

XJS Range
1992 Model Year

Technical Introduction

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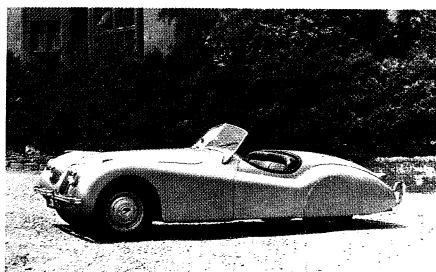
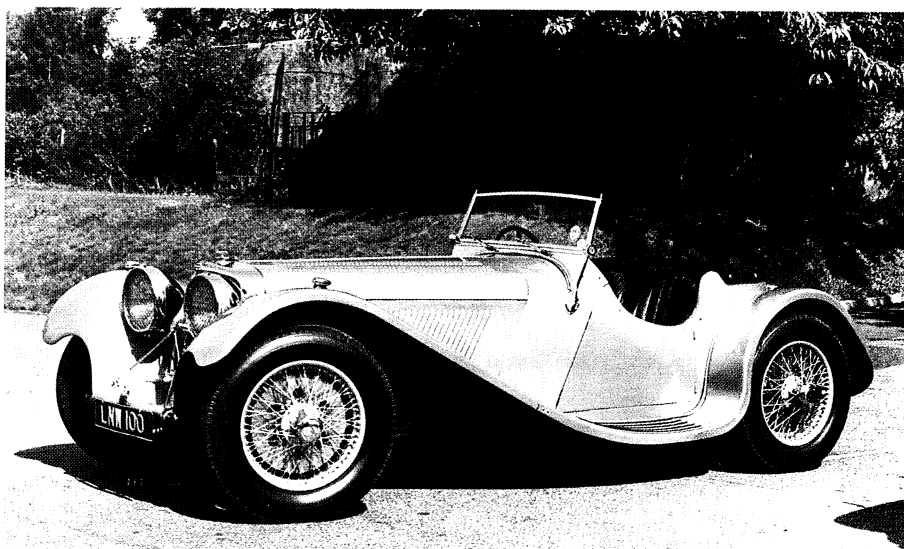
Technical Introduction

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Jaguar Heritage

The Jaguar heritage has its roots in the development of sporting and luxury automobiles in the 1930's. Every exciting new model introduced throughout Jaguar's history has had its own identity and has embodied elements that made it uniquely Jaguar. These elements combined to enhance the owner's motoring experience and include: traditional craftsmanship, the richness of natural materials — wood and leather, exceptional road holding and ride comfort, spirited performance and the tasteful integration of luxury features.

Today's Jaguars continue these traditions in a line of classic automobiles blended with a high degree of technical sophistication and advanced technology.

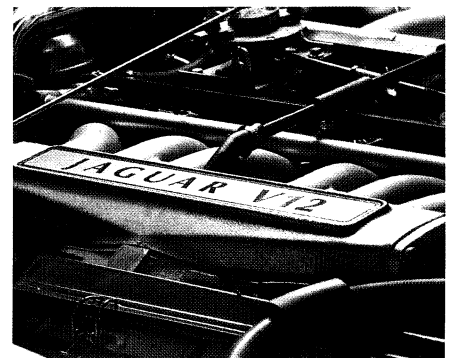
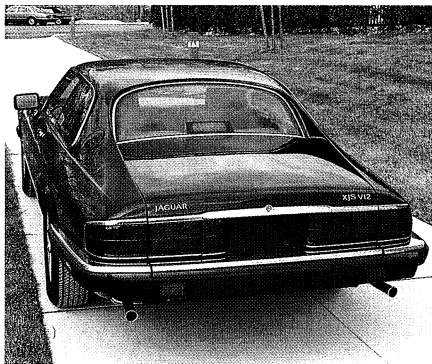
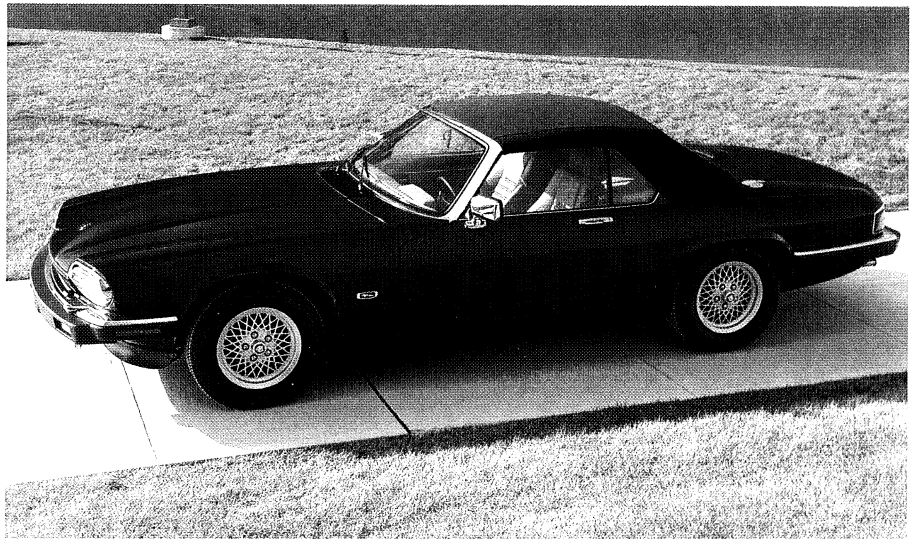


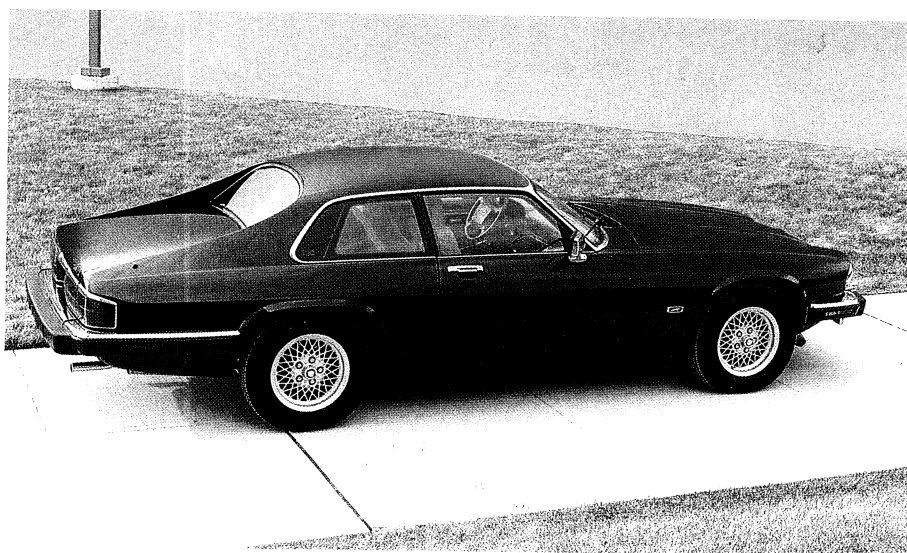
XJS Range

First introduced in 1975, the Jaguar XJS Range vehicles, with their smooth and powerful V12 engine, have earned a unique standing in the world of high performance luxury automobiles. The design of the XJS embodies the best of Jaguar's sporting and luxury heritage.

XJS Range — 1992 Model Year

Throughout its production run, the XJS has undergone steady improvement and refinement. To carry the Jaguar sporting line into the future in an increasingly competitive market, a decision was made to undertake a major facelift and quality upgrade program. The new XJS Range represents the results of the massive engineering and manufacturing effort required to fulfill the program's objectives. One main objective of the program was to retain the XJS distinctive Jaguar image. Although the end result retains much of its predecessors basic design, a detailed analysis will reveal a vastly improved automobile.



