Handling, Suspension and Occupant Protection

This publication is intended for instructional purposes only. Always refer to the appropriate Jaguar Service publication for specific details and procedures.

⚠ WARNING: WHILE SERVICING AND TESTING VEHICLES AND VEHICLE SYSTEMS, TAKE ALL NECESSARY SAFETY PRECAUTIONS TO PREVENT THE POSSIBILITY OF BODILY INJURY OR DEATH.

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About the Student Guide

What This Guide Is

This book is intended for instructional purposes only, as support material used during the presentation of Jaguar Service Training course No. 400: Handling, Suspension and Occupant Protection. Its purpose is to provide relevant background information, vehicle systems descriptions, component operation and construction descriptions, and provide a place for the technician to take notes during the training course. The book should be retained by the technician for future reference.

In most cases the book answers the following questions about each system discussed in the course:

- What is it?
- Where is it?
- Why do we need it?
- How does it work?

Additional information is also included to help the technician to more fully understand diagnostic procedures and fault finding techniques.

Not all of the material in the book will be covered during the training session. Therefore, to benefit fully from the course, the technician should review the entire book during non-training time.

What This Guide Is Not

This book is not a replacement for official Jaguar Service publications. Always refer to the appropriate Jaguar Service publications for specific details and procedures.

What This Guide Contains

The book is divided into seven sections.

Introduction
The Introduction section explains the purpose and layout of the book and gives a brief explanation of the other book sections.

Occupant Protection through 1997 MY
Occupant Protection through 1997 MY covers how the general vehicle structural elements, steering, and seat belt systems contribute to occupant protection. The electromechanical airbag SRS systems fitted to 1997 MY vehicles is covered in detail. Also covered are the description, operation and diagnosis of mechanical airbag SRS systems fitted on XJS Range vehicles from the 1990 MY ON and Sedan Range vehicles from the 1993 through the 1994 MY.

Power Steering through 1997 MY
Power Steering through 1997 MY describes the operation, service, maintenance, and other pertinent information about the power assist steering (PAS) systems on Jaguars through the 1997 MY.

Suspension through 1997 MY
Suspension through 1997 MY explains the Jaguar suspension design philosophy and contains important information about the front and rear suspensions, drive shafts, axle shafts and rear hubs of both Sedan and XJS Range Jaguars through the 1997 MY. The "X" bracing added to increase the body torsional rigidity of XJS convertibles from the 1993 MY ON is also described.

Alignment through 1997 MY
Alignment through 1997 MY includes an explanation of alignment angles and suspension steering problems. The explanations apply to all MY vehicles. In addition, the ride height setting procedures for XJS and Sedans through the 1997 MY and the general prealignment procedures for all vehicles are detailed. An alignment worksheet is also provided that allows the technician to document the vehicle pre and post alignment measurements.

XK8 Handling, Suspension and Occupant Protection
XK8 Handling, Suspension and Occupant Protection consists of an explanation of refinements to the Sedan Airbag / SRS system for XK8. Front seat pretensioning seat belts and the variable steering assist / variable steering PAS are also covered. Refinements to the rear suspension and the new front suspension are also explained in this section.

XJ Series Sedan Handling, Suspension and Occupant Protection
XJ Series Sedan Handling, Suspension and Occupant Protection covers the refinements to previous systems and the new systems introduced with the 1998 MY XJ Series V8 Sedans. Among the topics covered are the Electronic Single Point Sensor (SPS) supplementary restraint system, which includes side airbags and pretensioning front seat belts, refinements to the XK8 PAS to accommodate the Sedan, suspension and drive train refinements, and vehicle alignment information.

Warnings and Cautions

Important Warnings or Cautions are highlighted and defined in the book as follows:

WARNINGS

Warnings indicate when failure to follow a procedure correctly or ignoring the warning instructions could cause personal injury.

Warning example:

⚠ WARNING: WHILE SERVICING AND TESTING VEHICLES AND VEHICLE SYSTEMS, TAKE ALL NECESSARY SAFETY PRECAUTIONS TO PREVENT THE POSSIBILITY OF BODILY INJURY OR DEATH.

CAUTIONS

Cautions indicate when failure to follow a procedure correctly or ignoring the caution procedure could cause damage to the vehicle or component.

Caution example:

⚠ CAUTION: If filter replacement is necessary, the reservoir must be replaced.

Occupant Protection Summary

Depending on the model year, all Jaguar driver and front passenger positions are equipped with three-point active seat belts combined with airbag supplementary restraints systems (SRS), passive two-point diagonal seat belts with separate lap belts or active three-point seat belts. The two outboard rear seat passenger positions of Sedan Range vehicles are equipped with active three-point seat belts and the center passenger position is equipped with an active lap belt system.

Passive seat belt systems automatically move to restrain the occupant and retract to allow the occupant to exit the vehicle. Active seat belt systems require the occupant to physically buckle the seat belt into position and release the buckle to exit the vehicle.

XJ Series Sedan

Model year	Seat Belts	Airbag / SRS
1998 – ON	Driver / front passenger, pretensioning active Rear passengers, active	Driver / front passenger, electronic SPS / with side airbags

XJ Sedan Range

Model year	Seat Belts	Airbag / SRS
1995 – 1997	Driver / front passenger, active tear loop Rear passengers, active	Driver / front passenger, electromechanical
1994	Driver / front passenger, active tear loop Rear passengers, active	Driver / front passenger, mechanical
1993	Driver, active tear loop Rear passengers, active	Driver only, mechanical
1989 – 1992	Driver / front passenger, passive Rear passengers, active	None

XK8 Range

Model year	Seat Belts	Airbag / SRS
1997 – ON	Driver / front passenger, pretensioning active Rear passengers, active	Driver / front passenger, electromechanical

XJS Range

Model year	Seat Belts	Airbag / SRS
1994 – ON	Driver / front passenger, active tear loop	Driver / front passenger, mechanical
1990 – 1993	Driver, active tear loop Passenger, active	Driver only, mechanical
1988 – 1989 Coupe	Driver / front passenger, passive	None

Power Steering Summary

Jaguar power steering systems reduce the amount of steering effort required by the driver while providing the optimum road feel and steering feedback appropriate to the vehicle's design characteristics. All systems utilize rack and pinion steering gear assisted by an engine driven hydraulic pump.

XJ Series Sedan

Model year	Type / Manufacturer	Features
1998 – ON	Rack and pinion / ZF	Engine powered hydraulic assist Electronic variable steering assist Mechanical variable steering ratio

XJ Sedan Range

Model year	Type / Manufacturer	Features
1995 – 1997	Rack and pinion / ZF	Engine powered hydraulic assist Electronic variable steering assist
1994 from VIN 671806	Rack and pinion / ZF	Engine powered hydraulic assist
1993 – 1994 To VIN 671805	Rack and pinion / Adwest	Engine powered hydraulic assist
1990 – 1992	Rack and pinion / Adwest	Engine powered hydraulic assist Reservoir combined with Central Hydraulic System, MUST use H.S.M.O. fluid
1988 – 1989	Rack and pinion / Adwest	Engine powered hydraulic assist

XK8 Range

Model year	Type / Manufacturer	Features
1997 – ON	Rack and pinion / ZF	Engine powered hydraulic assist Electronic variable steering assist Mechanical variable steering ratio

XJS Range

Model year	Type / Manufacturer	Features
1993 from VIN 179740	Rack and pinion / ZF	Engine powered hydraulic assist
Up to 1993 VIN 179739	Rack and pinion / Adwest	Engine powered hydraulic assist

Suspension Summary

Sedan Range

The Sedan Range independent front suspension employs unequal length "A" arms. The lower "A" arm assembly includes a pan supporting the road spring. All suspension loads (except the shock absorbers) are fed into a fabricated subframe assembly that is isolated from the body by rubber bushings. The mounting of the subframe in rubber bushings allows for the necessary suspension compliance (movement). The upper and lower "A" arms are mounted to the subframe on nonparallel fulcrum shafts. The shafts angle toward the rear of the vehicle. During braking, the normal forward weight transfer is opposed by the fulcrum shaft angle reducing suspension "dive." The left and right suspension assemblies are linked by a stabilizer bar.

The independent rear suspension is a basic two-link system with the axle shaft acting as the upper control arm. Isolation is provided by a subframe assembly made up of several elements. The design of the lower control arm and its mountings eliminate the need for additional control arms to absorb fore and aft loads from the road wheel. A single coil spring / shock absorber unit attaches between the lower control arm and the body. The aluminum hub carriers supporting the wheels are attached to the lower control arms by fulcrum shafts. The pivot axis of the lower control arms and hub carriers reduce the tendency for the vehicle to "squat" during acceleration.

XK8

The XK8 front suspension system follows the Jaguar pattern of unequal length "A" arms mounted to a subframe. The inner fulcrum angles of the "A" arms reduce "dive" during braking. A road spring / shock absorber assembly mounts between each lower "A" arm and the vehicle body. The tapered road spring is coaxial with the shock absorber. No service adjustments are required for the front suspension, except for toe.

The independent rear suspension is of the same design as the 1995 – 1997 MY Sedan Range, incorporating lower control arm fulcrum angles that reduce "squat" during acceleration. Rear camber and toe are adjustable. A single fabricated "monostrut" replaces the two struts of the N / A (normally aspirated) engine equipped Sedans.

Both the front and rear suspension use link mounted stabilizer bars.

XJS Range Suspension

The XJS independent front suspension is a design similar to that of the Sedan Range.

The independent rear suspension is a two-link design with the axle shaft acting as the upper link. The built up lower control arm incorporates the lower pivots for the dual road spring / shock absorber units. Radius arms connect to the lower control arms to absorb fore and aft loads. The complete assembly, except for the radius arms, is mounted in a fabricated subframe that connects to the body.

The disc brake assemblies are mounted inboard of the axle shafts through the 1993 model year. From the 1994 model year on, the brake assemblies are mounted outboard on the aluminum hub carriers.

Alignment Summary

Table of Service Adjustments

XJ Series Sedan

Model year	FRONT Caster	Camber	Toe	REAR Camber	Toe	Mid-laden tools
1998 – ON	Yes	Yes	Yes	Yes	Yes	No

XJ Sedan Range

Model year	FRONT Caster	Camber	Toe	REAR Camber	Toe	Mid-laden tools
1994* – 1997	Yes	No	Yes	Yes	Yes	Yes
1988 – 1994**	Yes	No	Yes	Yes	No	Yes

XK8 Range

Model year	FRONT Caster	Camber	Toe	REAR Camber	Toe	Mid-laden tools
1997 – ON	No	No	Yes	Yes	No	No

XJS Range

Model year	FRONT Caster	Camber	Toe	REAR Camber	Toe	Mid-laden tools
All	Yes	Yes	Yes	Yes	No	Yes

*from VIN 687219

**up to VIN 687218

NOTE: Refer to the latest Jaguar technical information for the latest specifications and procedures.

Occupant Protection through 1997 MY

Contents

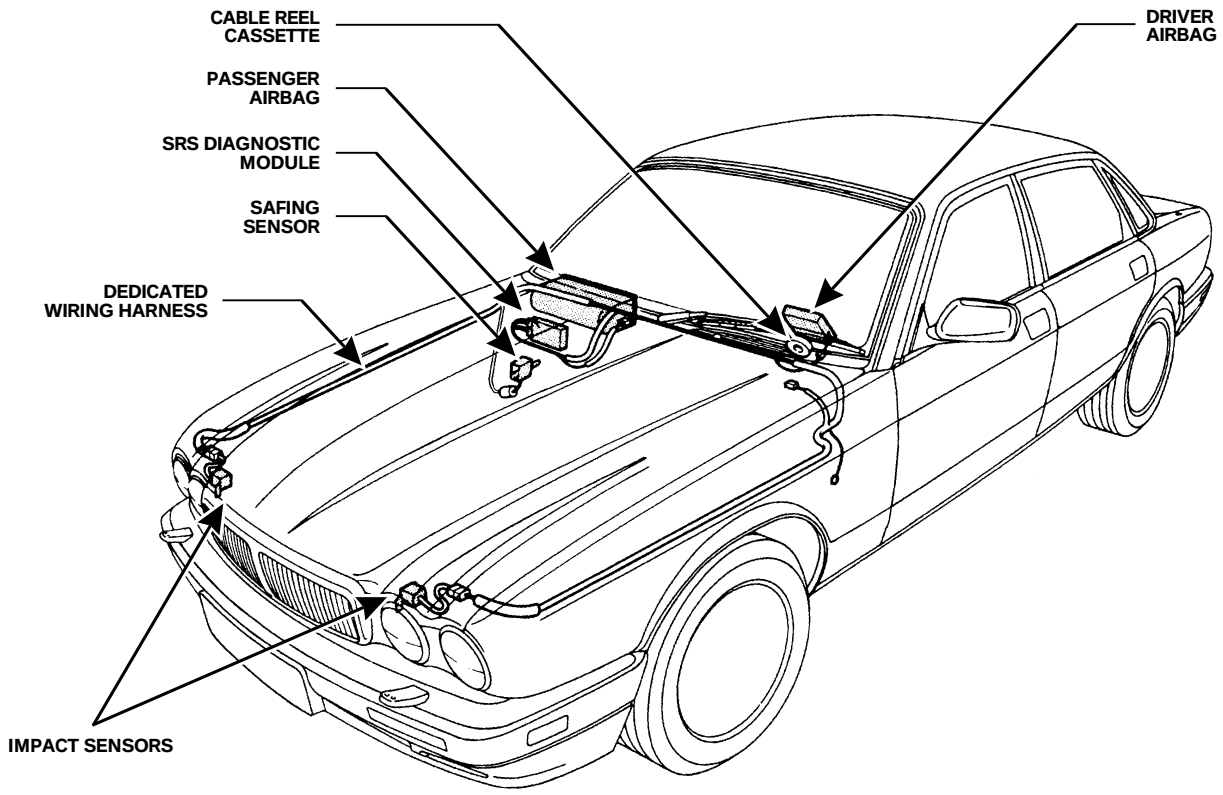
Electromechanical Airbag Supplementary Restraint System

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.

ELECTROMECHANICAL AIRBAG / SRS: SEDAN RANGE 1995 THROUGH 1997 MY



⚠ WARNING: READ THE INSTRUCTIONS IN THE SERVICE MANUAL AND OBSERVE ALL SAFETY PRECAUTIONS BEFORE ATTEMPTING TO SERVICE THE STEERING WHEEL, THE AREA AROUND THE PASSENGER SIDE AIRBAG, OR ANY AIRBAG / SRS COMPONENTS. OBSERVE ALL SAFETY PRECAUTIONS WHEN HANDLING OR TRANSPORTING AIRBAG MODULES.

DO NOT ATTEMPT TO MEASURE CIRCUIT RESISTANCE THROUGH THE AIRBAG ASSEMBLY. DOING SO MAY TRIGGER AIRBAG DEPLOYMENT AND POSSIBLY RESULT IN PERSONAL INJURY.

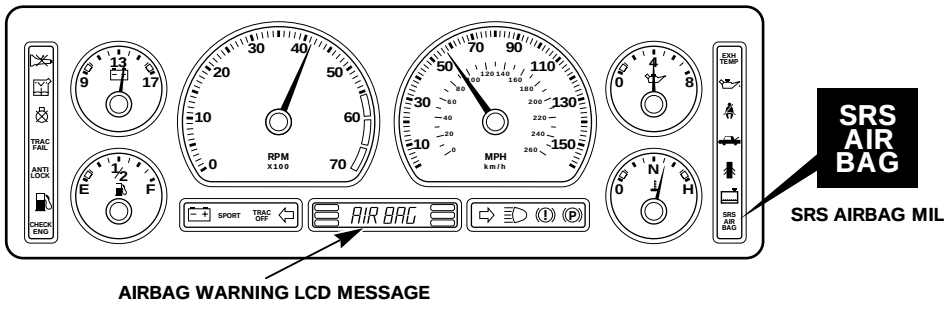
TO DISARM THE SRS SYSTEM, DISCONNECT THE NEGATIVE BATTERY CABLE AND WAIT A MINIMUM OF ONE MINUTE FOR THE POWER RESERVE CHARGE TO DISSIPATE.

On-board Diagnostics

The airbag / SRS diagnostic module (DM) continuously monitors the system power supply voltages, the state of the system components, and the system circuitry when the ignition is switched ON. If a fault is detected, the module transmits the DTC (diagnostic trouble code) information to the instrument pack and triggers the SRS AIRBAG MIL. The instrument pack stores the DTC in nonvolatile memory and also activates an AIRBAG warning on the LCD message display. The AIRBAG warning display can be canceled by pressing the odometer button. However, it will be redisplayed when the ignition is next switched ON. If an airbag / SRS fault disappears or is repaired, the DM stops transmitting the DTC information. The MIL and LCD warning will go out, but the DTC remains stored in the instrument pack memory.

Airbag / SRS system DTCs are expressed as two-digit codes that identify the nature of the fault and the circuit involved. DTCs are accessed via serial communication with PDU through the DLC (data link connector).

AIRBAG / SRS MIL AND AIRBAG LCD WARNING



SRS AIRBAG MIL

Each time the ignition is switched ON, the SRS AIRBAG MIL is activated by a low voltage signal from the DM. If the SRS system is functioning correctly, the DM drives the MIL OFF with a high voltage 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 memory.

SRS AIRBAG MIL diagnostic monitoring

SRS AIRBAG MIL faults can be diagnosed by observing the MIL state:

MIL OFF with ignition ON
The DM cannot activate the MIL without ignition auxiliary switched voltage. No MIL accompanied by five “beeps” from the DM every 30 minutes indicates a failure in the instrument pack power supply or the SRS AIRBAG MIL power supply circuit. No DTC is provided.

MIL continuously ON with ignition ON
The MIL will not be switched OFF if the DM is disconnected or there is an open circuit between the DM and the instrument pack. No DTC is provided.

MIL continuous flashing with ignition ON
The DM will continuously flash the MIL if the main SRS harness is disconnected or if both front impact sensors are disconnected or not grounded. No DTC is provided.

Refer to the DTC Summary, pages 25 – 27.

Instrument Pack

The instrument pack recognizes and stores all 18 SRS DM DTCs and can also monitor certain other system faults. If the MIL is activated, it relates to the most recent DTC stored. The instrument pack can store up to three airbag / SRS DTCs at one time.

Instrument pack diagnostic monitoring
A short circuit to ground on the airbag warning signal circuit from the DM to the instrument pack will flag DTC 00. Instrument packs manufactured before December 1994 may contain a software problem, which causes it to store DTC 00 with no fault. However, the MIL will not illuminate. If DTC 00 is found in an instrument pack manufactured before December 1994 and no MIL is activated, disregard the DTC. If the DTC is stored in the most recent memory location and the MIL is activated, the DTC is valid and must be repaired.

When the ignition is switched on, the DM performs a 4 to 8 second self test. When the self test is passed, the DM sends a "pass" signal to the instrument pack. If the instrument pack does not receive the "pass" signal it will flag DTC 01.

If both front impact sensors are disconnected before the ignition is switched ON, the DM transmits a rapid 5 Hz signal on the airbag warning light signal circuit. The instrument pack will flag DTC 99.

DTC	Component / signal	MIL
00	AIRBAG MIL circuit low voltage	YES
01	No DM self test "pass" signal	YES
99	Front impact sensors disconnected	YES

Refer to the DTC Summary, pages 25 – 27.

System Components

Diagnostic Module

The diagnostic module (DM) is a microprocessor located in the passenger side underscuttle. It monitors the state of the impact and safing sensors, the power supply, wiring harness and air-bag modules, and communicates DTC information to the instrument pack.

In case supply voltage is lost during an impact, the airbag can still be deployed by a reserve power supply located in the DM. The reserve power supply remains active for approximately one minute after voltage is removed from the module. The reserve power supply voltage is stored in a capacitor, which is loaded to 24 V by a voltage boost circuit within the DM.

A "dwell enhancer" circuit in the DM compensates for sensor or sensor ground damage during an impact. Once an impact sensor activates for 5 milliseconds, the "dwell enhancer" switches to complete an alternate ground for 90 milliseconds allowing airbag deployment.

A non-serviceable thermal fuse within the DM protects against system faults that could cause airbag deployment without an impact. If a fault occurs and the safing sensor plus at least one impact sensor is not activated (not providing a completed airbag deployment circuit), the thermal fuse will open circuit. The thermal fuse will also open circuit when the airbags deploy during an impact.

The thermal fuse is non-serviceable. If the fuse open circuits, the diagnostic module must be replaced.

Diagnostic module (DM) diagnostic monitoring
When the ignition is switched ON, the SRS AIRBAG MIL is activated for approximately six seconds and the diagnostic module performs a self test routine. If the DM fails the self test, it activates the MIL and flags DTC 53.

If the thermal fuse is open circuited, DTC 51 will be flagged.

The DM monitors the ignition switched voltage supply and the direct B+ (battery) voltage supply. If no ignition switched voltage is supplied, the AIRBAG MIL will not activate. If B+ voltage at the DM is less than 9 V, DTC 12 is stored.

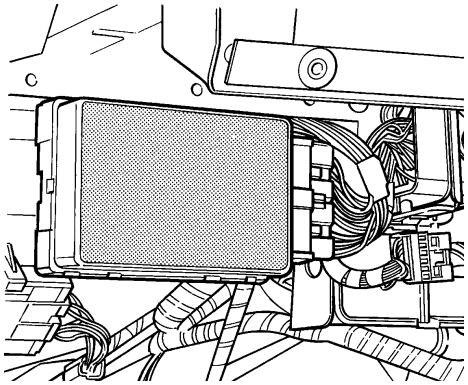
When the ignition is switched ON, a voltage boost circuit in the DM charges the reserve power supply capacitor. If a capacitor charge of 23 V is not reached and maintained within approximately 45 seconds after the ignition is switched ON, DTC 52 is flagged.

DTC	Component / signal	MIL
12	B+ voltage supply low (below 9 V)	YES
51	Thermal fuse open circuit	YES
52	Reserve power supply low voltage	YES
53	DM self test failure	YES

Refer to the DTC Summary, pages 25 – 27.

NOTES

SRS DIAGNOSTIC MODULE (RHD SHOWN)



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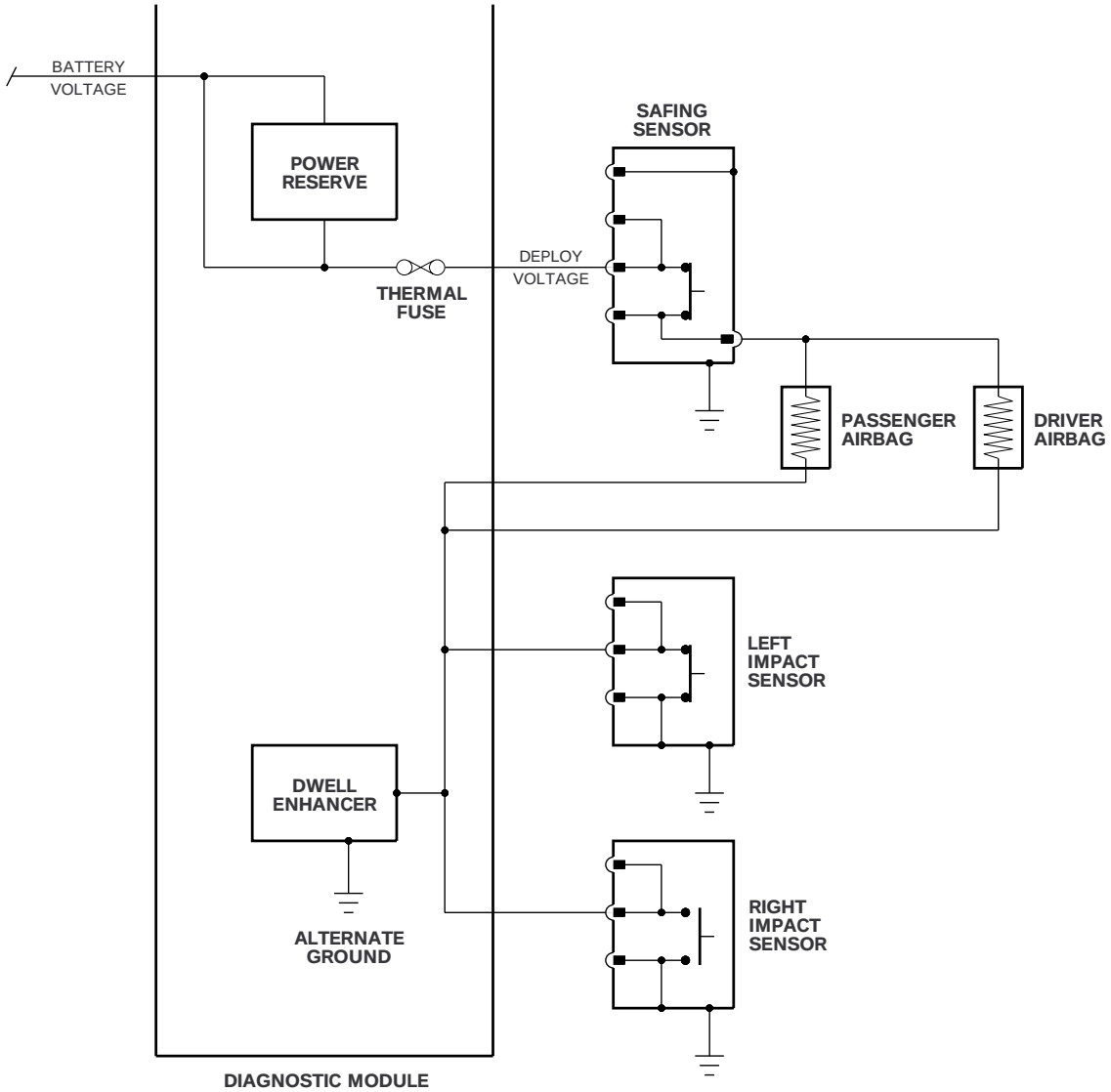
AIRBAG DEPLOYMENT – SAFING SENSOR AND LEFT IMPACT SENSOR ACTIVATED



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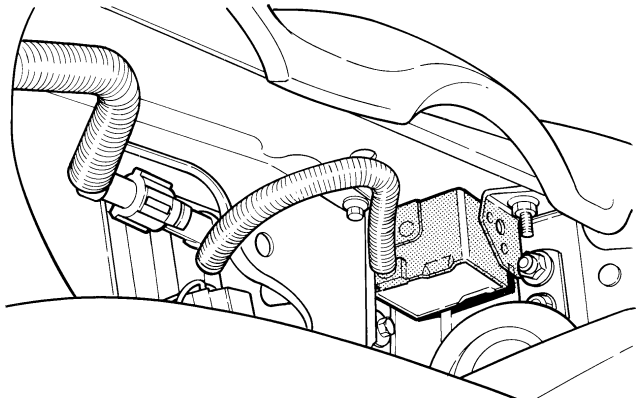
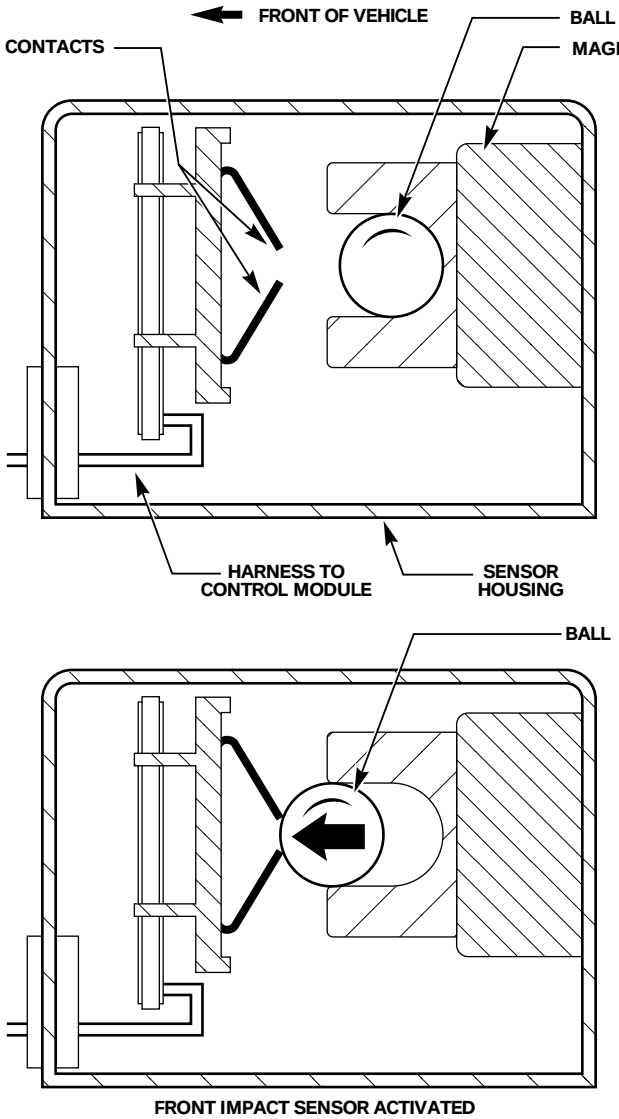
System Components (continued)

FRONT IMPACT SENSOR



T400/1.09

FRONT IMPACT SENSOR CUTAWAY



FRONT IMPACT SENSOR ACTIVATED

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Front Impact Sensors

The two front impact sensors detect crash energy according to direction of travel and impact force. The front impact sensors are located between each headlamp bracket and the hood hinge. Each impact sensor unit contains switch contacts and a metal ball held in position by a permanent magnet.

In the event of a frontal impact of sufficient force, the metal ball is dislodged and closes the switch contacts providing a ground signal for the airbag deployment circuit. One front impact sensor plus the safing sensor must be activated to enable airbag deployment.

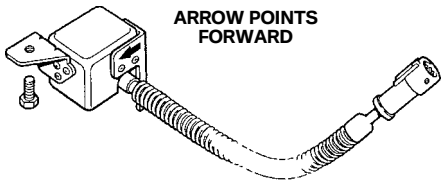
Sensor replacement

Both front impact sensors must be replaced if collision damage has occurred to any of the following components:

- Headlamp mounting panel
- Headlamp assembly
- Hood hinge mounting panel
- Front longitudinal members
- Hood / hood hinges
- Front bumper structure

IMPORTANT: The impact sensors are marked for position (L for left side and R for right side). An arrow on each sensor also indicates installed orientation. Sensors must be installed in their correct positions. Do not reuse the special flange head sensor fasteners. Torque the new sensor fasteners to 16 Nm (11.8 lb ft).

FRONT IMPACT SENSOR ORIENTATION



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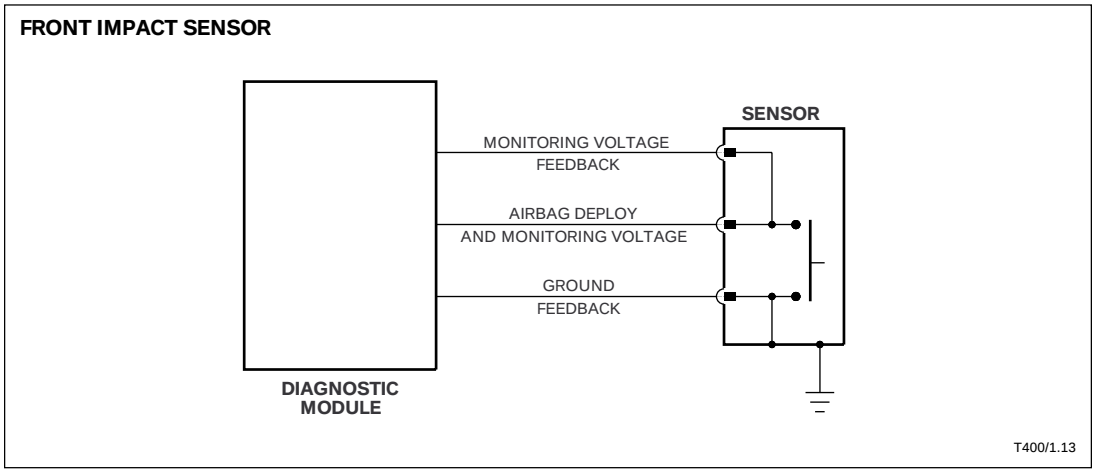


Front impact sensor diagnostic monitoring
Each impact sensor has three connections to the DM: voltage supply, voltage feedback and ground feedback. The DM monitors the sensor voltages and ground states.

If both front impact sensors are disconnected from the DM (no voltage or no ground) or the main wiring harness is disconnected, the AIRBAG MIL will flash continuously when the ignition is switched ON. No DTC will flag.

A sensor feedback voltage of 5 V or less indicates a short circuit to ground in one of the sensors' voltage circuits. If this occurs, DTC 14 will flag and the DM thermal fuse will open circuit disabling the airbag deployment circuits. When the correct voltage is restored to the sensor voltage supply circuit, DTC 51 will remain, indicating the open circuit thermal fuse. Because the thermal fuse is not serviceable, the DM must be replaced.

A sensor feedback voltage of between 5 V and 10 V indicates high resistance in the sensor circuit, flagging DTC 53. DTC 53 may also be caused by a failed DM self test.

The DM monitors impact sensor supply voltage circuit resistance between the supply and feedback pins on the DM. Resistance greater than 2 Ω will flag DTC 41 (RH side sensor) or DTC 42 (LH side sensor).

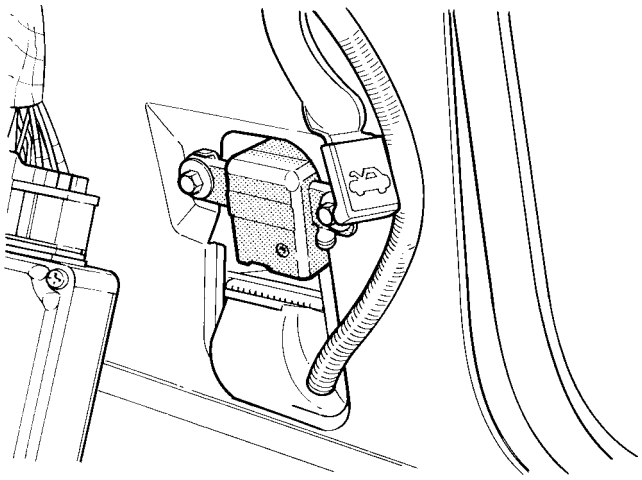
The DM also monitors the resistance of the sensors' ground circuits. Resistance greater than 2 Ω in the ground circuit will flag DTC 44 (RH side sensor) or DTC 45 (LH side sensor).

DTC	Component / signal	MIL
–	Both front sensors disconnected	CONTINUOUS FLASHING
14	Front impact sensor short circuit	YES
41	Front right sensor supply circuit high resistance	YES
42	Front left sensor supply circuit high resistance	YES
44	Front right sensor poor ground	YES
45	Front left sensor poor ground	YES
53	Front impact sensor supply circuits high resistance	YES

Refer to the DTC Summary, pages 25 – 27.

System Components (continued)

SAFING SENSOR



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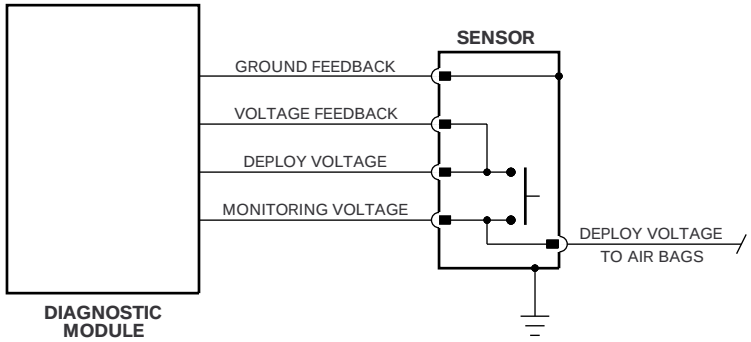
Safing Sensor

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.

NOTE: Do not reuse the special flange head safing sensor fasteners. Torque the new fasteners to 12 Nm (8.9 lb ft).

SAFING SENSOR



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NOTES

Safing sensor diagnostic monitoring
The DM continuously monitors the safing sensor voltage and ground states.

DTC 21 will flag if the resistance in the sensor ground circuit is greater than 2 Ω.

The deployment voltage supply to the safing sensor is provided by battery and power reserve voltage. The power reserve voltage should be between 23 V and 26 V. If the DM measures less than 23 V, DTC 23 will flag.

The deployment voltage output circuit from the safing sensor to the airbags is also monitored by the DM. The monitoring voltage in this circuit is conditioned by the DM and varies according to battery voltage. If the monitoring voltage is more than 5 V, a short circuit to B+ voltage in the airbag deployment power circuit is indicated and the DM will flag DTC 22. If the monitoring voltage is not as expected, the DM will flag DTC 24.

Battery voltage versus deployment output circuit monitoring (conditioned) voltage

Battery V	Conditioned V	Battery V	Conditioned V
9.0	2.3	12.5	3.2
9.5	2.4	13.0	3.4
10.0	2.5	13.5	3.5
10.5	2.7	14.0	3.7
11.0	2.8	14.5	3.8
11.5	3.0	15.0	4.0
12.0	3.1	15.5	4.1
		16.0	4.3

NOTE: Conditioned V tolerance ± 0.5 V

DTC	Component / signal	MIL
21	Safing sensor poor ground	YES
22	Safing sensor output circuit short circuit to B+ voltage	YES
23	Safing sensor input voltage low	YES
24	Safing sensor output circuit incorrect voltage	YES

Refer to the DTC Summary, pages 25 – 27.

NOTES

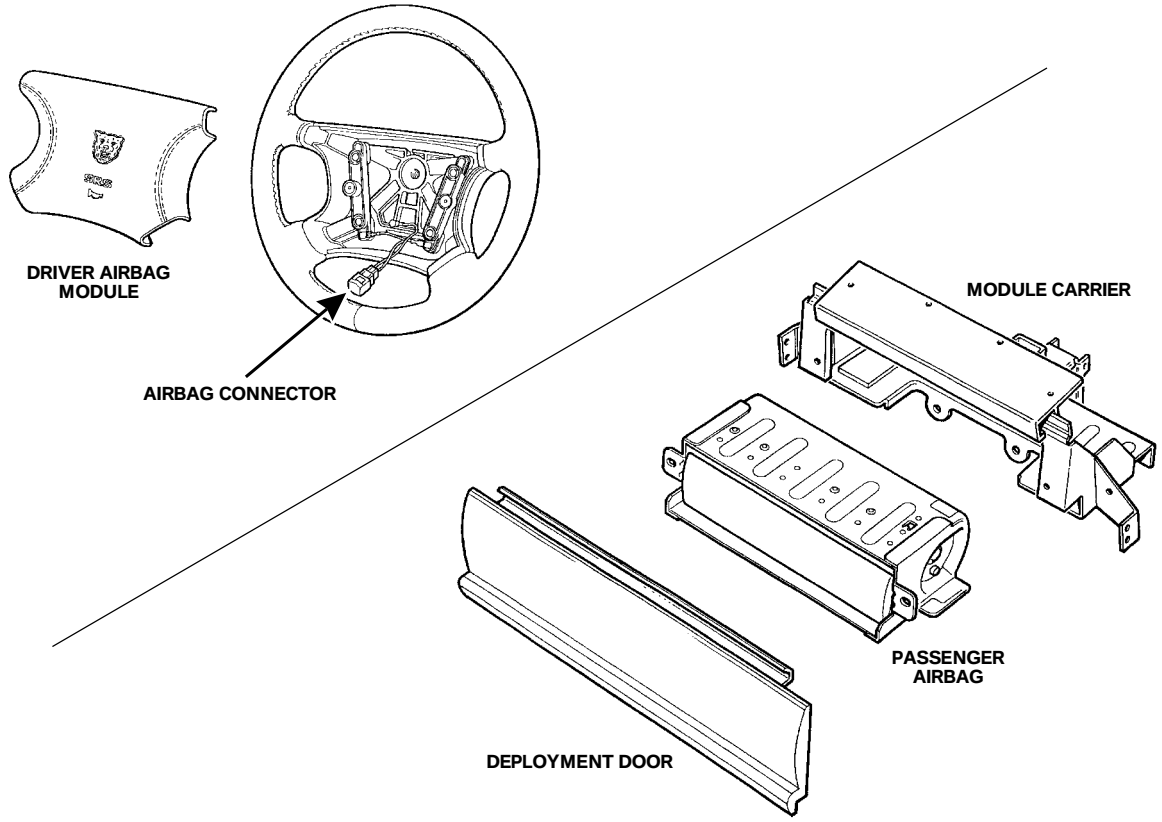
System Components (continued)

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.

AIRBAG MODULES – SEDAN RANGE SHOWN



T400/1.16, 1.17

When the safing sensor plus one impact sensor is activated (contacts closed), the circuit from the DM deployment voltage supply (or reserve voltage supply) is completed through the safing sensor to each airbag and to ground at the activated impact sensor (or dwell enhancer). 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.

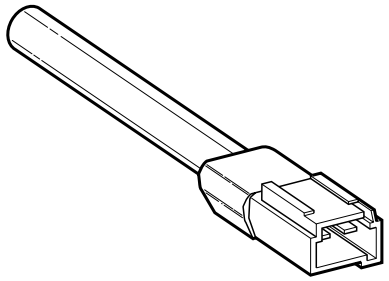
⚠ WARNING: OBSERVE ALL "LIVE AIRBAG" SAFETY PRECAUTIONS WHEN HANDLING THE UNDEPLOYED AIRBAG. OBSERVE ALL SAFETY PRECAUTIONS WHEN HANDLING OR TRANSPORTING AIRBAG MODULES.

Airbag module diagnostic monitoring
The DM monitors the resistance of each airbag circuit (wiring, airbag, and cable reel cassette on the driver side). The normal resistance for the driver side circuit is 1.5 – 2 Ω. The normal resistance for the passenger side circuit is 0.9 – 1.2 Ω.

If the resistance is greater than 4 Ω, DTC 32 (driver side fault) or DTC 33 (passenger side fault) will flag. If the circuit resistance is less than 0.7 Ω, DTC 34 (driver side) or DTC 35 (passenger side) will flag.

⚠ 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 THE JAG 7956 AIRBAG SIMULATOR TOOL IN THE AIRBAG CONNECTORS BEFORE CONNECTING THE METER. THE AIRBAG SIMULATOR TOOL RESISTANCE IS 2.5 Ω.

AIRBAG SIMULATOR TOOL JAG 7956



T400/1.18

The deployment voltage output circuit from the safing sensor to the airbags is also monitored by the DM. The monitoring voltage in this circuit is conditioned by the DM and varies according to battery voltage. Refer to the Battery voltage versus deployment output circuit monitoring (conditioned) voltage table on page 11. If the monitoring voltage is less than 2 V, a short circuit to ground is indicated and DTC 13 will flag. This fault will cause the thermal fuse to open circuit and disable the airbag deployment circuit. When the cause of the fault has been repaired, DTC 51 will remain flagged, indicating the open circuit thermal fuse. Because the thermal fuse is not serviceable, the DM must be replaced.

DTC	Component / signal	MIL
13	Airbag circuit short circuit	YES
32	Driver airbag circuit high resistance	YES
33	Passenger airbag circuit high resistance	YES
34	Driver airbag circuit low resistance	YES
35	Passenger airbag circuit low resistance	YES

Refer to the DTC Summary, pages 25 – 27.

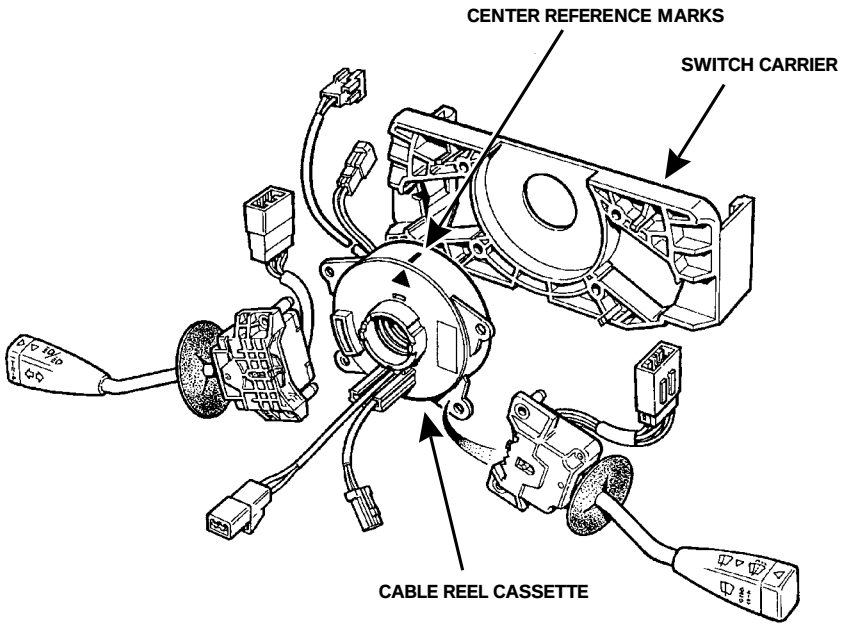
NOTES

System Components (continued)

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.

