt pre-tensioners could deploy even if the front pre-tensioners do not.

a. Technician A

b. Technician B

c. Both A and B

d. Neither A or B