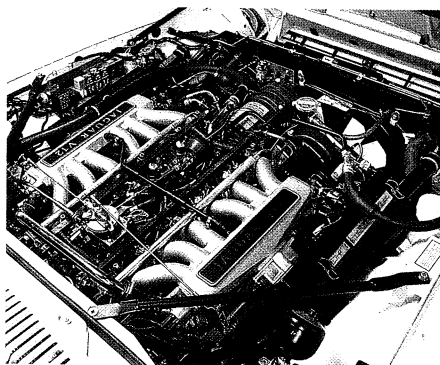


Quality upgrade

The emphasis on quality upgrade concentrated on the fuel delivery system, the body construction methods and techniques, body corrosion resistance, and the electrical system. The basic engine mechanical system, chassis and drive train systems remain unchanged.

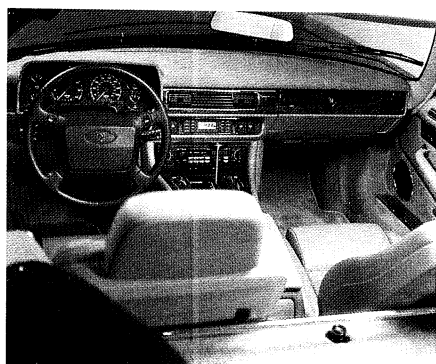
Exterior changes

The exterior styling underwent subtle but effective changes producing a fresh appearance to the classic Jaguar form. New glazing (coupe), new front and rear bumpers, and new front and rear lighting complement the styling changes.



Vehicle systems changes

A new engine management system with on-board diagnostics (OBD), a new fuel delivery system, new cruise control, air conditioning revisions, and new electrical system construction methods and componentry upgrade the existing Jaguar systems.



Interior changes

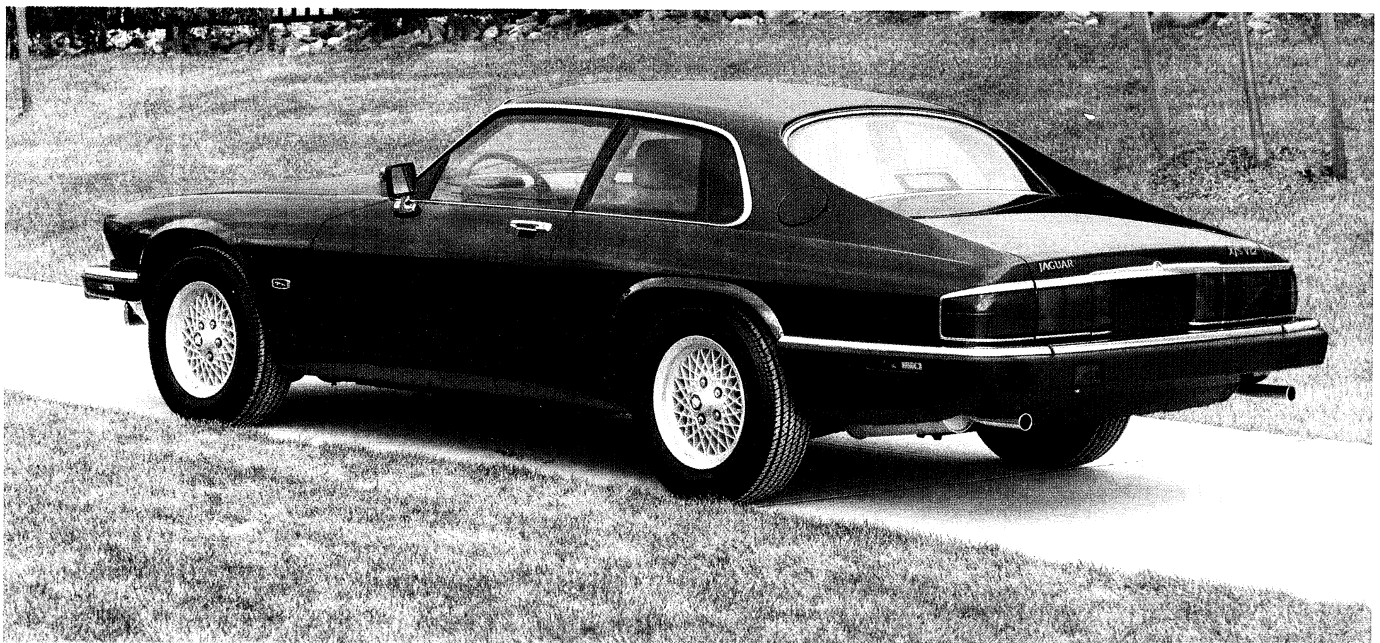
New restyled powered seats with memory (driver's side), color keyed dash panel, new door casings, new instrument pack, new trip computer, new clock and message display, door mirror memory, new switch gear, climate control revisions, and a new in-car entertainment system with optional CD autochanger enhance the XJS driving experience.

Body Styling

The major objective in the design of the new XJS Range vehicles was to produce a sports / luxury automobile with style, performance, and elegance that would appeal to the sporting minded driver while retaining the Jaguar uniqueness.

Most of the styling changes are subtle in nature but combine to provide a distinctively fresh appearance to the classic XJS Range:

- New sills with a slight flare at the front and rear add a sportier appearance.
- New front and rear bumpers with modified shapes employ new construction techniques and materials.
- All new lighting at the front and rear is the most obvious external change from previous models.
- All new glazing on Coupe models.
- Expanded convertible top color availability.
- Additional new body colors are offered.



Exterior

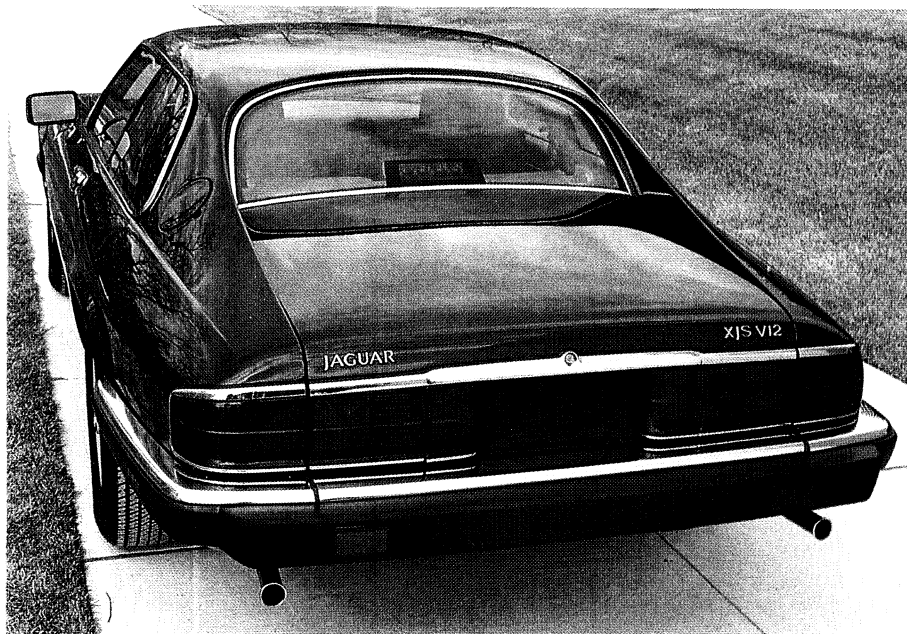


The numerous subtle changes to the front of the vehicle have the combined effect of making the hood appear longer and the overall vehicle appear more sleek and longer:

- The hood is styled with a raised center section.
- The flat black grille with its chrome front edge finisher produces a clean appearance.

Styling and design changes to the rear of the car combine to allow more accurate and reliable construction and assembly, in addition to providing the desired updating of the XJS image:

- Redesigned Coupe rear quarter panels and trunk opening ensure a consistent trunk lid fit.
- Redesigned buttress area and new rear window allow a more reliable and simplified construction technique with fewer seams and the resulting fill operations.