CABLE REEL CASSETTE



T400/1.19

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.

Cable reel cassette diagnostic monitoring
The cable reel cassette is monitored as part of the airbag circuit.

NOTES

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 flyleads 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."

Wiring harness diagnostic monitoring
The wiring harness is monitored as part of the airbag / SRS system diagnostics.

NOTES

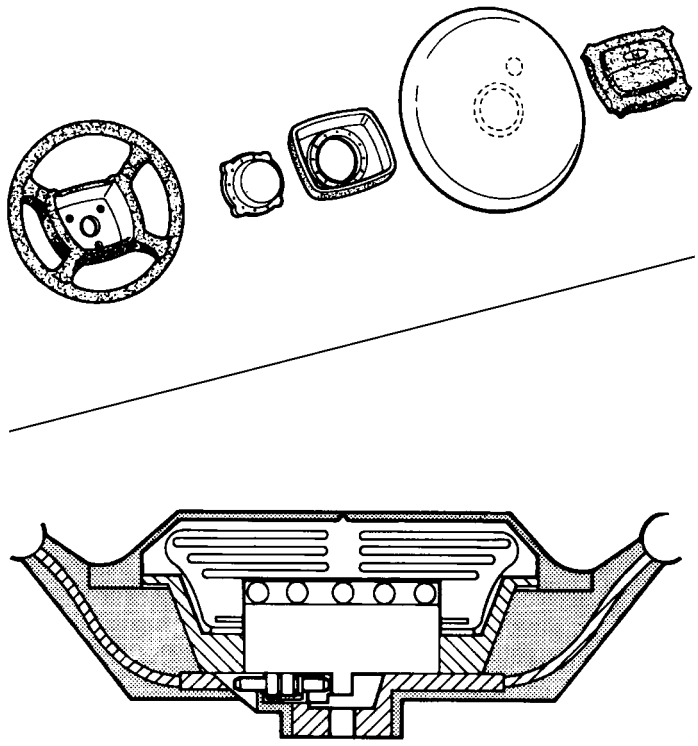
Driver Airbag

XJS Range vehicles from the 1990 Model Year ON and Sedan Range vehicles from the 1993 through the 1994 Model Year are equipped with mechanical airbags. The airbag assembly is a self contained unit 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 6 mph (9.5 km/h). Because each airbag triggers individually, vehicles fitted with both passenger and driver side airbags may only deploy one airbag, depending on the forces of the impact.

AIRBAG LABEL

T400/1.04

STEERING WHEEL WITH DRIVER SIDE AIRBAG



T400/1.20

Airbag identification symbol
Beginning with the 1994 MY, the vehicle identification number plate (VIN plate) located at the base of the windshield on the driver's side includes an airbag symbol. The purpose of this graphic symbol is to alert emergency and service personnel that the vehicle is airbag equipped. In the event of a road accident in which the airbag does not deploy, emergency and service personnel must proceed with caution when working around the airbag positions.

Steering wheel with driver side airbag
The steering wheel houses the airbag assembly and the arming / disarming mechanism for the driver side airbag. The steering wheel also transmits the crash pulse to the airbag sensors (via the inflator / sensor housing).

Upper steering column
The upper steering column assembly transmits the crash pulse to the steering wheel. In the event of a frontal impact, the steering column collapses to absorb impact energy.

Vehicle structure and components
In the event of a frontal impact, the body structure will deform and absorb impact energy. The crash pulse is transmitted through the body to the steering column.

Active seat belts
The airbag / SRS system is designed as a supplement to the active seat belt system and the other safety components. The seat belts should be used at all times when the vehicle is in operation.

Knee bolster
The driver's side underdash panel is padded and incorporates a knee bolster. Changes have been made to the climate control ducting and the location of electrical components to make room for the knee bolster panel.

Airbag Assembly

The airbag assembly contains the airbag, the inflator / sensor assembly, and the inflator / sensor housing. The assembly is enclosed by a trimmed cover that splits horizontally as the airbag inflates.

NOTE: The airbag assembly is non-serviceable and must not be transferred for use in other vehicles.

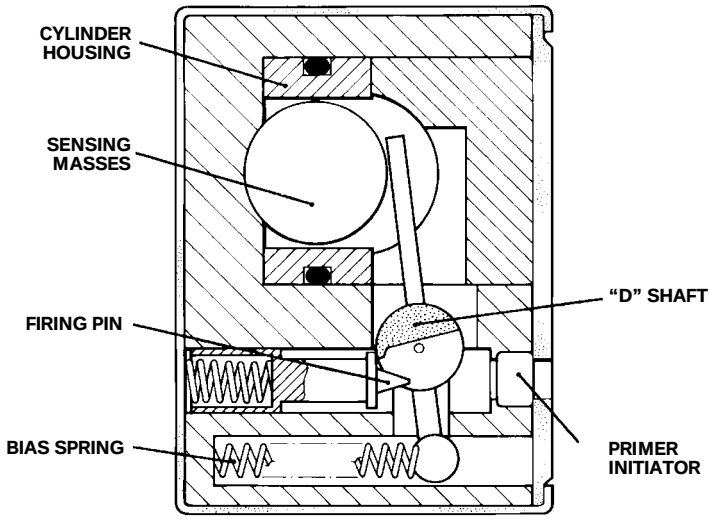
Inflator / sensor assembly

The inflator / sensor assembly triggers airbag deployment if it senses a crash pulse equal to a frontal impact into a solid barrier at or above 6 mph (9.5 km/h). Through the operating mechanism, two firing pins ignite a primer, which reacts with a propellant to produce nitrogen gas and inflate the airbag.

If the specified impact occurs, two spherical "sensing masses" move forward against levers that rotate the "D" shafts. Two bias springs return the "D" shafts to their seated positions if an impact is insufficient to fully trigger the sensing masses. The "D" shafts can be prevented from rotating by carrying out a disarming procedure so that service and maintenance work can be safely conducted.

⚠ WARNING: DO NOT ATTEMPT SERVICE OR MAINTENANCE WORK ON THE AIRBAG / SRS SYSTEM WITHOUT THE JAGUAR SPECIFIED TOOLS, EQUIPMENT, AND SERVICE PROCEDURES. DO NOT REMOVE THE STEERING COLUMN OR STEERING WHEEL FROM THE VEHICLE WITHOUT FIRST DISARMING AND REMOVING THE AIRBAG ASSEMBLY.

INFLATOR / SENSOR ASSEMBLY

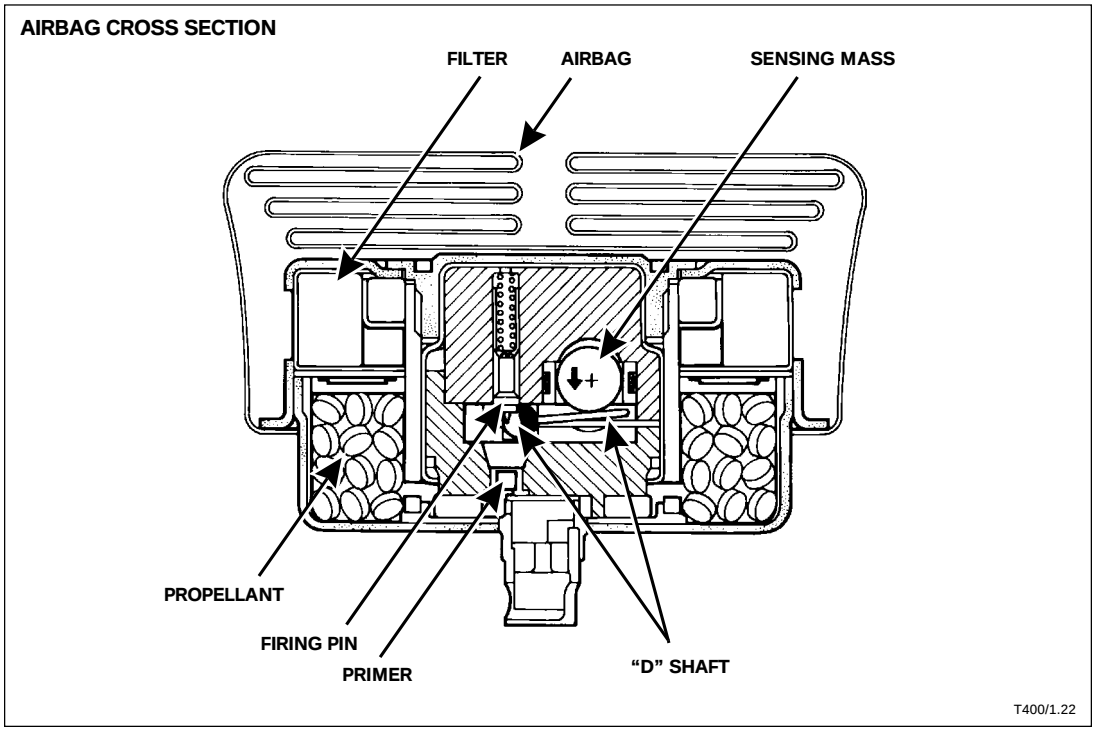


T400/1.21

NOTES

Driver Airbag (continued)

Airbag / SRS System Operation



Crash sensing
In the event of a frontal impact, the vehicle body structure will deform, absorbing the energy of the impact. The crash pulse is transmitted to the steering column, then to the steering wheel, and then to the inflator / sensor.

Airbag deployment
If the crash pulse is of sufficient strength and duration, the sensing masses move forward and rotate the "D" shafts. The "D" shafts release the firing pins to ignite the primer. The primer reacts with the propellant to produce nitrogen gas and inflate the airbag.

Driver protection
The airbag fills with nitrogen gas and expands, splitting open the airbag cover. The airbag continues to expand until it is fully inflated. The driver travels forward until contact is made with the fully inflated airbag, at which time the driver's forward motion is decelerated. As the driver travels into the airbag, the nitrogen is expelled via the vent hole in the rear of the airbag, thus absorbing impact energy. Simultaneously, the steering column collapses, absorbing additional impact energy until the driver comes to rest. Impact energy is also absorbed by the deformation of the steering wheel and the steering column brackets.

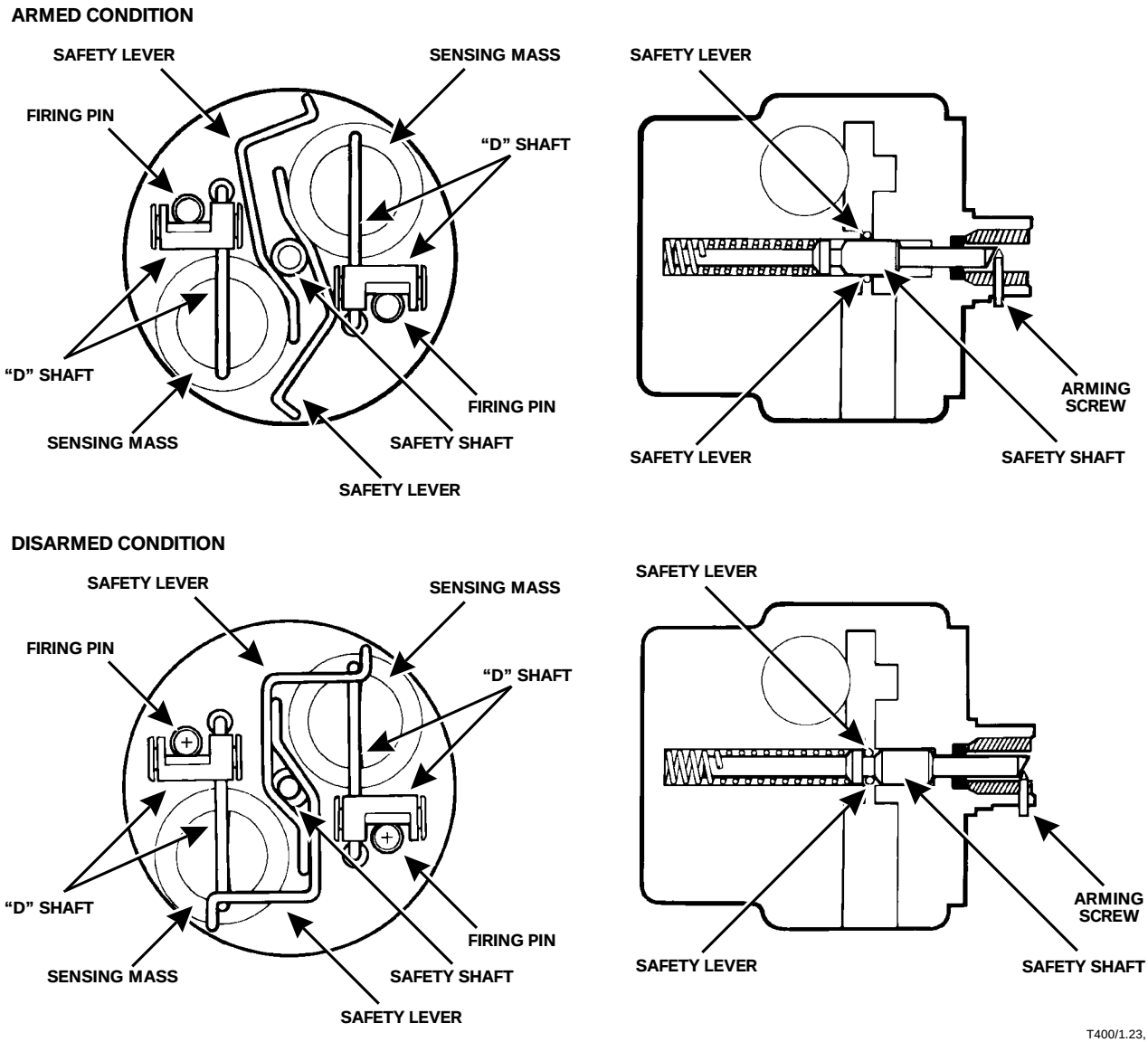
Airbag replacement
The airbag assembly is designed for one deployment only. If deployed, the complete assembly and the cover must be replaced and armed.

⚠WARNING: REFER TO TECHNICAL BULLETINS AND THE SERVICE MANUAL FOR SAFETY PRECAUTIONS BEFORE HANDLING AN AIRBAG.

Arming / Disarming Mechanism

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

ARMING / DISARMING MECHANISM



T400/1.23, 1.24

Armed condition

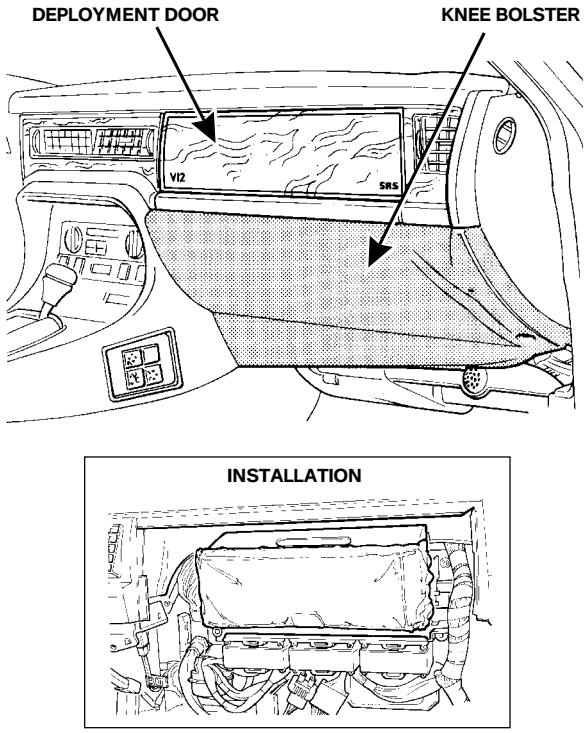
When screwed fully clockwise against the stop, the arming screw forces the chamfered safety shaft between the two safety levers. The levers are held away from the "D" shafts, allowing the "D" shafts to be triggered by the sensing masses.

Disarmed condition

When screwed fully counterclockwise against the stop, spring pressure moves the safety shaft away from the safety levers. The safety levers return to their rest position in the safety shaft recess and prevent any movement of the sensing masses.

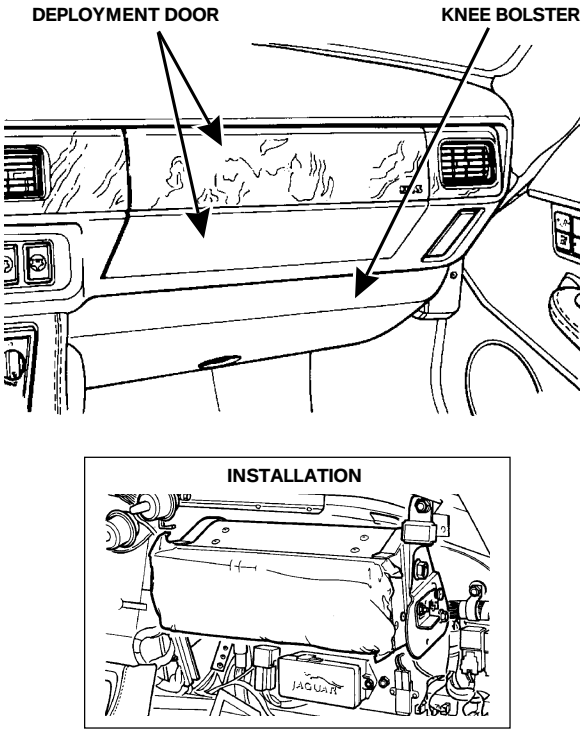
Passenger Airbag

PASSENGER AIRBAG: SEDAN RANGE (1994 MY ONLY)



T400/1.25A & B

PASSENGER AIRBAG: XJS RANGE (1994 MY ON)



T400/1.26A & B

XJS Range vehicles from the 1994 MY ON and Sedan Range vehicles for the 1994 MY have the airbag supplementary restraint system (SRS) as standard equipment for both driver and front seat passenger. The driver system is continued from the 1993 model year. The front seat passenger supplementary system consists of an additional airbag module, a passenger side underdash knee bolster, and a revised seat belt with a tear loop buckle.

Passenger airbag

The front passenger airbag is a separate unit with an integrated inflator / sensor assembly similar to the driver side airbag module. The mechanical operation for airbag deployment is similar to the driver airbag. The passenger airbag module is larger than that required for the driver. It is installed behind a veneer faced deployment door in the area previously used for the glove box. When the system is activated, the airbag emerges by opening the deployment doors and splitting the perforated veneer as it deploys.

⚠ WARNING: REFER TO TECHNICAL BULLETINS AND THE SERVICE MANUAL FOR SAFETY PRECAUTIONS BEFORE HANDLING OR SERVICING ANY JAGUAR AIRBAG.

Passenger knee bolster

The passenger underdash panel has been replaced with a knee bolster designed to work with the passenger airbag and tear loop seat belt. The bolster is an integral part of the supplementary restraint system; it is vital that it be clipped properly in place for the SRS system to function properly.

NOTES

Arming / Disarming Mechanism

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.

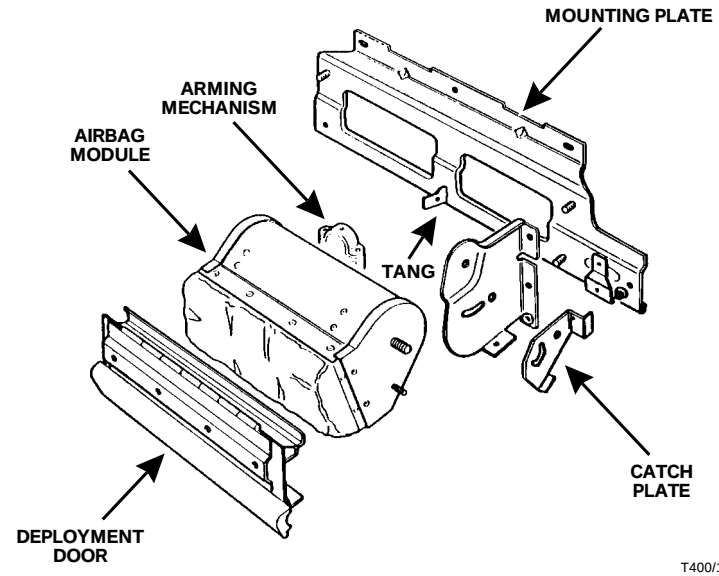
To disarm an installed airbag module, carefully loosen but do not remove the two airbag module mounting nuts and catch plate nuts. Because the arming mechanism spring will cause the module to snap down with considerable force when the catch plates are released, restrain the airbag module with both hands while releasing the catch plates and allow the module to slowly rotate to the disarmed position.

⚠ **WARNING**: **UNTIL IT IS VERIFIED THAT THE ARMING SLIDE IS FULLY DOWN IN THE DISARMED POSITION, THE AIRBAG IS STILL CONSIDERED TO BE ARMED; OBSERVE ALL SAFETY PRECAUTIONS IN THE SERVICE MANUAL**.

When the module assembly is removed, check that the arming mechanism slide is fully down in the disarmed position. If the slide is not fully down, the module is still armed. Gently position the module so the side is toward your body and the deployment opening is NOT facing down. With finger pressure only, pull the slide down. If the slide cannot be pulled down, safely store the armed module and contact Jaguar for further instructions.

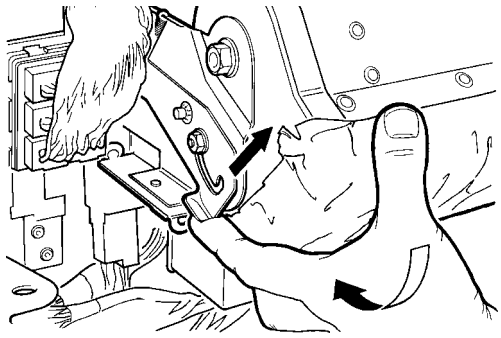
NOTES

PASSENGER AIRBAG COMPONENTS



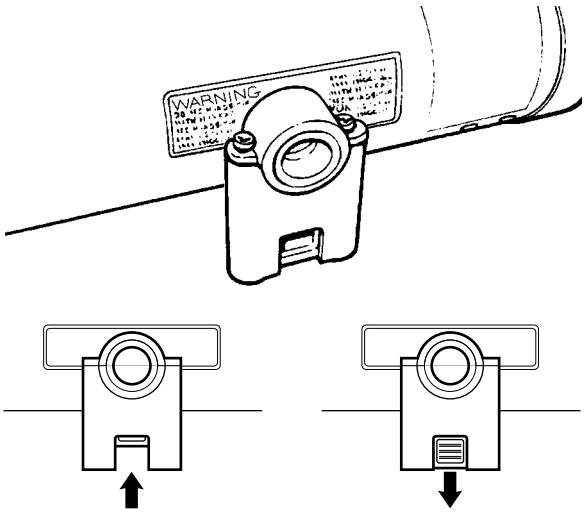
T400/1.27

PASSENGER AIRBAG MODULE DISARMING



T400/1.28

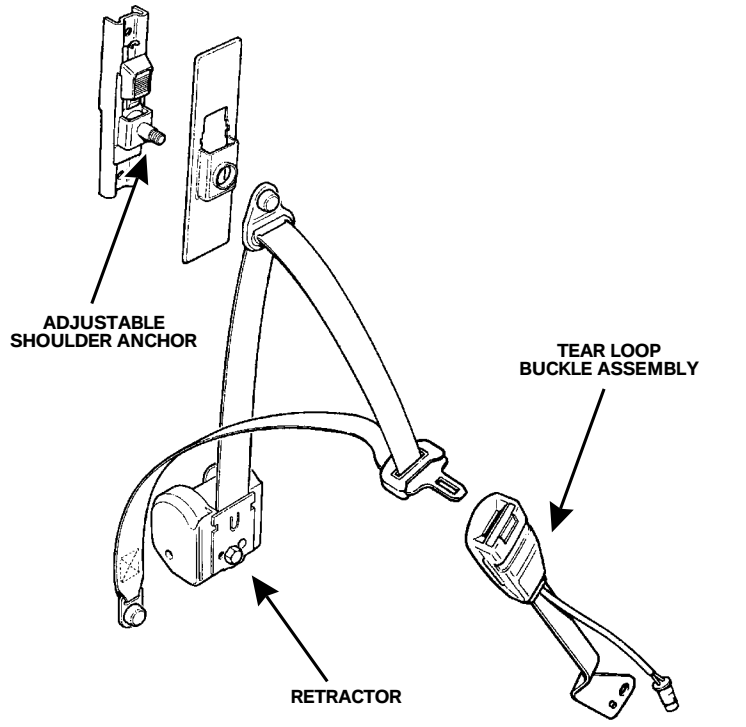
PASSENGER AIRBAG MODULE ARMING MECHANISM



T400/1.29A & B

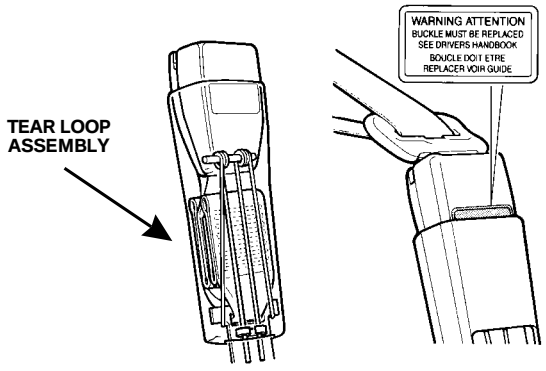
Active Seat Belts

TYPICAL FRONT SEAT BELT ASSEMBLY



T400/1.30

TEAR LOOP SEAT BELT BUCKLE



SERVICEABLE UNIT: REPLACE IF WARNING LABEL IS VISIBLE

T400/1.31

Front Seat Belts

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.

⚠ 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.

The front passenger seat belt retractor in 1995 – 1997 MY Sedans and 1996 MY XJS vehicles has two operating modes. The normal inertia mode allows the occupant freedom of torso movement while restrained. The static reel mode prevents belt outward movement. Static reel mode is used to secure child seats. To engage this mode, pull the belt all the way out. As the belt is fed back into the reel, the ratchet prevents the belt from reversing direction. To reset to the normal mode, allow the belt to fully retract, which disengages the ratchet.

NOTE: All seat belts should be periodically inspected by examining their full length for cuts, signs of fraying, or other damage. Damaged seat belts should be replaced. The entire seat belt assembly should be replaced if it was worn during a severe impact even if there is no obvious damage.

Rear Seat Belts

The rear outboard seating positions for Sedan and XJS Range vehicles are equipped with three-point seat belts. The 1995 – 1997 MY Sedan Range and 1996 MY XJS convertible outboard seat belt retractors are of the two operating mode design described above.

The 1996 MY XJS coupes utilize standard single mode inertia retractors on the rear seat belts. However, the seat belt buckle assembly insertion tongue has a clamping device. When the belt is buckled and the lap section tightens, the clamping device prevents the lap section from being loosened until the buckle is released. The inertia retractor allows the shoulder section of the belt to extend and retract in the normal manner.

Passive Restraint Seat Belt Systems

Passive restraint seat belt systems were used for the driver and front passenger on 1988 – 89 MY XJS Range and 1989 – 92 MY Sedan Range vehicles.

USA specification vehicles that are equipped with passive restraint seat belt systems and registered in the USA are warranted under the terms of the Jaguar Motorized Seat Belts Limited Lifetime Warranty. Refer to the Warranty Policies and Procedures Manual for details of warranty coverage.

The system consists of a diagonal seat belt fed from an inertia reel mounted on the inside seat slide. The diagonal belt is connected to a motorized runner on the upper door opening. An independent lap belt fed from an inertia reel mounted on the outside seat slide connects manually to the anchor on the inside seat slide.

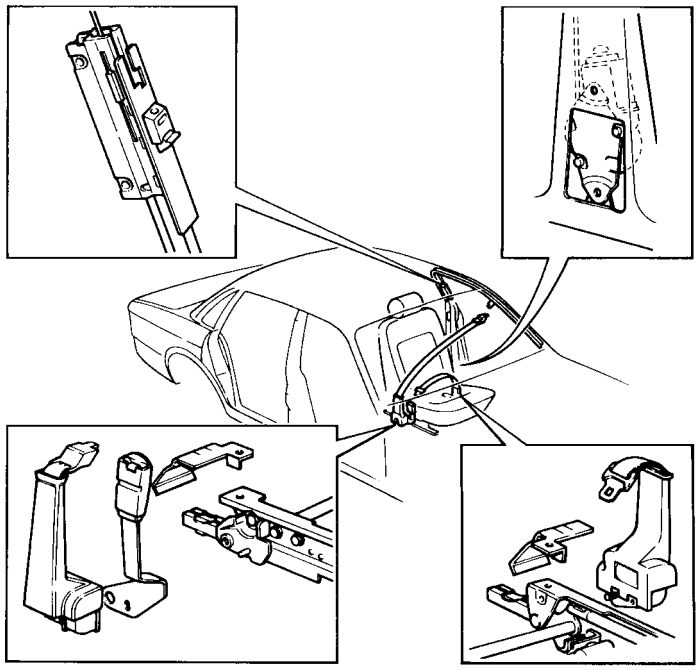
The motorized diagonal belts move to the restrained position when the respective front door is closed and the ignition is turned to position I or II. The passenger belt operates with the seat empty. Both belts move to the unrestrained position when the ignition is turned to position I or OFF. If a front door is opened with the ignition in position I, that belt will move to the unrestrained position. In reverse with the driver's door open and the ignition in position I or II, the belt remains in the restrained position.

If the inertia switch trips with the ignition ON, the belts will remain restrained and the doors will unlock.

An emergency release is provided on the shoulder end of the diagonal belt.

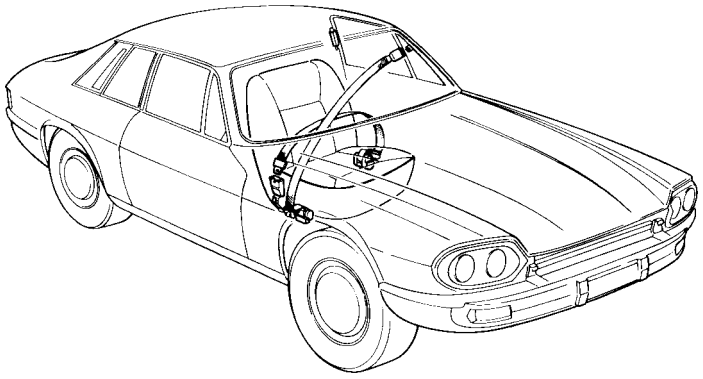
NOTES

PASSIVE RESTRAINT SEAT BELT SYSTEM: SEDAN RANGE



T400/1.32

PASSIVE RESTRAINT SEAT BELT SYSTEM: XJS RANGE



T400/1.33

DTC Summary

Electromechanical Airbag / SRS: Sedan Range 1995 – 1997 MY

DTCs are stored in the instrument pack nonvolatile memory and can be accessed only through the DLC (data link connector) using PDU.
PDU displays the DTCs as 2-digit numbers.

⚠ WARNING: MEASURING THE RESISTANCE OF AIRBAG CIRCUITS MAY CAUSE AIRBAG DEPLOYMENT.
REFER TO THE SERVICE LITERATURE FOR SAFE TESTING PROCEDURES.
OBSERVE ALL SAFETY PRECAUTIONS WHEN DIAGNOSING OR REPAIRING AIRBAG / SRS SYSTEMS.

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	MIL ACTIVATED	POSSIBLE CAUSES
No DTC	No AIRBAG MIL	Switch ignition ON.	—	AIRBAG MIL bulb failure Ignition auxiliary switched circuit to diagnostic module; no voltage or open circuit Instrument pack to diagnostic module AIRBAG MIL circuit; open circuit Diagnostic module failure Instrument pack failure
No DTC	No AIRBAG MIL and diagnostic module "beeps" 5 times every 30 minutes	Switch ignition ON.	—	Instrument pack power supply circuit; open circuit Instrument pack internal AIRBAG MIL power circuit; open circuit
No DTC	AIRBAG MIL stays ON constantly with ignition	Switch ignition ON for more than 8 seconds.	YES	Instrument pack to diagnostic module AIRBAG MIL circuit; open circuit or high resistance Diagnostic module failure
No DTC	AIRBAG MIL flashes continuously	Switch ignition ON for more than 8 seconds.	CONTINUOUS FLASHING	Both front impact sensors disconnected Both front impact sensors not grounded Main wiring harness disconnected
00	AIRBAG MIL circuit low voltage	Switch ignition ON.	YES	Diagnostic module to instrument pack airbag failure warning circuit; short circuit to ground
01	No diagnostic module self test "pass" signal	Switch ignition ON for more than 10 seconds.	YES	Ignition switched auxiliary power circuit to diagnostic module; open circuit, high resistance, short circuit to ground or short circuit to B+ voltage Instrument pack power supply circuit; open circuit Instrument pack internal AIRBAG MIL power circuit; open circuit Diagnostic module to chassis ground circuit; open circuit or high resistance Ignition auxiliary positive relay failure
12	B+ voltage supply low (below 9 V)	Switch ignition ON for more than 8 seconds.	YES	Low battery voltage B+ voltage to diagnostic module circuit; open circuit, high resistance or short circuit to ground Diagnostic module to safing sensor voltage supply circuit; short circuit to ground Safing sensor failure
13	Airbag circuit short circuit (DTC 13 will cause thermal fuse to open circuit, flagging DTC 51. Repair cause of DTC 13 first.)	Switch ignition ON for more than 8 seconds.	YES	Diagnostic module to safing sensor voltage supply circuit: short circuit to ground Safing sensor to airbag circuits; short circuit to ground Airbag to diagnostic module circuits; short circuit to ground Safing sensor failure
14	Front impact sensor circuit short circuit (DTC 14 will cause thermal fuse to open circuit, flagging DTC 51. Repair cause of DTC 14 first.)	Switch ignition ON for more than 8 seconds.	YES	Diagnostic module to front impact sensor voltage supply circuit; open circuit, short circuit to ground or B+ voltage Front impact sensor failure
21	Safing sensor poor ground	Switch ignition ON for more than 8 seconds.	YES	Safing sensor to vehicle ground; high resistance Diagnostic module to safing sensor ground circuit; open circuit or high resistance Safing sensor failure
22	Safing sensor output circuit short circuit to B+ voltage	Switch ignition ON for more than 8 seconds.	YES	Charging system voltage above 17 V Safing sensor to diagnostic module output circuit; short circuit to B+ voltage Cable reel cassette; short circuit to B+ voltage Diagnostic module to airbag harness; short circuit to B+ voltage Safing sensor failure
23	Safing sensor input voltage low	Switch ignition ON for 30 seconds.	YES	Diagnostic module to safing sensor harness; high resistance, open circuit or short circuit to ground or B+ voltage Safing sensor failure Diagnostic module failure
24	Safing sensor output circuit incorrect voltage	Switch ignition ON. Run engine above 1500 rpm.	YES	Charging system / battery; intermittent low voltage B+ voltage supply circuit to diagnostic module; open circuit, high resistance or short circuit to ground Diagnostic module to safing sensor harness; open circuit, high resistance, short circuit to ground or B+ voltage Airbag and impact sensor harness circuits; open circuit, high resistance, short circuit to ground or B+ voltage Safing sensor failure Diagnostic module failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	MIL ACTIVATED	POSSIBLE CAUSES
32	Driver airbag circuit high resistance (above 4 Ω)	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to driver side cable reel cassette harness; open circuit or high resistance Cable reel cassette; open circuit or high resistance Driver side airbag; open circuit or high resistance Diagnostic module failure
33	Passenger airbag circuit high resistance (above 4 Ω)	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to passenger side airbag harness; open circuit or high resistance Passenger side airbag; open circuit or high resistance Diagnostic module failure
34	Driver airbag circuit low resistance (below 0.7 Ω)	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to driver side cable reel cassette harness; short circuit Driver side cable reel cassette; short circuit Driver side airbag; short circuit Diagnostic module failure
35	Passenger airbag circuit low resistance (below 0.7 Ω)	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to passenger side airbag harness; short circuit Passenger side airbag; short circuit Diagnostic module failure
41	Front right impact sensor supply circuit high resistance	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to front right impact sensor harness voltage supply and return circuits; open circuit, high resistance or short circuit to ground Front right impact sensor failure Diagnostic module failure
42	Front left impact sensor supply circuit high resistance	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to front left impact sensor harness voltage supply and return circuits; open circuit, high resistance or short circuit to ground Front left impact sensor failure Diagnostic module failure
44	Front right impact sensor poor ground	Switch ignition ON for more than 30 seconds.	YES	Sensor to body grounds; loose or corroded Sensor to diagnostic module harness sensor ground circuit; high resistance or open circuit Sensor failure Diagnostic module failure
45	Front left impact sensor poor ground	Switch ignition ON for more than 30 seconds.	YES	Sensor to body grounds; loose or corroded Sensor to diagnostic module harness sensor ground circuit; high resistance or open circuit Sensor failure Diagnostic module failure
51	Thermal fuse open circuit	Switch ignition ON for more than 30 seconds.	YES	System short circuit or intermittent short circuit; refer to DTC 12 and DTC 14 Airbag deployed
52	Reserve power supply voltage low (less than 23 V)	Switch ignition ON for more than 45 seconds.	YES	Diagnostic module to safing sensor harness voltage supply and return circuits; short circuit to ground or B+ voltage Diagnostic module failure
53	Front impact sensor supply circuits high resistance	Switch ignition ON for more than 45 seconds.	YES	Diagnostic module to impact sensor harnesses sensor voltage supply or monitor circuits; high resistance or diagnostic module self test failure Impact sensor failure Diagnostic module failure
99	Front impact sensors disconnected	Switch ignition ON.	YES	Both front impact sensors disconnected from diagnostic module Diagnostic module failure

Contents

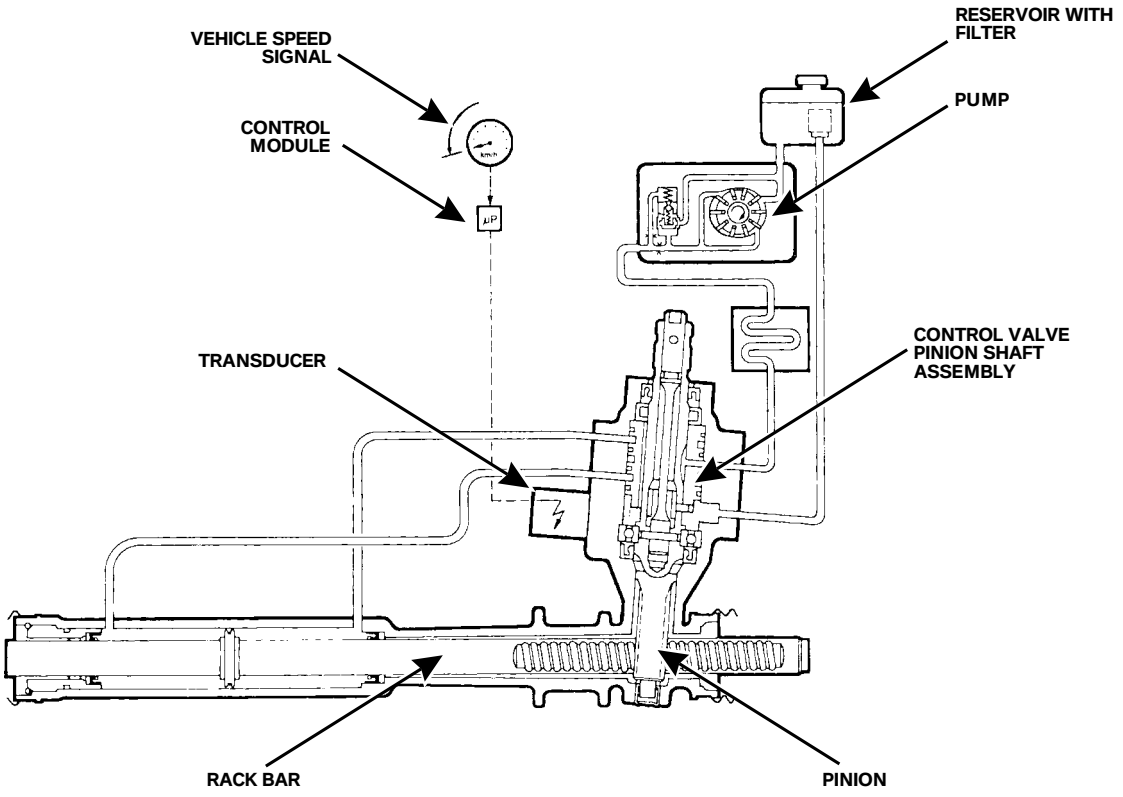
Variable Assist Power Steering: Sedan Range 1995 – 1997 MY

The Jaguar variable assist power steering system, supplied by ZF, provides full power assist during parking and low speed maneuvers and progressively reduces power assist as vehicle speed increases.

During parking, the system provides up to 95% of the power needed to turn the wheel, making parking effortless.

As vehicle speed increases, the "transducer" (variable steering converter), which is controlled by the power steering control module (PAS CM), progressively reduces power assistance to provide precise steering control.

VARIABLE ASSIST POWER STEERING SYSTEM: SEDAN RANGE 1995 THROUGH 1997 MY

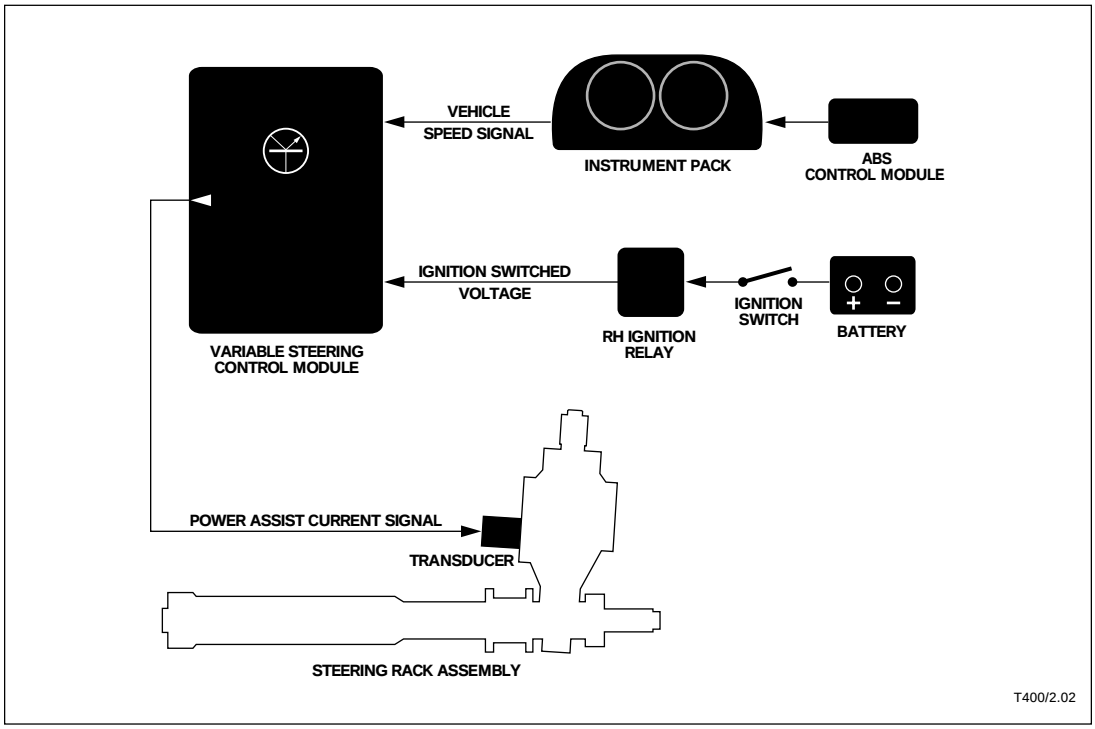


T400/2.01

NOTES

Variable Steering Control Module

The variable assist power steering control module is located behind the LH side A post lower trim. The control module is powered by ignition switched battery voltage and is provided with a vehicle speed signal from the instrument pack. The steering control module regulates the amount of steering power assist required in relation to the vehicle speed by converting the speed signal to a low amperage current. The current reduces as vehicle speed increases. The current signal is applied to the variable steering converter (transducer) located on the control valve / pinion assembly.