Body Construction

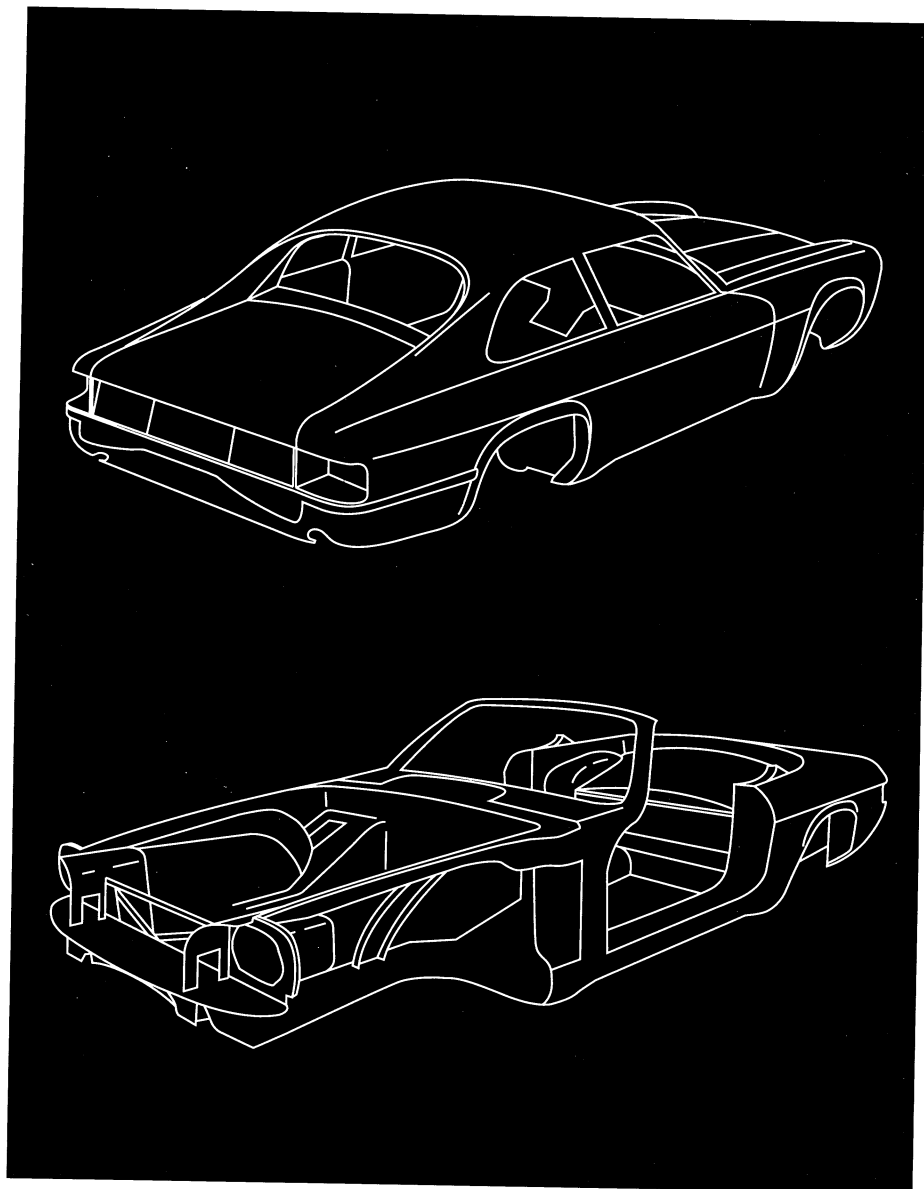
Body Shell

Panels and seams

In the redesigned XJS, there is substantial reduction in the number of panels in the body shell. All leaded seams have been eliminated and the number of metal finishing operations has been reduced.

Automated assembly

The body shell is produced in an automated assembly facility. The new construction techniques, with a minimum number of openings in the vehicle's underbody, reduce the possibility of moisture entering the vehicle structure.



Corrosion Protection

Improved materials

Exterior components such as bumpers and mouldings are revised in material or finish to reduce the possibility of corrosion.

Zinc-coated steel

The extensive use of zinc-coated steel in areas where the risk of moisture accumulation can occur (approximately 40% of the panels) provides substantially increased protection. Some panels in high risk areas are zinc coated on both sides.

Cathodic primer application

A cathodic process, in which the body is charged negatively and the primer paint bath is charged positively results in even and complete primer coverage.

Finish

Clear Over Base process

The XJS Range is finished using the state-of-the-art Clear Over Base process. The color coats are electrostatically applied and then covered with two clear coats, resulting in a very smooth, durable finish.

Glazing

The 1992 Coupe glazing system is completely new, both in design and construction. The convertible retains the previously upgraded glazing system.

Windshield

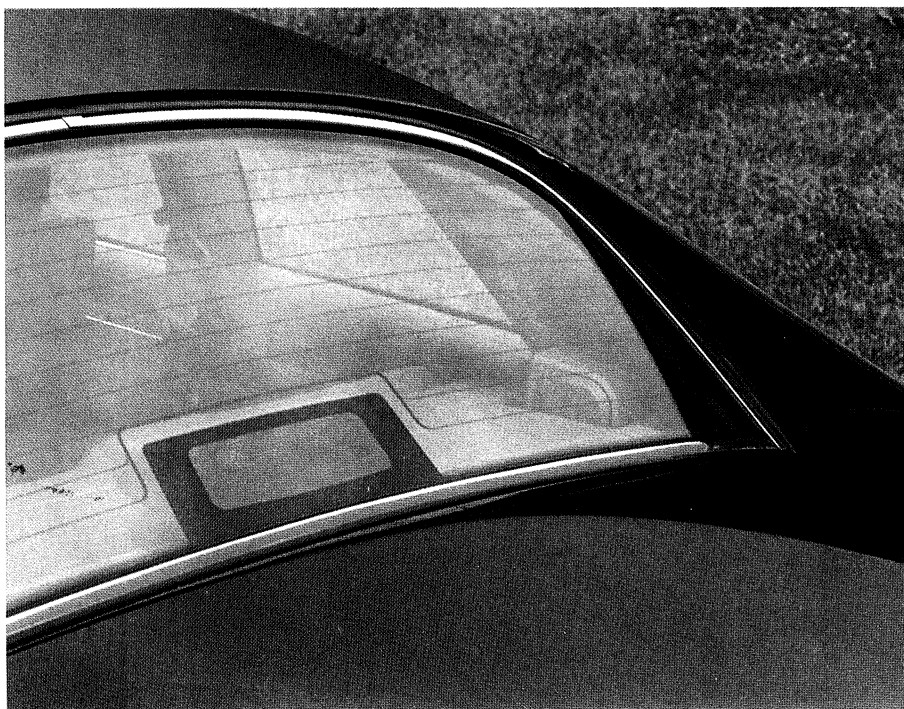
The windshield employs the direct glazing technique to enhance aerodynamics, reduce wind noise, and improve sealing.

Rear window

The new direct glazed rear window has an increased angle of rake and finishes at the leading edge of the trunk opening eliminating the previous body panel in this area.

Door and rear quarter windows

The door windows have frameless construction and close against a new-style seal. An improved window lift mechanism and redesigned guide channels are used to provide smooth and reliable window operation. Redesigned rear quarter windows replace the previous extractor panel and trim. Interior air extraction is incorporated into the "B" post as on the convertible.



Lighting

Front Lighting

Headlights

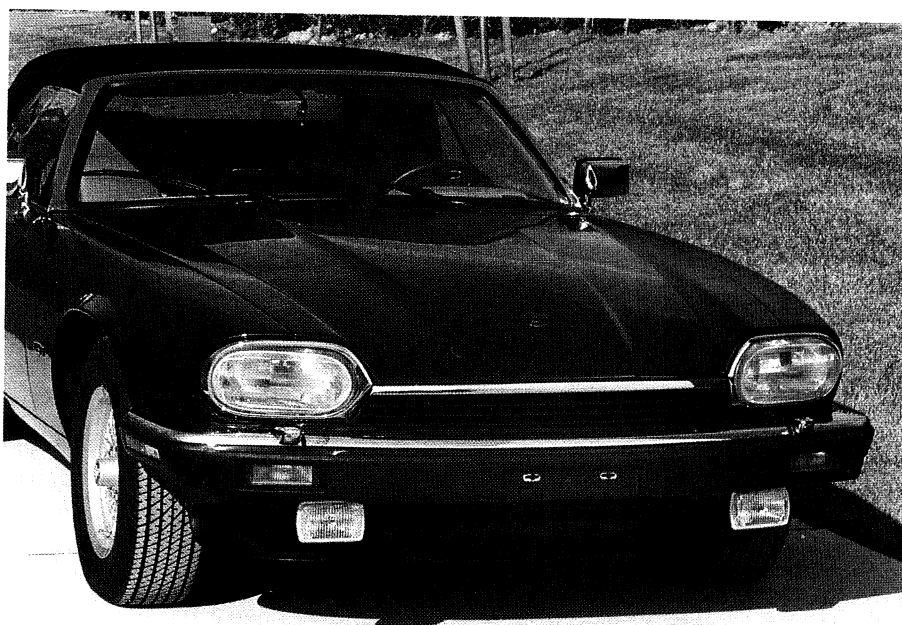
The styled headlights increase headlight performance and provide a balanced light spread. They are easy to adjust with remote adjustment screws located on the inner fenders.

Auxiliary lighting

The auxiliary lighting compliments the new front end treatment and restyled bumpers.

Fog lights

Standard equipment fog lights provide an additional level of lighting safety.



Rear Lighting

Wraparound lighting

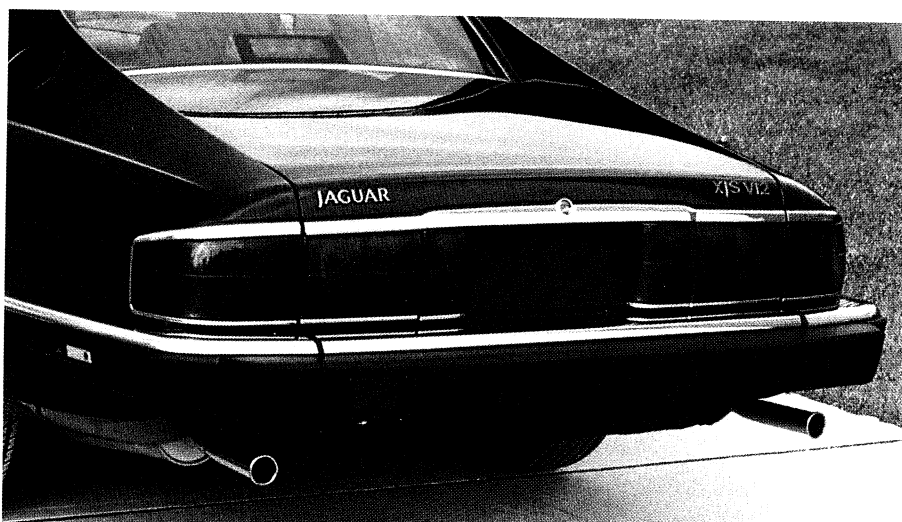
A new wraparound neutral density lighting system for the rear of the car gives a distinctive new appearance and improves the reliability and accessibility of the components. The entire unit is trimmed in chrome.

Auxiliary lighting

The auxiliary lighting is incorporated into the new wraparound lighting system.

Fog lights

New rear fog lights allow for increased recognition in poor visibility conditions.



Doors; Mirrors

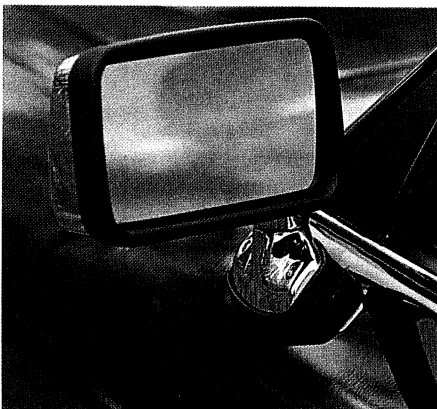


Doors

The new door assembly is designed to achieve reliable, consistent assembly and fit. A one-piece inner panel simplifies assembly and improves quality.

The frameless door window is operated by a simplified window regulator. A new door and glass seal system minimizes wind noise.

The door lock actuators are mounted directly to the latch assemblies eliminating link rods and adjustment requirements.



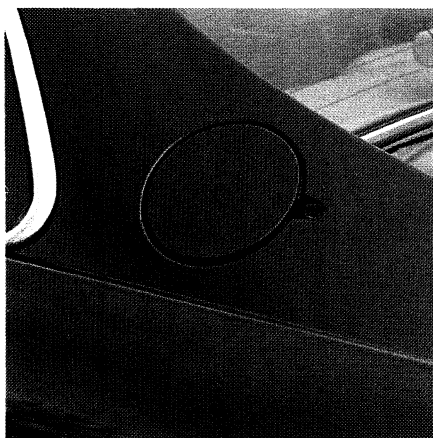
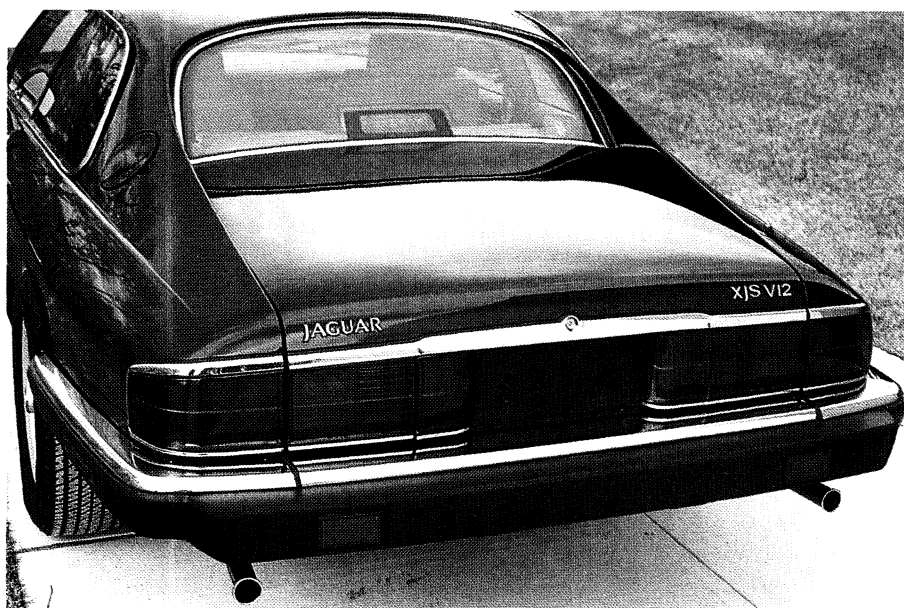
Mirrors

The mirrors incorporate revised viewing angles, larger glass area, new frames and motor assemblies. Two memory positions are available in conjunction with the driver's seat memory. The passenger's side mirror can be dipped when REVERSE is selected.

Trunk; Fuel Flap

Trunk lid

A new construction design and technique have produced a trunk lid that is 30% stiffer than its predecessor. Gas struts are used to hold the lid open. The trunk body opening panels are made using a new one-piece construction method providing improved and consistent fit of the trunk lid. New drain channels minimize the chance for water entry into the trunk.



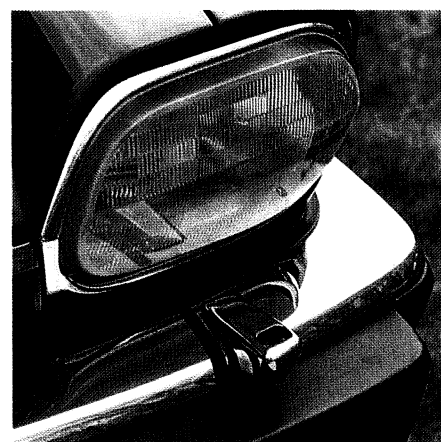
Fuel filler flap

On coupe models, the new fuel filler flap is round in shape and employs a revised locking arrangement. The flap is incorporated into the central locking system. Emergency release is obtained by a manual release lever located in the trunk.