Variable steering control module diagnostic monitoring
The control module ignition switched voltage supply, speed signal input, and current output to the steering converter can be monitored via PDU.

Variable steering converter (transducer)
The variable assist converter is located on the power steering rack pinion / valve assembly. The electrically operated steering converter valve controls power steering hydraulic feedback pressure. The feedback pressure acts on the reaction piston that regulates steering assist.

During parking, the current signal from the control module is at its highest (700 – 800 mA), holding the converter valve closed. Pressures acting on both sides of the reaction piston are equal, positioning the control valve to provide maximum power assist. As vehicle speed increases, the current signal decreases in strength. The converter valve partially opens, bleeding feedback pressure from one side of the reaction piston and moving the control valve to reduce the amount of power assist available. At highway speeds the vehicle speed current signal is at its lowest (100 mA). The converter valve is fully open, providing the minimum amount of steering assist.

NOTES

Steering Pump

Steering pump

A "vane type" pump provides hydraulic pressure for the power steering system. Vane pumps are designed to provide sufficient pressure at idle to assist with parking maneuvers. A flow and pressure limiting valve is incorporated in the pump to compensate for higher engine (pump) speeds.

AJ16 pumps are driven from the engine accessory drive in the timing assembly. A coupling disc is used to absorb shock. XJ12 pumps are driven by the A / C compressor drive belt.

XJ12 drive belt tension

New belt setting	In-service minimum	In-service setting
760 N	270 N	630 N
178 lbf	61 lbf	142 lbf
114 – 120 Hz	70 Hz	87 – 93 Hz

Refer to the Service Manual for belt tension adjustment procedures.

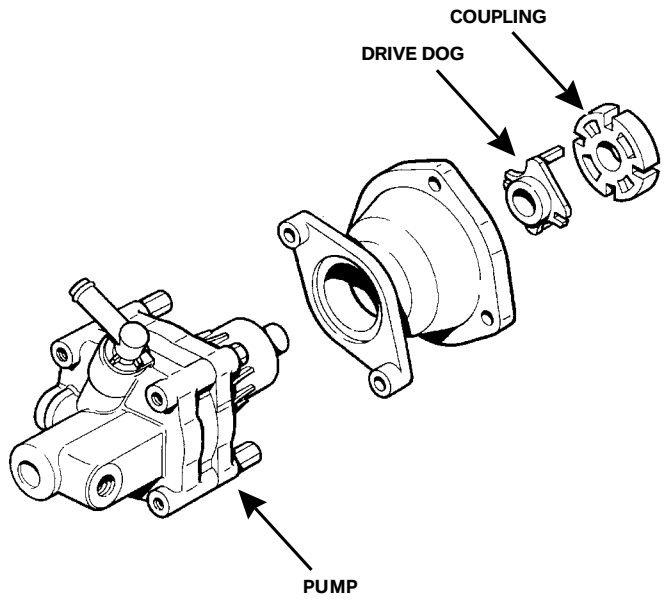
Reservoir

The power steering reservoir has a non-serviceable integral fluid filter in the return side.

⚠ CAUTION: If filter replacement is necessary, the reservoir must be replaced.

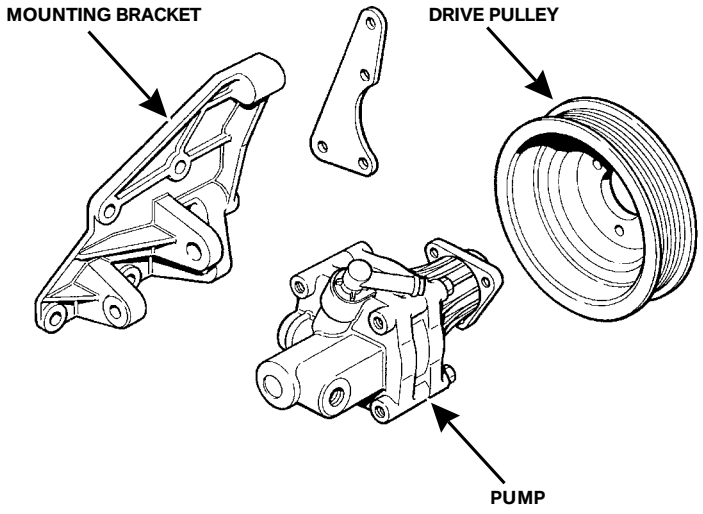
NOTES

STEERING PUMP: AJ16



T400/2.03

STEERING PUMP: XJ12

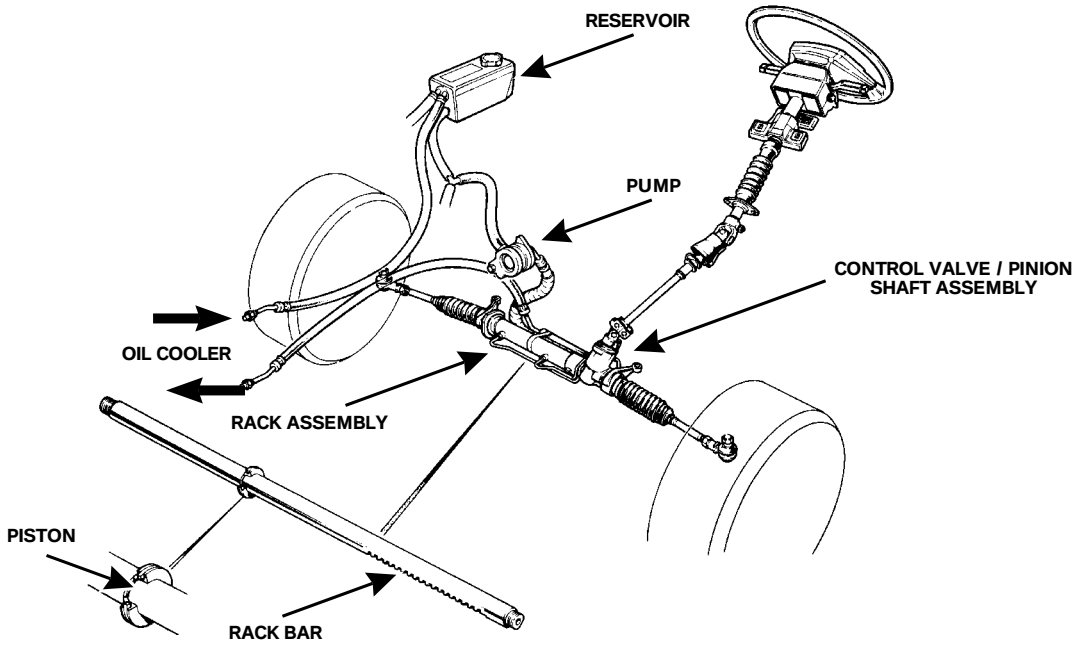


T400/2.04

Power Steering: Sedan Range through 1994 MY and XJS

The power-assist rack and pinion system provides precise steering control and gives the driver positive feedback from the road. Hydraulic pressure is supplied by an engine-driven pump. Oil cooling is provided by a cooler integral with the radiator (Sedan Range), or a separate cooler (XJS Range).

TYPICAL POWER STEERING SYSTEM: SEDAN RANGE THROUGH 1994 MY AND XJS



T400/2.05

Power Steering System Summary: 1988 through 1994 MY Sedan Range and XJS

Sedan Range

Model Year	Power Steering Rack	Reservoir	Fluid
1988 – 1989	Adwest	Separate	Dexron II 'D' or 'E'
1990 – 1992	Adwest	Combined	H.S.M.O.
1993 – 1994 up to VIN 671805	Adwest	Separate	Dexron II 'D' or 'E'
1994 from VIN 671806	ZF	Separate	Dexron II 'D' or 'E'

XJS Range

Model Year	Power Steering Rack	Reservoir	Fluid
Up to 1993 VIN 179739	Adwest	Separate	Dexron II 'D' or 'E'
1993 from VIN 179740	ZF	Separate	Dexron II 'D' or 'E'

NOTE: When replacing Adwest with ZF steering racks, additional components are required depending on the vehicle model year and radiator power steering hose fittings. Refer to the Parts Microfiche for details.

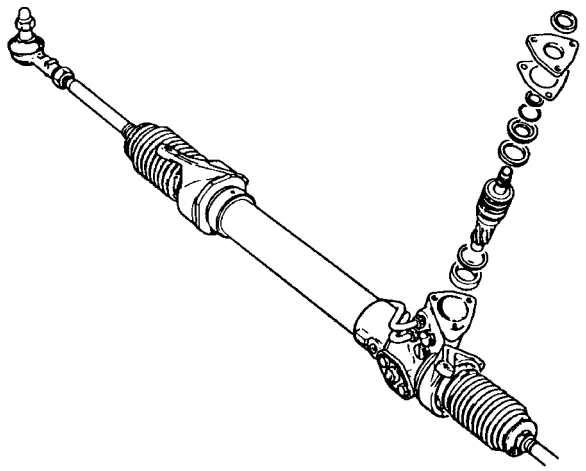
Steering Rack

Sedan Range up to 1993 MY VIN 671805

The control valve / pinion shaft housing is integral with the rack housing assembly. Mounting points on the steering rack and the suspension subframe are machined to allow precise positioning without the need for bushings or shims.

Later rack assemblies have "energized" pinion valve seals and nickel plated racks.

STEERING RACK: SEDAN RANGE UP TO 1993 MY VIN 671805

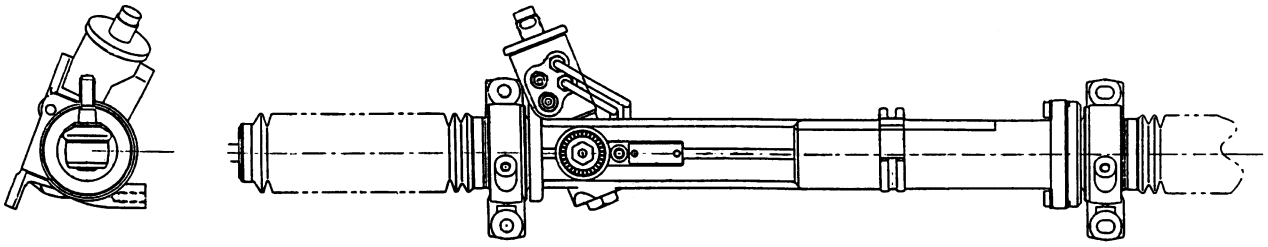


T400/2.06A

Sedan Range 1993 MY VIN 671806 through 1994 MY

A steering rack manufactured by ZF mounts to the rear of the front suspension subframe. The installation arrangement and attaching hardware are different for the XJ6 and XJ12 models.

ZF STEERING RACK INSTALLATION: SEDAN RANGE 1993 MY VIN 671806 THROUGH 1994 MY

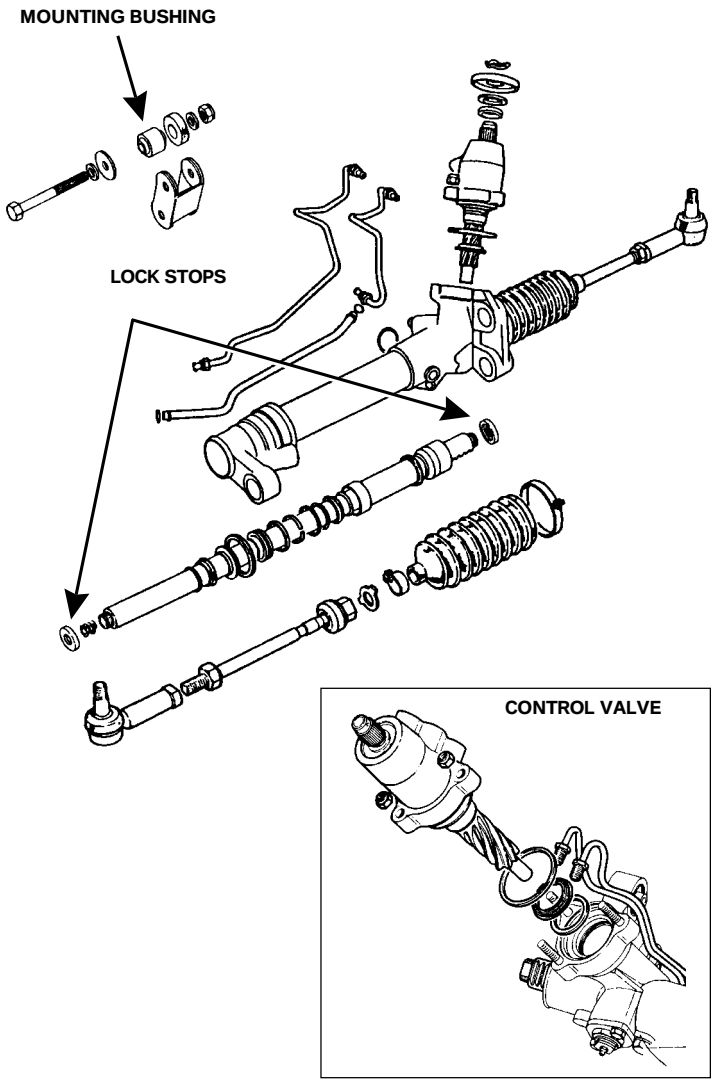


T400/2.06B

NOTES

Steering Rack (continued)

STEERING RACK: XJS RANGE UP TO 1993 MY VIN 179739



T400/2.07a, 2.08

XJS Range up to 1993 MY VIN 179739

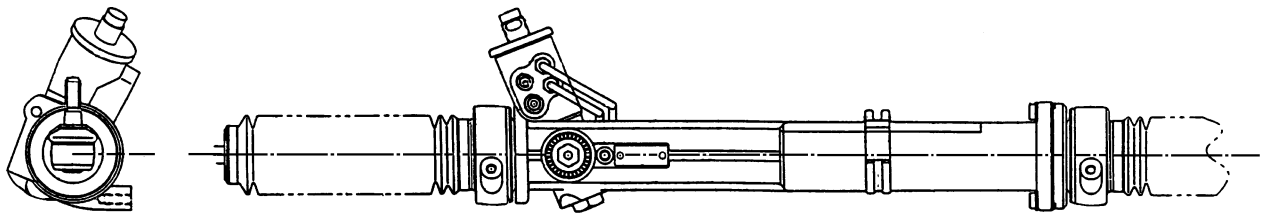
The control valve / pinion shaft housing is separate from the rack housing assembly.

The steering rack mounts incorporate rubber mounting bushings, float washers, and adjustment shims. These are required for isolated mounting and rack alignment. The XJR-S is equipped with a steering rack that includes mounting bushings to reduce side float and a revised spool valve to decrease power assistance and permit greater "road feel." Additionally, 8 mm (0.315 in.) lock stops are installed to prevent the wheel from rubbing the inner fender at full turning lock. The steering wheel turns 2.5 times lock to lock.

XJS Range from 1993 MY VIN 179740

A steering rack manufactured by ZF mounts to the rear of the front suspension subframe in the same manner as the previous rack.

ZF STEERING RACK INSTALLATION: XJS RANGE FROM 1993 MY VIN 179740 ON



T400/2.07B

Power Steering Pump and Reservoir

AJ6 Engine

A vane type pump is driven from the engine accessory drive pad on the timing assembly. A coupling disc is used to connect the pump to the drive and to absorb shock.

The fluid reservoir used with the AJ6 engine pump is remote-mounted. The XJ6 Sedan Range power steering fluid reservoir configuration has changed with the various model years:

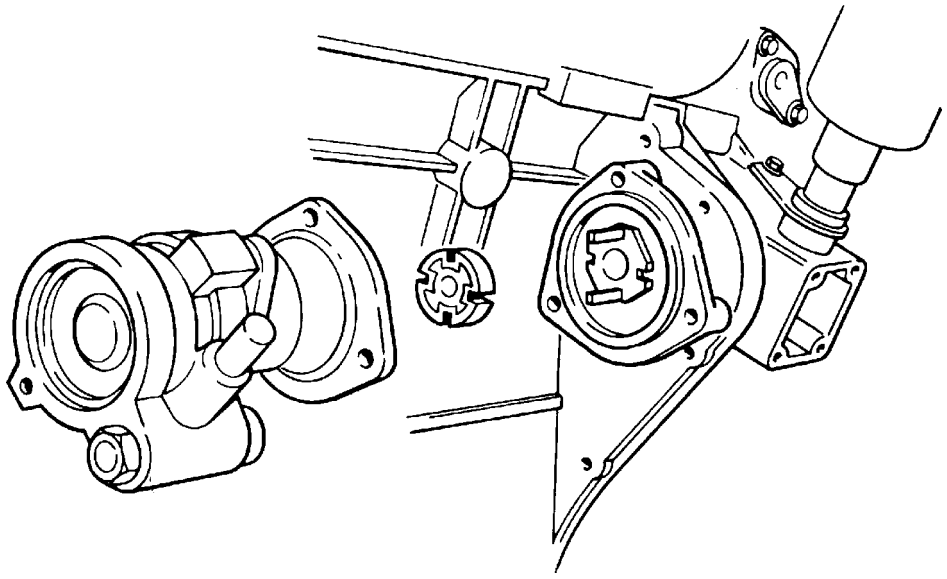
1988 – 89: separate reservoir using Dexron II 'D' or 'E' fluid

1990 – 92: combined reservoir with Power Hydraulic System using H.S.M.O.

1993 – 94: separate reservoir using Dexron II 'D' or 'E' fluid

The XJS reservoir is similar to the early XJ6 Sedan reservoir.

POWER STEERING PUMP: AJ6 ENGINE

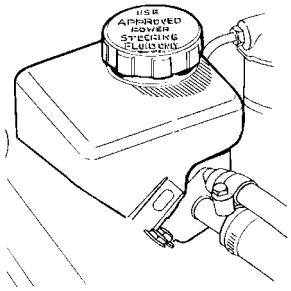


T400/2.09

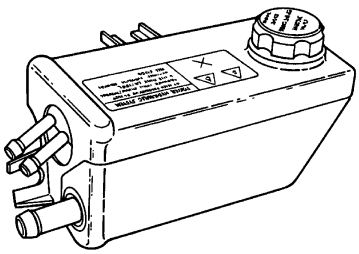
NOTES

Power Steering Pump and Reservoir (continued)

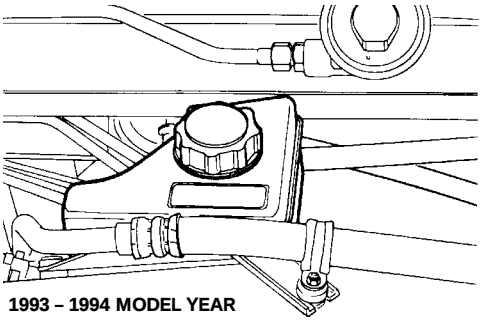
POWER STEERING FLUID RESERVOIR: SEDAN RANGE



1988 – 1989 MODEL YEAR



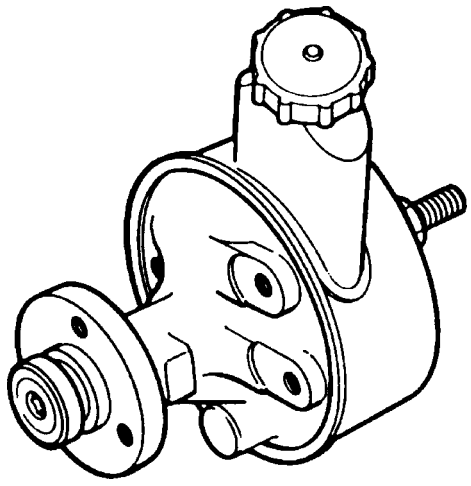
1990 – 1992 MODEL YEAR



1993 – 1994 MODEL YEAR

T400/2.11, 2.12, 2.13

POWER STEERING PUMP: 5.3L, 6.0L, AND XJR-S V12 ENGINES



T400/2.10

5.3 Liter, XJS 6.0 Liter, and XJR-S V12 Engines

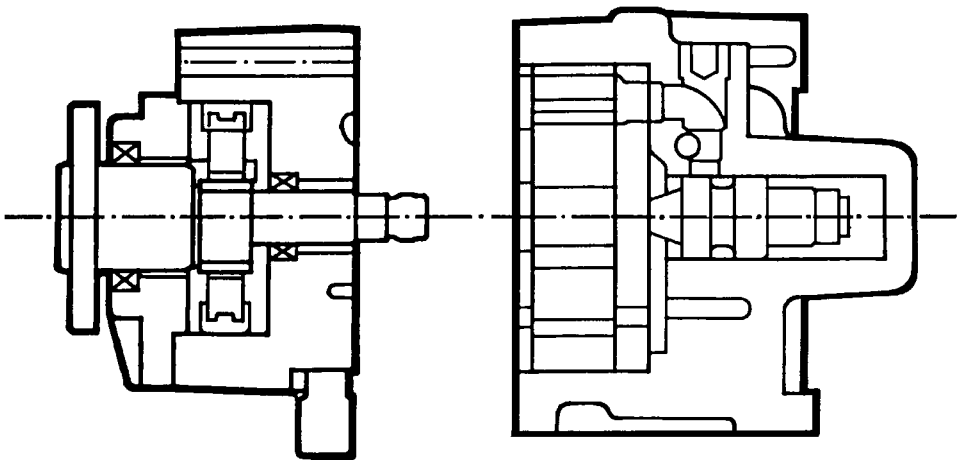
These engine installations use a vane-type pump that is belt driven from the pulley assembly. The pump incorporates a fluid reservoir.

NOTES

XJ12 Sedan Range with Ride Leveling

The power steering pump is part of a tandem pump used to serve both the steering and ride leveling systems. The pump sections are completely separate and share only a common drive shaft. The rearward section is a vane type pump for the power steering system. The forward section is a radial piston pump for the ride leveling system.

TANDEM PUMP (XJ12 WITH RIDE LEVELING)



T400/2.14

XJ12 Sedan Range without Ride Leveling

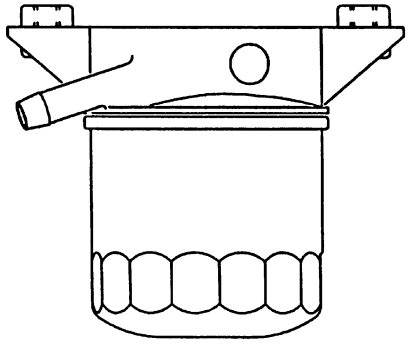
XJ12 vehicles without ride leveling are equipped with a pump that is simply the rearward half of the tandem pump. A revised housing and drive shaft are used.

XJ12 System filter

A renewable cartridge type filter is used to protect the system components from contamination. The filter is located for easy access under the right body crush tube. The filter cartridge must be changed at regular service intervals and in the case of a major component failure.

NOTES

XJ12 POWER STEERING SYSTEM FILTER



T400/2.15

Power Steering Pump Belt Tension

XJS V12 1995 MY ON and XJ12

New Belt Setting	In-Service Minimum	In-Service Setting
760 N	270 N	630 N
178 lbf	61 lbf	142 lbf
114 – 120 Hz	70 Hz	87 – 93 Hz

XJS V12 1994 MY

New Belt Setting	In-Service Setting
710 N	600 N
160 lbf	128 lbf

XJS V12 through 1993 MY

Deflecting Force	Deflection
6.5 lb	0.16 in. (4.1 mm)

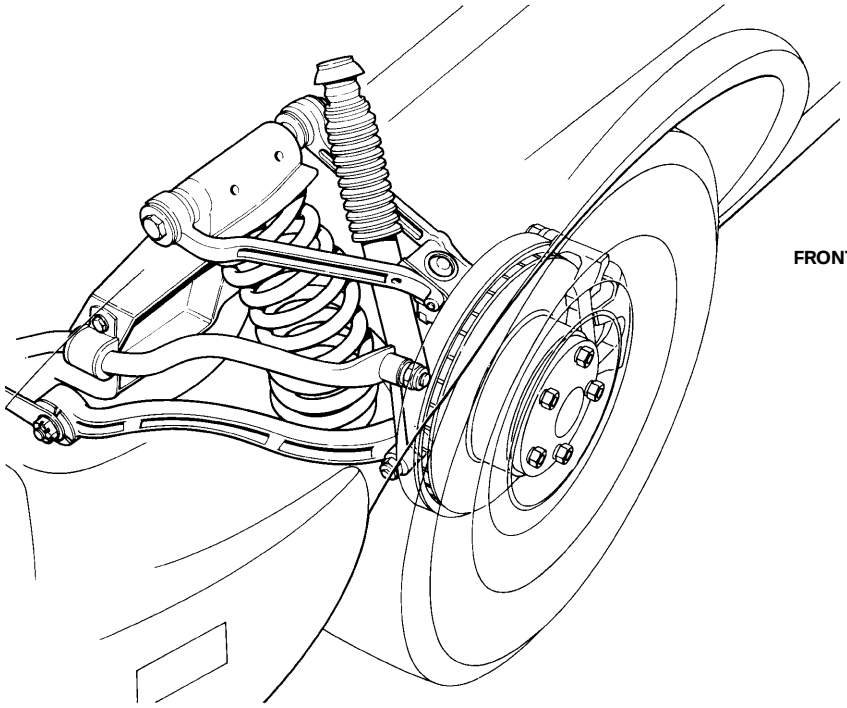
Refer to the appropriate Service Manual for belt adjustment procedures.

NOTES

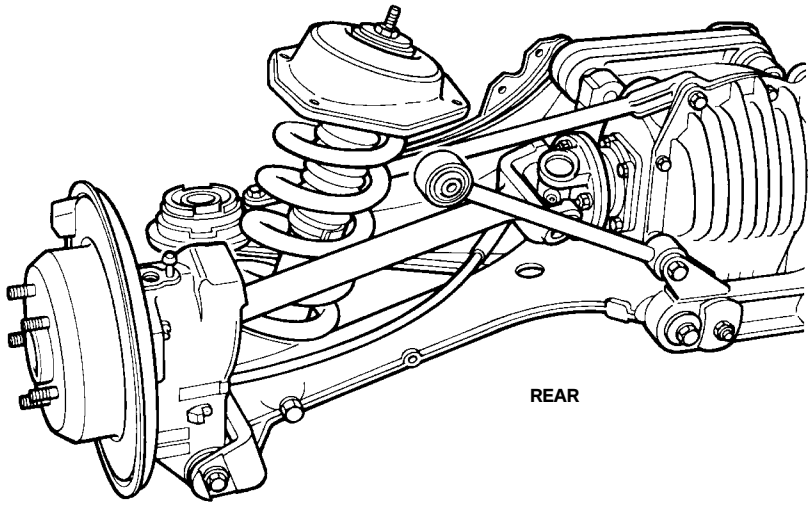
Contents

Sedan Range Suspension

TYPICAL SEDAN RANGE SUSPENSION LAYOUT



FRONT



REAR

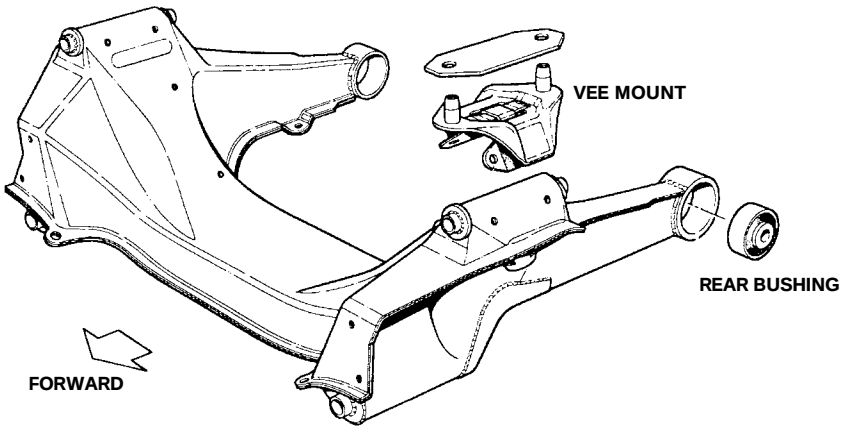
T400/3.01,3.02

Sedan Range Front Suspension

Front subframe

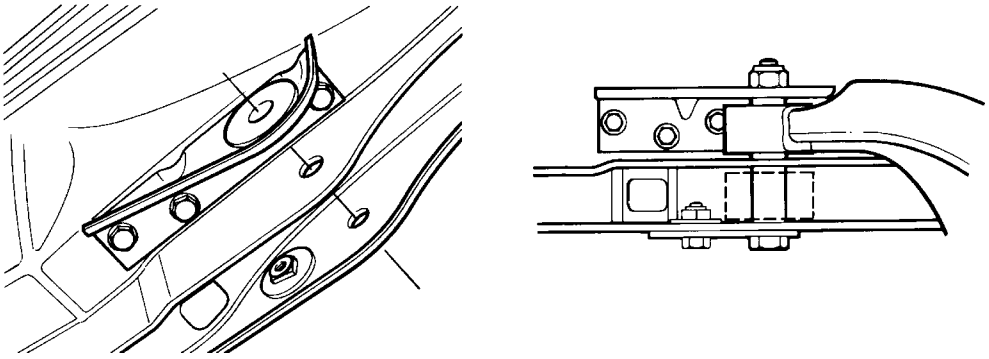
The front subframe mounts to the body with rubber rear bushings and vee shaped rubber front bushings. The front engine mounts are supported by the front subframe.

FRONT SUBFRAME: SEDAN RANGE 4.0L



T400/3.03

SUBFRAME REAR MOUNTING: SEDAN RANGE 4.0L

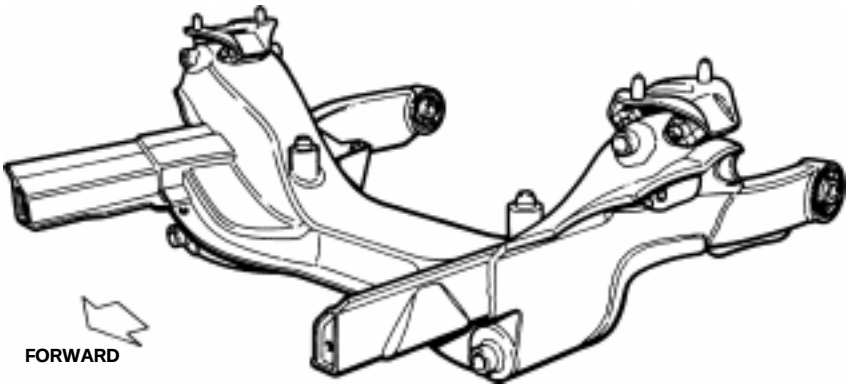


T400/3.04

NOTES

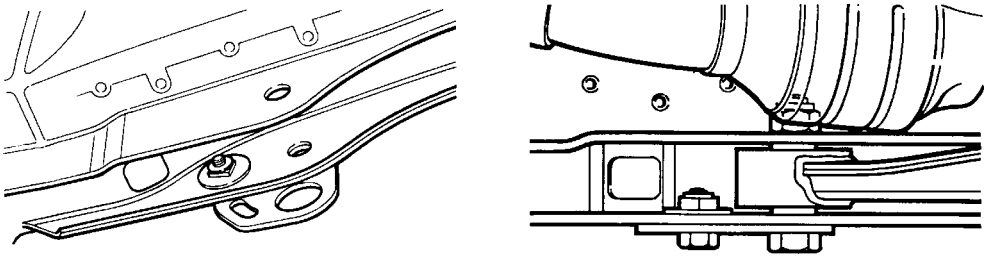
The XJ12 Sedan subframe has forward arms that extend forward and rear arms that are designed to provide additional clearance for the V12 engine exhaust system catalytic converters. The front engine mounts are supported by the front subframe.

FRONT SUBFRAME: XJ12 SEDAN



T400/3.05

SUBFRAME REAR MOUNTING: XJ12 SEDAN



T400/3.06

NOTES

Sedan Range Front Suspension (continued)

Front "A" arms

Upper and lower front "A" arms are two-piece steel forgings. The upper arm incorporates shims at the ball joint for caster adjustment. Camber is not adjustable.

For the 1994 MY, the front suspension components were revised to handle the additional power and weight of the V12 engine. Wherever possible the revised components were phased into production for all Sedans.

Only the revised "A" arm components are available as service replacements. If individual "A" arm components must be replaced, existing and revised components can be used to make up one "A" arm. It is not necessary to replace undamaged components to match new components.

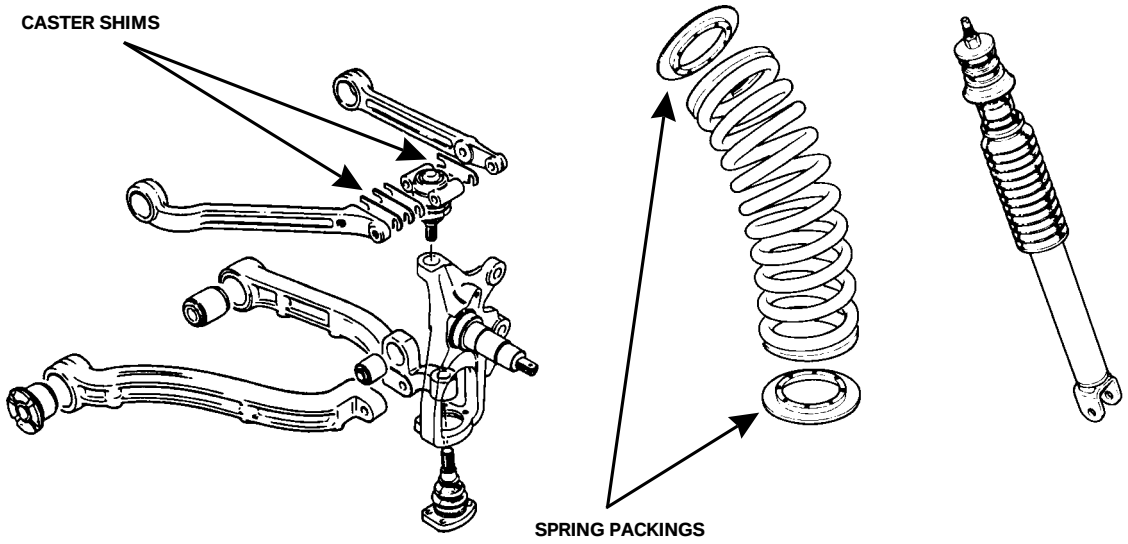
Front hub carriers and ball joints

The forged-steel front hub carrier has a pressed-fit stub axle and pivots on nonadjustable sealed ball joints.

Front springs and shock absorbers

The road springs are color coded and are installed with matching packings. The shock absorbers incorporate the suspension rebound stops.

FRONT SUSPENSION COMPONENTS: SEDAN RANGE



T400/3.07

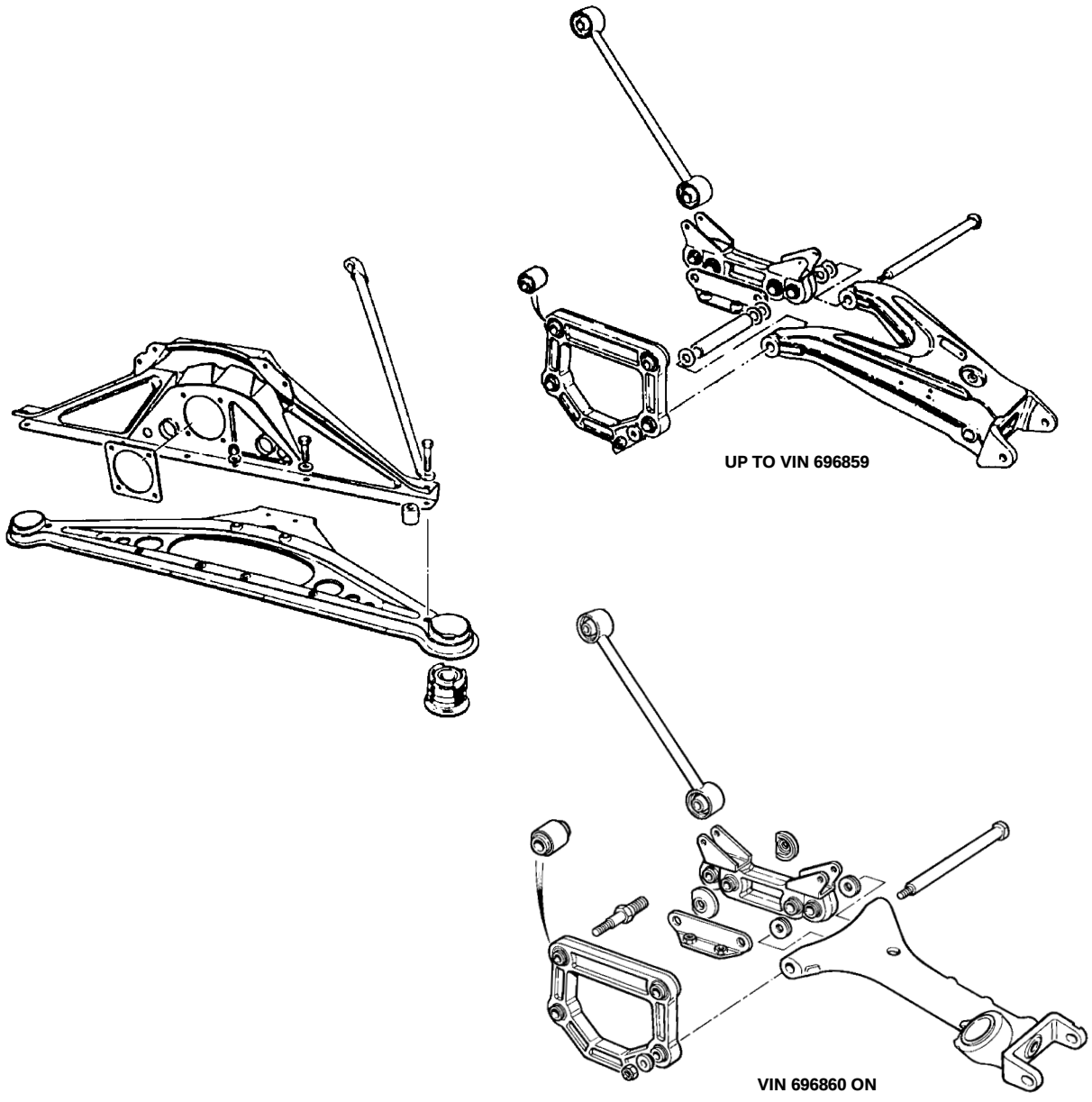
NOTES

Sedan Range Rear Suspension

Rear Subframe and Compliant System

The Sedan Range rear subframe is made up of a crossmember and a wide mounting bracket. Additional support and attachment to the body are provided by struts and links. Fore and aft compliance (movement) is provided by the pendulum bracket at the front of the final drive unit and the cross tie at the rear of the final drive unit. This compliant system attaches to the axle through bushings and uses axle mass to dampen road noise.

REAR SUSPENSION COMPONENTS: SEDAN RANGE



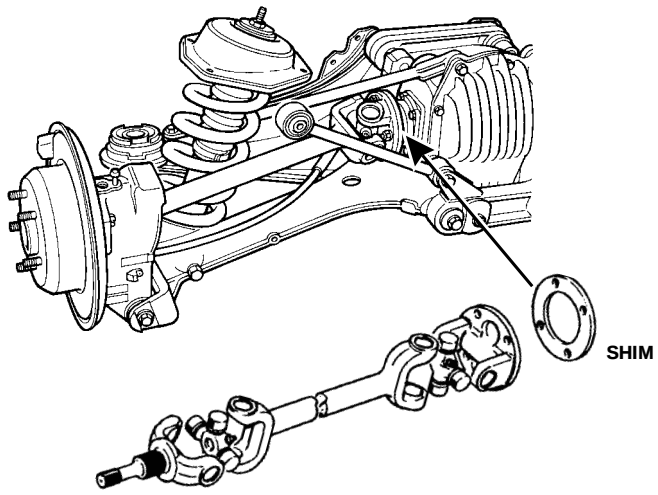
T400/3.08, 3.09

Sedan Range Rear Suspension (continued)

Rear camber adjustment
Rear wheel camber adjustment is provided by shims placed between the axle shaft inner universal joint flange and the final drive output flange. The left and right camber shims are of the same design from VIN 667829 (1993 MY), when the final drive output shaft speedometer impulse rotor was eliminated.

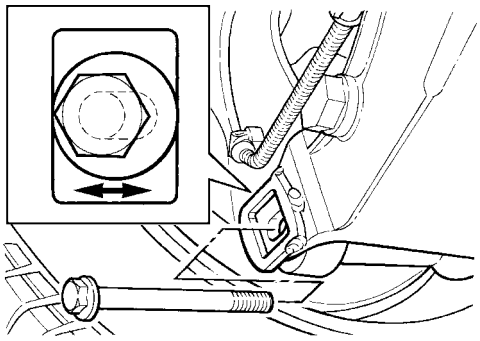
Rear toe adjustment
Starting at VIN 687219 (1994 MY), the rear suspension allowed rear toe adjustment by an eccentric mechanism on the hub carrier fulcrum.

CAMBER ADJUSTMENT: SEDAN RANGE



T400/3.02, 3.11

REAR TOE ADJUSTMENT: SEDAN RANGE FROM VIN 687219 ON



T400/3.12

These additional rear suspension changes were introduced at VIN 696859:

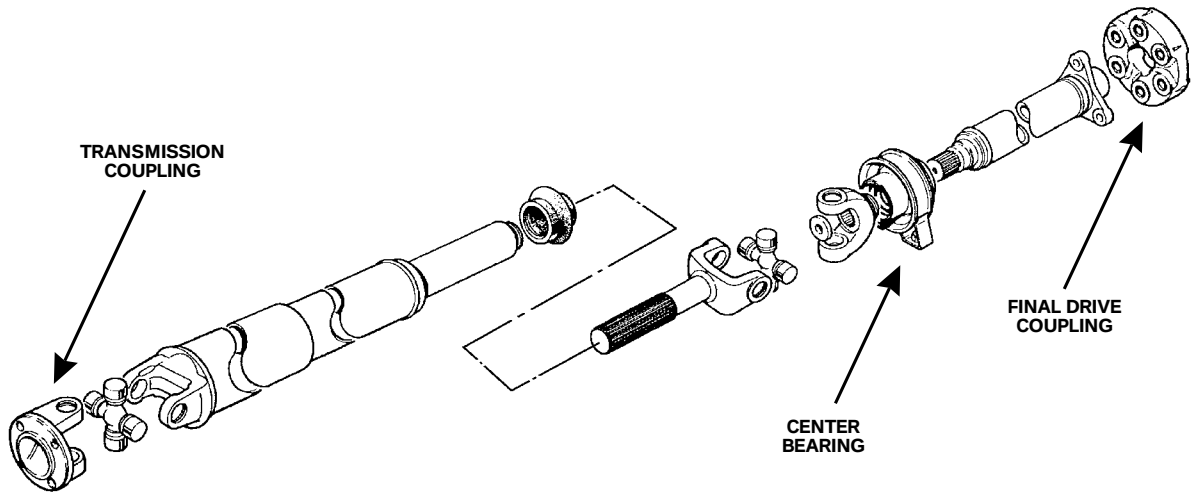
- Cast wishbone replaces the pressed steel and welded wishbone
- Road spring and shock absorber are independently mounted
- Lower spring / shock absorber pin is integral with the wishbone

NOTES

Drive Shaft and Axle Shafts

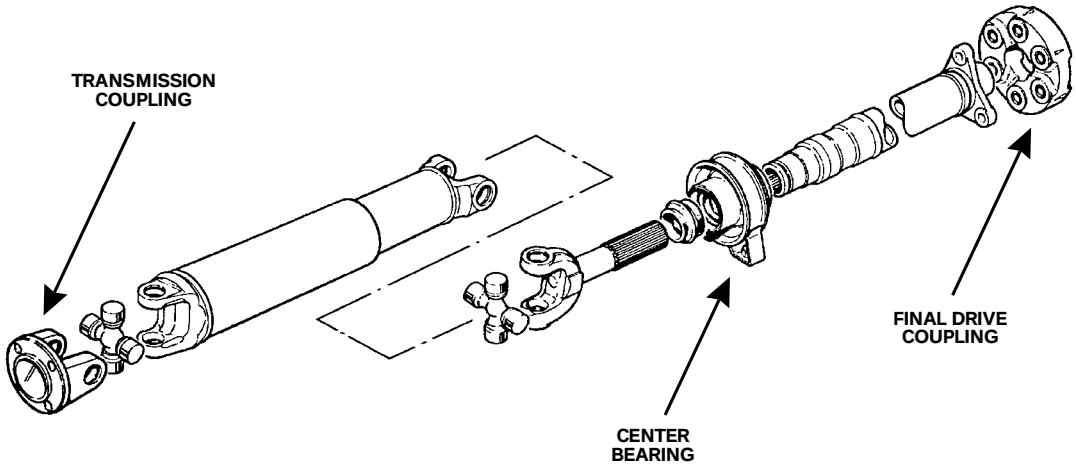
The drive shaft and axle shafts are considered part of the rear suspension because the axle shafts act as the upper links of the rear suspension. In addition, drive power is transmitted from the transmission to the driving wheels through the drive shaft and axle shafts. Misalignment, imbalance, low vehicle rear ride height (refer to Ride Height on pages 14 and 15 of the Alignment section), or worn drive train components may cause noise or vibration in the vehicle that can be mistaken for tire / wheel, bearing, or other suspension faults.