Wash; Wipe

Windshield wipers and washers

The windshield wipers and washers have programmed operation that includes adjustable intermittent wipe delay. The motor unit is housed under a grille which is color keyed to the body color. The washer jets are heated to prevent freezing.



Headlight power wash

The power wash function is timed through the wiper logic unit. Power wash jets are heated to prevent freezing.

Interior Design

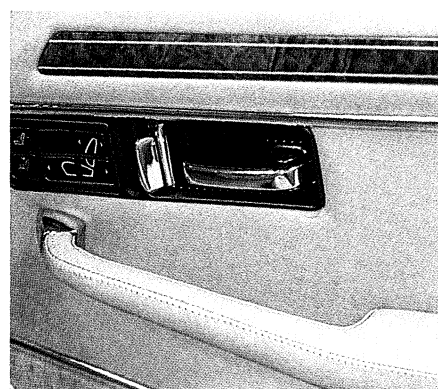
Interior Design and Finish

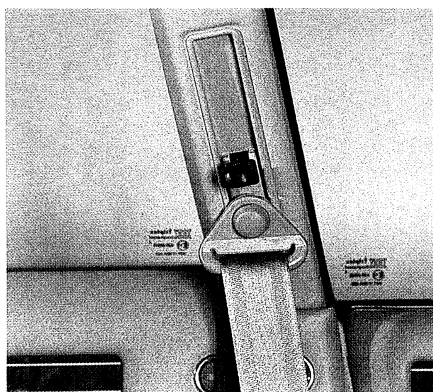
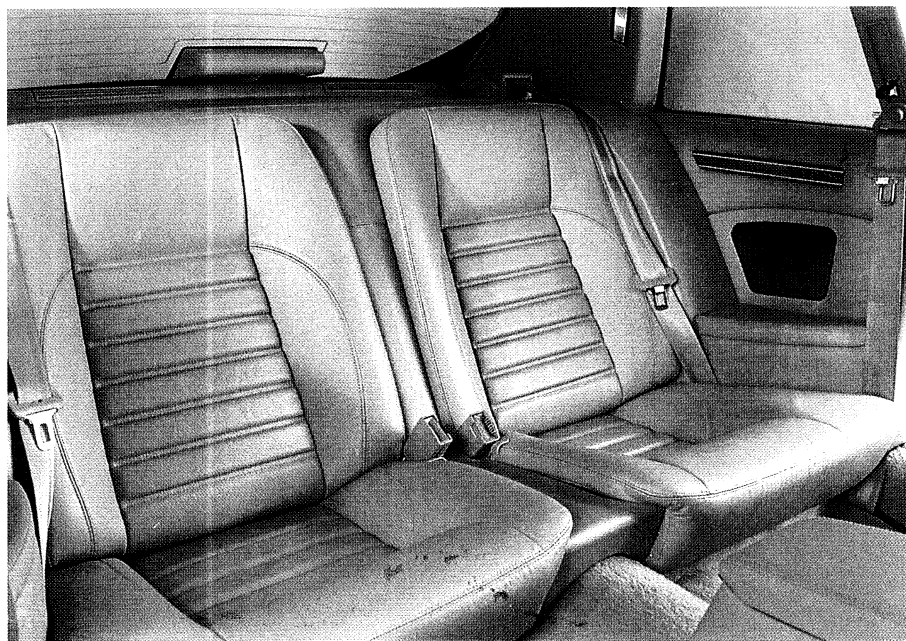
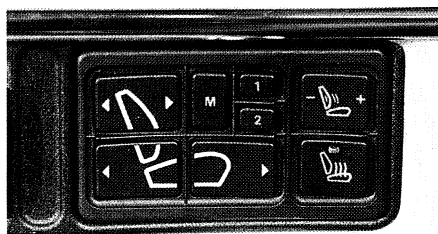
The interior of the XJS Range underwent subtle but effective changes, as did the exterior, resulting in an integrated and luxurious passenger environment:

- All new dash and instrument panel.
- New center console.
- Color keyed interior trim and dash panel.
- Door casings with wood insets.
- New restyled front sports seats combining traditional and modern design.

Coupe models

- Redesigned and enhanced rear compartment is color keyed and integrated evenly into an attractive and comfortable seating area.
- New rear seats are complimented by color keyed seat belts.
- Rear quarter panels incorporate wood insets to match the door insets.





Powered sports seats

The new sports seats feature full power adjustment. Tastefully styled with box pleats and double stitching, these seats provide both comfort and support. The moulded seat back has an integral release lever for tilting the seat forward. An integrated seat switch pack is located just forward of each interior door handle.

Seat heaters

The new seat heaters are high efficiency units that provide rapid seat heating.

Lumbar supports

The new power lumbar support mechanisms operate quietly.

Driver's seat memory

Memory controls are incorporated into the driver's seat switch pack. An Electronic Control Unit is used to manage the system. This circuit also controls the door mirror memory functions.

Rear seats — Coupe

The rear seats match the styling of the front seats and have a center section for storing the seat belt latches.

Adjustable seat belt anchors — Coupe

The anchor points for the shoulder belt are adjustable through five positions.

Instrumentation

Instrument pack

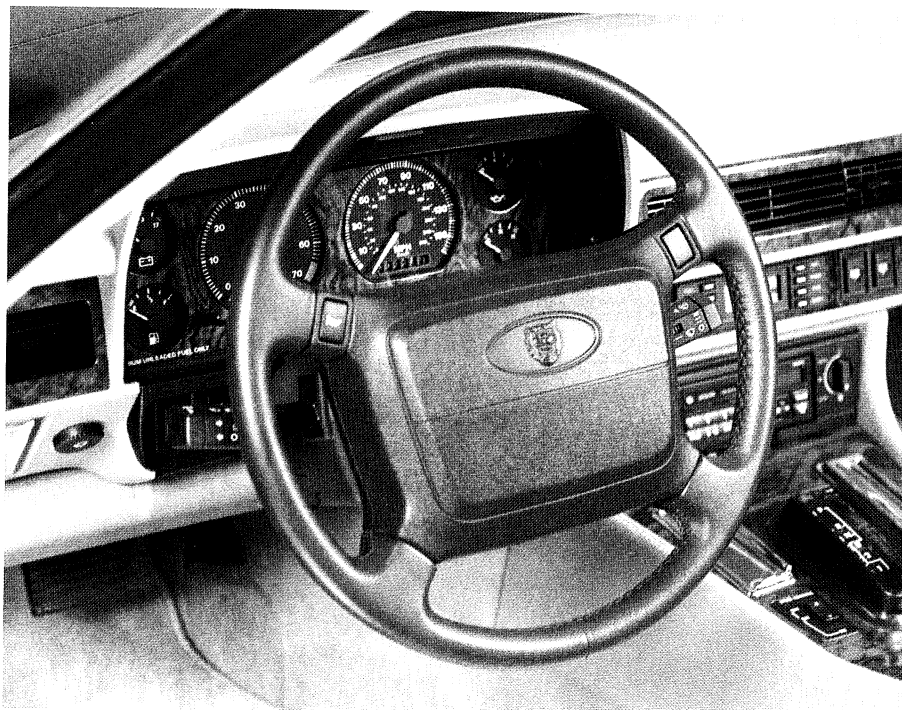
The new instrument pack follows the classic Jaguar design featuring analog instruments and wood overlay. The speedometer and tachometer are supported by four small instruments. An indicator and warning light system is arranged across the top.

Trip computer

The revised trip computer retains its straight forward operation.

Clock and message display

An easy-to-read LCD display is shared by the clock, the trip computer, and the OBD (On Board Diagnostics) CHECK ENGINE function.



Controls

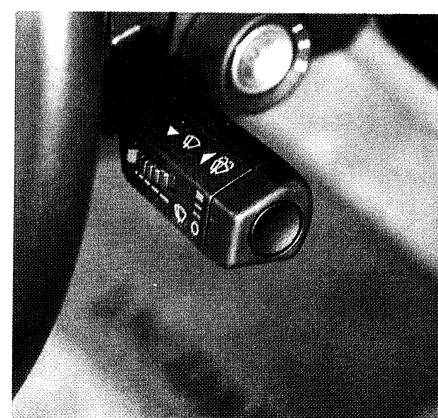
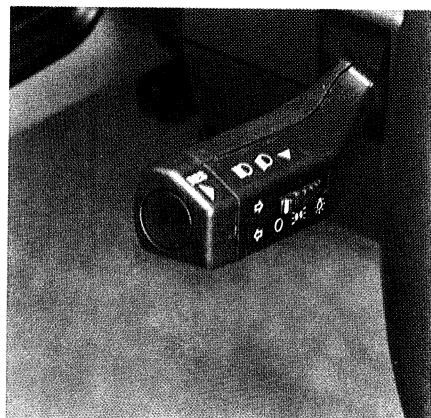
Steering column stalk switches operate most of the circuits frequently used by the driver. The stalk switches are lighted for easy identification.

Left switch

The left stalk switch incorporates the main lighting switch, cruise control resume, and turn signals.

Right switch

The right stalk switch incorporates all the controls for the programmed wiper system, and the power wash and windshield wash systems.





Dimmer

All locate lighting is controlled through the dimmer system.

Fog lights

The fog lights are switched by new-style switches similar to the center console switches.

Mirrors

The mirrors have a single joy stick control and have a REVERSE gear dip function.

Cruise control

The new cruise control system, with its independent vacuum pump, provides accurate speed control. This is the same system as used in the Sedan Range.

Center console switches

Redesigned switches flank the center console.

Climate control panel

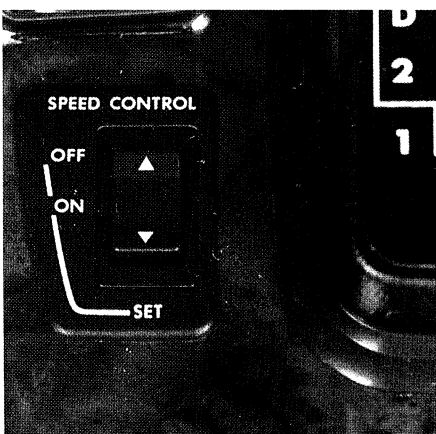
The revised control panel incorporates locate lighting.

In-car entertainment

A new Alpine unit, similar to that in the Sedan Range, with an optional CD autochanger coupled to an improved larger speaker system delivers outstanding audio performance.

Keys and locks

Three keys are provided. The ignition key operates the ignition, trunk, and the glove box. The valet key operates the ignition only. The doors use a conventional key.



IGNITION



VALET

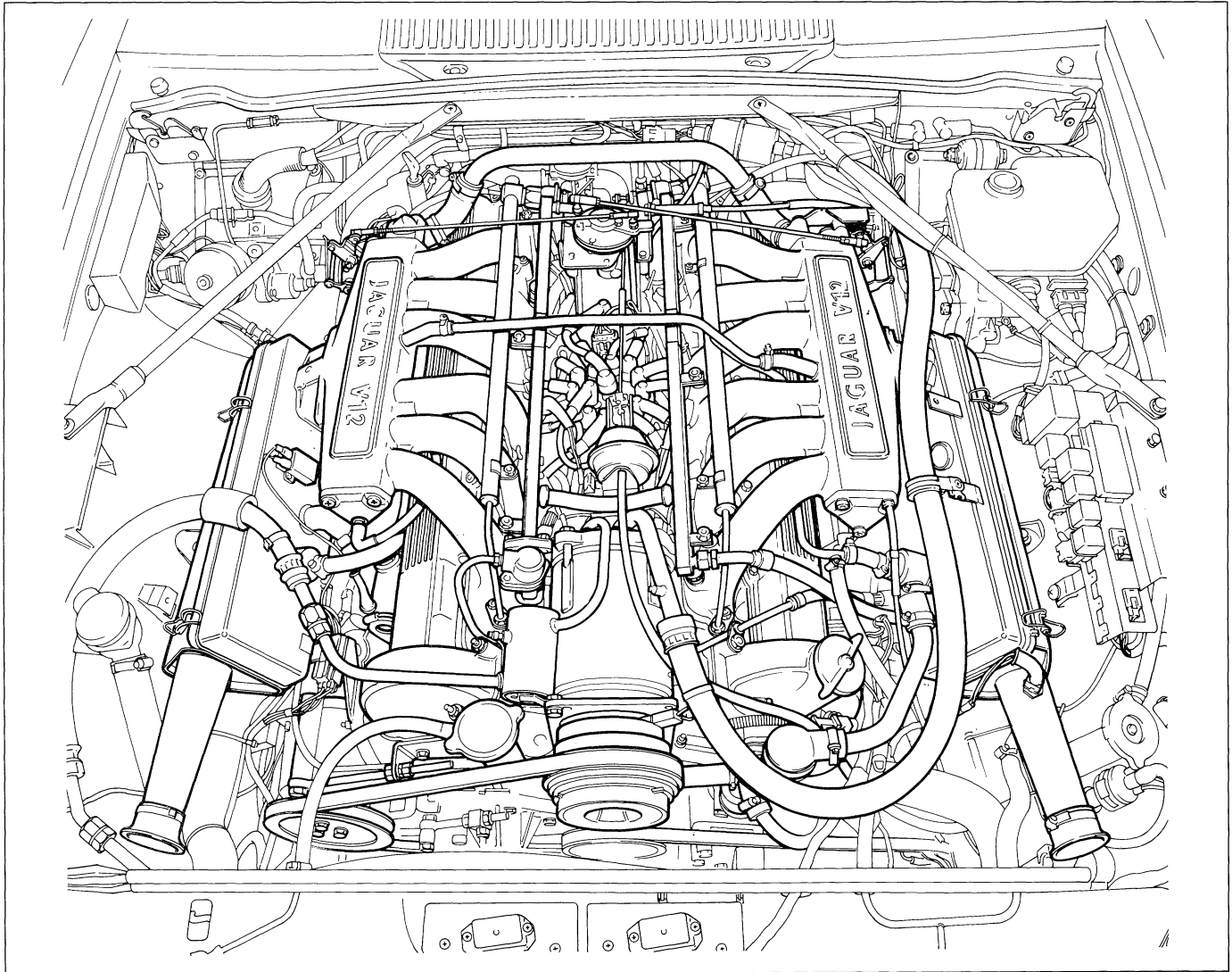


DOOR

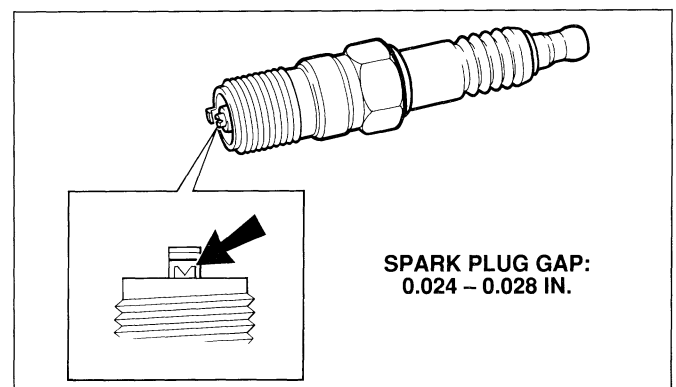
Engine Mechanical

The smooth and powerful Jaguar 5.3 litre V12 engine powers the XJS Range. The basic mechanical system remains unchanged. Minor changes have been incorporated to enhance the underhood appearance and allow easier servicing:

- Redesigned intake manifolds feature etched stainless steel identification plates.
- The ignition coils are relocated to allow better accessibility.
- A shorter oil filter enables easy removal at service intervals.