DRIVE SHAFT: XJ12 SEDAN 1995 MY ON



T400/3.13

DRIVE SHAFT: XJ6 SEDAN RANGE 1995 MY ON

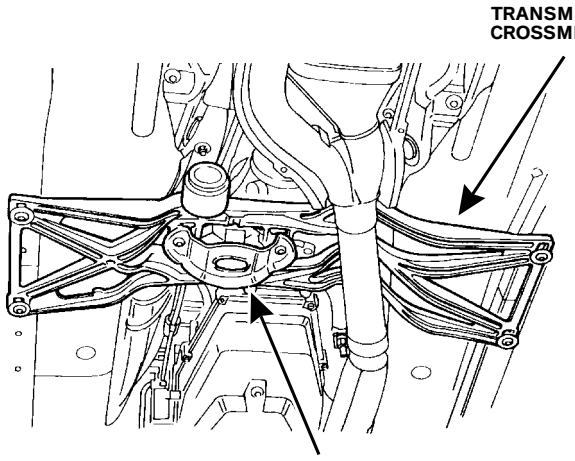


T400/3.14

NOTES

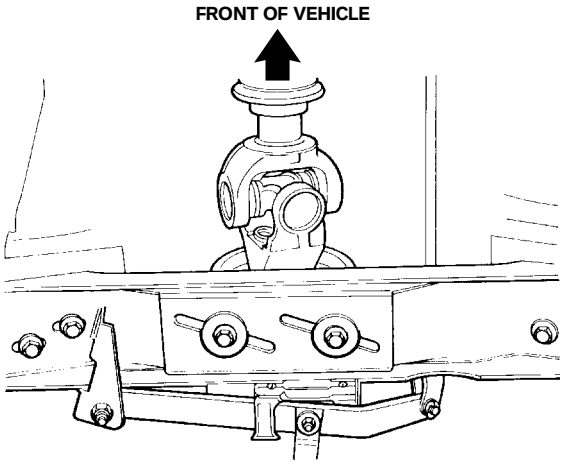
Drive Shaft and Axle Shafts (continued)

TRANSMISSION MOUNT AND CROSSMEMBER: SEDAN RANGE



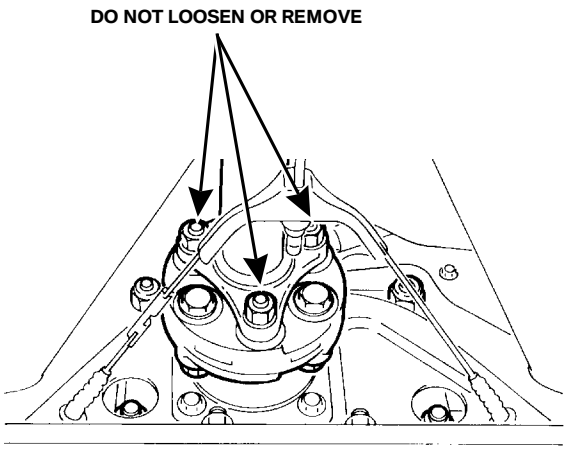
T400/3.15

DRIVE SHAFT CENTER BEARING: SEDAN RANGE



T400/3.16

DRIVE SHAFT FLEXIBLE COUPLING: SEDAN RANGE



T400/3.17

The two-piece drive shaft is supported on a center bearing. Sliding splines at the center universal joint allow for engine and transmission movement. Angular movement is compensated for with front and center universal joints and a flexible composite coupling at the final drive. The drive shaft complete with universal joints, center bearing, and rear coupling is available only as a complete unit. Individual components are not available. The drive shaft assembly, including the flexible coupling, is balanced as a unit during assembly.

⚠ CAUTION: The flexible coupling must not be removed from the drive shaft, and the coupling to drive shaft bolts must never be loosened. To remove the drive shaft, disconnect the flexible coupling from the final drive pinion flange.

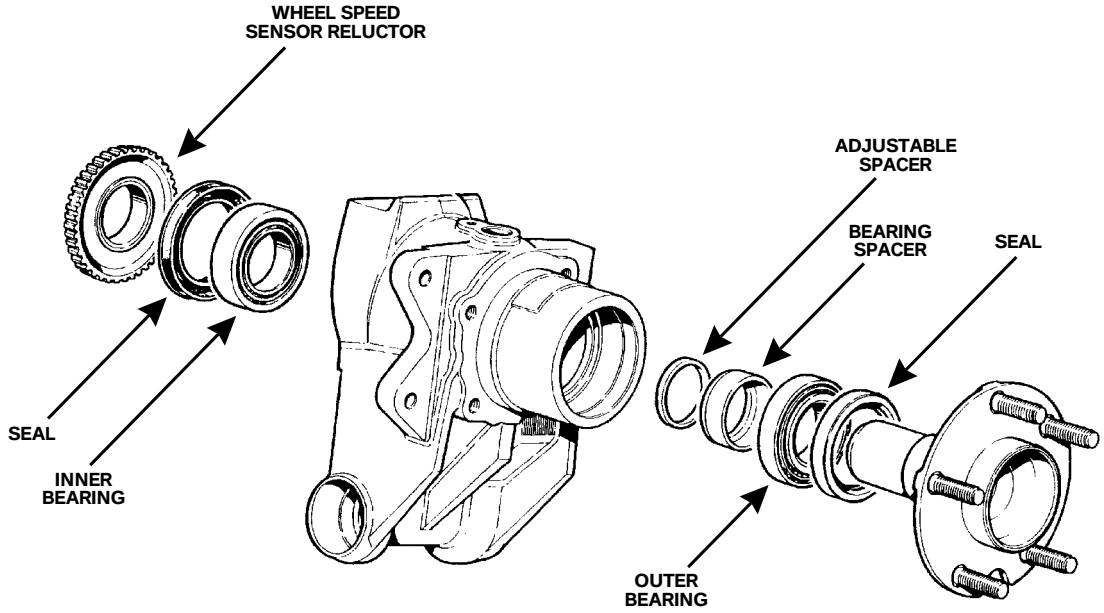
Refer to the Service Manual for drive shaft alignment procedures.

NOTES

Rear Hubs

The rear hub assembly consists of the aluminum hub carrier and bearings to support the rear road wheel and axle shafts. Sedan Range vehicle rear hubs use a bearing spacer between the tapered roller bearing inner races plus an adjustable spacer to provide a bearing preload of 0.025 mm – 0.08 mm (0.001 in. – 0.003 in.). Refer to the appropriate Service Manual for bearing replacement / adjustment procedures.

REAR HUB: SEDAN RANGE



BEARING PRELOAD 0.025 mm – 0.08 mm (0.001 in. – 0.003 in.)

T400/3.18

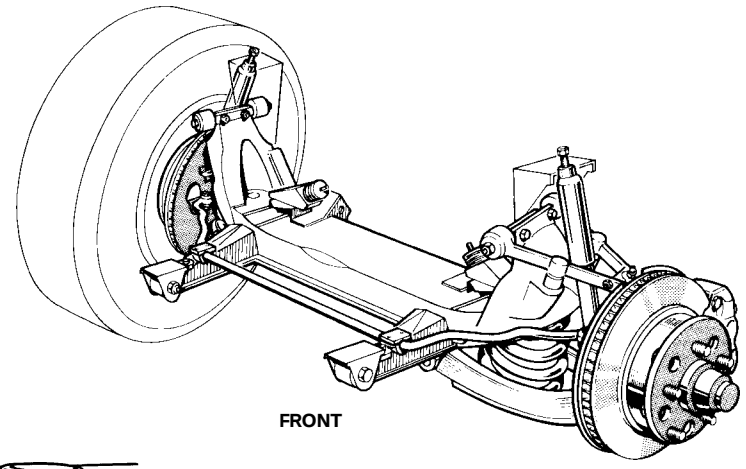
NOTES

XJS Range Suspension

The XJS independent front suspension has a design similar to that of the Sedan Range. Unequal length "A" arms provide an anti-dive effect under braking. All suspension loads (except the shock absorbers) are fed into a fabricated subframe that is isolated from the body by rubber bushings. The subframe is mounted in rubber bushings to provide the necessary compliance.

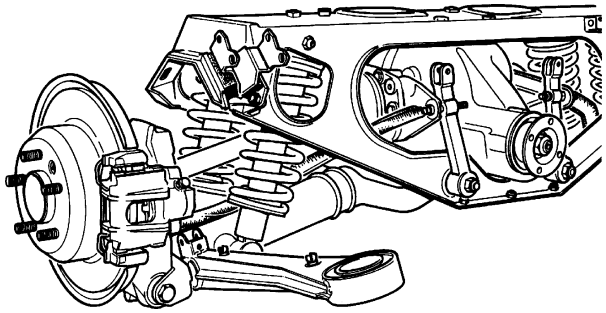
The independent rear suspension is also a two-link design, with the axle shaft acting as the upper link. The complete assembly, except for the radius arms, is mounted in a fabricated sub-frame that connects to the body. The built-up lower control arm incorporates the lower pivots for the dual road spring / shock absorber units. Radius arms connect to the lower control arms to absorb fore and aft loads. The disc brake assemblies were mounted inboard of the axle shafts through the 1993 MY. From the 1994 MY ON, the brake assemblies are mounted outboard on the aluminum hub carriers.

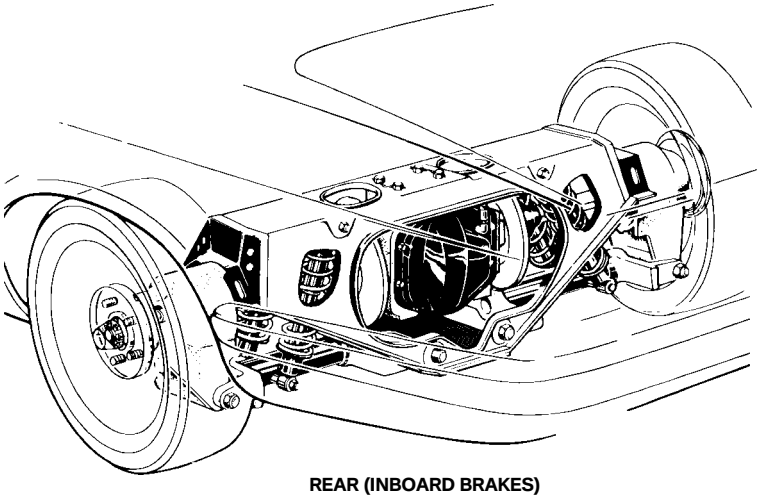
SUSPENSION LAYOUT: XJS RANGE



FRONT

REAR (OUTBOARD BRAKES)





REAR (INBOARD BRAKES)

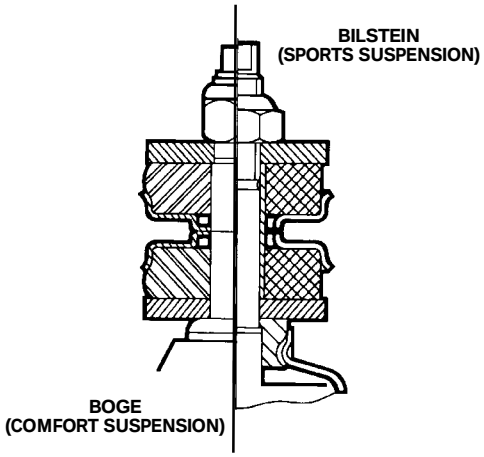
T400/3.19, 3.20, 3.21

XJS Range Front Suspension

Front subframe
The XJS front subframe is designed with the pitch control arms facing forward. The rear mounting bushings are hex shaped.

Springs and shock absorbers
The road springs are color coded and are installed with matching packings. Rebound stops for the suspension are incorporated on the upper "A" arms. Compression stops are on the spring pans under the road springs. Spring rates and shock absorbers vary with the individual XJS models: convertible, coupe, XJR-S, and vary between comfort or sports suspension systems .

FRONT SHOCK ABSORBER MOUNTINGS

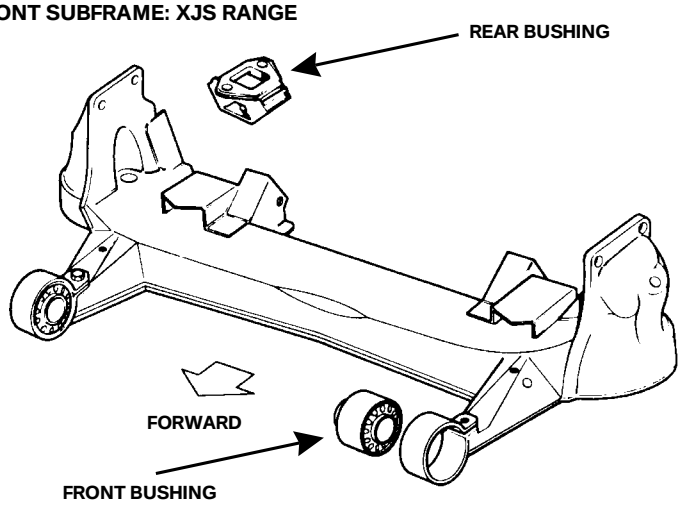


T400/3.24

"A" arms
The upper "A" arm is a two-piece steel forging while the lower "A" arm is a one-piece steel forging. The upper arm incorporates shims at the ball joint for caster adjustment. Camber is adjusted by shims placed between the subframe and the upper "A" arm bracket.

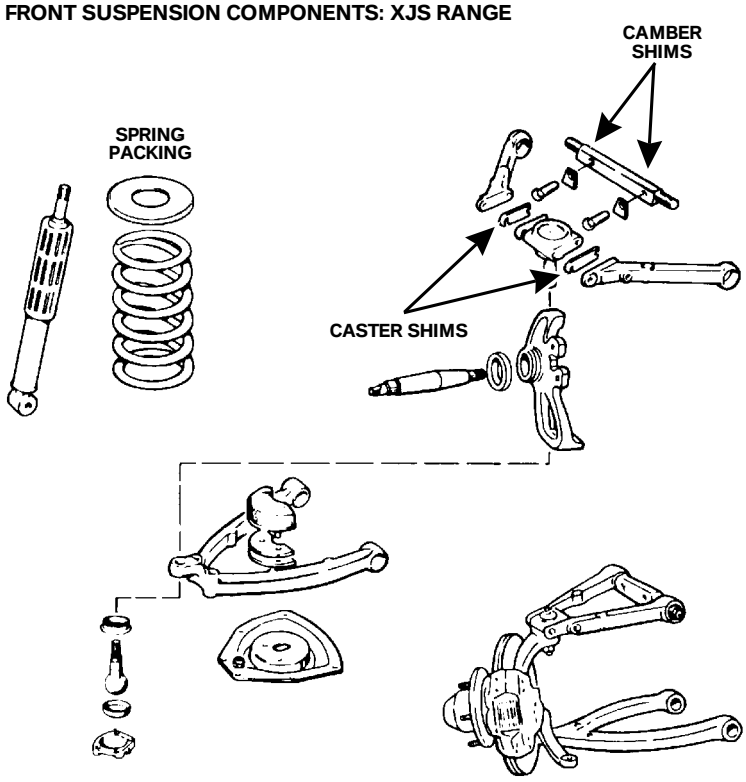
Hub carrier and ball joints
The forged-steel hub carrier has a pressed-fit stub axle and is retained by ball joints. The upper and lower ball joints are nonadjustable.

FRONT SUBFRAME: XJS RANGE



T400/3.22

FRONT SUSPENSION COMPONENTS: XJS RANGE



T400/3.23

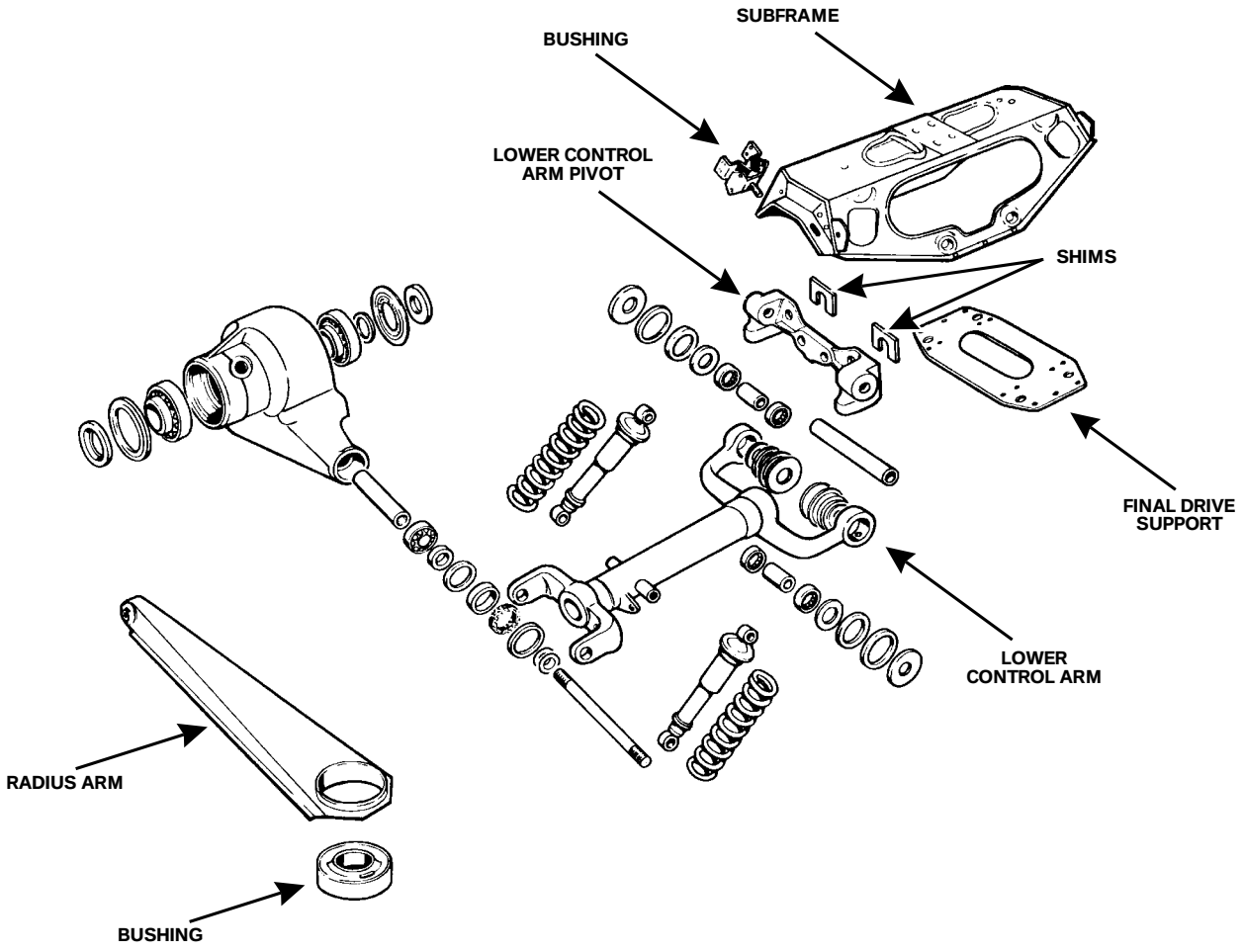
NOTES

XJS Range Rear Suspension

Rear Suspension Components

The four subframe-mounting rubber bushings and the two forward radius-arm rubber bushings provide isolation from the body and the necessary suspension compliance. The inner pivot of the built-up lower control arm connects to the final drive and subframe through a bracket. The outer pivot connects to the hub carrier. These pivot points are precision machined and employ both needle bearings and taper roller bearings requiring periodic lubrication.

REAR SUSPENSION COMPONENTS: XJS RANGE (INBOARD REAR BRAKES SHOWN)



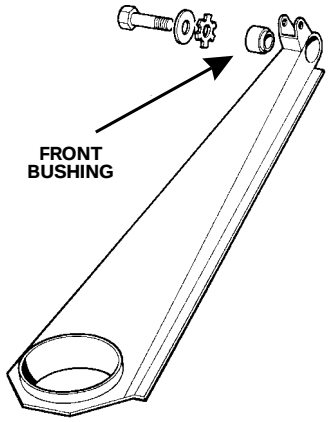
T400/3.25

NOTES

XJR-S radius arm

The 1993 MY limited production XJR-S uses upgraded front bushings in the radius arm to accept increased power and torque. XJR-S radius arm rubber bushings are installed with the relief slots at 90º to the vehicle centerline to provide less compliance. If the bushings are installed with the relief slots parallel to the vehicle centerline, the increased power of the XJR-S will deflect the bushings causing rear wheel steering during hard acceleration.

REAR RADIUS ARM: XJS RANGE

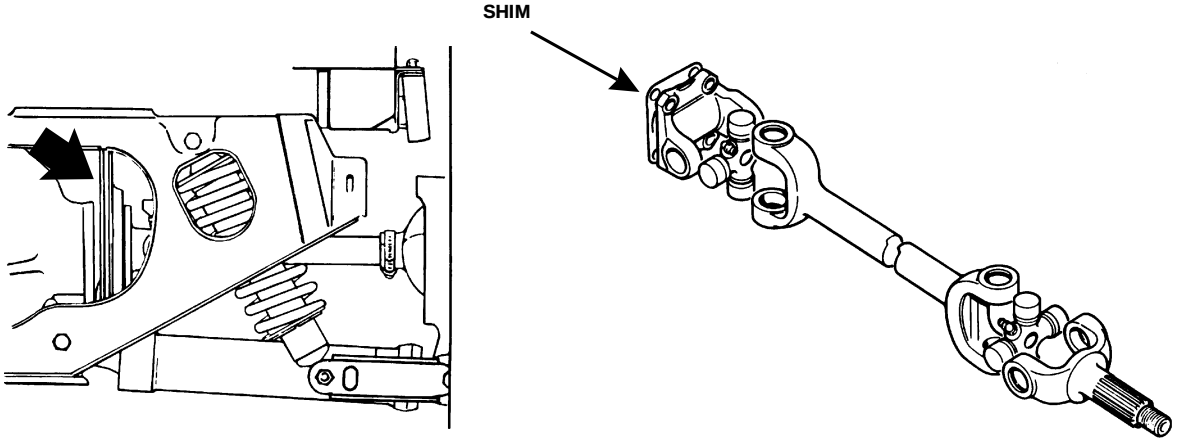


T400/3.26

Rear camber adjustment

Rear wheel camber adjustment is provided by shims of varying thicknesses placed between the drive shaft inner universal joint flange and the brake disc. Consult the Parts Microfiche for spacer availability.

REAR CAMBER ADJUSTMENT: XJS RANGE (INBOARD REAR BRAKES SHOWN)



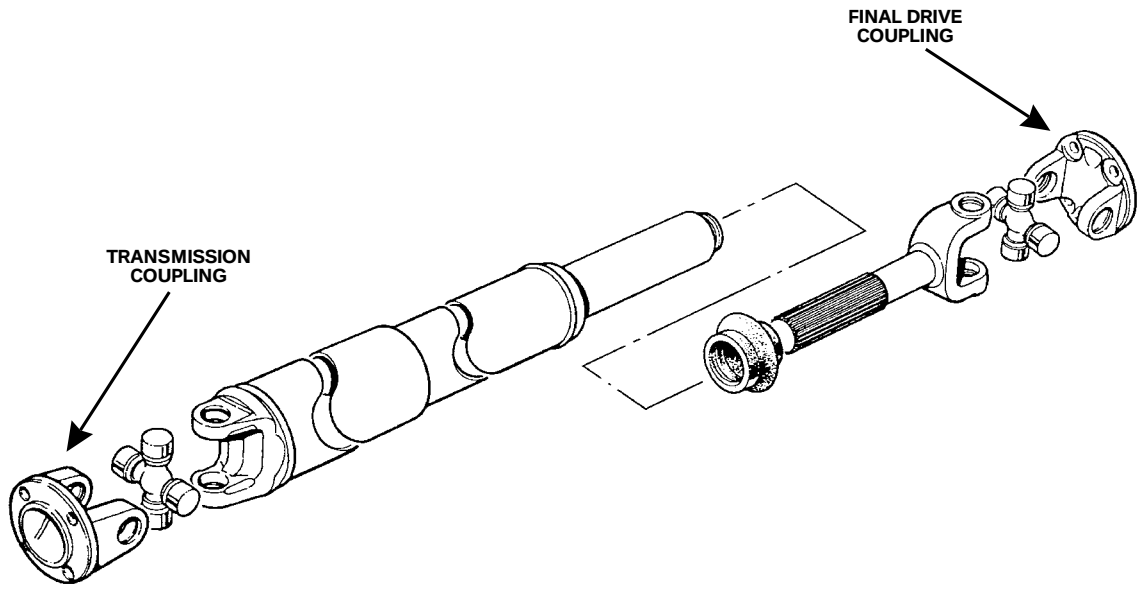
T400/3.27

NOTES

Drive Shaft and Axle Shafts

XJS Range vehicles use a single drive shaft with front and rear universal joints. A sliding spline at the rear of the shaft compensates for engine and transmission movement. No center support bearing is used. Universal joint repair kits are available; however the front and rear drive shaft flanges are not available as separate items. The axle shafts are similar to the Sedan Range in design and installation.

DRIVE SHAFT: XJS RANGE



T400/3.28

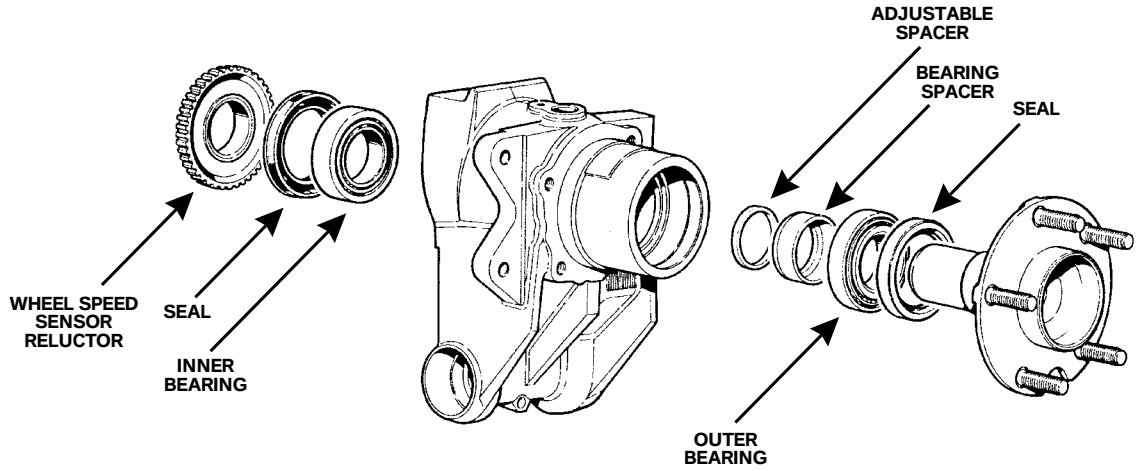
NOTES

Rear Hubs

The rear hub assembly consists of the aluminum hub carrier and the supporting bearings for the rear road wheels and axle shafts.

XJS Range vehicles are equipped with outboard rear brakes from 1993 MY, VIN 188105. The rear hubs of XJS Range vehicles with outboard rear brakes use the same rear hub shim and bearing arrangement as Sedan Range vehicles to provide a bearing preload of 0.025 mm – 0.008 mm (0.001 in. – 0.003 in.).

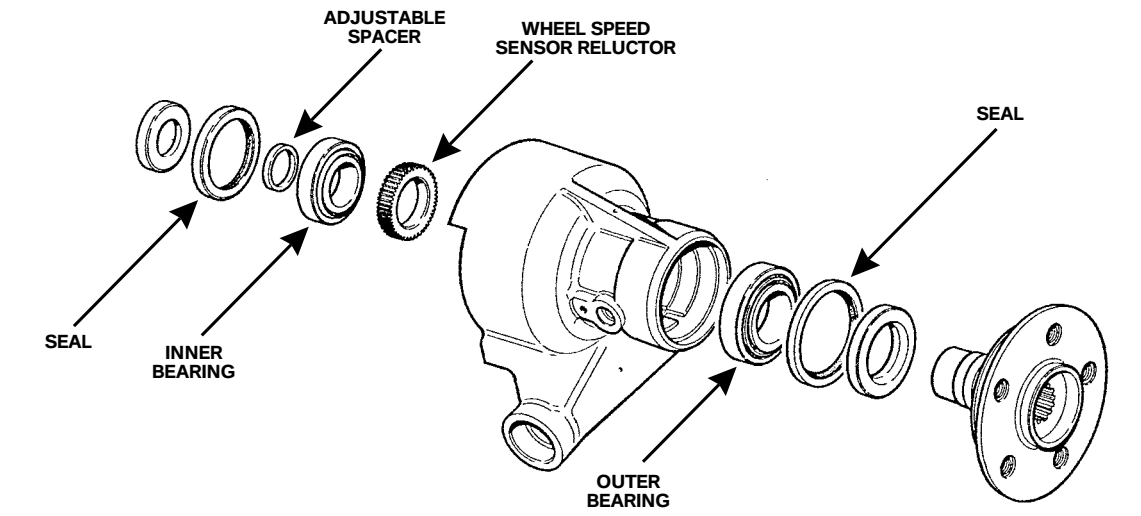
REAR HUB ASSEMBLY: XJS RANGE WITH OUTBOARD BRAKES



T400/3.29

XJS Range vehicles are equipped with inboard rear brakes through VIN 188104. The rear hubs of inboard rear brake XJS Range vehicles use a shim to provide a bearing end float of 0.025 mm – 0.008 mm (0.001 in. – 0.003 in.).

REAR HUB ASSEMBLY: XJS RANGE WITH INBOARD BRAKES



T400/3.30

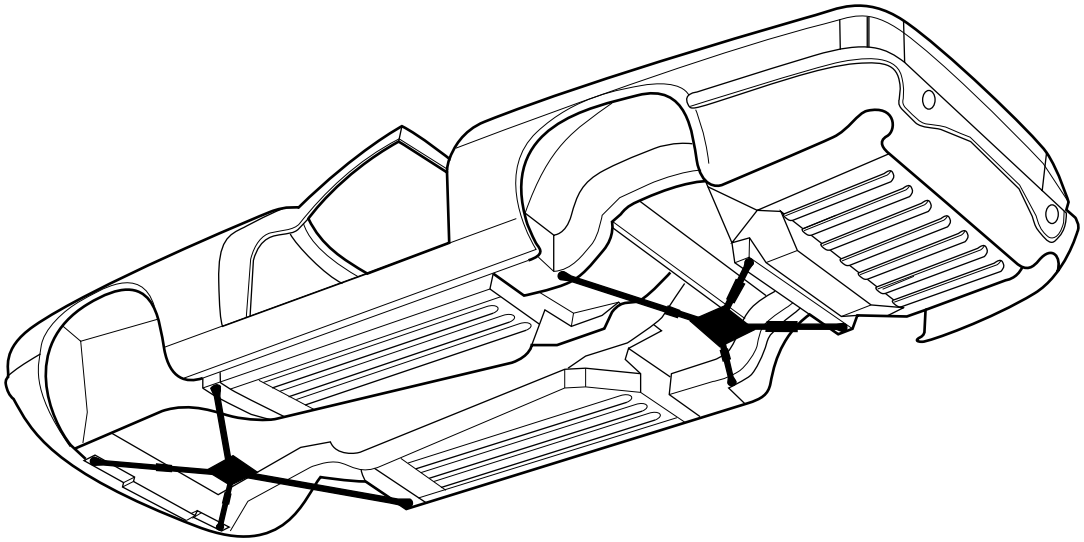
Refer to the appropriate Service Manual for bearing replacement / adjustment procedures.

Convertible Torsional Rigidity "X" Bracing

Starting with the 1993 MY, the torsional rigidity of the convertible body shell is substantially enhanced by a system of front and rear "X" bracing. Constructed of stainless steel tubing with welded reinforcements at the center, the "X" bracing system provides a 40% increase in body torsional rigidity. The trunk floor is locally reinforced to handle the increased loading through the brace rear mounting brackets. Servicing of the vehicle is not compromised, as the "X" braces are easily removable. Each brace is secured to the body structure by four bolts and washers.

NOTE: A limited number of late 1992 MY XJS Convertibles were fitted with front "X" braces only.

CONVERTIBLE "X" BRACING

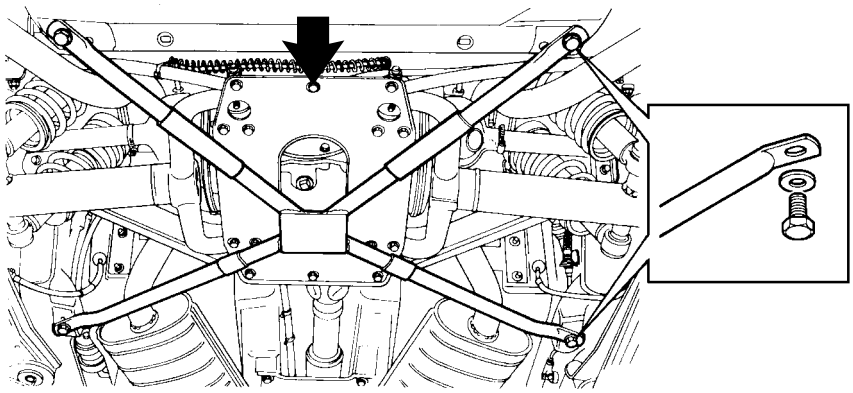


T400/3.31

⚠ CAUTION: Do not jack the vehicle on the center of the "X" braces. Jack only as described in the Service Manual and the Owner's Handbook. A jacking pad is provided on the front suspension subframe at the rear of the "X" brace reinforcement plate. If the rear of the vehicle must be jacked from the center point, place a wooden block against the rear skid pan, behind the "X" brace reinforcement plate.

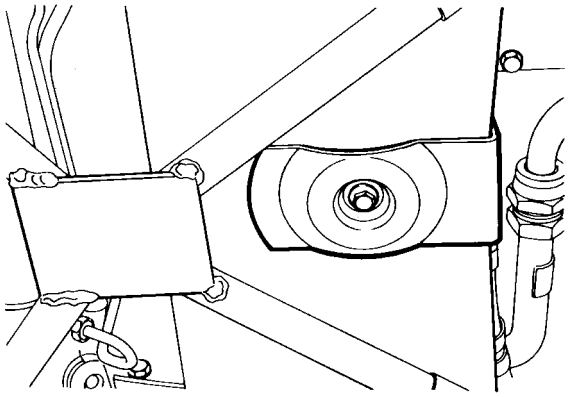
NOTES

REAR “X” BRACE



T400/3.32

FRONT JACKING PAD



T400/3.33

NOTES

Contents

Suspension / Steering Problems

Refer to Service Bulletins for the latest suspension / steering information.

Problem	Description	Possible Causes
Bump steer	The vehicle wanders or changes course over bumps or road irregularities.	Loose / worn steering components: • tie rod ends • steering rack bushings • wheel bearings Loose / worn suspension components: • ball joints • shock absorber or bushings Rear suspension problems that cause a camber or toe change in one wheel only
Memory steering or drift	The front wheels seek a set position rather than returning to center. This condition may also be described as a consistent drift or lead to one direction.	Steering rack not centered to front wheels or steering wheel Steering rack binding or binding ball joints Front tires: a difference in tire rolling resistance or rolling diameter between left and right sides Incorrect pull index (refer to Service Bulletin) Excessive camber imbalance (refer to Service Bulletin)
Shimmy	The front wheels oscillate in and out rapidly. Shimmy will occur at all speeds and may be difficult to distinguish from out-of-balance wheels.	Low tire pressure Loose wheel bearings / loose steering Worn ball joints Excessive caster, positive or negative Excessive tire or wheel runout Excessive disc brake rotor runout Tire problems: tire tread or belt out of alignment
Wander	The vehicle tends to drift to the left and right of the steered course.	Extremely low tire pressure Excessive toe in or toe out Loose wheel bearings Extreme negative caster Tire problems: mismatched tires or difference in tire rolling resistance Incorrect pull index

NOTE: Refer to Service Bulletins for the latest alignment setting specifications and information concerning correcting camber imbalance conditions and calculating the vehicle pull index.

NOTES

Alignment Angles

Camber

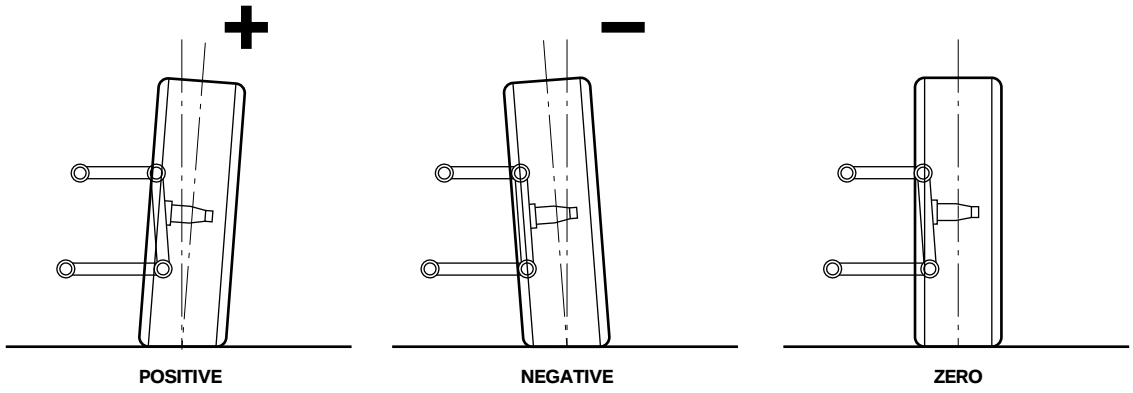
Camber is the inward or outward inclination of the wheel vertical axis in reference to a vertical line at the center of the wheel where it contacts the road. This angle is measured in degrees.

Positive camber
Camber is considered positive when the top of the wheel is inclined outward.

Negative camber
Camber is considered negative when the top of the wheel is inclined inward.

Zero camber
Camber is zero when the wheel is vertical.

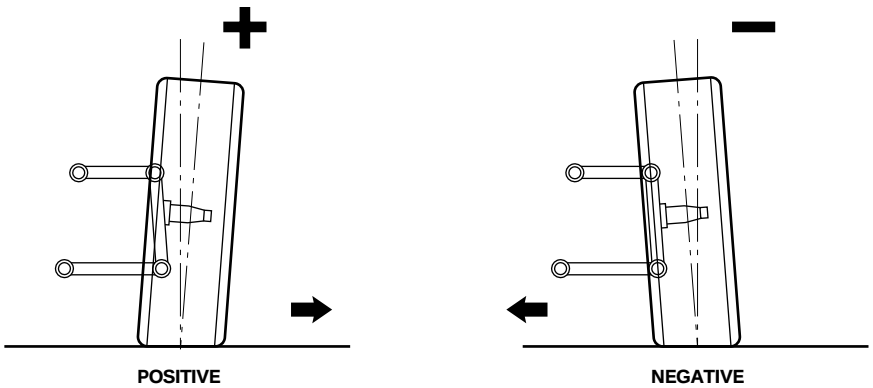
CAMBER



T400/4.01

Effect of camber
A cambered wheel does not roll straight ahead. A wheel with positive camber will roll away from the center of the vehicle; a wheel with negative camber will roll toward the center of the vehicle. Front positive camber is normally specified in automotive application to provide directional stability and isolate road forces.

EFFECT OF CAMBER

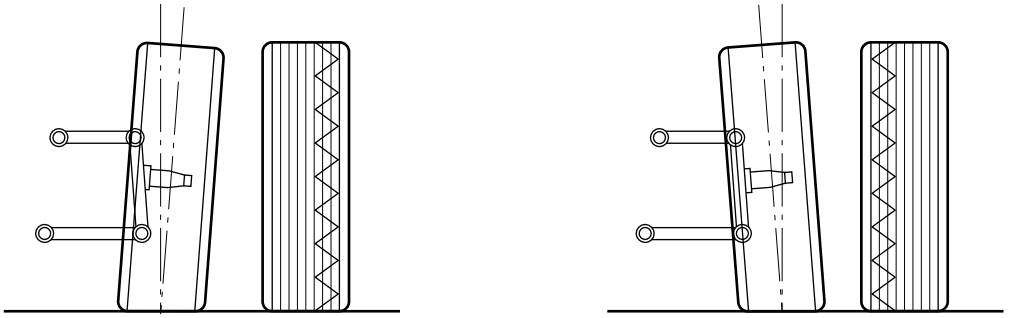


T400/4.02

Camber problems

Excessive positive camber can cause scuffing on the outside of the tire tread. Excessive negative camber can cause scuffing on the inside of the tire tread.

CAMBER PROBLEMS



T400/4.03

Camber errors

Camber error from side to side can cause a "pull" to one side. The vehicle will usually steer to the side with the greater positive camber.

CAMBER ERRORS

T400/4.04

NOTES

Caster

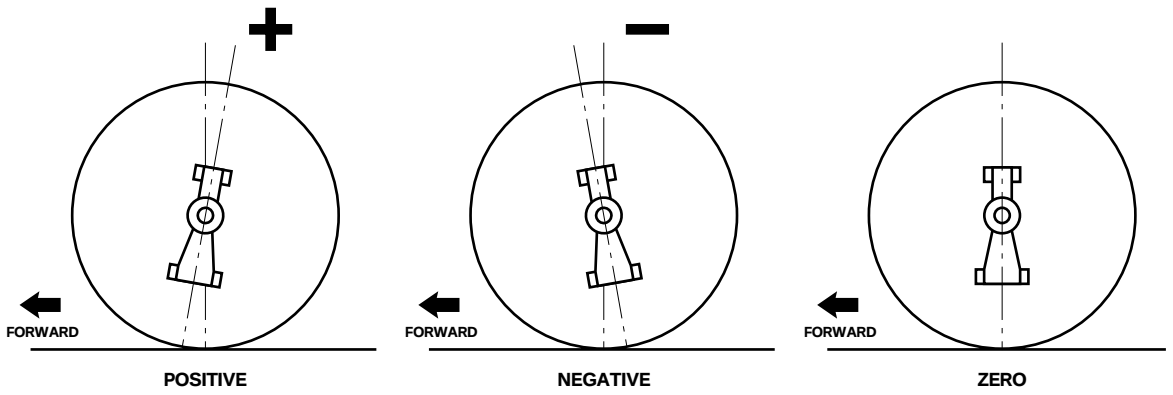
Caster is the forward or rearward inclination of the vertical steering axis in reference to a vertical line through the center of the wheel. This angle is measured in degrees.

Positive caster
Caster is considered positive when the top of the steering axis is inclined rearward.

Negative caster
Caster is considered negative when the top of the steering axis is inclined forward.

Zero caster
Caster is zero when the steering axis is vertical.

CASTER



T400/4.05

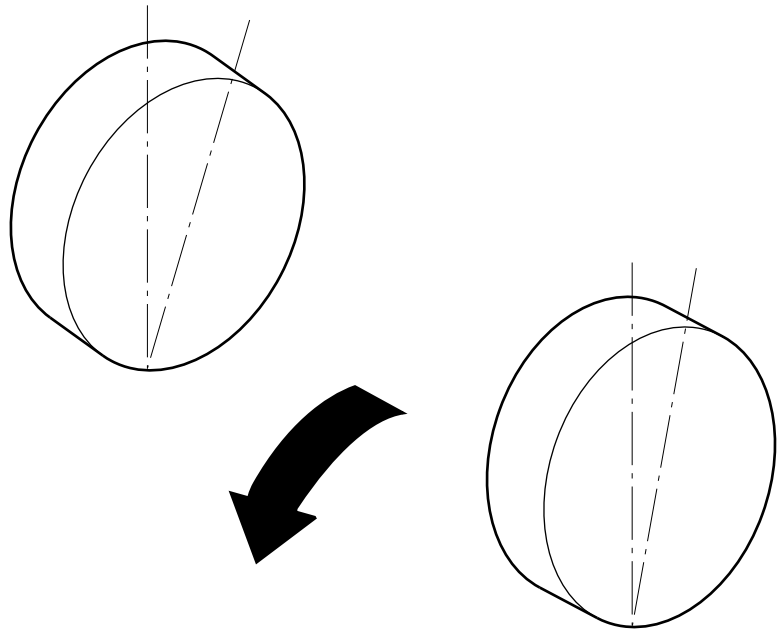
NOTES

Effect of caster
Positive caster will cause a wheel to return to the straight ahead position when it is turned. Positive caster is normally specified in automotive application to provide directional stability and steering return ability.