V-groove electrode spark plugs (BR7EF) improve engine efficiency and deliver improved firing consistency.



Engine Management System

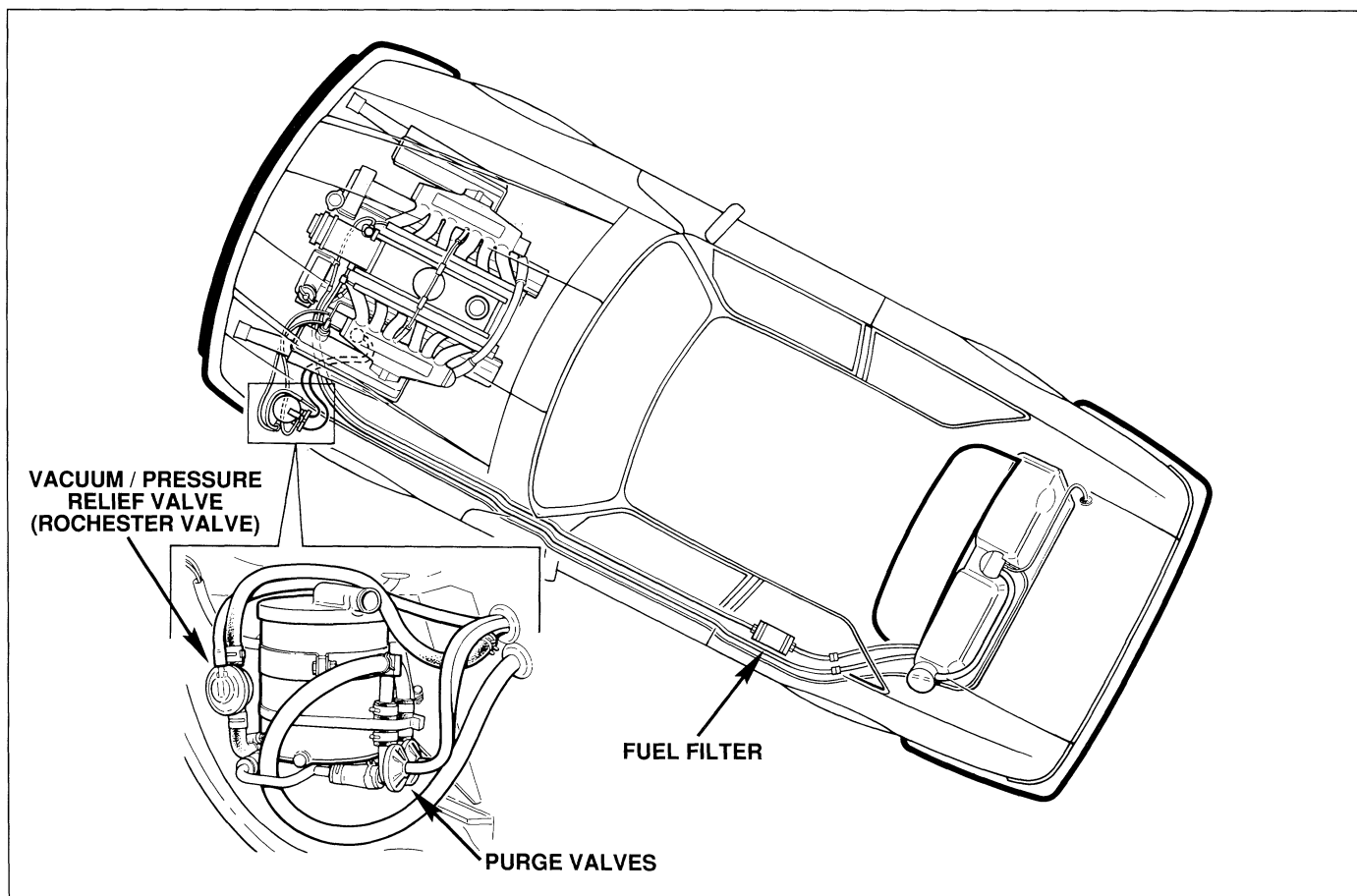
The XJS Range vehicles use electronic systems, vacuum systems, and air injection to govern engine and engine-related functions. These are independent systems; however, they are dependent on each other to achieve an overall efficiency of operation, while providing precise control over each individual function. The independent systems should be thought of as one engine management system when considering engine performance.

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Although the Engine Management systems remain fundamentally similar to previous XJS systems, many of the components are new and operation is revised. In the interest of clarity, a complete system description, except for ignition, is included in this section.

Fuel Delivery and Evaporative Emission Control

The fuel delivery system in the new XJS Range is completely redesigned and follows the same principals and layout as the current Sedan Range system. The fuel pump is part of an in-tank fuel pump module that gives superior fuel handling qualities under varying conditions and reduces operating noise. A new external filter is located under the vehicle. The previous sump tank has been eliminated. Approximate fuel tank capacity – 23.5 gallons (Coupe), 21.6 gallons (Convertible).