Caster problems
Excessive positive caster can cause hard steering, road shock, and shimmy. Insufficient positive caster, or negative caster, reduces directional stability and return ability.

Caster errors
Caster error from side to side can cause a "pull" to one side. The vehicle will usually steer to the side with the least amount of positive caster.

CASTER ERROR



T400/4.06

NOTES

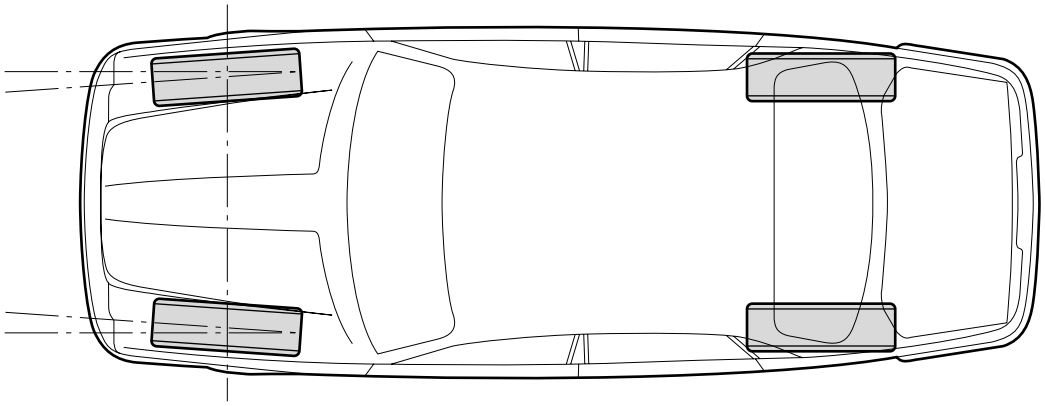
Toe and Related Angles

Toe can be defined as the difference in distance measured across the front and across the rear of the wheels on the same axle. Toe is specified to achieve near zero toe during most driving conditions.

Toe-in

Toe-in indicates that the front of the wheels are closer together than the rear of the wheels.

TOE-IN

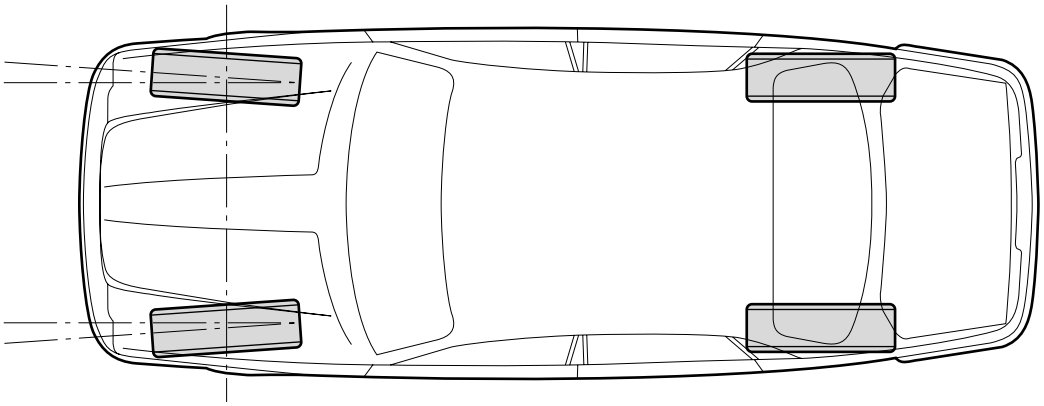


T400/4.07

Toe-out

Toe-out indicates that the front of the wheels are further apart than the rear of the wheels.

TOE-OUT

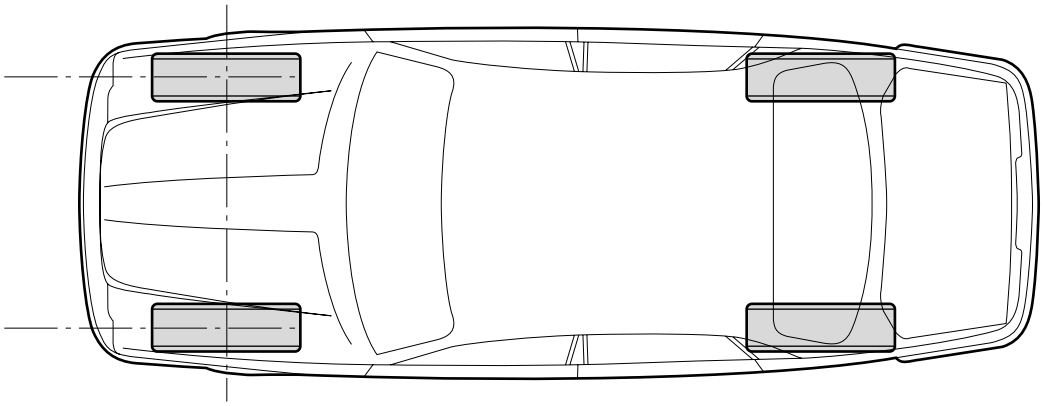


T400/4.08

NOTES

Zero toe
Zero toe indicates that the front of the wheels are parallel to each other.

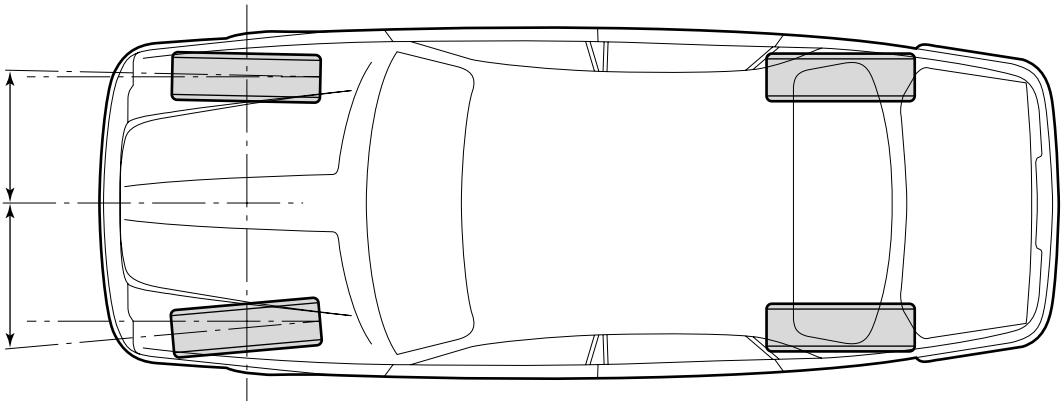
ZERO TOE



T400/4.09

Individual toe
Individual toe is the difference in distance measured from the vehicle centerline.

INDIVIDUAL TOE



T400/4.10

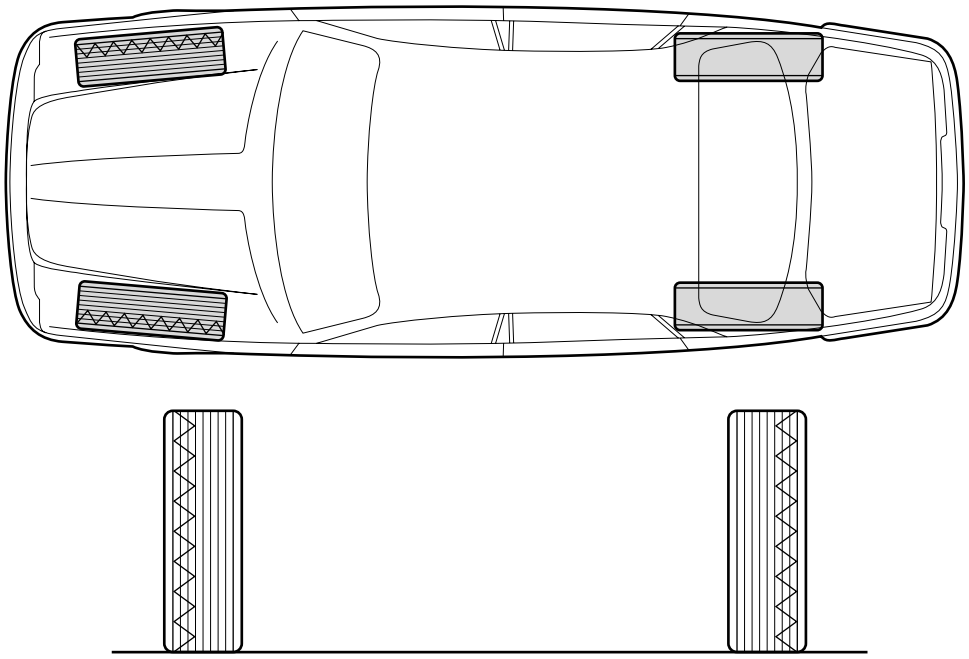
NOTES

Toe and Related Angles (continued)

Toe problems

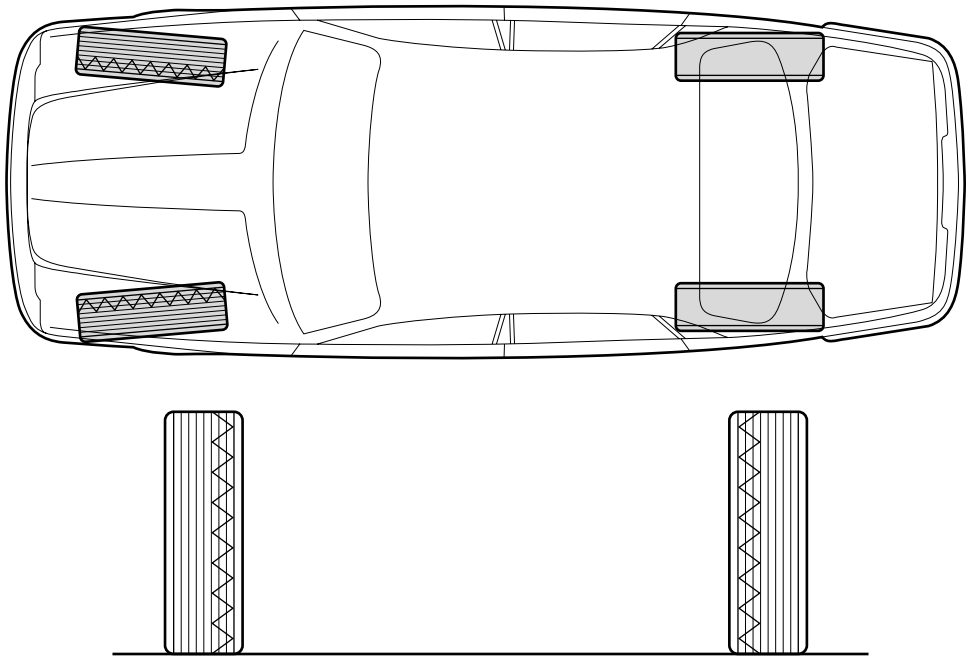
Excessive toe-in can increase the amount of scuffing on the outside of the tire tread. Excessive toe-out can increase the amount of scuffing on the inside of the tire tread.

EXCESSIVE TOE-IN



T400/4.11

EXCESSIVE TOE-OUT



T400/4.12

Thrust Axis

Thrust axis is the drive angle of the rear wheels and should fall on the centerline of the vehicle. The angles on either side of the thrust axis are always equal regardless of the individual wheel angles.

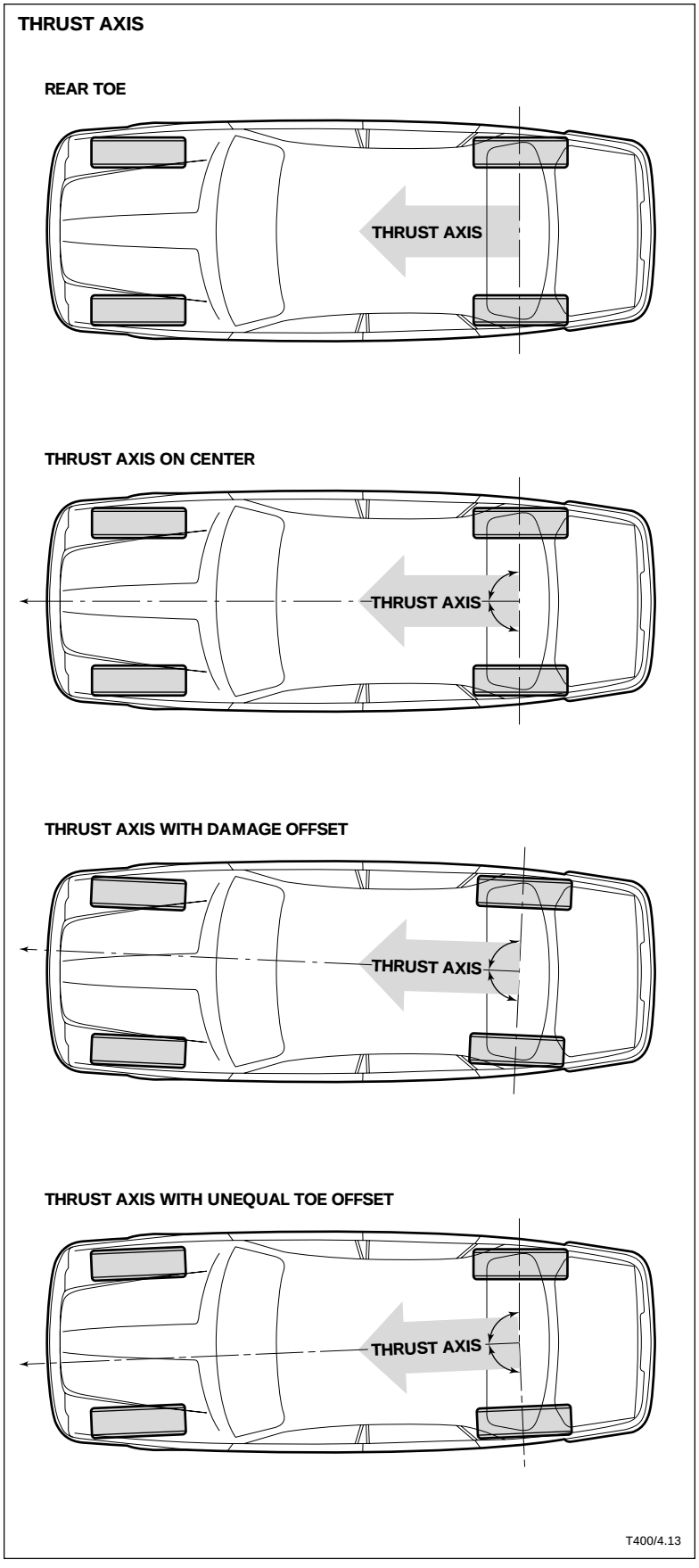
When the thrust axis is not centered, the vehicle will tend to travel in a circle, requiring the driver to turn the steering wheel in order to steer straight ahead.

Thrust axis on center
With all suspension components and chassis dimensions within specification, the thrust axis will fall on the center line of the vehicle, providing normal handling, tracking, and tire wear.

Thrust axis with damage offset
If the chassis has been damaged causing displacement of the rear suspension unit, the thrust axis will be offset to one side.

Thrust axis with unequal toe offset
Unequal rear wheel toe will also offset the thrust axis. The example shows the left rear wheel toed-out, creating an offset to the left.

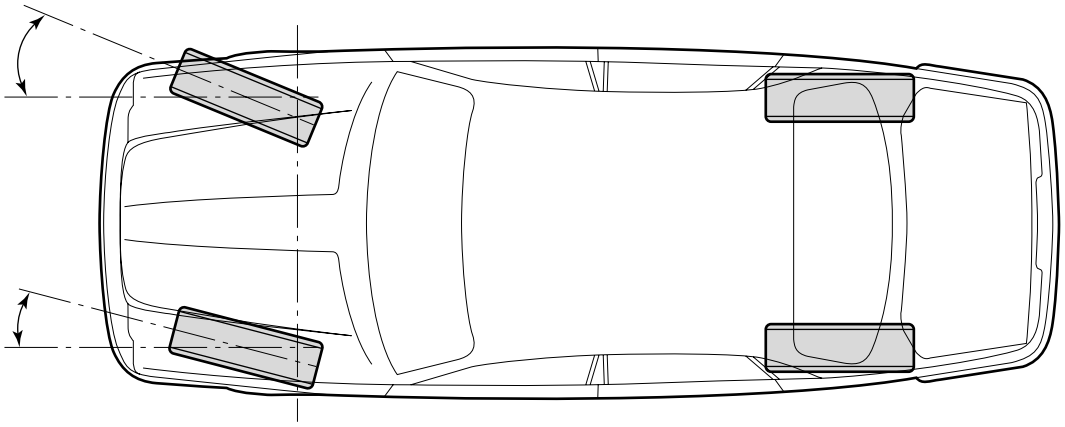
NOTES



Toe-Out-on-Turns

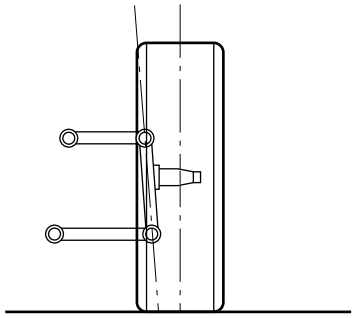
Toe-out-on-turns is the differential angle between the inner and outer front wheels in a turn. Toe-out-on-turns allows the wheels to travel in different diameter circles when the vehicle is turning.

TOE-OUT-ON-TURNS



T400/4.14

STEERING AXIS INCLINATION



T400/4.15

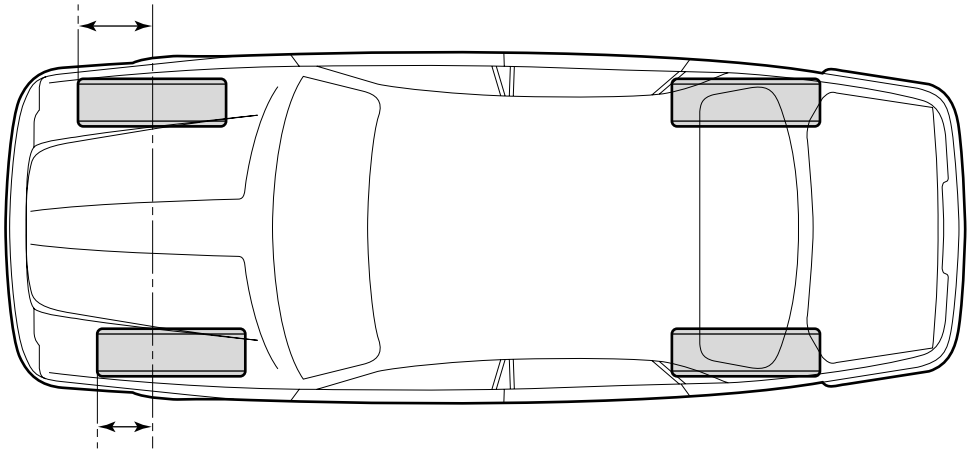
Steering Axis Inclination

Steering axis inclination is the angle formed by a line drawn through the steering axis and vertical.

Set-Back

Set-back is the distance fore or aft of one front wheel to the other caused by chassis or suspension component damage.

SET-BACK



T400/4.16

Preparation for Alignment Procedure

Before proceeding with suspension alignment, the following must be carefully checked and rectified as necessary:

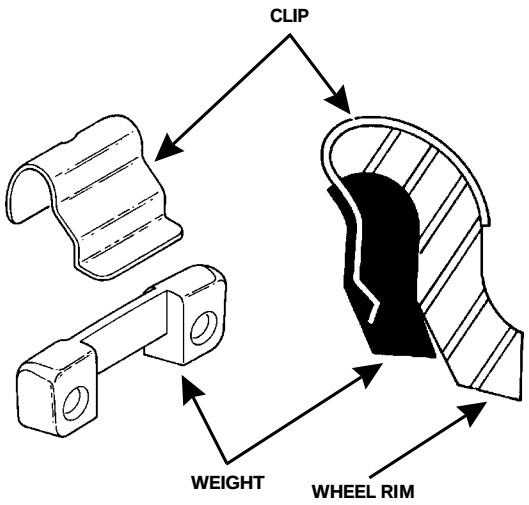
- **Suspension components:** wear and damage
- **Ball joints:** wear
- **Steering tie rod ends:** wear
- **Steering gaiters and ball joint boots:** damage
- **Rubber bushings:** wear
- **Shock absorbers:** wear; leakage
- **Wheel bearings:** wear; adjustment
- **Wheel rims:** condition
- **Tires:** inflation pressure; balance; wear patterns; tread depth; correct specification

In addition to the "condition" items listed above, the vehicle should be checked for the correct ride height. Refer to Ride Height, page 14. Also, the vehicle steering rack must be centralized and the suspension set to the correct ride height or mid-laden condition as specified. Refer to Mid-laden Condition, page 17.

Two-piece wheel balance weights

Starting with the 1994 Model Year, coated two-piece wheel weights are used. The coating prevents galvanic action that can cause corrosion. The clip and balance weight assembly is designed to fit the profile of the road wheel rim. Installation of the clip requires that the tire sidewall be displaced. To ensure that no damage occurs to the alloy wheel, the tire sidewall, or the clip, use special tool HAW 900 to displace the tire from the rim. The installed clip must be opened with special tool HAW 900/1 and the proper weight inserted under the clip.

TWO-PIECE WHEEL WEIGHT



T400/4.17

NOTES

Ride Height

Correct front and rear ride height is essential to good road holding, handling, and ride. Because the suspension undergoes minor geometry changes as it moves through its range of travel, an incorrect ride height will result in incorrect suspension geometry for a specific vehicle load.

Ride height is checked with the vehicle in the "ride" condition on sliding wheel plates and on a level surface. Ride condition means that the vehicle has the correct wheel and tire specification, correct tire pressure, full fuel, all fluid levels normal, and only the spare wheel and tools in the trunk. Be sure to "settle" the suspension by pressing down on the front and rear bumpers and gently releasing. Adjustment to front and rear ride height is made by spring and spring packing replacement.

Effects of changes in ride height (kerb height) on suspension angles:

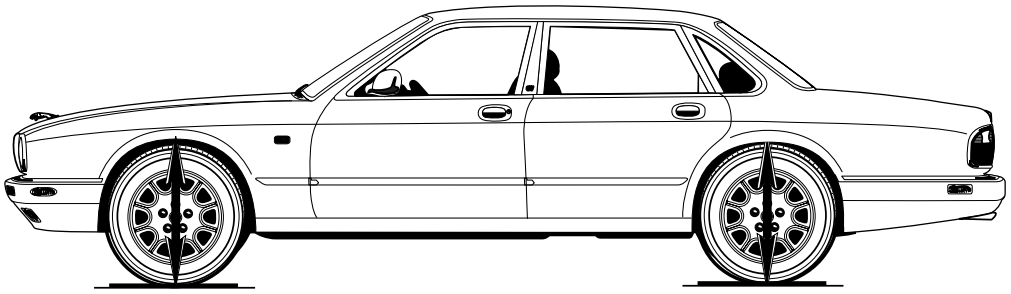
Camber
As the vehicle lowers, camber becomes more negative.

Caster
For each degree that the front lowers in relation to the rear, caster becomes one degree more negative (front spring sag or ride level problems).

For each degree that the rear lowers in relation to the front, caster becomes one degree more positive (rear spring sag or ride level problems).

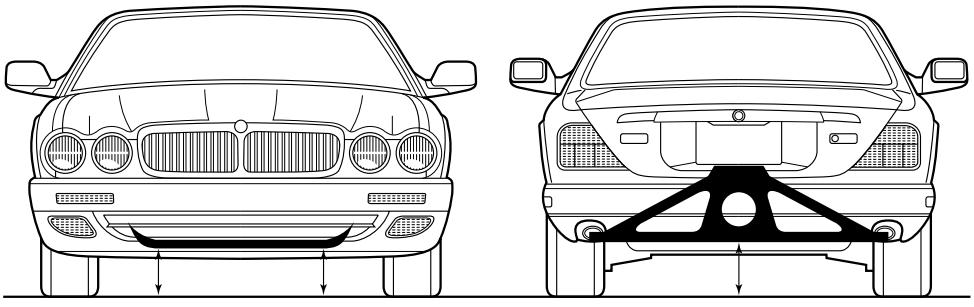
Ride height: Sedan vehicles
Ride height varies with the Sedan model, model year and type of suspension fitted (Sport or Comfort). Consult the latest technical information for the correct ride height specification.

RIDE HEIGHT MEASURING POINTS : XJ SERIES SEDAN 1998 MY



T400/6.24

RIDE HEIGHT MEASURING POINTS : SEDAN RANGE THROUGH 1997 MY

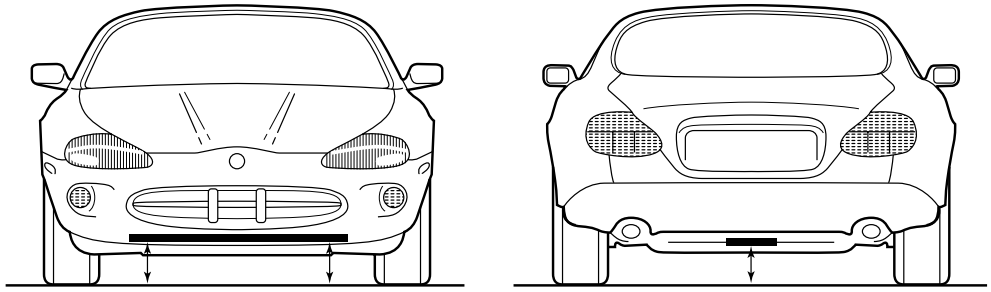


T400/4.18

Ride height: XK8

Ride height varies with the XJ8 model, model year and type of suspension fitted (Sport or Comfort). Consult the latest technical information for the correct ride height specification.

RIDE HEIGHT: XK8

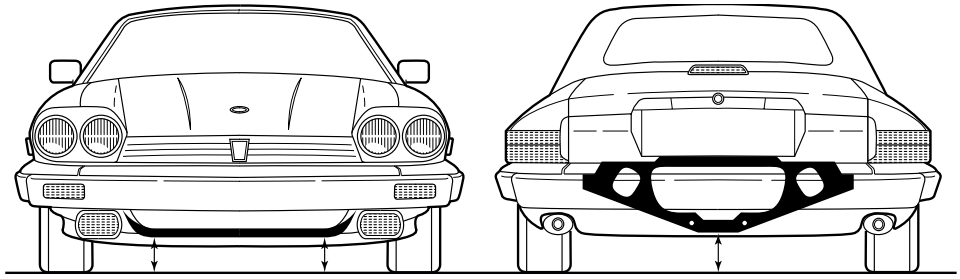


T400/4.18A

Ride height: XJS Range

Ride height varies with the XJS model, model year and type of suspension fitted (Sport or Comfort). Consult the latest technical information for the correct ride height specification.

RIDE HEIGHT: XJS RANGE



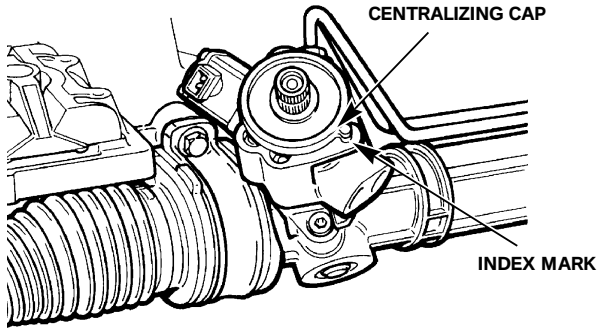
T400/4.19

NOTES

Centralizing Steering

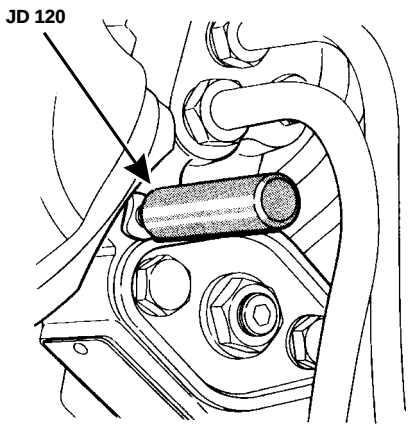
During alignment checks, the steering must be centralized to allow accurate measurement.

SEDAN 1995 MY ON AND XK8



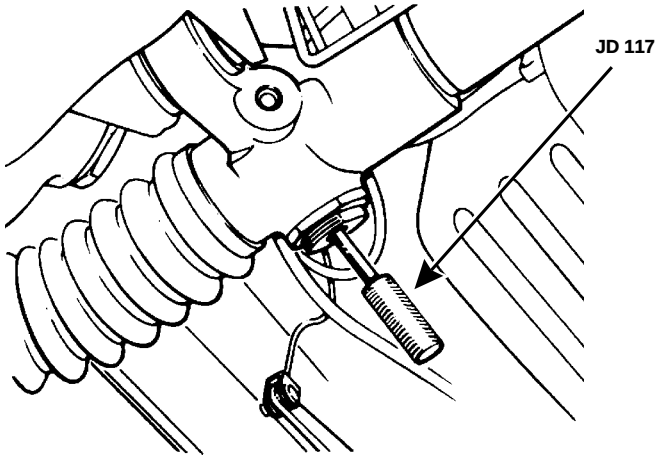
T400/4.19A

SEDAN RANGE UP TO 1993 MY VIN 671806



T400/4.20

XJS RANGE UP TO 1993 MY VIN 179739



T400/4.21

XJ Series Sedan 1998 MY ON and XK8

A centralizing cap is pressed on the pinion shaft. Align the cap with the index mark on the pinion valve assembly housing.

Sedan Range through 1997 MY

Adwest steering rack UP TO VIN 671805

Steering alignment pin, tool JD 120, is inserted into the rack to maintain the centralized position.

ZF Steering rack through 1994 MY

The steering alignment pin supplied with a new steering rack from parts stock is inserted into the rack to maintain the centralized position.

ZF Steering rack 1995 through 1997 MY

Steering alignment is performed as on the 1998 MY XJ Series Sedan and XK8 by aligning the centralizing cap with the index mark on the pinion / valve assembly housing.

XJS

ZF Steering rack from 1993 MY VIN 173740

The steering alignment pin supplied with a new steering rack from parts stock is inserted into the rack to maintain the centralized position.

Adwest steering rack UP TO VIN 173739

Steering alignment pin, tool JD 117, is inserted into the rack to maintain the centralized position.

NOTES

Mid-laden Condition

The wheel alignment of Sedan Range through the 1997 MY and XJS vehicles is checked in the "mid-laden" condition. Mid-laden condition is achieved through the use of special tools to compress the suspension, setting the vehicle to a specified height.

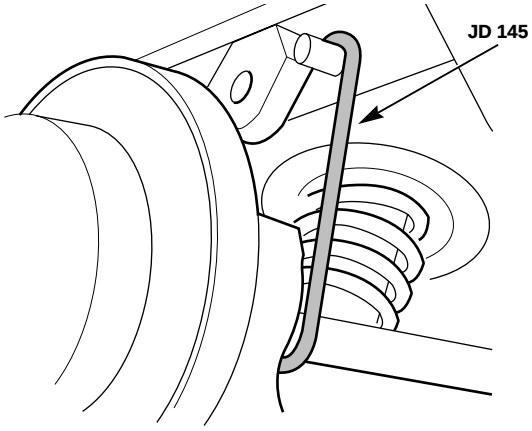
Mid-laden condition: Sedan Range

The mid-laden condition for Sedan Range vehicles is specified as follows: the rear drive shafts are horizontal and the front suspension subframe is at a height of 6 in. to the road surface.

With the vehicle resting on sliding wheel plates, tool JD 145 is installed at the rear with the large hook located around the drive shaft. After careful compression of the rear suspension, the small or upper hook is then attached to the top of the compression stop.

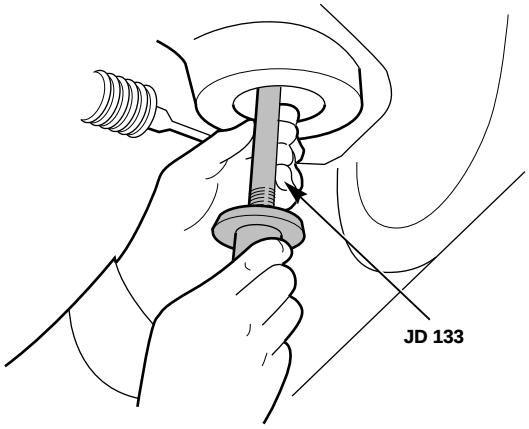
Next, tool JD 133 is used to compress the front suspension until the measurement between the wheel plates and the bottom of the subframe is 6 in. on both sides.

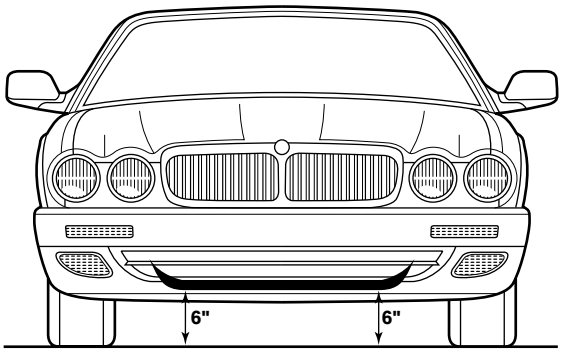
REAR MID-LADEN CONDITION SETTING: SEDAN RANGE THROUGH 1997 MY



T400/4.22

FRONT MID-LADEN CONDITION SETTING: SEDAN RANGE THROUGH 1997 MY



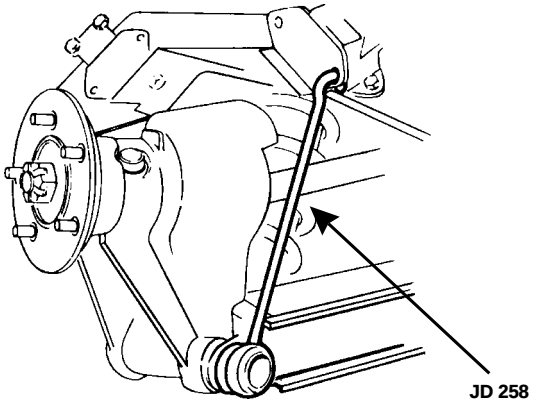


T400/4.23A & B

NOTES

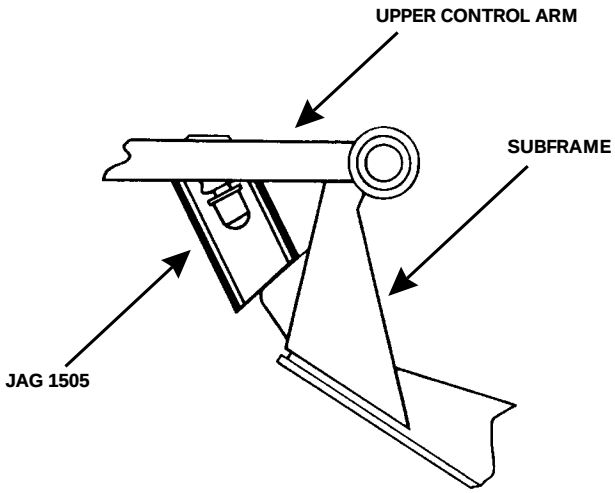
Mid-laden Condition (continued)

REAR MID-LADEN CONDITION SETTING: XJS RANGE



T400/4.24

FRONT MID-LADEN CONDITION SETTING: XJS RANGE



T400/4.25

Mid-laden Condition: XJS Range

The XJS mid-laden condition is achieved by the installation of two sets of special tools.

With the vehicle resting on sliding wheel plates, tool JD 258 is installed at the rear with the hook located in the hole in the subframe bushing plate. After careful compression of the rear suspension, the lower loop is then fitted over the lower control arm pivot nut.

Next, tool JAG 1505 is placed between the upper "A" arm and the subframe rebound stop as the front suspension is compressed.

NOTE: XJR-S vehicles do not require the use of "mid-laden" tools for wheel alignment.

NOTES

Alignment Worksheet

Model _____ **MY** _____ **VIN** _____

Customer complaint _____

_____

_____

_____

Tire Pressure

Before		**After**	
Left Front _____	Right Front _____	Left Front _____	Right Front _____
Left Rear _____	Right Rear _____	Left Rear _____	Right Rear _____

Visual Inspection

Tires / Wheels: condition and runout

Left Front _____ Right Front _____

Left Rear _____ Right Rear _____

Wheel / Hub: bearing clearance

Left Front _____ Right Front _____

Left Rear _____ Right Rear _____

Suspension component condition _____

_____

_____

Possible causes of customer complaint _____

_____

_____

Vehicle ride height specification

Front _____ Rear _____

Alignment Measurements

Front

	Left Front		Right Front	
	Specification	Measured	Specification	Measured
Caster	_____	_____	_____	_____
Camber	_____	_____	_____	_____
Toe	_____	_____	_____	_____
Total Toe	_____	_____	_____	_____
Turning Angle	_____	_____	_____	_____

Rear

	Left Front		Right Front	
	Specification	Measured	Specification	Measured
Camber	_____	_____	_____	_____
Toe	_____	_____	_____	_____
Total Toe	_____	_____	_____	_____

Pull Index Calculation

Right Side Camber _____ Right Side Caster _____

MINUS Left Side Camber _____ MINUS Left Side Caster _____

EQUALS **Camber Imbalance** _____ EQUALS **Caster Imbalance** _____

Camber Imbalance _____

MINUS **Caster Imbalance** _____

MULTIPLY by 10 _____

EQUALS **Pull Index** _____

Pull index specification _____

Action to be taken _____

_____

_____

_____

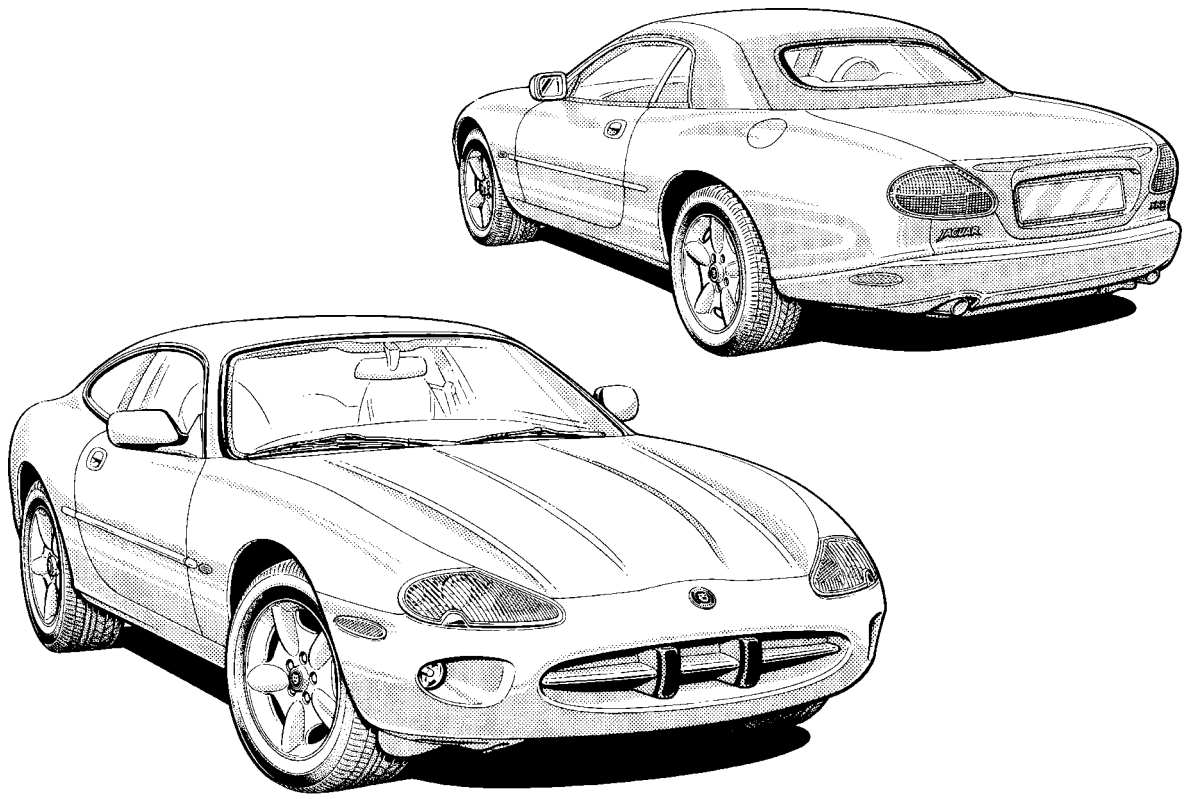
XK8 Handling, Suspension and Occupant Protection

Contents

Introduction

The XK8 Range contains a number of technological innovations that raise Jaguar's benchmarks for performance, refinement, and reliability to a new level. These innovations are combined with proven technology from 1995 – 1997 MY Sedan Range vehicles. The result is a performance vehicle that defines the Jaguar heritage and provides convenience features unmatched in its class.

JAGUAR XK8 COUPE AND CONVERTIBLE



T400/5.01, 5.02

NOTES

Occupant Protection

The Jaguar XK8 Range of vehicles comply with the occupant protection and safety standards of all countries.

Active three-point seat belts are fitted for the driver and passenger positions. An electromechanical airbag is mounted in the steering wheel for the driver and in the fascia for the front passenger. In addition, the front seat belt retractors include pyrotechnic seat belt pretensioners. Rear seat passenger positions are equipped with conventional three-point seat belts.

⚠ WARNING: READ THE INSTRUCTIONS IN THE SERVICE MANUAL AND OBSERVE ALL SAFETY PRECAUTIONS BEFORE ATTEMPTING TO SERVICE THE STEERING WHEEL, THE AREA AROUND THE PASSENGER AIRBAG, OR ANY AIRBAG / SRS COMPONENTS. OBSERVE ALL SAFETY PRECAUTIONS WHEN HANDLING OR TRANSPORTING AIRBAG MODULES.

DO NOT ATTEMPT TO MEASURE CIRCUIT RESISTANCE THROUGH THE AIRBAG MODULES. DOING SO MAY TRIGGER AIRBAG DEPLOYMENT AND RESULT IN PERSONAL INJURY.

DO NOT ATTEMPT TO REPLACE THE AIRBAG / SRS 10 A BATTERY POWER FUSE UNLESS THE SYSTEM IS DISARMED.

TO DISARM THE SRS SYSTEM, DISCONNECT THE NEGATIVE BATTERY CABLE AND WAIT A MINIMUM OF ONE MINUTE FOR THE RESERVE POWER CHARGE TO DISSIPATE.

NOTES

Electromechanical Airbag / SRS

The XK8 airbag / SRS is similar to that of the 1995 – 1997 MY Sedan system. The control module is connected to the DLC for PDU diagnosis but is not part of the XK8 multiplex circuitry. Important differences between the Sedan Range and XK8 systems are outlined in this section.

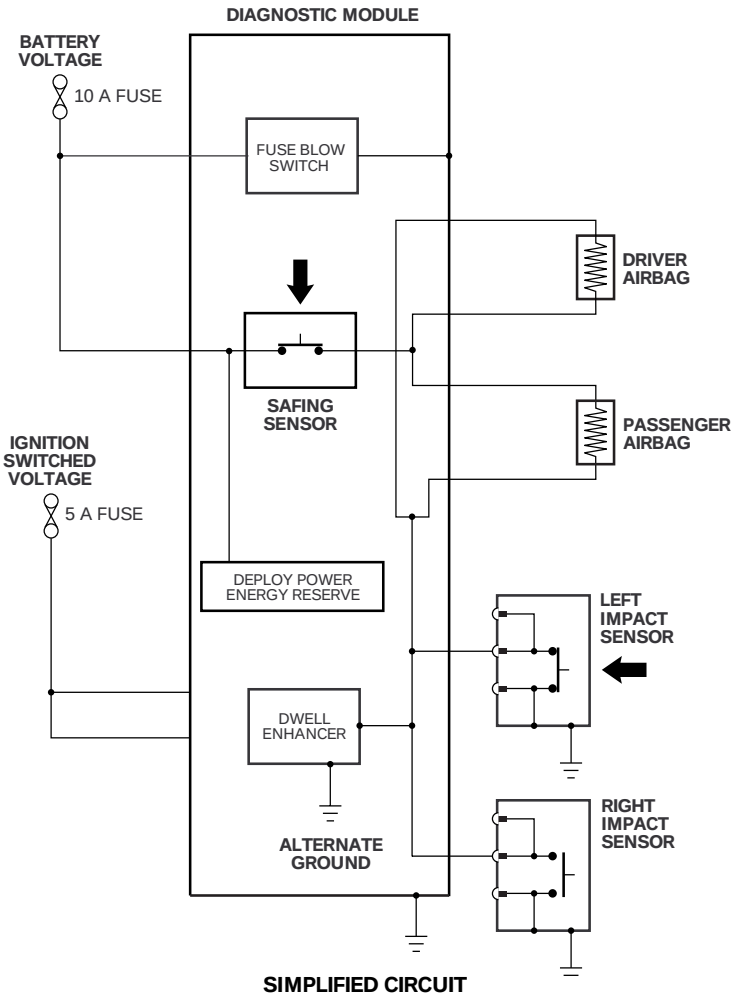
The XK8 airbag / SRS control module is powered by a 5 A fused ignition-switched power supply. Airbag deployment power is supplied to the module separately via a 10 A fused battery power supply.

Airbag Deployment

In the event of an impact severe enough to trigger at least one impact sensor plus the safing sensor, both airbags are triggered and deploy within 32 milliseconds. The impact force will also independently trigger the mechanically sensed pretensioning retractors of buckled front seat belts. The pretensioning retractors position the belts to optimum tension and lock their retractor mechanisms.

NOTES

AIRBAG DEPLOYMENT –
SAFING SENSOR AND LEFT IMPACT SENSOR ACTIVATED

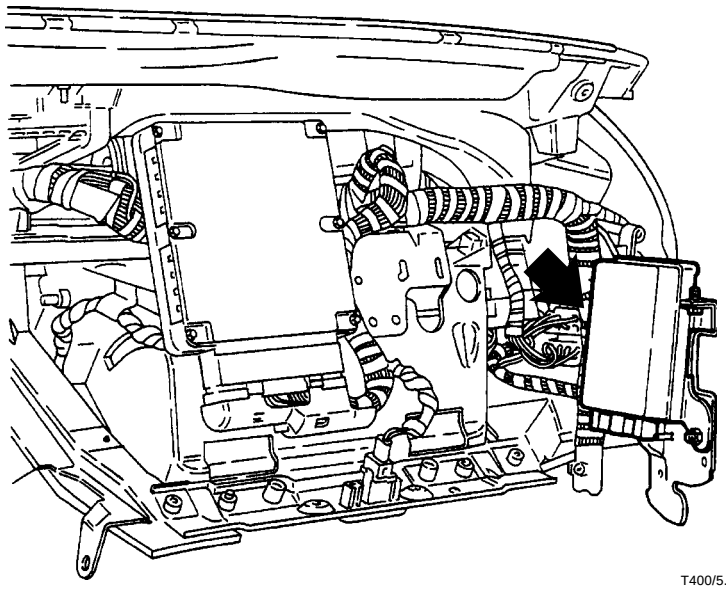


SIMPLIFIED CIRCUIT

T400/5.03

Electromechanical Airbag / SRS (continued)

AIRBAG / SRS CONTROL MODULE LOCATION



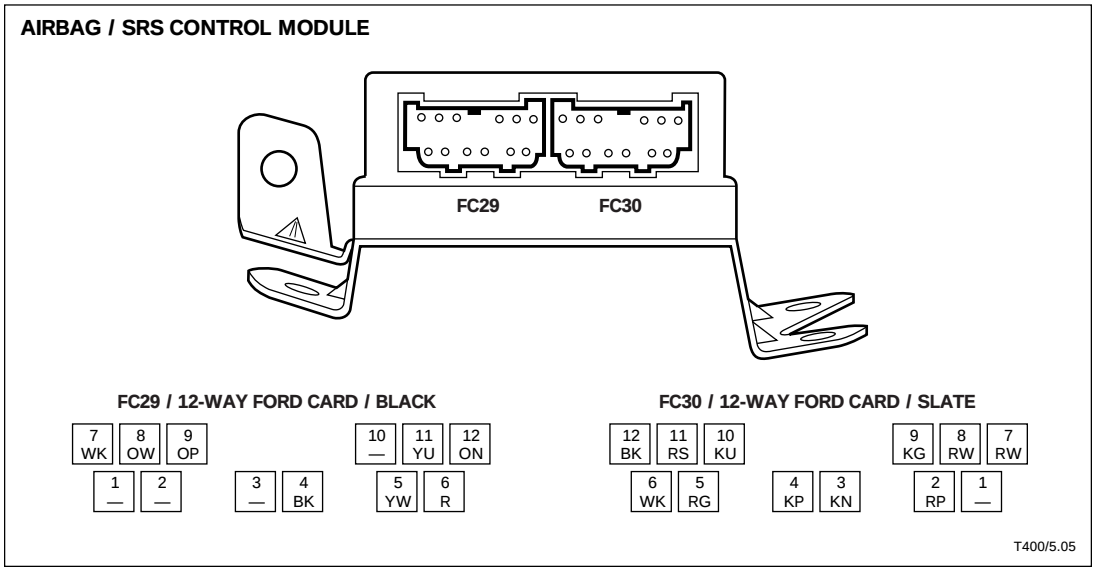
Airbag / SRS Control Module

The airbag / SRS control module, located near the passenger side "A" post, monitors the system state and performs the same functions as the diagnostic monitor on 1995 – 1997 MY Sedan Range vehicles. Both the XK8 airbag / SRS control module (CM) and Sedan Range airbag diagnostic monitor (DM) connect to the vehicle with 12-way Ford Card connectors, but the connector pin assignments are different to prevent module cross switching.

Other major differences between the XK8 airbag / SRS CM and the Sedan Range DM are outlined in the chart below.

Component	XK8	Sedan Range 1995 –1997 MY
Safing Sensor	Integrated in CM	Separate – located on passenger side "A" post
Thermal fuse	Separate – located in driver side fascia fuse box	Non-serviceable; integrated in DM
Interrogation connector	Provides "blink code" fault data	Not fitted

NOTES



Airbag / SRS control module pin out information

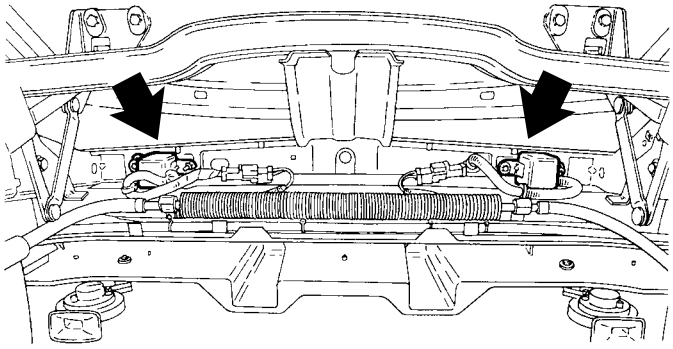
I – Input, O – Output

I/O	Pin	Description
	FC29-1	Not used
	FC29-2	Not used
	FC29-3	Not used
I	FC29-4	Ground
O	FC29-5	AIRBAG MIL
O	FC29-6	Serial communication
I	FC29-7	Ignition switched power supply
I	FC29-8	LH impact sensor ground supply status
I	FC29-9	RH impact sensor ground supply status
	FC29-10	Not used
I	FC29-11	LH impact sensor status
I	FC29-12	RH impact sensor status

I/O	Pin	Description
	FC30-1	Not used
O	FC30-2	Driver side airbag power supply
O	FC30-3	Driver side airbag ground supply
O	FC30-4	Passenger side airbag ground supply
O	FC30-5	Passenger side airbag power supply
I	FC30-6	Ignition switched power supply
O	FC30-7	Fused supply interrupt
I	FC30-8	Deployment battery power supply
I	FC30-9	Common airbag ground supply
I	FC30-10	Common airbag ground supply
O	FC30-11	Blink code output
I	FC30-12	Ground

Electromechanical Airbag / SRS (continued)

FRONT IMPACT SENSOR LOCATIONS



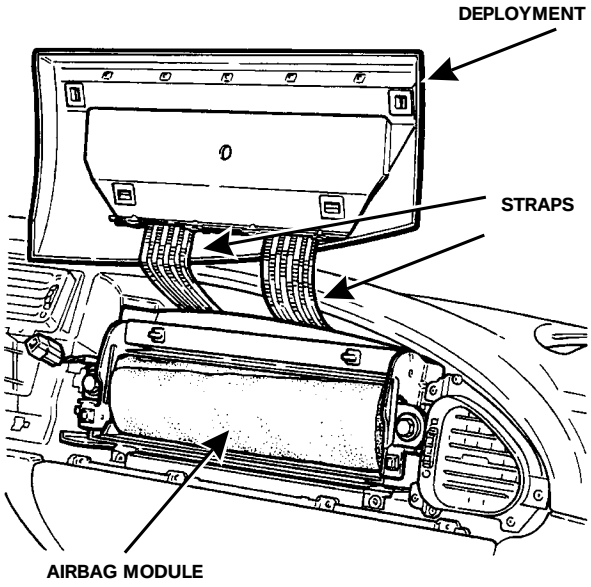
T400/5.06

Front Impact Sensors

The front impact sensors are located on the upper front cross member in front of the radiator.

The sensors function identically to the 1995 – 1997 MY Sedan Range impact sensors.

PASSENGER AIRBAG



T400/5.07

Airbag Modules

The driver and passenger airbag modules are the same as the 1995 – 1997 MY Sedan modules. The passenger side deployment door snaps on the fascia. Straps attach to the airbag module mounting bracket to control the door during deployment.

⚠ WARNING: DO NOT ATTEMPT TO MEASURE CIRCUIT RESISTANCE OR CONTINUITY THROUGH THE AIRBAG MODULES. DOING SO MAY TRIGGER AIRBAG DEPLOYMENT AND RESULT IN PERSONAL INJURY.

NOTES

Seat Belts

Front Seat Belts

Front seat belts are the same for coupe and convertible models with the exception of the shoulder anchor points. Coupe models have a four–position adjustable shoulder mounting point. Convertible model shoulder mounting points are fixed.

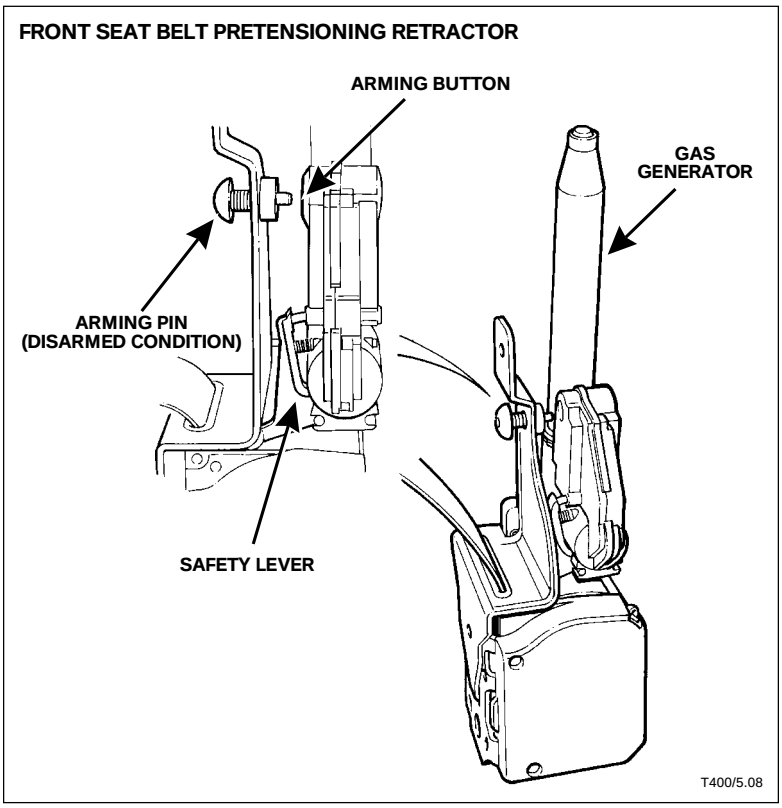
For both coupe and convertible models, floor mounted slider bars guide the lower seat belt runs to ease rear seat passenger access.

The driver seat belt retractor unit includes an emergency locking function (ELR) and a pyrotechnic pretensioner. The passenger seat belt retractor includes both emergency locking (ELR) and automatic locking (ALR) functions, and a pyrotechnic pretensioner.

ELR (normal mode) allows the occupant free torso movement while restrained, but it locks the retractor during rapid deceleration. ALR (static mode) locks the retractor, preventing withdrawal of the belt and allowing retraction only. ALR is used to secure a child seat. 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.

NOTES

Front Seat Belts (continued)



Pretensioning retractor units

The front seat belt pretensioners are pyrotechnic devices that remove seat belt slack and lock the retractors in the event of a severe frontal impact. Tear-loop–type seat belts are not used on XK8 vehicles.

Each self-contained pretensioning retractor unit consists of a mechanical impact sensor and triggering control, a gas generator, and a piston / cable assembly that connects to the seat belt retractor mechanism. If a frontal impact of sufficient force occurs within 30° of the vehicle center line and the seat belt is in use, the pretensioner activates. The impact sensor ignites a solid nitrocellulose propellant in the gas generator, driving the piston / cable assembly connected to the retractor mechanism. The cable turns the retractor to remove excess seat belt slack at the moment of airbag / SRS deployment. After activation, the seat belt is locked. It will not retract and cannot be pulled from the retractor reel. The retractor unit / seat belt assembly must be replaced following activation.

Pretensioning retractor arming

The pretensioning retractor unit is armed at installation by screwing in the red arming pin to fully depress the red arming button. Once installed, a safety lever prevents the impact sensor from activating the pretensioner with the seat belt fully retracted. When the seat belt is pulled from the retractor reel (seat belt in use by an occupant or securing a child seat), the safety lever moves and the unit is ready to activate if an impact occurs.

⚠ WARNING: IF A PRETENSIONING UNIT IS RUPTURED AND PROPELLANT INGESTION OR INHALATION OCCURS, APPLY FIRST AID AND SEEK MEDICAL ADVICE.

DO NOT ATTEMPT TO DISMANTLE THE NON-SERVICEABLE RETRACTOR UNIT.

WHEN HANDLING THE RETRACTOR UNIT, THE PISTON MUST ALWAYS BE POINTED DOWN AND AWAY FROM ANYONE. KEEP FINGERS AWAY FROM THE RETRACTOR REEL MECHANISM.

IF A PRETENSIONING RETRACTOR UNIT IS DROPPED FROM A HEIGHT GREATER THAN 0.3 M (12 IN.), IT MUST NOT BE FITTED TO A VEHICLE.

Rear Seat Belts

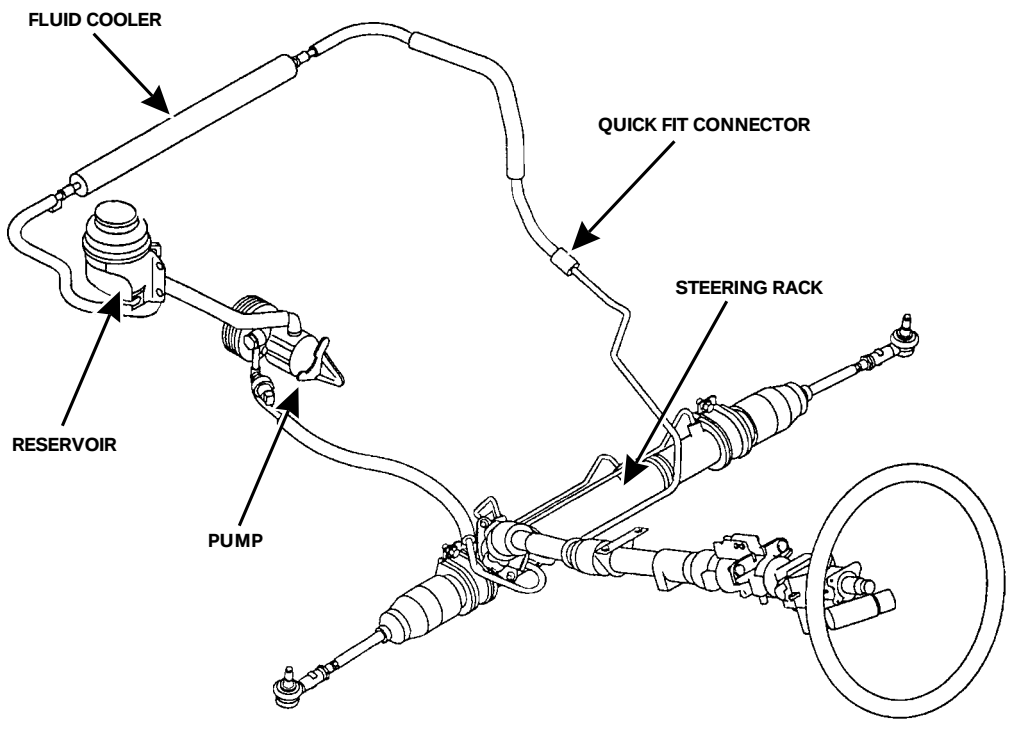
Three-point seat belts with ELR and ALR functions are fitted to the two rear seat positions. Refer to Front Seat Belts on page 9 for ELR and ALR operation.

Coupe retractors are outboard on the parcel shelf. Convertible retractors are behind the rear seat squab with the belt routed up and inside the seat belt tower.

Power Steering

The XK8 power steering system is manufactured by ZF and functions the same way as the 1995 – 1997 MY Sedan Range power steering system, with the addition of a variable steering ratio rack and pinion assembly that provides precise steering and optimum control by mechanically reducing the steering ratio as the steering wheel is turned to the left or right of center.

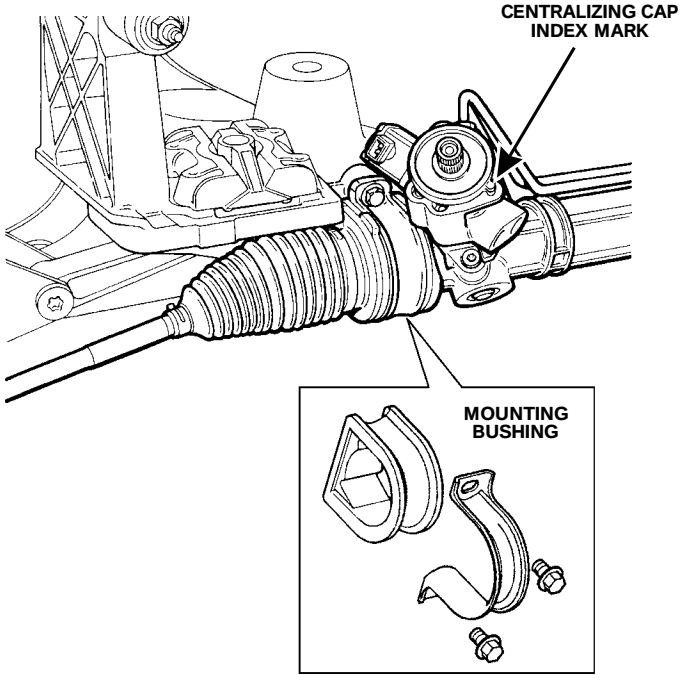
VARIABLE ASSIST POWER STEERING HYDRAULIC SYSTEM



NOTES

Steering Rack

STEERING RACK MOUNTING



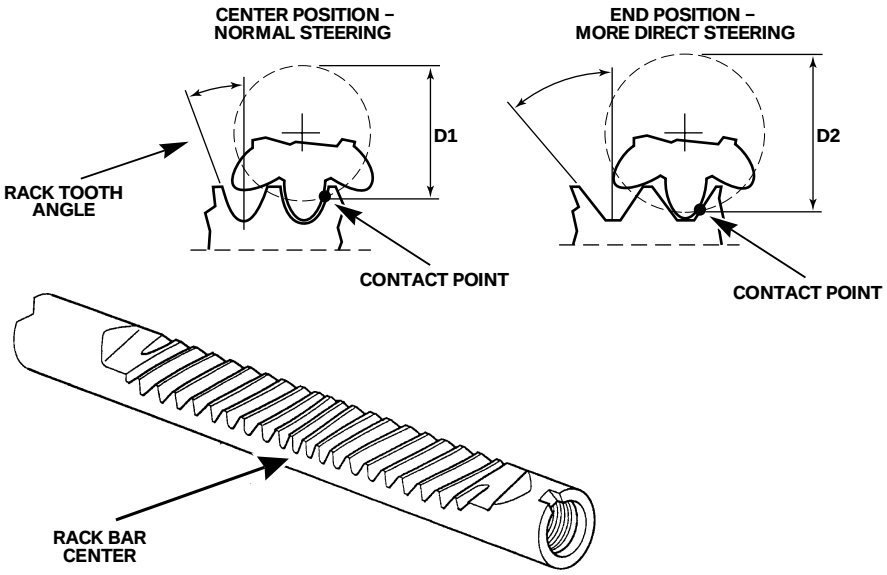
T400/5.10

The steering rack assembly is mounted directly to the subframe in rubber bushings. Because of its variable ratio design, the steering must be centered during steering column or suspension geometry adjustment. To center the steering, align the pinion centralizing cap with the index mark on the pinion / valve assembly.

Variable ratio steering

The variable steering ratio is achieved by the tooth design of the pinion gear and rack bar. As the steering is moved to the left and right of center, the pinion gear tooth / rack bar contact point progressively changes, effectively increasing the pinion gear diameter. The steering ratio becomes more direct as the pinion diameter increases.

VARIABLE RATIO RACK AND PINION GEARS



T400/5.11A & B

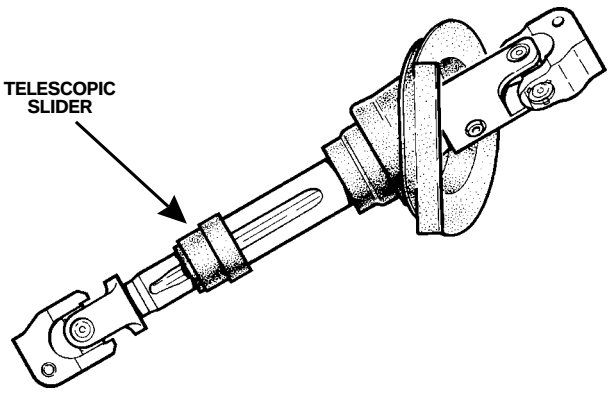
Steering Column

Lower Steering Column

The telescopic lower steering column and its boot are a non-serviceable assembly. The telescopic slider allows 20 mm (0.79 in.) movement. If the telescopic slider is separated for any reason, the column must be replaced. It must not be reassembled. The column universal joints can be connected to the pinion and upper steering column on any spline.

NOTE: The column must be disconnected from the steering rack before the engine or the front suspension subframe is removed.

LOWER STEERING COLUMN



T400/5.12

Upper Steering Column

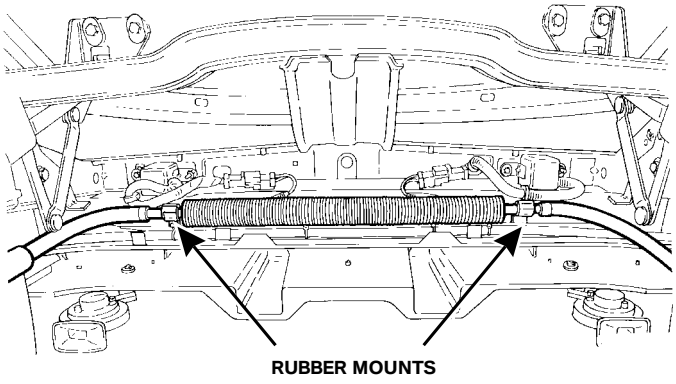
The upper steering column is the same as the 1995 – 1997 MY Sedan Range, but with differences in adjustment range, connector mounting brackets, and the reach adjustment motor.

Cable Reel Cassette

The XK8 cable reel cassette provides the interface between the vehicle wiring harnesses and the following steering-wheel-mounted components:

- Driver side airbag
- Horn switches
- ICE mode, seek and, volume switches
- Cruise control set, cancel, and resume switches.

POWER STEERING FLUID COOLER



T400/5.13

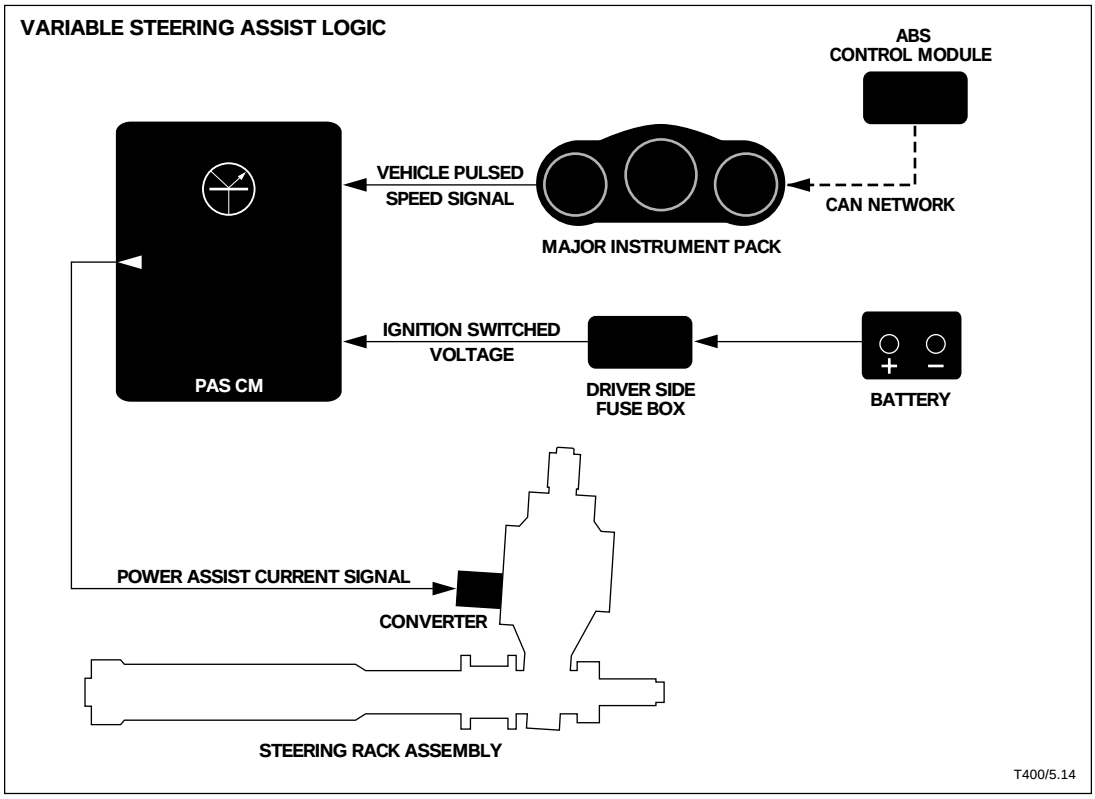
Steering Fluid Cooler

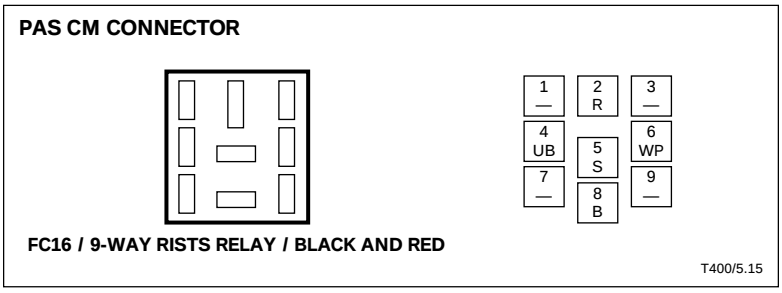
The PAS fluid cooler is located in front of the radiator, rubber mounted on the body front cross-member. The cooler is a non-serviceable assembly complete with its hoses. The right side hose connects to the rack-mounted return pipe with a quick fit connector sealed by two replaceable "O" rings. The left side hose connects to the reservoir with a conventional spring clamp.

NOTES

Steering Control Module

The power-assisted steering control module (PAS CM) performs the same functions as the 1995 – 1997 MY Sedan Range module by varying the amount of steering assist according to vehicle speed. It is located above the passenger footwell near the "A" post. The PAS CM converts a B+ voltage pulsed vehicle speed signal from the instrument pack to a variable current signal. The variable current signal drives the PAS control valve converter (transducer), which acts on the pinion / control valve assembly to vary the amount of hydraulic assist pressure. At low vehicle speeds the steering assist pressure is high, and it progressively reduces as the vehicle speed increases.





PAS CM Pin out information

I – Input, O – Output

I/O	Pin	Description
O	FC16-2	Transducer (converter) neg.
I	FC16-4	Vehicle speed
O	FC16-5	Transducer (converter) pos.
I	FC16-6	Ignition sw. power supply
I	FC16-8	Ground

Vehicle speed signal	@ 10 mph (16 km/h) = 20 Hz, @ 20 mph (32 km/h) = 40 Hz
Maximum converter drive signal	854 mA (Maximum steering assist)
Minimum converter drive signal	15 mA (Minimum steering assist)

Steering Pump

The new design "roller vane type" hydraulic pump is mounted directly on the engine block. Powered by the engine drive belt, the pump provides 107 bar (1,550 psi) of hydraulic pressure to the steering rack assembly. The pump is not serviceable.

Drive belt tension

A single belt is used to drive the steering pump and other engine accessories. Belt tension is automatically regulated with a spring loaded idler pulley. A belt stretch indicator on the pulley mechanism determines the need for belt replacement.

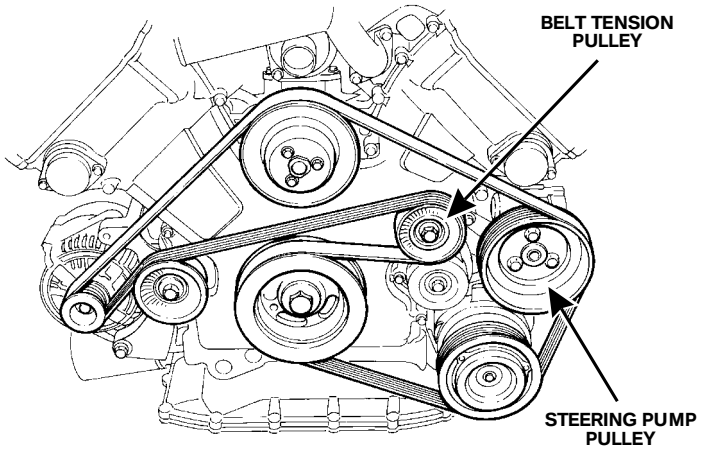
Reservoir

The fluid reservoir contains a 10 micron filter and is not serviceable. If the system is damaged or a major component is replaced, the reservoir must also be replaced.

Refer to the XK8 Diagnostic and Test Manual for the power steering filling procedure.

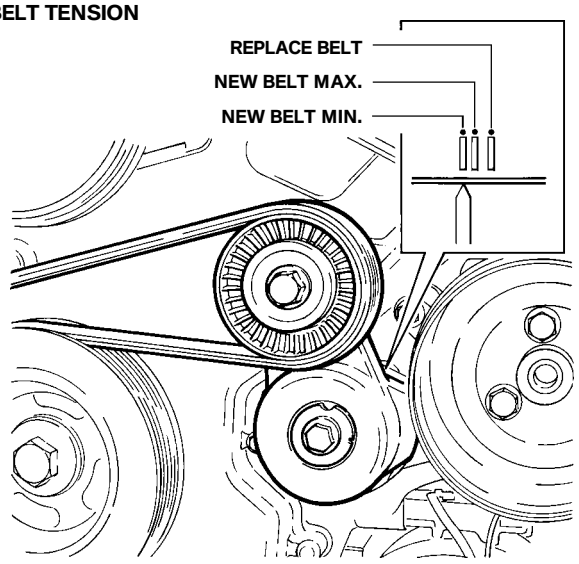
NOTES

POWER STEERING PUMP DRIVE



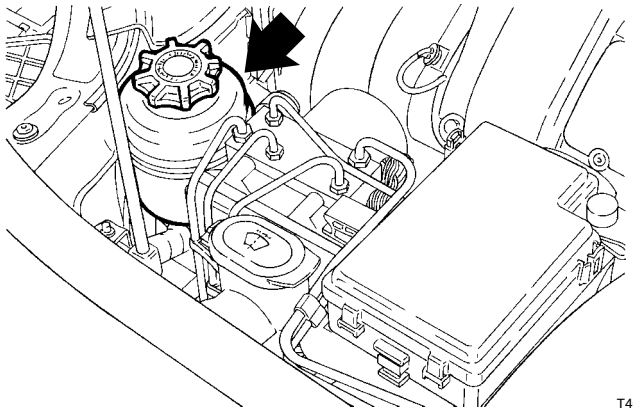
T400/5.16

DRIVE BELT TENSION



T400/5.17

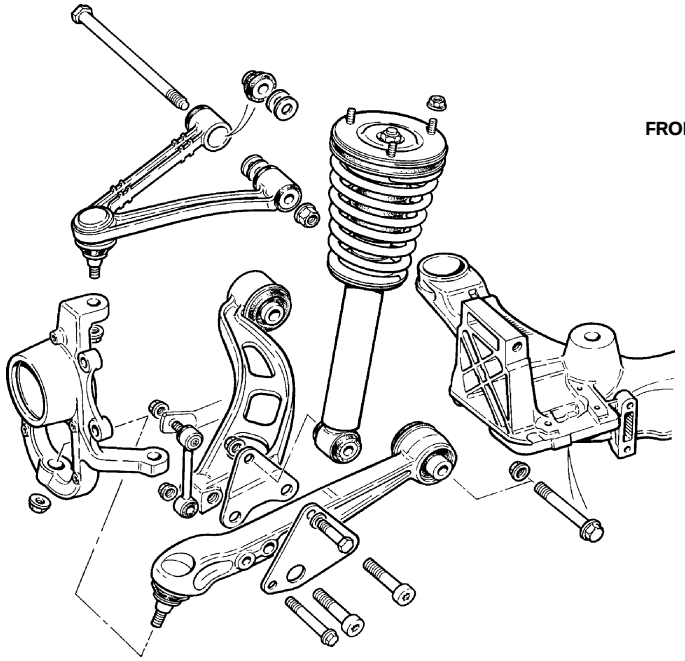
POWER STEERING FLUID RESERVOIR



T400/5.18

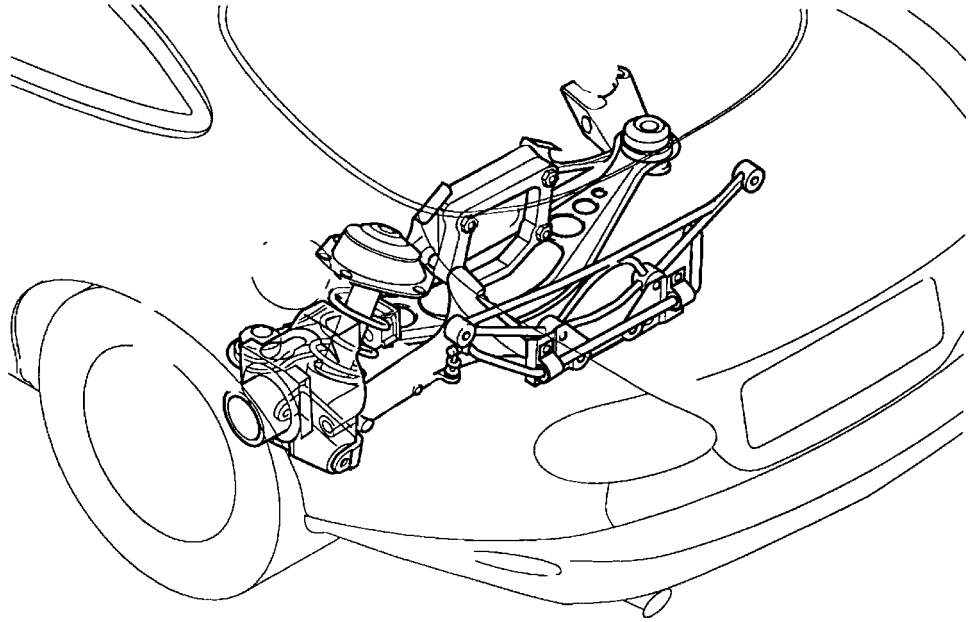
Suspension

XK8 SUSPENSION



FRONT SUSPENSION

REAR SUSPENSION



T400/5.19A & B

Front Suspension

Front subframe

The front subframe is manufactured from aircraft grade heat-treated aluminum. It mounts to the body with two bonded rubber bushings at the front and two bonded rubber mounts at the rear. The engine mounts are supported by the subframe.

⚠ CAUTION: Do not jack the vehicle on the front subframe. Do not attempt to weld or repair the subframe; if the subframe is damaged, it must be replaced.

Front upper "A" arms

The upper "A" arms are one-piece steel forgings with slipflex bushings for the fulcrum bolt. Each "A" arm is located axially on its fulcrum bolt by four spacers: two 1.6 mm (0.0629 in.) blue spacers and two 0.9 mm (0.0355 in.) red spacers. Spacer position tailors the front suspension caster angle for various markets. Spacer positions are different between the left side and the right side.

Front lower "A" arms

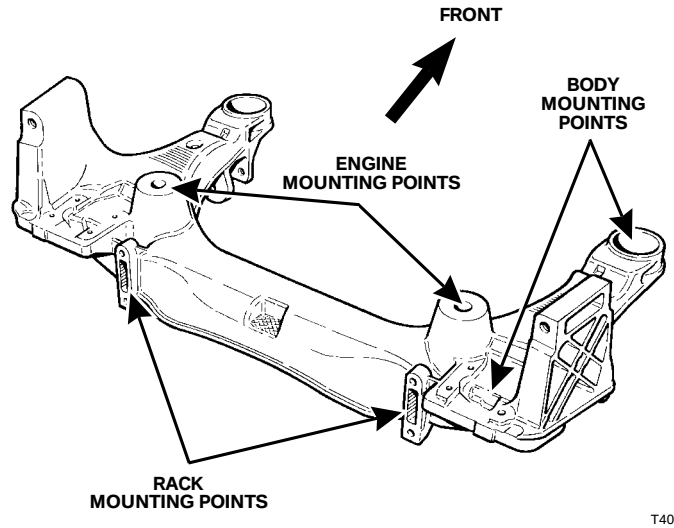
The lower "A" arms are two-piece steel forgings bolted together to form the assembly. The lower road spring / shock absorber mounting plates are secured by the "A" arm connecting bolts. Nonadjustable ball joints are pressed into the "A" arms to support the vertical link.

Front upper "A" arm spacer specifications

Location	Size	Qty.
Left forward (A)	1.6 mm (0.0629 in.)	2
	0.9 mm (0.0355 in.)	1
Left rearward (B)	0.9 mm (0.0355 in.)	1
Right forward (C)	0.9 mm (0.0355 in.)	1
Right rearward (D)	1.6 mm (0.0629 in.)	2
	0.9 mm (0.0355 in.)	1

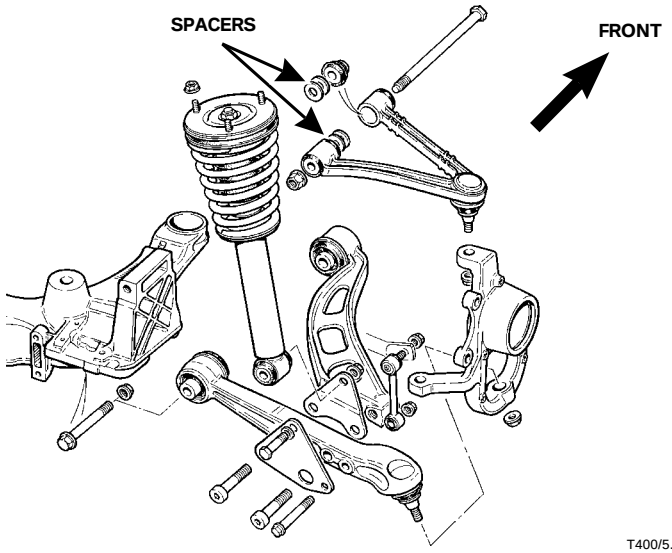
NOTES

FRONT SUBFRAME



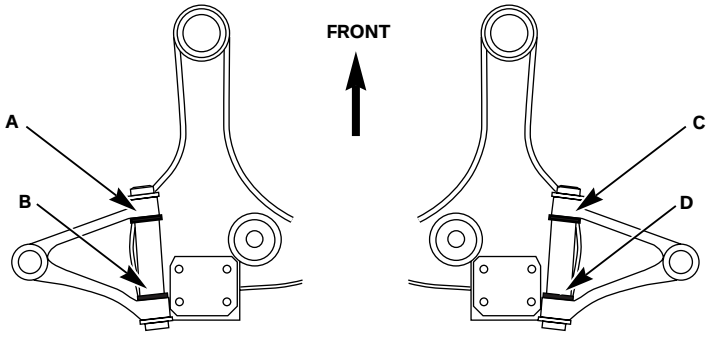
T400/5.20

FRONT SUSPENSION COMPONENTS



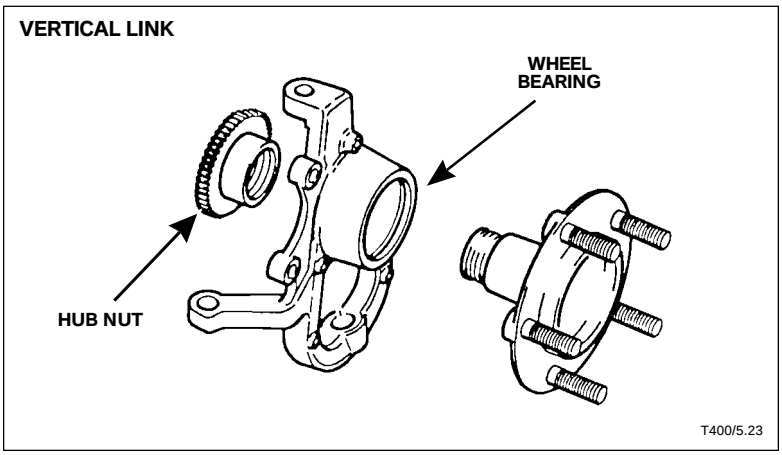
T400/5.21

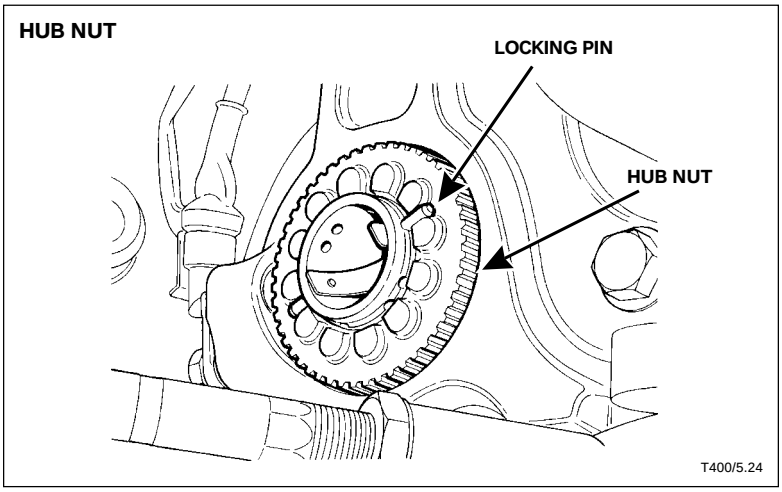
SPACER LOCATIONS

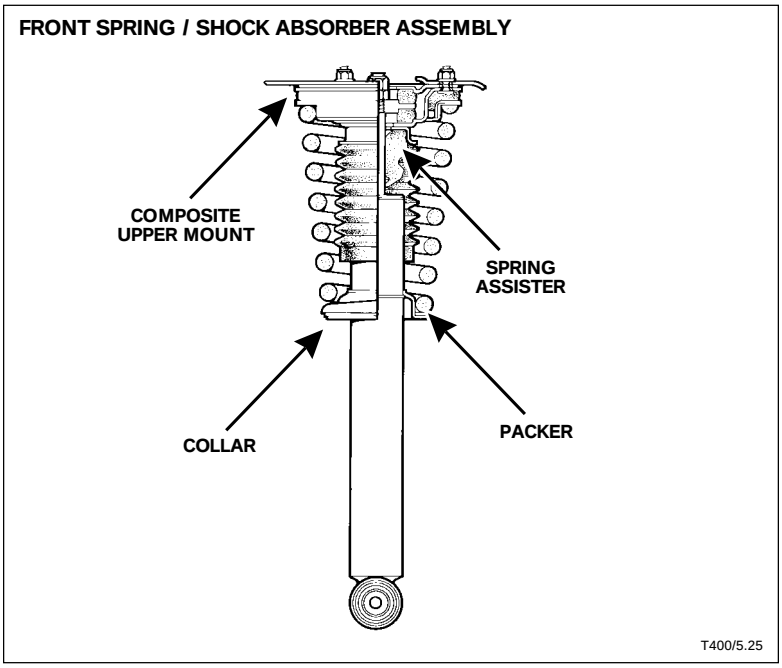


T400/5.22

Front Suspension







Front wheel bearings

The front wheel bearings are sealed units requiring no service or adjustment.

The bearing is pressed into the vertical link. The wheel hub is pressed into the bearing and retained by a special nut that acts as the wheel speed sensor rotor. The special hub nut is locked with a two pin spring loaded device. A Jaguar Service tool is needed to remove the bearing hub.

NOTE: If the hub is removed, the wheel bearing must be replaced.

Refer to the Workshop Manual section 204-01-4 for service procedures.

Front springs and shock absorbers

A tapered road spring mounts coaxially on each shock absorber. The spring is compressed between a lower spring pan collar, supported by the shock absorber body, and a composite upper mount, which is attached to the shock absorber piston rod. Packers are used between the lower pan and the spring. The composite upper mount bolts to the body. The lower shock absorber bushing and the composite upper mount are insulated to isolate the body from road vibrations.

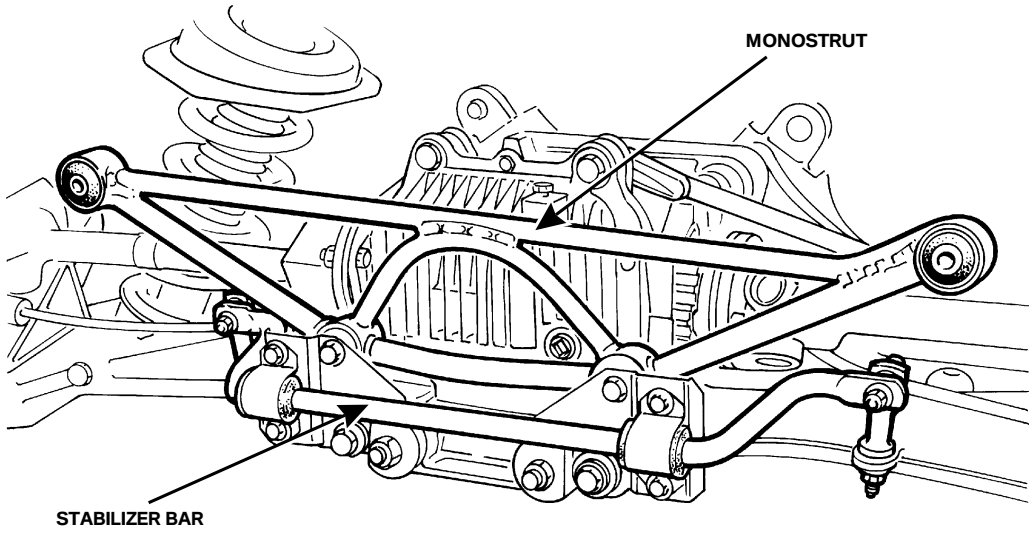
The suspension compression stop is a rubber "spring assister" on the shock absorber piston rod. The rebound stop is incorporated into the shock absorber.

NOTES

Rear Suspension

The rear suspension assembly is similar to that in the 1995 – 1997 MY Sedan Range. A fabricated monostrut takes the place of the two single struts used by the N/A (normally aspirated) Sedan. To improve drive shaft alignment, the new 14 HU final drive unit is constructed so that the drive pinion is on the vehicle center line. Camber and rear toe are adjustable, as on the Sedan.

REAR SUSPENSION MOUNTING



T400/5.26

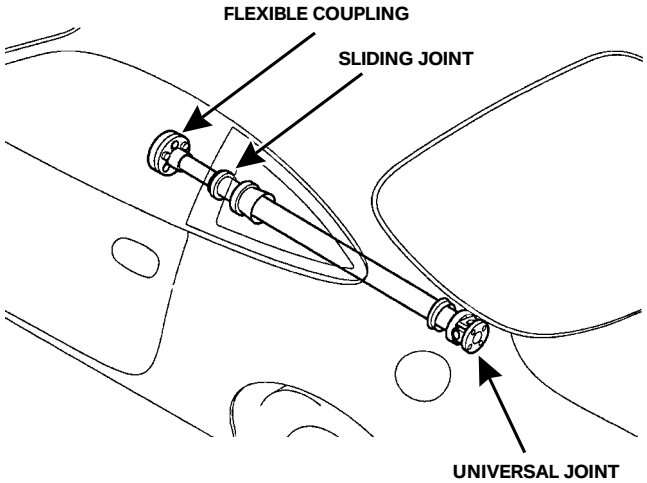
Drive shaft

An aluminum drive shaft connects to the transmission drive flange with a flexible coupling. A conventional universal joint is used at the final drive flange. The drive shaft sliding joint is nylon coated to reduce noise, vibration and harshness.

When removing the drive shaft, disconnect the front coupling from the transmission drive flange before disconnecting at the final drive.

NOTE: Allowing the drive shaft to hang unsupported will damage the nylon coating in the sliding joint.

DRIVE SHAFT



T400/5.27

NOTES

Alignment

Wheel alignment angles are specified with the vehicle set to the correct "ride height." Mid-laden tools are not required.

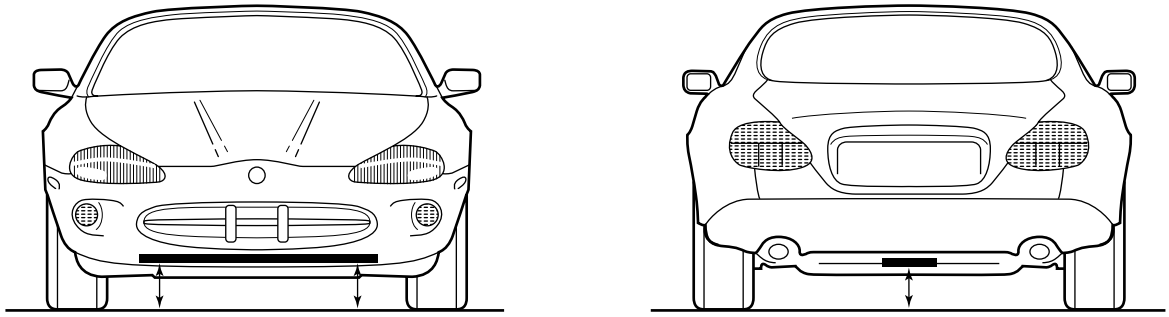
Ride height specifications

With a full fuel load and the tires inflated to comfort settings, ride height should measure as follows:

Front – subframe pads to ground: 276 ± 5 mm (10.87 ± 0.2 in.)

Rear – final drive carrier to ground: 207 ± 5 mm (8.15 ± 0.2 in.)

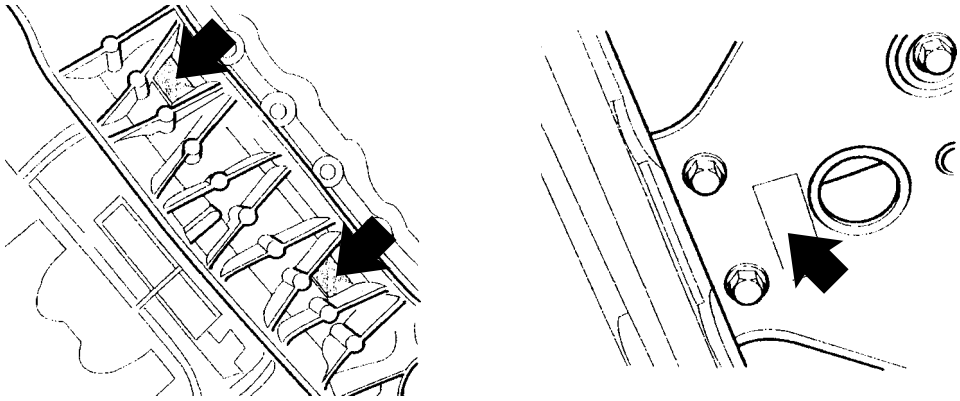
RIDE HEIGHT



276 ± 5 mm (10.87 ± 0.2 in.) **207 ± 5 mm (8.15 ± 0.2 in.)**

T400/5.28

RIDE HEIGHT MEASURING POINTS



FRONT SUBFRAME PADS **FINAL DRIVE CARRIER**

T400/5.29A & B

NOTES

Alignment Specifications

XK8 suspension geometry does not require adjustment under normal circumstances. Front caster and camber are not service adjustable. The following specifications are provided for reference only. If vehicle ride height or alignment geometry measurements are incorrect, inspect for suspension damage. If no damage is evident, contact Jaguar for further assistance.

Angle	Front	Rear
Caster	5.0˚ to 8.0˚ (max. differential left–to–right: 1.2˚)	N/A
Camber	+ 0.3˚ to –0.9˚ (max. differential left–to–right: 1.0˚)	–0.1˚ to –0.9˚
Toe-in	0.2˚ ± 0.2˚	0.3˚ ± 0.2˚

Refer to the latest technical information to assure the correct alignment specifications.

NOTES

DTC Summary

Electromechanical Airbag SRS: XK8 1997 MY ON

DTCs are stored in the diagnostic module nonvolatile memory and can be accessed only through the DLC (data link connector) using PDU.

⚠WARNING: MEASURING THE RESISTANCE OF AIRBAG CIRCUITS MAY CAUSE AIRBAG DEPLOYMENT.
REFER TO THE SERVICE LITERATURE FOR SAFE TESTING PROCEDURES.
OBSERVE ALL SAFETY PRECAUTIONS WHEN DIAGNOSING OR REPAIRING AIRBAG SRS SYSTEMS.

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	MIL ACTIVATED	POSSIBLE CAUSES
B1342	Internal diagnostic module fault	Switch ignition ON for more than 10 seconds.	YES	Diagnostic module failure
B1867	B+ voltage supply low (< 5 V) (Repair causes of any other logged DTCs before repairing B1867)	Switch ignition ON for more than 10 seconds.	YES	B+ voltage to diagnostic module circuit: open circuit, high resistance or short circuit to ground
B1869	Diagnostic module “beeps” 5 times every 30 minutes (Repair causes of any other logged DTCs before repairing B1869)	Switch ignition ON	—	AIRBAG SRS MIL failure plus additional airbag SRS system faults; Refer to “No AIRBAG SRS MIL” near the end of this summary
B1913	Airbag circuit short circuit (DTC 1913 will cause airbag SRS system 10 A battery fuse to open circuit, flagging DTC B1867. Repair cause of DTC B1913 first.)	Switch ignition ON for more than 3 minutes.	YES	Passenger or driver airbag to diagnostic module: short circuit to ground Passenger or driver airbag: internal short circuit to ground Driver airbag cassette: short circuit to ground Diagnostic module to impact sensor voltage supply circuit: high resistance or short circuit to ground Impact sensor to airbag circuits: short circuit to ground Impact sensor to ground: high resistance
B1914	Impact sensor circuit short circuit to ground (DTC B1914 will cause airbag SRS system 10 A battery fuse to open circuit, flagging DTC B1867.	Switch ignition ON for more than 3 minutes.	YES	Diagnostic module to impact sensor voltage supply circuit: open circuit, high resistance or short circuit to ground Impact sensor failure
B1921	Diagnostic module poor ground (> 3.0 Ω)	Switch ignition ON for more than 10 seconds.	YES	Diagnostic module to vehicle ground: high resistance Diagnostic module failure
B1922	Safing sensor voltage high (> 5 V)	Switch ignition ON for more than 10 seconds.	YES	Charging system voltage above 17 V Diagnostic module to airbag harness: short circuit to B+ voltage Cable reel cassette: short circuit to B+ voltage Diagnostic module failure
B1923	Diagnostic module fault (memory clear circuit)	Switch ignition ON for 30 seconds	YES	Diagnostic module failure
B1924	Diagnostic module “fuse blow” circuit fault	Switch ignition ON for more than 3 minutes.	YES	Diagnostic module B+ voltage supply circuit: open circuit or high resistance Diagnostic module to impact sensor circuits: open circuit or high resistance Impact sensor ground circuit: high resistance Impact sensor failure Diagnostic module failure
B1932	Driver airbag circuit high resistance (above 3.5 Ω)	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to driver side cable reel cassette; harness: open circuit or high resistance Cable reel cassette: open circuit or high resistance Driver side airbag: open circuit or high resistance Diagnostic module failure
B1933	Passenger airbag circuit high resistance (above 2.5 Ω)	Switch ignition ON for more than 30 seconds	YES	Diagnostic module to passenger side airbag harness: open circuit or high resistance Passenger side airbag: open circuit or high resistance Diagnostic module failure
B1934	Driver airbag circuit low resistance (below 1 Ω)	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to driver side cable reel cassette harness: short circuit Driver side cable reel cassette: short circuit Driver side airbag: short circuit Diagnostic module failure
B1935	Passenger airbag circuit low resistance (below 0.7 Ω)	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to passenger side airbag harness: short circuit Passenger side airbag: short circuit Diagnostic module failure
B1941	Right side impact sensor supply circuit high resistance	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to impact sensor harness circuits: open circuit, high resistance or short circuit to B+ voltage Impact sensor failure Diagnostic module failure
B1942	Left side impact sensor supply circuit high resistance	Switch ignition ON for more than 30 seconds.	YES	Diagnostic module to impact sensor harness circuits: open circuit, high resistance or short circuit to B+ voltage Left impact sensor failure Diagnostic module failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	MIL ACTIVATED	POSSIBLE CAUSES
B1944	Right impact sensor poor ground	Switch ignition ON for more than 30 seconds.	YES	Sensor to body grounds: loose or corroded Sensor to diagnostic module harness sensor ground circuit: high resistance or open circuit Sensor failure Diagnostic module failure
B1945	Left impact sensor poor ground	Switch ignition ON for more than 30 seconds.	YES	Sensor to body grounds: loose or corroded Sensor to diagnostic module harness sensor ground circuit: high resistance or open circuit Sensor failure Diagnostic module failure
No DTC	No AIRBAG SRS MIL	Switch ignition ON.	—	AIRBAG SRS MIL bulb failure Ignition auxiliary switched circuit to diagnostic module: no voltage or open circuit Instrument pack to diagnostic module AIRBAG SRS MIL circuit: open circuit Diagnostic module failure Instrument pack failure
No DTC	AIRBAG SRS MIL stays ON constantly with ignition ON	Switch ignition ON for more than 10 seconds.	YES	Instrument pack to diagnostic module AIRBAG SRS MIL circuit: open circuit or high resistance Ignition switched voltage to diagnostic module: open circuit, high resistance or short circuit to ground Diagnostic module failure
No DTC	AIRBAG SRS MIL flashes continuously (DTCs B1941, B1942, B1944 and B1945 logged)	Switch ignition ON for more than 10 seconds.	CONTINUOUS FLASHING	Both impact sensors disconnected Main wiring harness disconnected

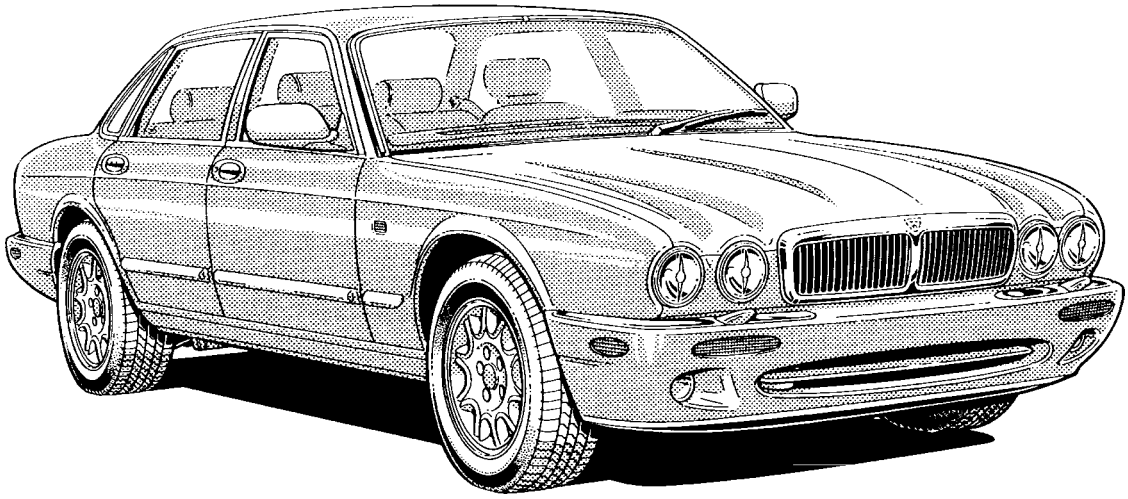
Contents

Introduction

XJ Series Sedan vehicles introduced for the 1998 Model Year contain a number of refinements that are built upon successful 1995 MY Sedan and XK8 systems. The refinements to the occupant protection systems, steering, suspension, and drive line may not be readily apparent to the driver. However, the changes improve the comfort, safety, and overall performance of the vehicle.

There are no significant changes to the XK8 for the 1998 Model Year. Refer to the XK8 Section for systems descriptions.

V8 XJ SERIES SEDAN



T400/6.01

NOTES

Occupant Protection

Jaguar V8 XJ Series Sedans comply with the occupant protection and safety standards of all countries. Body torsional rigidity and side impact resistance is improved through the revision of some body components and the use of high strength steel in a number of body panels.

Three-point active seat belts with pyrotechnic pretensioning retractors are fitted to the driver and front passenger positions. Pyrotechnic front airbags for the driver and passenger deploy to additionally protect the occupants during frontal impacts. Argon gas inflated side airbags located in the outboard frames of the driver and front passenger seats deploy to protect the occupants in the event of a severe side impact. A single-point sensing module (SPS) controls the operation of the front airbags and the front seat belt pretensioners. Side airbag deployment is controlled by the SPS using input signals from separate side impact sensors.

Active three-point seat belts are provided for the rear seat passengers.

⚠ WARNING: READ AND OBSERVE ALL SAFETY PRECAUTIONS IN JTIS (JAGUAR TECHNICAL INFORMATION SYSTEM) AND SERVICE BULLETINS BEFORE ATTEMPTING TO SERVICE THE FRONT OR SIDE AIRBAGS, THE STEERING WHEEL, THE AREA AROUND THE PASSENGER AIRBAG, THE FRONT SEAT BELT PRETENSIONING RETRACTORS, THE FRONT SEATS, OR ANY AIRBAG / SRS COMPONENTS.

OBSERVE ALL SAFETY PRECAUTIONS WHEN HANDLING OR TRANSPORTING AIRBAG MODULES.

DO NOT ATTEMPT TO MEASURE CIRCUIT RESISTANCE THROUGH THE AIRBAG MODULES OR THE SEAT BELT PRETENSIONING RETRACTOR UNITS. DOING SO MAY TRIGGER DEPLOYMENT AND RESULT IN PERSONAL INJURY.

DO NOT ATTEMPT TO REPLACE THE AIRBAG / SRS BATTERY POWER FUSE UNLESS THE SYSTEM IS DISARMED.

TO DISARM THE SRS SYSTEM, DISCONNECT THE NEGATIVE BATTERY CABLE AND WAIT A MINIMUM OF ONE MINUTE FOR THE RESERVE POWER CHARGE TO DISSIPATE.

NOTES

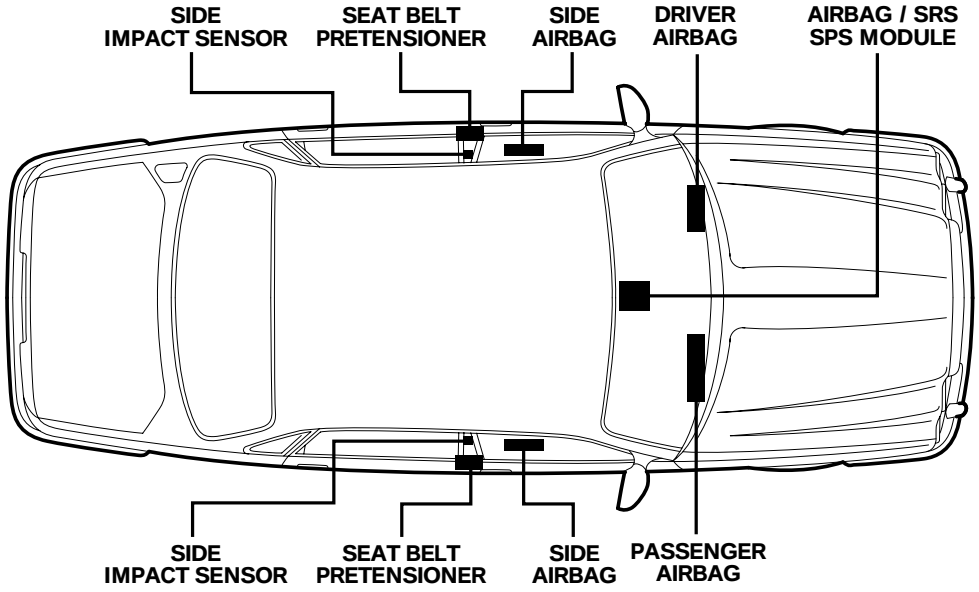
Electronic Single-Point Sensor Airbag / SRS

System Description

The SPS (electronic single-point sensor) Airbag / SRS system is a microprocessor controlled system that controls the deployment of the driver and passenger front and side airbags, and the front seat belt pretensioning retractors. The system connects to: the data link connector (DLC) for PDU diagnosis, the instrument pack for the AIRBAG / SRS MIL, and the body processor module (BPM) for an audible backup warning in case of MIL failure. The SPS Airbag / SRS system is not part of the vehicle multiplex circuitry.

A 5 A, fused, ignition switched B+ circuit provides system power.

SPS AIRBAG / SRS COMPONENT LOCATIONS



T400/6.01A

SPS Airbag / SRS system major components:

- Airbag / SRS single-point sensor module (SPS)
- AIRBAG / SRS MIL (malfunction indicator lamp)
- DLC (data link connector)
- Driver side
  - Airbag
  - Three-point active seat belt with pretensioning retractor
  - Side airbag
  - Side impact sensor
- Passenger side
  - Airbag
  - Three-point active seat belt with pretensioning retractor
  - Side airbag
  - Side impact sensor

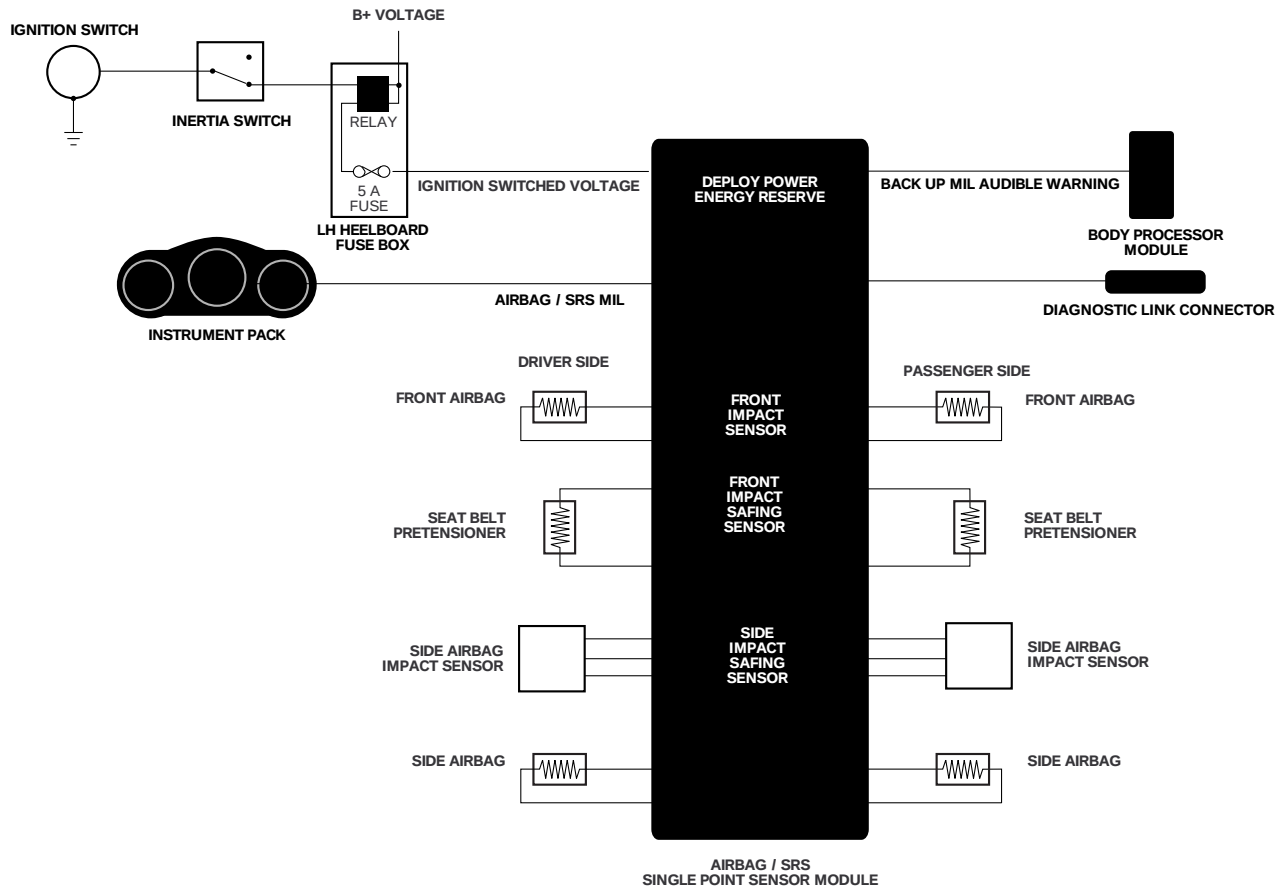
NOTE: All system components MUST be torqued to specification. Refer to the JTIS and Service Bulletins for the correct specifications.

Electronic Single-Point Sensor Airbag / SRS

System Operation

The SPS Airbag / SRS system uses a centralized single-point sensor module (SPS) containing a single electronic front impact sensor, safing sensors, diagnostic functions, nonvolatile DTC memory, and control circuitry.

SPS AIRBAG / SRS LOGIC



The front airbags, seat belt pretensioning retractors, side impact sensors, and side airbags are connected to and powered by the SPS. The SPS receives power from an ignition switched 5 A fused supply via the left hand heelboard fuse box.

When the ignition is switched to position II, a ground signal via the inertia switch activates the ignition positive relay located in the left hand heelboard fuse box. The relay supplies B+ voltage to the fuse box ignition power bus.

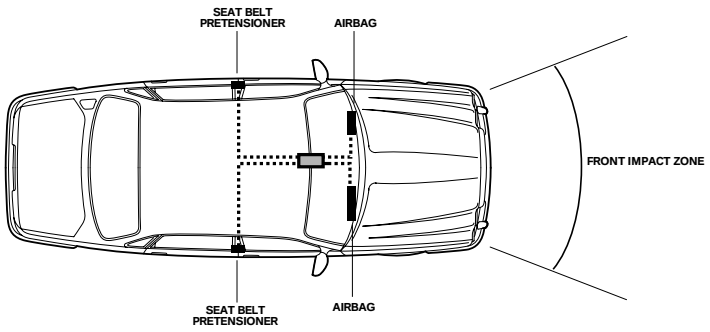
The SPS Airbag SRS system is active only when the ignition is switched ON and the inertia switch is in its normal state providing a ground signal to the heelboard ignition positive relay. A reserve voltage supply in the SPS maintains system power for approximately 1 minute after B+ power is disconnected or the inertia switch is activated.

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

Frontal impact

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.

FRONT IMPACT ZONE



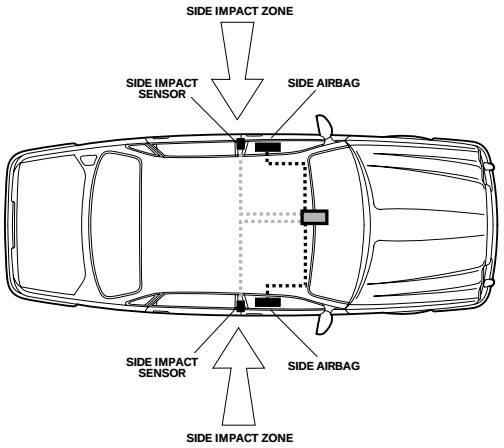
T400/6.04

Side impact

If a side impact sensor 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.

NOTES

SIDE IMPACT ZONE

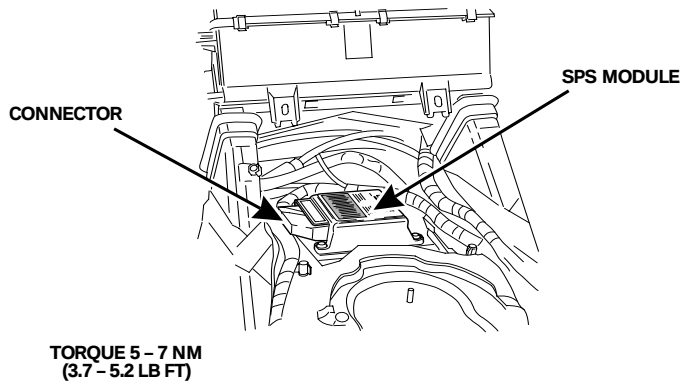


T400/6.05

Electronic Single-Point Sensor Airbag / SRS

Components

SINGLE-POINT SENSOR (SPS) MODULE LOCATION



T400/6.06

Single-point sensor (SPS) module

The SPS module is located on the drive shaft tunnel below the radio. The module completely controls the operation of the front airbags and the front seat belt pretensioners. Side impact sensors provide signals that are processed by the SPS module for side airbag control. In addition, the SPS monitors the state of the entire system, controls the AIRBAG / SRS MIL and an audible backup warning signal if the MIL circuit fails, and provides DTC diagnostic access via the diagnostic link connector (DLC).

The SPS module contains a power reserve to maintain deployment power for approximately 1 minute after the module is disconnected from B+ voltage.

The following functions are integrated within the SPS module:

- Electronic front impact sensor
- Front impact safing sensor
- Side impact safing sensor
- Diagnostic, control, and DTC storage
- Deployment power reserve

Separate side impact sensors mounted on the B/C posts connect to the SPS module.

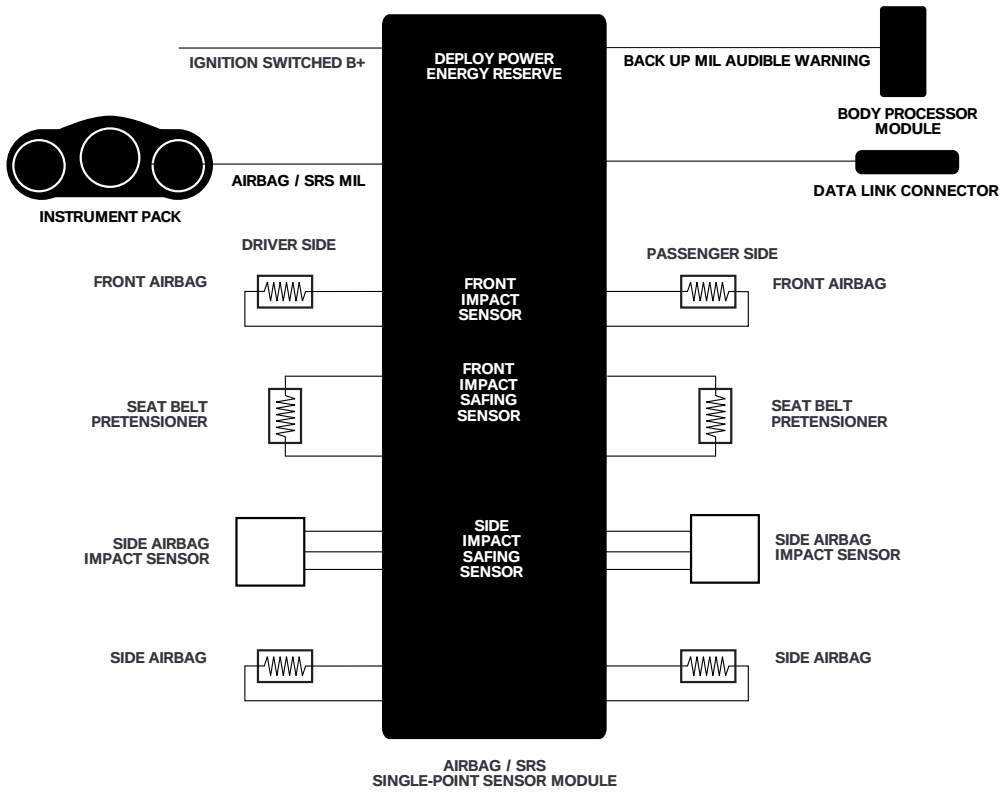
The module will function for three impact events. If three impacts have been recorded in memory, the module flags a DTC.

NOTES

SPS module diagnostics

The SPS module actively monitors the state of the entire system for faults, except for the side impact sensor modules (SISMs). The SISMs conduct their own diagnostics. The SISMs are in continuous communication with the SPS module whenever the system is active. If communication fails between a SISM and the SPS, or the SISM detects a fault, the SPS module logs a DTC and activates the AIRBAG / SRS MIL.

SPS AIRBAG MODULE DIAGNOSTICS



The SPS module logs all system DTCs including the time, in running hours, that the fault occurred. If a fault is intermittent, the MIL is activated and the DTC logged with the time, in running hours, that the fault occurred and the time that the fault was corrected. The MIL remains active until the ignition is switched off. If the fault is not present when the ignition is next switched on, the MIL is not activated. However, the DTC and its time of occurrence remains in SPS memory.

If the MIL circuit fails and an additional fault occurs, the SPS module signals the BPM via a direct hard wired data link. The BPM then operates an audible warning as a back up to the failed MIL circuit. The audible warning is 5 groups of 5 tones with a 5 second interval between each group. The warning repeats every 30 minutes. If the fault still exists when the ignition is next switched on, the warning is again activated.

DTC extraction and fault diagnosis can only be done with PDU.

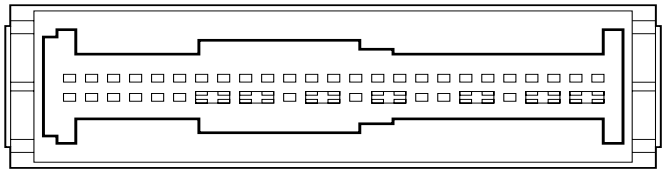
Refer to the DTC summaries on page 25.

Electronic Single-Point Sensor Airbag / SRS

Components (continued)

Single-point sensor (SPS) module

AIRBAG / SRS SINGLE-POINT SENSOR MODULE



25 R	24 R	23 S	22 S	21 P	20 P	19 YR	18 Y	17 YU	16 Y	15 —	14 YR	13 Y	12 —	11 YU	10 Y	SO 6	8 —	7 YR	6 BK	5 WK	4 N	3 U	2 N	1 U
50 —	49 —	48 —	47 —	46 —	45 —	44 —	43 —	42 —	41 —	40 Y	39 —	38 —	37 —	36 —	35 —	34 —	33 —	32 —	31 —	30 —	29 —	28 —	27 —	26 —

CA / 5-WAY / YELLOW

T400/6.07

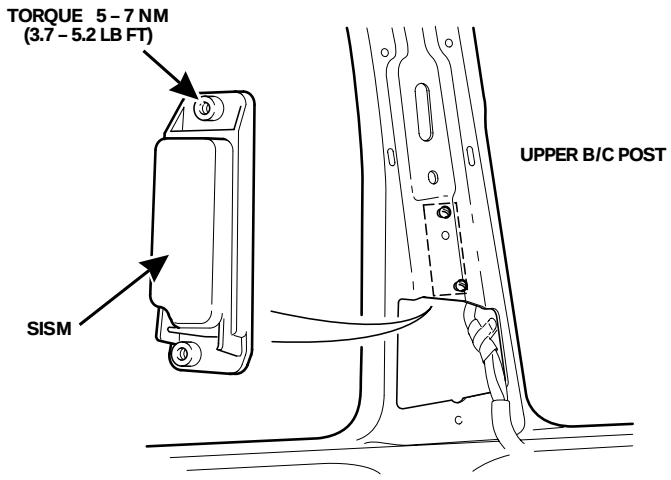
Pin out information
I – Input, O – Output, D – Serial and Encoded Communications

I/O	Pin	Description
O	CA61-1	LH seat belt pretensioner power supply
O	CA61-2	LH seat belt pretensioner ground supply
O	CA61-3	RH seat belt pretensioner power supply
O	CA61-4	RH seat belt pretensioner ground supply
I	CA61-5	Ignition supply voltage
I	CA61-6	Ground supply
O	CA61-7	Instrument pack SRS MIL
D	CA61-9	Diagnostic output
O	CA61-10	Driver airbag power supply
O	CA61-11	Driver airbag ground supply
O	CA61-13	Passenger airbag power supply
O	CA61-14	Passenger airbag ground supply
O	CA61-16	Side driver airbag power supply
O	CA61-17	Side driver airbag ground supply
O	CA61-18	Side passenger airbag power supply
O	CA61-19	Side passenger airbag ground supply
I	CA61-20	LH side impact sensor ground supply
I	CA61-21	RH side impact sensor ground supply
I	CA61-22	LH side impact sensor status
I	CA61-23	RH side impact sensor status
I	CA61-24	LH side impact sensor ground supply status
I	CA61-25	RH side impact sensor ground supply status
D	CA61-40	SRS audible backup warning output

Side impact sensor module (SISM)

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.

SIDE IMPACT SENSOR MODULE (SISM) LOCATION



T400/6.08

Airbags

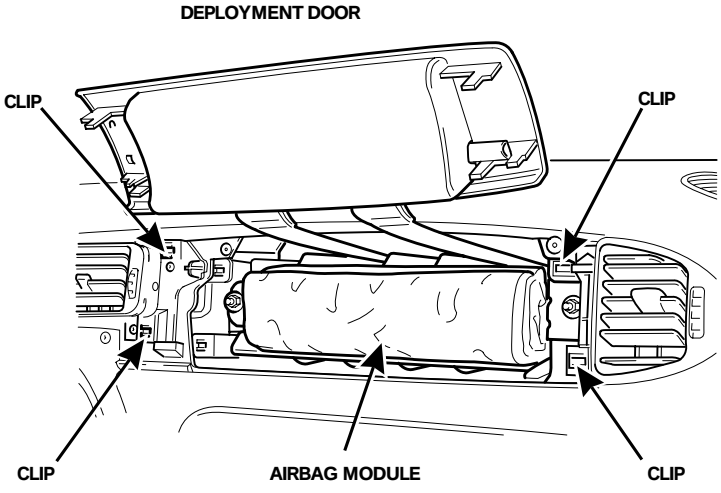
Driver airbag module

The driver airbag module is similar to the module used with the 1995 – 1997 Sedan electromechanical airbag / SRS system. Refer to Airbag Modules on page 12 of the Occupant Protection through 1997 MY section. For the 1998 MY, airbag igniter resistance is increased to 2Ω (1995 – 1997 MY igniter resistance is 1Ω) and the shape of the airbag module is revised to accommodate the steering wheel switches.

Passenger airbag module

The passenger airbag module uses a tethered deployment door similar to XK8. The deployment door retaining clips must be replaced every time the door is removed. In addition, the module igniter resistance is increased to 2Ω (1995 – 1997 MY igniter resistance is 1Ω).

PASSENGER AIRBAG MODULE



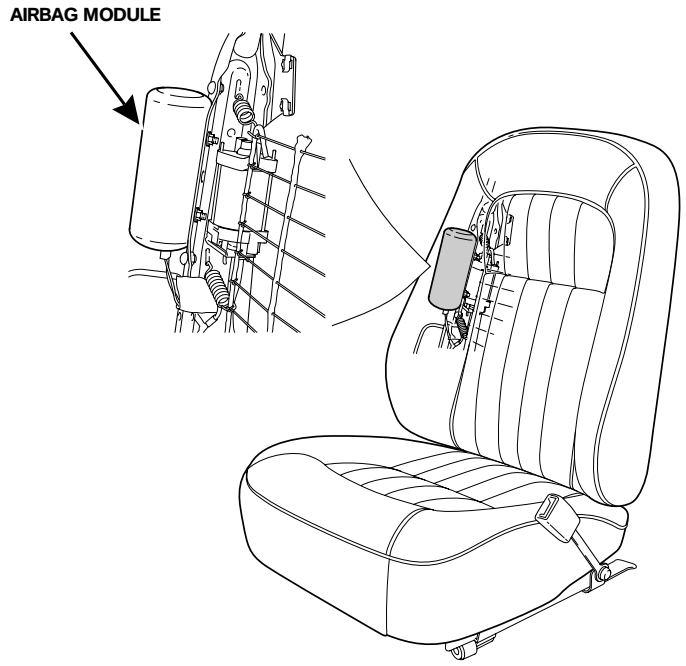
T400/6.09

NOTES

Electronic Single-Point Sensor Airbag / SRS

Components (continued)

SIDE AIRBAG MODULE LOCATION (PASSENGER SIDE)



T400/6.10

Side airbags

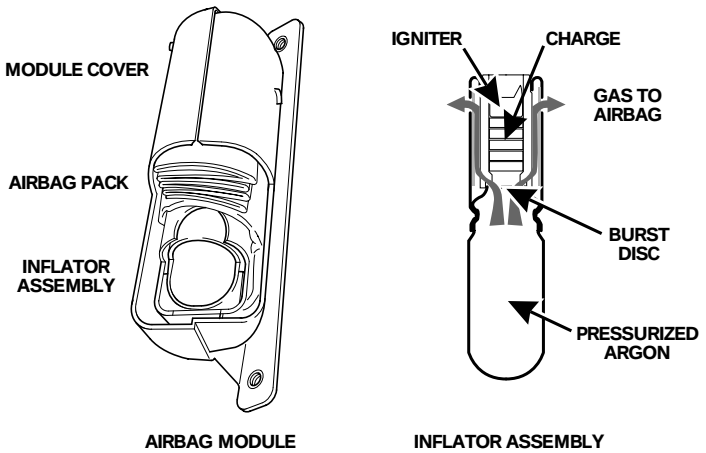
A side airbag module is attached to the outboard side of each front seat back frame. The module is contained in a cavity formed in the outboard seat bolster padding. A slit in the padding directs the expanding bag to deploy through the existing side bolster stitched seam. The airbag fully deploys within 11 milliseconds of impact.

If a side impact causes airbag deployment, the seat should be replaced because the impact would be severe enough to cause structural damage to the seat and the vehicle.

⚠ WARNING: AFTERMARKET SEAT COVERS MUST NOT BE INSTALLED ON SIDE AIRBAG EQUIPPED SEATS BECAUSE THEY MAY INTERFERE WITH AIRBAG DEPLOYMENT.

LOOSE ITEMS SHOULD NOT BE CARRIED IN THE SEATS WHERE THEY COULD INJURE VEHICLE OCCUPANTS IN THE EVENT OF SIDE AIRBAG DEPLOYMENT.

SECTION THROUGH SIDE AIRBAG



T400/6.11, 6.11A

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.

NOTES

Seat Belts

Front seat belts

The height adjusters for driver and front passenger three-point active seat belts are mounted 30 mm (1.18 in.) higher on the B/C post than on the 1995 – 1997 MY Sedans.

Front seat belt pretensioners

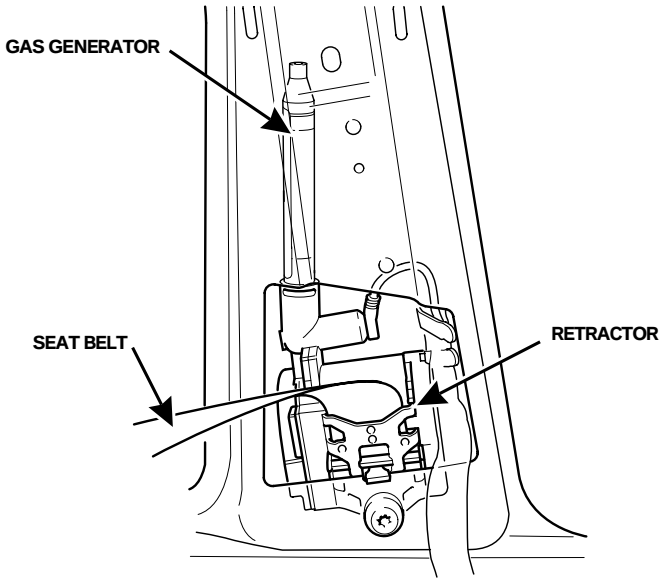
The front seat belt pretensioners are located in the B/C posts. In the event of front airbag deployment, the pretensioners activate to remove seat belt slack. The seat belt pretensioning retractor units are pyrotechnic devices similar to the XK8 units, except that they are triggered together electronically by the Airbag / SRS system when the front airbags are deployed. Refer to Pretensioning retractor units on page 10 of the XK8 section.

Rear seat belts

Three-point active seat belts equipped with ELR and ALR functions are fitted to the rear seat positions. Refer to Front Seat Belts on page 9 of the XK8 section for ELR and ALR operation.

NOTES

FRONT SEAT BELT PRETENSIONER



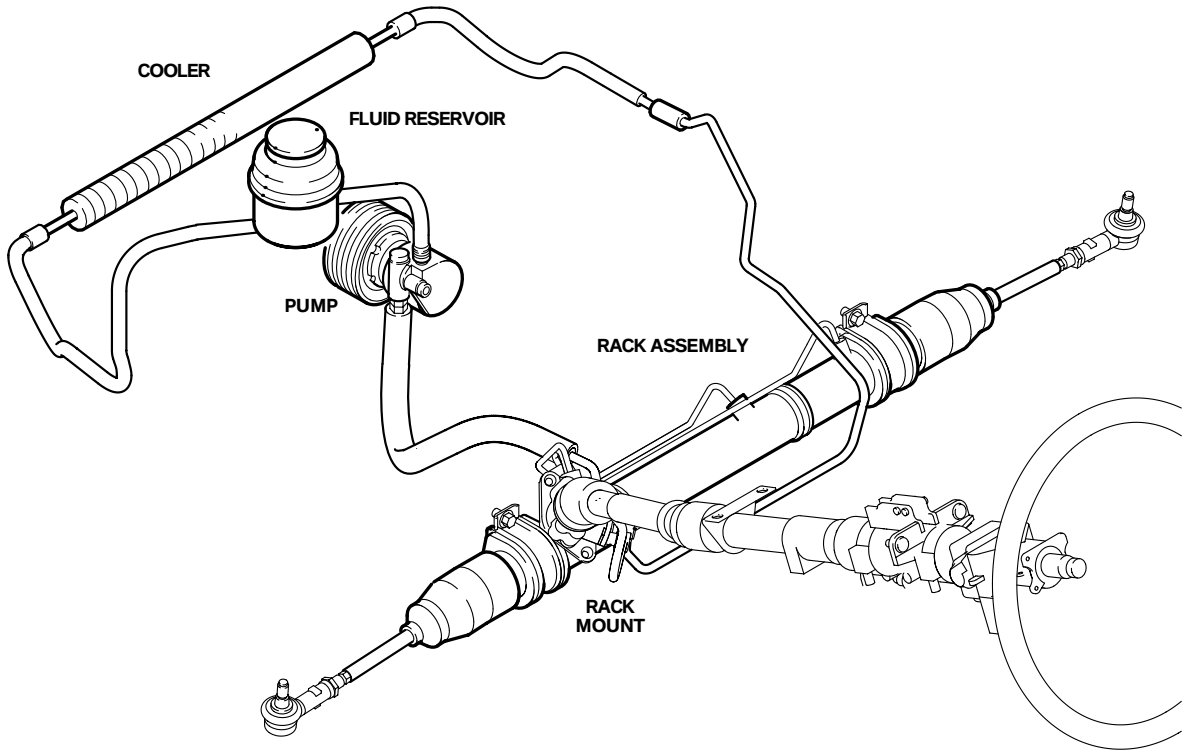
LOWER B/C POST

T400/6.13

Power Steering

XJ Series Sedan vehicles use the XK8 power assisted steering system (PAS) with minor changes to adapt to Sedan installation and steering characteristics. The system provides speed sensitive power assist and a variable steering ratio with a positive on-center feel.

XJ SERIES SEDAN POWER STEERING SYSTEM



T400/6.13A

Steering Reservoir, Pump, and Fluid Cooler

The PAS fluid reservoir, pump, and fluid cooler are the same as in the XK8. Hoses and piping are revised for the Sedan installation.

NOTES

Rack and Pinion Assembly

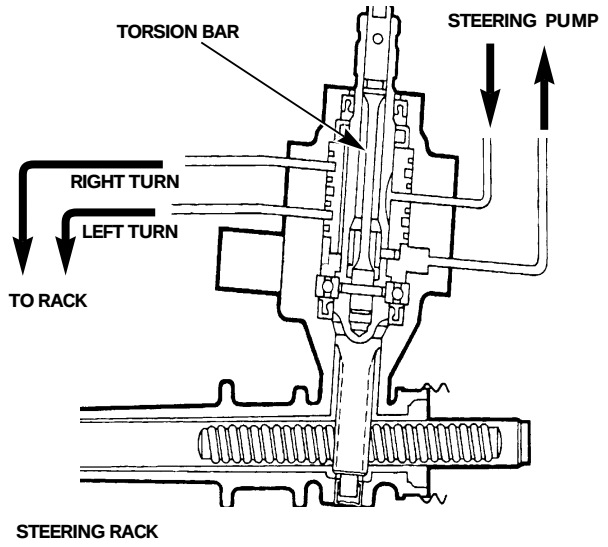
The Sedan steering rack is located behind the subframe and uses the same bushings and brackets as the XK8. The Sedan rack is externally the same as in the XK8 except for changes to the transfer pipes. Two versions of the steering rack are used on Sedans.

A "Comfort" steering rack, identified with a green plate, is used on all Sedans except XJR models. The torsion bar in the "Comfort" rack control valve / pinion assembly is 4.8 mm (0.189 in.) in diameter.

A "Sport" steering rack, identified with a silver plate, is used on XJR Sedans and all XK8 models. The torsion bar in the "Sport" rack control valve / pinion assembly is 5 mm (0.197 in.) in diameter.

The larger diameter torsion bar in the "Sport" rack provides less steering assist and requires more driver steering effort. All other specifications are the same between the racks.

TYPICAL CONTROL VALVE / PINION SHAFT ASSEMBLY



T400/6.13B

Steering rack specifications

Turns lock to lock	2.8
Steering ratio at center	18.7 : 1
Steering ratio at lock	13.5 : 1
Turning circle	12.1 m (39.7 ft.)
Turning circle long wheel base	12.4 m (40.7 ft.)
Torsion bar diameter:	
"Comfort" (green plate)	4.8 mm (0.189 in.)
"Sport" (silver plate)	5.0 mm (0.197 in.)

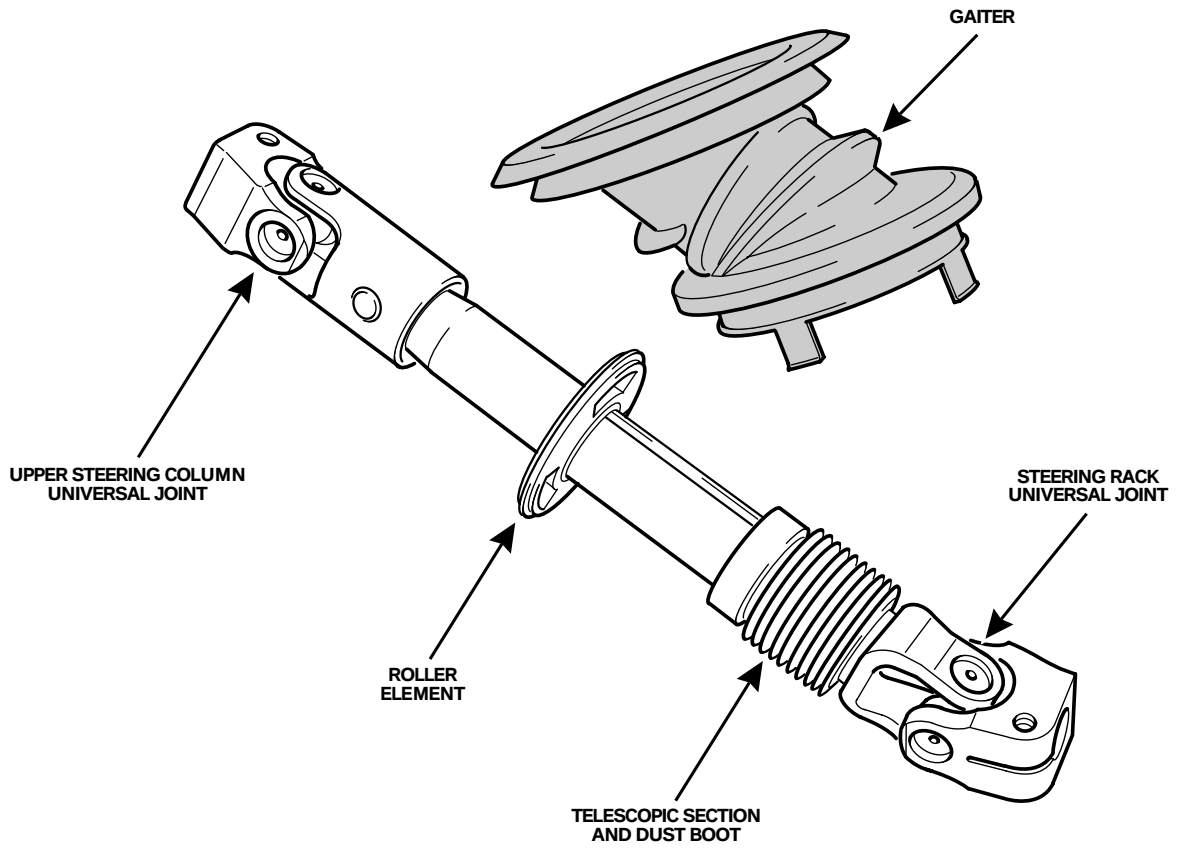
NOTES

Steering Column

Lower steering column

The lower steering column is similar to the XK8 column with the addition of a bellows type dust seal over the telescopic section. The telescopic section allows 20 mm (0.79 in.) movement of the column. The upper and lower universal joints allow the column to rotate on its axis supported by a rolling element assembly that helps centralize the column and reduce friction. The lower steering column telescopic section should not be separated, and the column assembly is not serviceable. The gaiter can be replaced separately.

LOWER STEERING COLUMN



NOTE: The column must be disconnected from the steering rack and partially collapsed to remove the engine or front suspension subframe. Thread locking compound must be applied to the column universal joint pinch bolt if it is reused.

NOTES

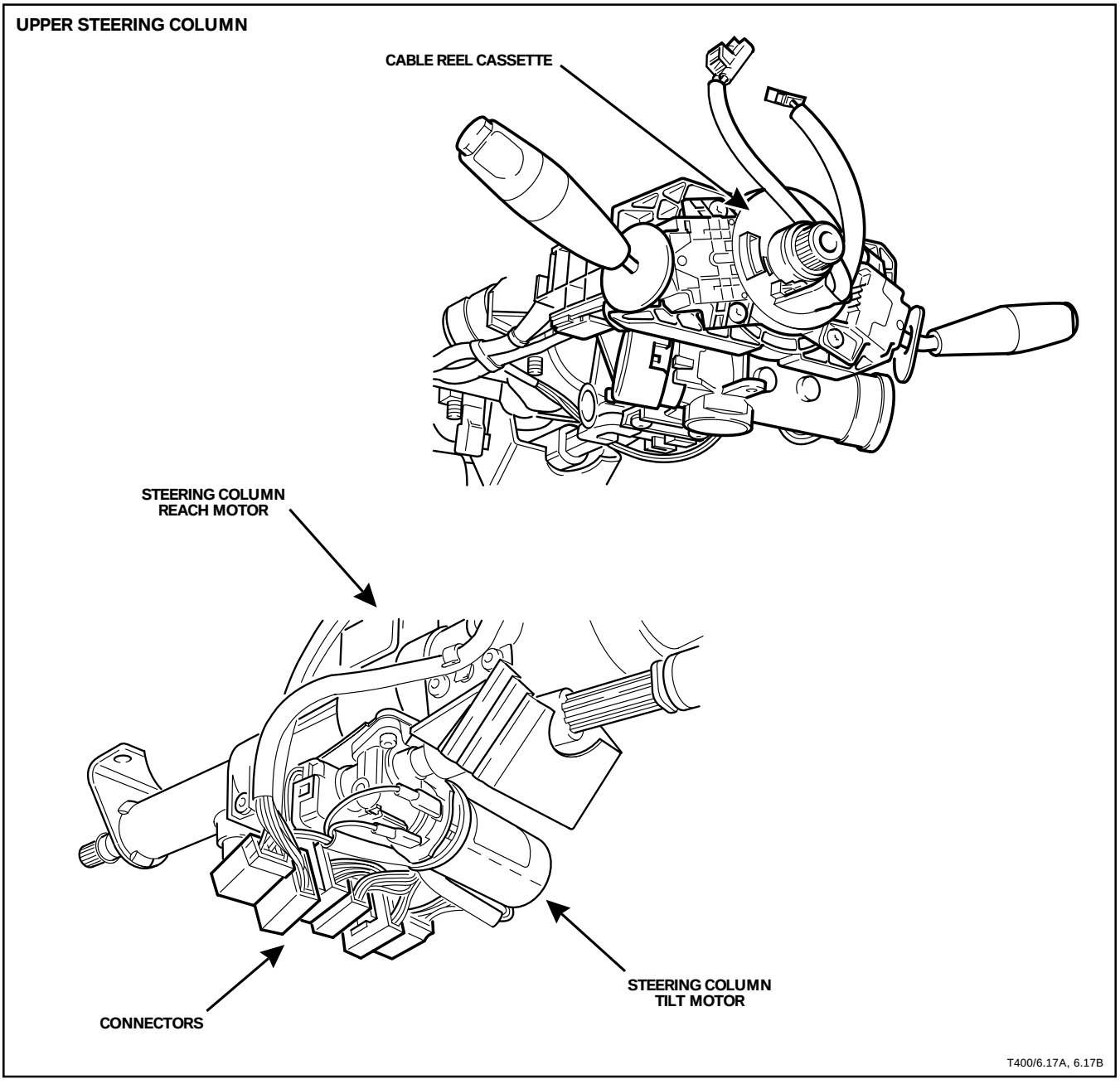
Upper steering column

The upper steering column attachment points have been simplified and the connectors relocated for easier servicing. Because the redesigned fascia eliminates the fascia switch pods, wheel reach adjustment is increased from 32 mm (1.26 in.) to 40 mm (1.6 in.). In addition, the BPM software controlling the steering column motors is revised to prevent the column from jamming during entry / exit tilt-away mode. The software stops the adjustment motors before the column contacts its mechanical stops.

Cable reel cassette

The cable reel cassette assembly is revised to include circuitry for the steering wheel mounted cruise control and ICE switches.

UPPER STEERING COLUMN



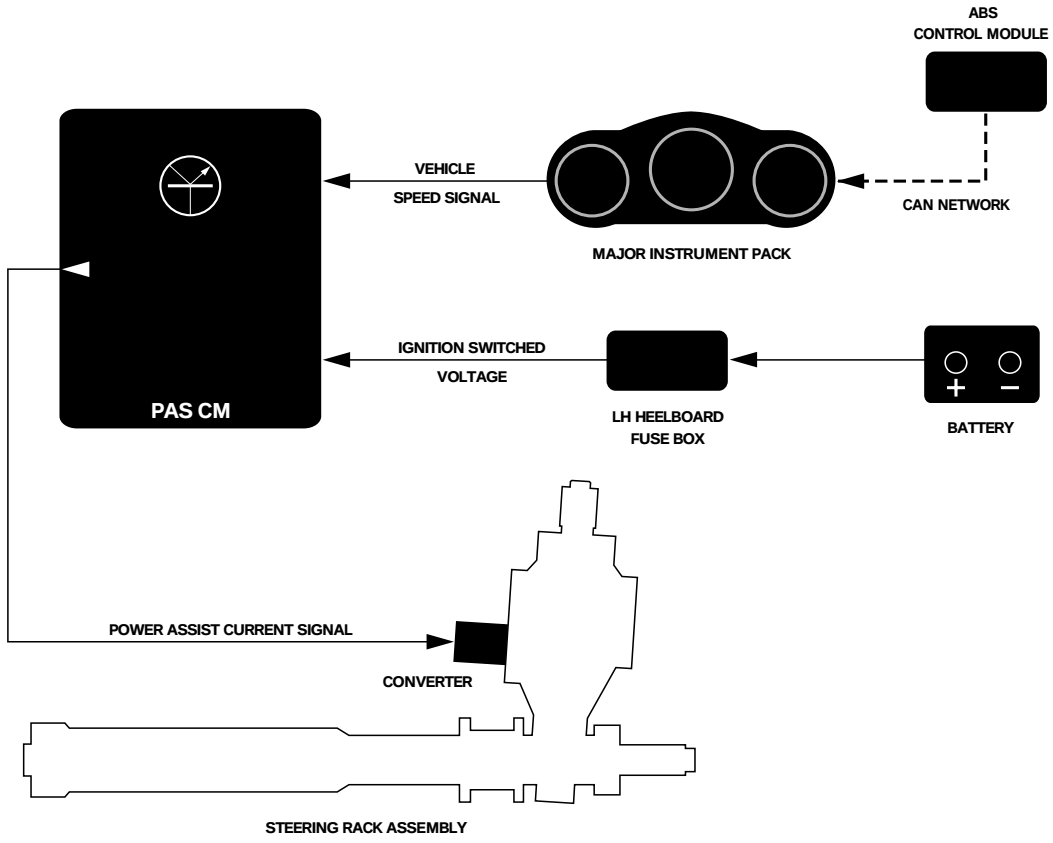
T400/6.17A, 6.17B

Steering Control

Steering control module

The PAS control module software is new to suit Sedan requirements.

XJ SERIES SEDAN POWER STEERING SYSTEM LOGIC



T400/6.14

PASCM CONNECTOR

FC16 / 9-WAY RISTS RELAY / BLACK AND RED

T400/6.15

PAS CM Pin out information

I – Input, O – Output

I/O	Pin	Description
O	CA32-2	Converter negative
I	CA32-4	Vehicle speed signal
O	CA32-5	Converter positive
I	CA32-6	Ignition switched power supply
I	CA32-8	Ground

Suspension

The newly designed XJ Series Sedan front suspension maintains the Jaguar pattern of unequal length “A” arms mounted to a subframe. The “A” arm inner fulcrum angles reduce dive during braking. Refinements to the suspension components improve NVH (noise, vibration, and harshness) refinement without compromising ride quality, suspension response, or handling. Caster, camber, and toe are adjustable. The independent rear suspension design is common across the current Jaguar model range.

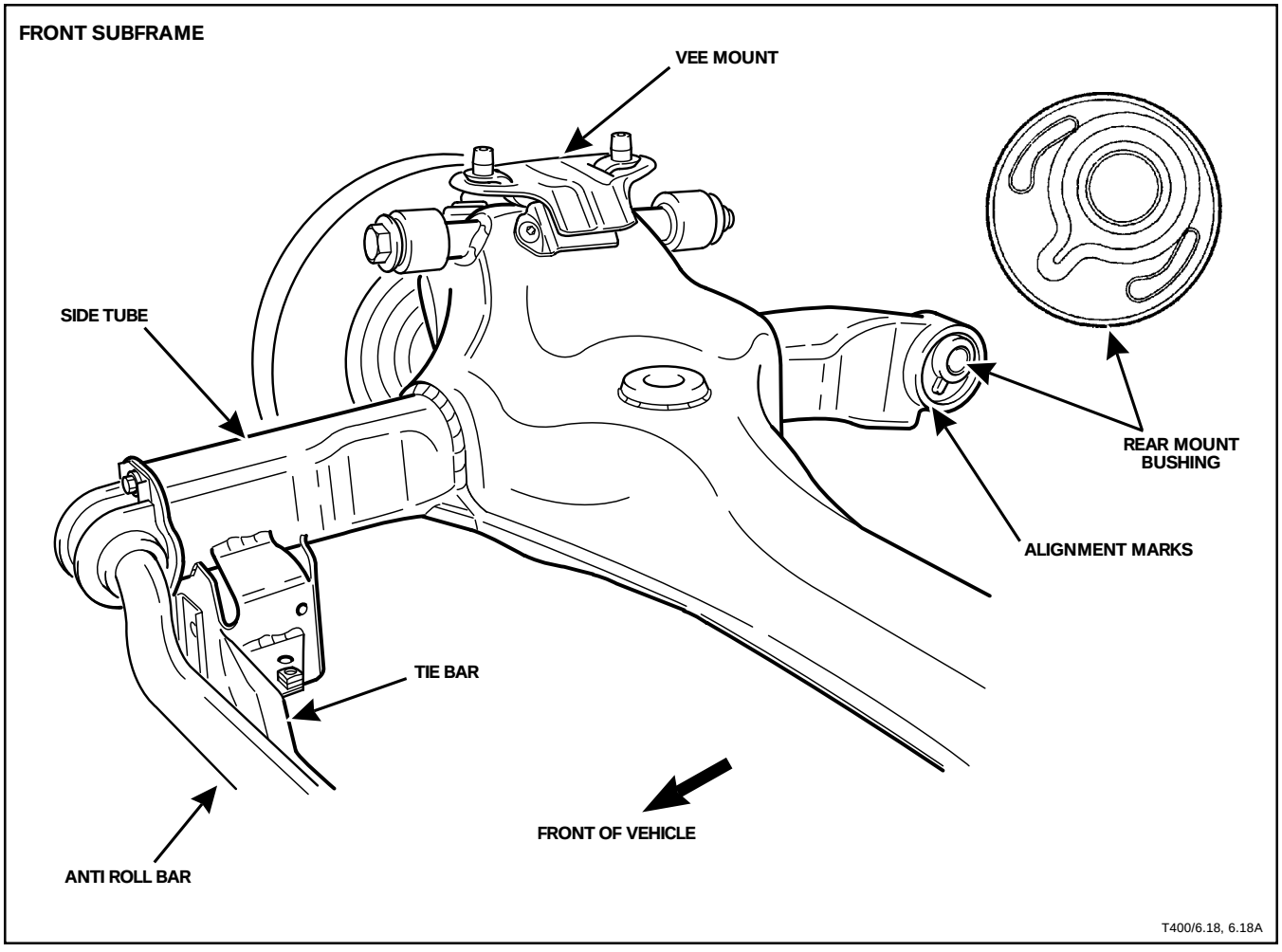
Front Suspension

Front subframe

A new front subframe is required to provide clearance for V8 engine installation. The subframe is fabricated of pressed steel and formed side tubes, which are welded to the subframe. The side tubes pass through the subframe and are joined to each other at the front with a tie bar. If a front impact occurs, the side tubes are designed to deform and absorb some of the impact force. No wax or foam is required within the subframe assembly.

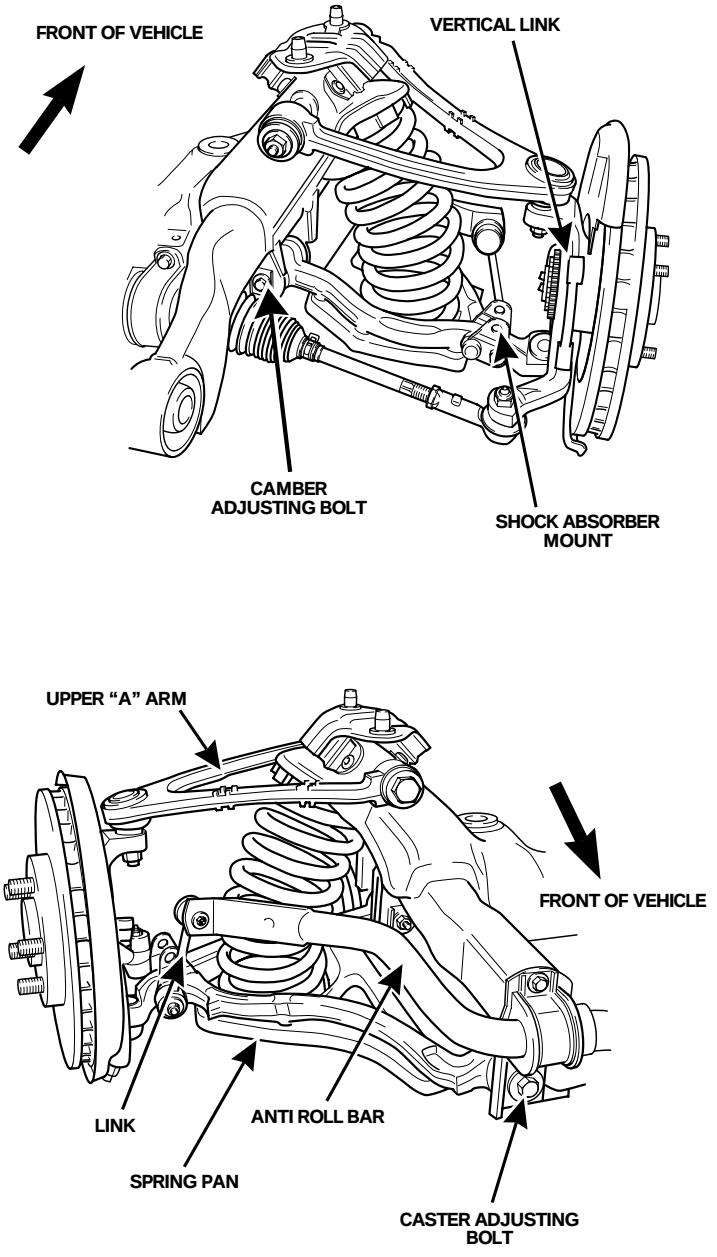
The subframe mounts to the body using the mounting points previously used for V12 Sedans. Retuned vee mounts and new bonded rear bushings improve ride refinement by reducing the transfer of braking energy, bumps, and road surface inputs to the body.

The rear bushings are a press fit in the subframe and must be installed with their installation marks aligned with marks on the subframe.



Front Suspension (continued)

VIEWS OF RIGHT FRONT SUSPENSION ASSEMBLY



T400/6.19, 6.20

Upper "A" arms

The one-piece forged steel upper "A" arms are similar to those in the XK8, with a nonadjustable ball joint pressed into the arm for the connection to the vertical link. The arm is located axially on the subframe upper fulcrum bolt by spacers between the "A" arm bushings and the subframe. The upper bushings are identical to those in the XK8.

Lower "A" arms

The lower "A" arms are two-piece steel forgings bolted together with plates for the lower shock absorber mounting point. The fulcrum bushings are similar to those in the XK8 but are retuned for the Sedan. Nonadjustable ball joints press into the rear arms to support the vertical link. The wide base lower "A" arm assembly reduces the suspension forces transmitted to the subframe and allows the use of cam fulcrum bolts for suspension geometry adjustment. A spring pan bolts to the lower side of the "A" arm assembly.

NOTE: Spring pan bolts should not be reused.

Vertical link

The vertical link assemblies are identical to those in the XK8. Refer to Front wheel bearings on page 18 of the XK8 section.

Road springs

The road springs are similar to previous Sedan vehicles, with spring rates calibrated for the new suspension.

NOTES

Front shock absorbers

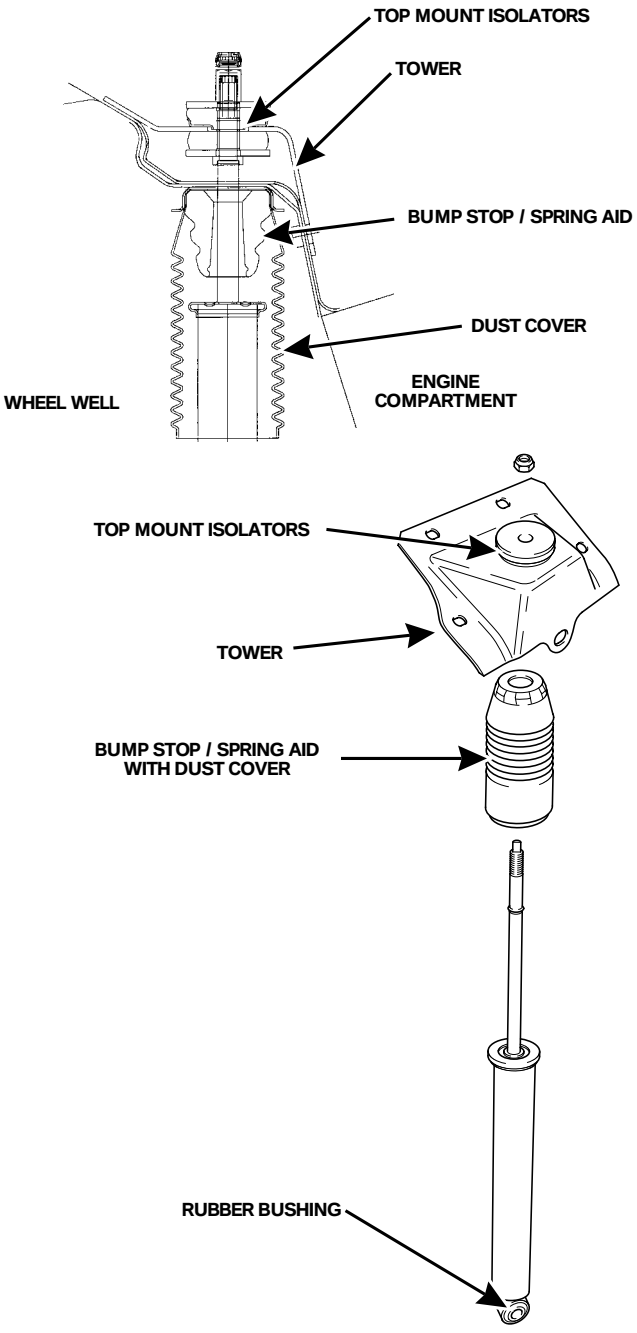
The lower shock absorber mount is a rubber isolated bushing. The upper mount is redesigned to separate the shock absorber loads from the bump stop / spring aid loads.

Shock absorber loads are transmitted to a tower bolted to the body within the engine compartment. The bump stop / spring aid loads are transmitted directly to the body.

This design allows the shock absorber top mount isolators to be softened because they no longer need to accept the bump stop / spring aid loads.

NOTES

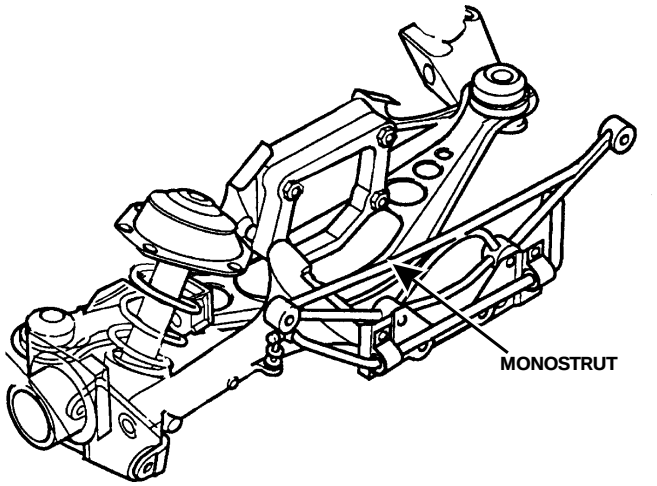
FRONT SHOCK ABSORBER ASSEMBLY



T400/6.21, 6.21A

Rear Suspension

REAR SUSPENSION



T400/6.22

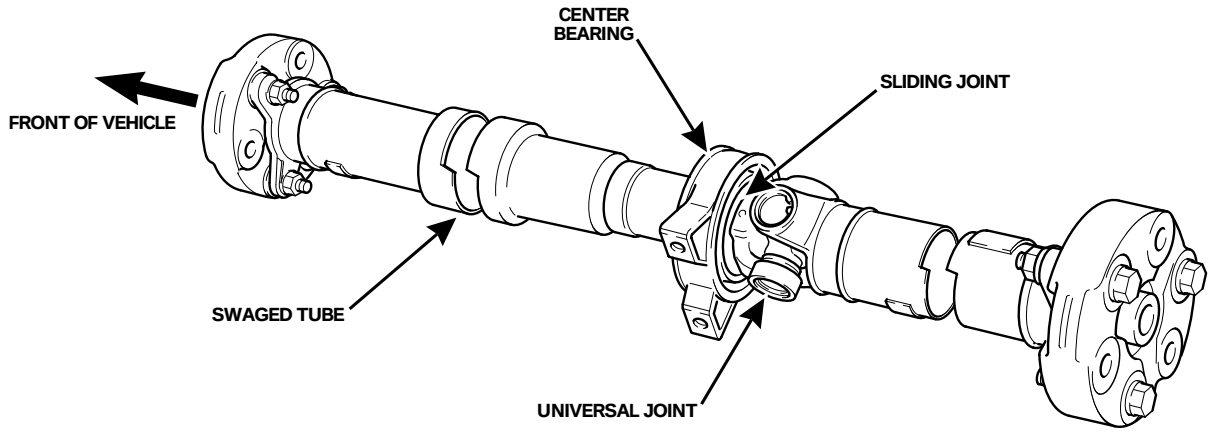
The independent rear suspension system is similar to the XK8 system. Refer to Rear Suspension on page 19 of the XK8 section.

All Sedans are fitted with the fabricated monostrut used on the XK8 and a 14 HU final drive unit. The 14 HU final drive unit is designed with the pinion shaft in the vehicle center line to improve NVH (noise, vibration, and harshness) levels.

Drive shaft

A new design drive shaft, constructed of thin wall tubing, reduces total weight and improves drive shaft balance. The on-center pinion design of the 14 HU final drive unit and the relocation of the drive shaft center bearing allows in-line shaft installation, which reduces the universal joint operating angles and resulting vibrations.

DRIVE SHAFT



T400/6.23

The front half of the drive shaft is manufactured with a swaged tube section to provide collapse in the event of a collision. The front and rear halves are connected at the center bearing with a splined sliding joint. The center universal joint is relocated to the rear half of the drive shaft. Flexible couplings connect the assembly to the transmission and final drive flanges.

The new drive shaft is between 7.12 – 9.7 lb (2.2 – 4.4 kg) lighter than the 1997 MY drive shaft, depending on the model.

NOTES

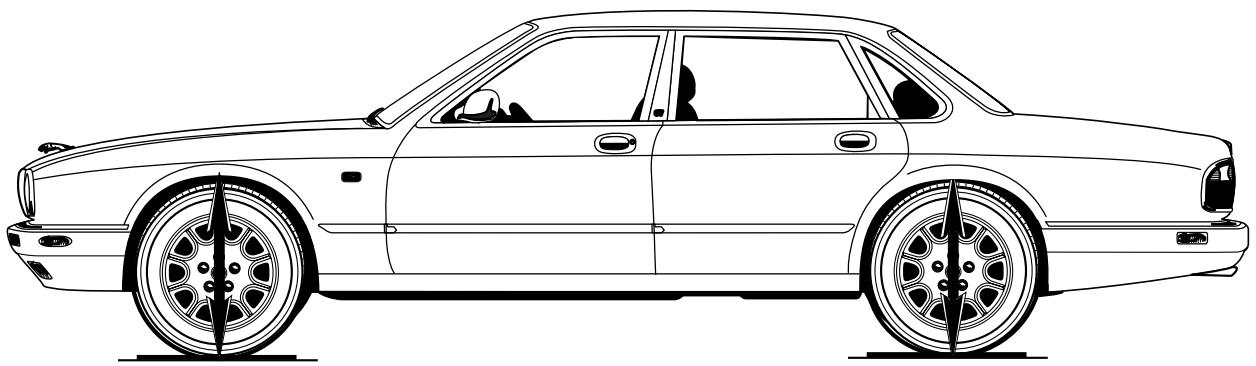
Alignment

Wheel alignment angles are specified with the vehicle at its normal ride height, the steering rack centered, the tires inflated to comfort settings, and a full tank of fuel. Mid-laden tools are not required.

Alignment Specifications

The following specifications are for guidance only. Consult the Jaguar Technical Information System (JTIS) and Service Bulletins for the latest specifications.

RIDE HEIGHT MEASUREMENT POINTS



T400/6.24

Ride height is measured from the alignment equipment slip plates to the top of the wheel arch.

Ride Height Specifications

Model	Front	Rear
XJ Series Sedan	702 mm (27.64 in.)	688 mm (27.09 in.)
XJR	682 mm (26.85 in.)	678 mm (26.69 in.)

Alignment Specifications

	Front	Rear
Camber	+ 0.3º to –0.9º (+ 0º 18‘ to –0º 54‘) (left and right sides within 1’.0º)	0º to –1.2º (0º to –1º 12’)
Caster	4º to 8º (left and right sides within 1.2º)	Not adjustable
Total toe	0º 5’ toe-out to 0º 25’ toe-in	0º 5’ toe-out to 0º 35’ toe-in
Total toe (inches)		
16 in. wheels	0.58 mm (0.023 in.) toe-out to 1.78 mm (0.070 in.) toe-in	0.58 mm (0.023 in.) toe-out to 4.09 mm (0.161 in.) toe-in
17 in. wheels	0.61 mm (0.024 in.) toe-out to 1.88 mm (0.074 in.) toe-in	0.61 mm (0.024 in.) toe-out to 4.27 mm (0.168 in.) toe-in

DTC Summary

Electronic Airbag / SRS: Single-point Sensor – XJ Series Sedan 1998 MY ON

DTCs are stored in the Single-Point Sensor module nonvolatile memory and can be accessed only through the DLC (data link connector) using PDU.

⚠ WARNING: MEASURING THE RESISTANCE OF AIRBAG CIRCUITS MAY CAUSE AIRBAG DEPLOYMENT.
REFER TO THE SERVICE LITERATURE FOR SAFE TESTING PROCEDURES.
OBSERVE ALL SAFETY PRECAUTIONS WHEN DIAGNOSING OR REPAIRING AIRBAG / SRS SYSTEMS.

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	MIL ACTIVATED	POSSIBLE CAUSES
B1414	Incorrect components	Switch ignition on for more than 20 seconds.	YES	Incorrect components fitted Single-point Sensor module failure
B1342	Single-point Sensor module internal fault or module crash record full	Switch ignition ON for more than 10 seconds.	YES	Single-point Sensor module has logged three impact events Single-point Sensor module failure
B1865	SRS system voltage low (< 8.3 V)	Run engine for more than 30 seconds at greater than 1600 rpm.	YES	Airbag SRS voltage supply fuse open circuit Single-point Sensor module voltage supply harness; open circuit, high resistance, or short circuit to ground Charging system low voltage output
B1866	SRS system voltage high (> 18.3 V)	Run engine for more than 30 seconds at greater than 1600 rpm.	YES	Charging system high voltage output
B1869	AIRBAG SRS MIL circuit open circuit **Note:** If another DTC is logged when the AIRBAG / SRS MIL is not functioning, a five beep audible warning will sound every 30 minutes during vehicle operation.	Switch ignition on for more than 20 seconds.	YES	AIRBAG SRS MIL lamp open circuit Single-point Sensor to instrument pack harness; open circuit or high resistance Instrument pack failure
B1870	AIRBAG SRS MIL circuit short circuit **Note:** If another DTC is logged when the AIRBAG / SRS MIL is not functioning, a five beep audible warning will sound every 30 minutes during vehicle operation.	Switch ignition on for more than 30 seconds.	YES	Single-point Sensor module to instrument pack harness; short circuit to B+ voltage Instrument pack failure
B1877	Driver seat belt pretensioner circuit open circuit	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to driver seat belt pretensioner harness; open circuit, or high resistance Driver seat belt pretensioner failure
B1878	Driver seat belt pretensioner circuit short circuit to B+ voltage	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to driver seat belt pretensioner harness; short circuit to B+ voltage Driver seat belt pretensioner failure
B1879	Driver seat belt pretensioner circuit short circuit to ground	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to driver seat belt pretensioner harness; short circuit to ground Driver seat belt pretensioner failure
B1881	Passenger seat belt pretensioner circuit open circuit	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to passenger seat belt pretensioner harness; open circuit or high resistance Passenger seat belt pretensioner failure
B1882	Passenger seat belt pretensioner circuit short circuit to B+ voltage	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to passenger seat belt pretensioner harness; short circuit to B+ voltage Passenger seat belt pretensioner failure
B1883	Passenger seat belt pretensioner circuit short circuit to ground	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to passenger seat belt pretensioner harness; short circuit to ground Passenger seat belt pretensioner failure
B1885	Driver seat belt pretensioner low resistance	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to driver seat belt pretensioner harness; short circuit to ground Driver seat belt pretensioner failure
B1886	Passenger seat belt pretensioner low resistance	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to passenger seat belt pretensioner harness; short circuit to ground Passenger seat belt pretensioner failure
B1887	Driver airbag circuit short circuit to ground	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to driver airbag harness; short circuit to ground Driver airbag cable reel cassette short circuit to ground Driver airbag failure
B1888	Passenger airbag circuit short circuit to ground	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to passenger airbag harness; short circuit to ground Passenger airbag failure
B1916	Driver airbag circuit short circuit to B+ voltage	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to driver airbag harness; short circuit to B+ voltage Driver airbag cable reel cassette short circuit to B+ voltage Driver airbag short circuit to B+ voltage
B1925	Passenger airbag circuit short circuit to B+ voltage	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to passenger airbag harness; short circuit to B+ voltage Passenger airbag short circuit to B+ voltage

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	MIL ACTIVATED	POSSIBLE CAUSES
B1932	Driver airbag circuit open circuit	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to driver airbag harness; open circuit or high resistance Driver airbag cable reel cassette; open circuit or high resistance Driver airbag failure
B1933	Passenger airbag circuit open circuit	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to passenger airbag harness; open circuit or high resistance Passenger airbag failure
B1934	Driver airbag circuit low resistance	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to driver airbag harness; short circuit to ground Driver airbag cable reel cassette; short circuit between airbag power and ground supply Driver airbag failure
B1935	Passenger airbag circuit low resistance	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to passenger airbag harness; short circuit to ground Passenger airbag failure
B1992	Side driver airbag circuit short circuit to B+ voltage	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side driver airbag harness; short circuit to B+ voltage Side driver airbag short circuit to B+ voltage
B1993	Side driver airbag circuit short circuit to ground	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side driver airbag harness; short circuit to ground Side driver airbag failure
B1994	Side driver airbag open circuit	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side driver airbag harness; short circuit to ground Side driver airbag failure
B1995	Side driver airbag circuit short circuit	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side driver airbag harness; short circuit between power and ground supply Side driver airbag failure
B1996	Side passenger bag circuit short circuit to B+ voltage	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side passenger airbag harness; short circuit to B+ voltage Side passenger airbag failure
B1997	Side passenger airbag circuit short circuit to ground	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side passenger airbag harness; short circuit to ground Side passenger airbag failure
B1998	Side passenger airbag circuit open circuit	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side passenger airbag harness; open circuit or high resistance Side passenger airbag failure
B1999	Side passenger airbag circuit short circuit	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side passenger airbag harness; short circuit between power and ground supply Side passenger airbag failure
B2444	Side driver airbag impact sensor fault	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side driver airbag impact sensor harness; open circuit, high resistance, short circuit to ground or B+ voltage Impact sensor failure
B2445	Side passenger airbag impact sensor fault	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side passenger airbag impact sensor harness; open circuit, high resistance, short circuit to ground or B+ voltage Impact sensor failure
U2017	Side driver airbag impact sensor communications fault	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side driver airbag impact sensor; open circuit, high resistance or short circuit to ground Side driver impact sensor failure
U2018	Side passenger airbag impact sensor communications fault	Switch ignition on for more than 20 seconds.	YES	Single-point Sensor module to side passenger airbag impact sensor; open circuit, high resistance or short circuit to ground Side passenger impact sensor failure