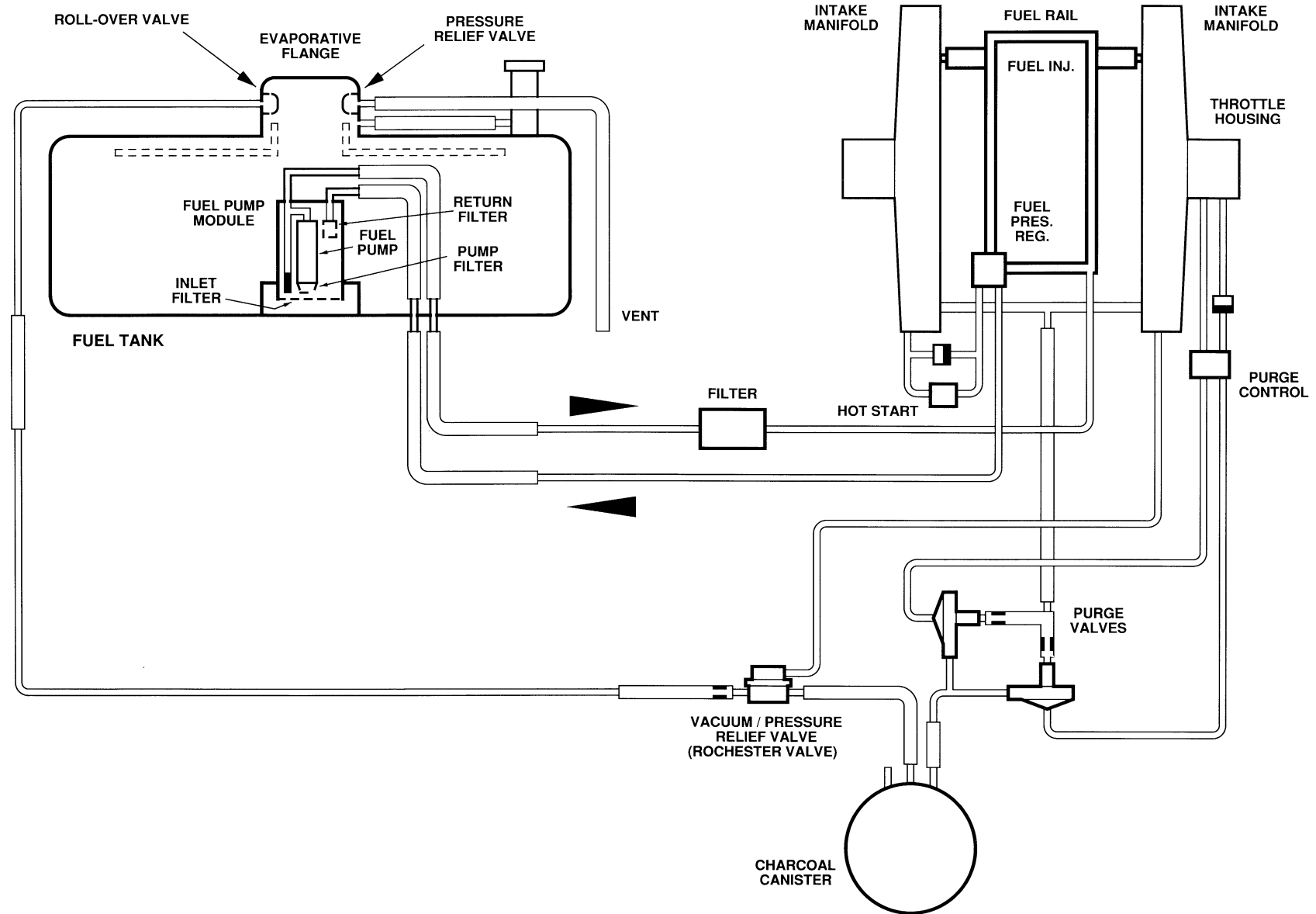
Fuel lines and connectors

The routing, materials, and connectors of the fuel lines are all new. Steel braided PTFE hoses run between the fuel tank flange and the steel underbody lines. Flexible plastic hoses that can be clamped during service operations are used in the engine compartment. Quick fit connectors are used throughout the system (except for internal fuel tank, fuel filter, and fuel rail connections). Feed lines have 3/8 in. connectors; return lines have 8 mm connectors.

Engine Management System

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FUEL DELIVERY AND EVAPORATIVE EMISSION CONTROL



Fuel Delivery and Evaporative Emission Control

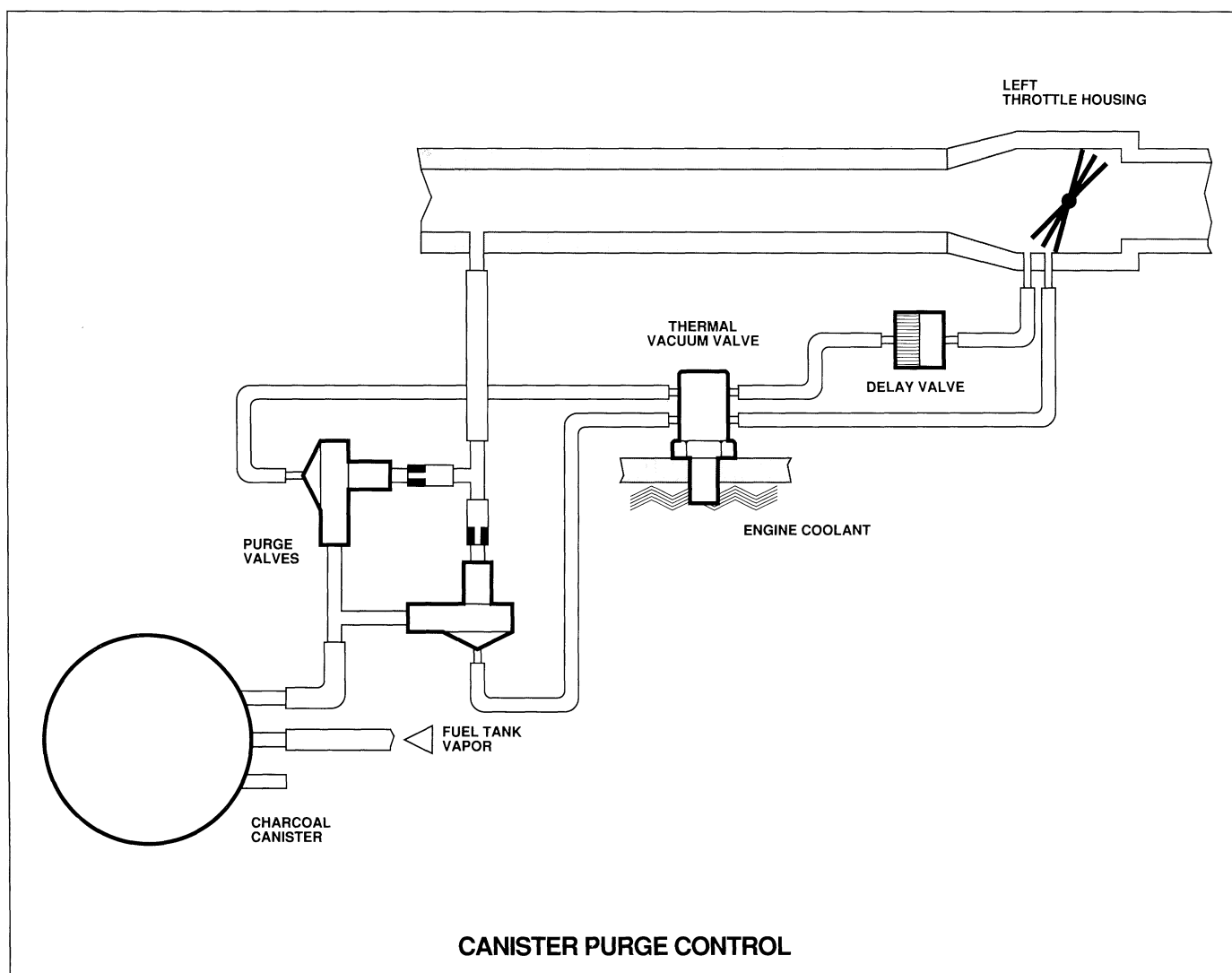
Evaporative emission control

The fuel tank design includes a lengthened fill tube that limits the fill level and allows for 10% fuel expansion. Tank venting is via the fuel tank evaporative flange. From there, a tube leads to the charcoal canister located in the left front wheel well. Vapor flow to the canister is controlled by a pressure / vacuum relief (Rochester) valve that holds 1–1.25 psi when the engine is not running. Fuel tank pressure is released to the canister upon engine start-up.

The system incorporates two safety pressure relief valves that vent to the atmosphere: a 2 psi relief valve in the evaporative flange and a 4 psi relief valve in the fill cap.

Canister purging is accomplished by a two stage system. Two purge control valves are vacuum controlled from two left throttle body ports via a thermal vacuum valve. The vacuum ports are situated so that there is no purge when the throttle plate is in the idle position. Progressive purge is obtained as the throttle is opened. The thermal vacuum valve controls both vacuum circuits. The vapor flows to the intake manifolds via the crankcase breather pipe.

At engine coolant temperature of 95° F and above, the thermal vacuum valve opens allowing canister purge. As the throttle plate moves off idle, the first vacuum port is exposed applying vacuum to the first stage purge valve. Further throttle plate movement exposes the second vacuum port and vacuum is applied to the second stage purge valve. A delay valve in the second stage further delays full canister purge as the engine speed increases preventing an over-rich fuel mixture.



Fuel Delivery and Evaporative Emission Control

Fuel tank

The fuel tank assemblies are similar for Coupe and Convertible models with the exception of the filler necks. The previous sump tank has been eliminated.

Fuel pump module

The fuel pump is contained in a module that mounts in a rubber holder attached to the bottom of the fuel tank on brackets. The fuel pump module and the rubber holder are indexed to ensure correct alignment in the tank. The design diverts some of the fuel flow from the pump through a venturi to maintain full fuel in the module at all times. Fuel enters the module through a 70 micron filter then into the pump inlet through a 400 micron filter. Returning fuel from the engine fuel rail enters the module through a 70 micron filter. Both the outlet and return feed ports into the pump module have check valves. The outlet check valve reduces backflow from the fuel rail when the pump is off. The return check valve prevents siphoning of the fuel tank when the fuel line is disconnected. Two rubber hoses connect the assembly to the tank inlet and outlet bosses. The hoses are retained by clamps that are installed and removed with special tool JD 175. Electrical connection to the pump is made through the evaporative loss flange.

Fuel pump specifications:

Speed	7000 rpm
Flow rate	170 litres per hour
Current	8 – 9 amps @ 13.2 volts

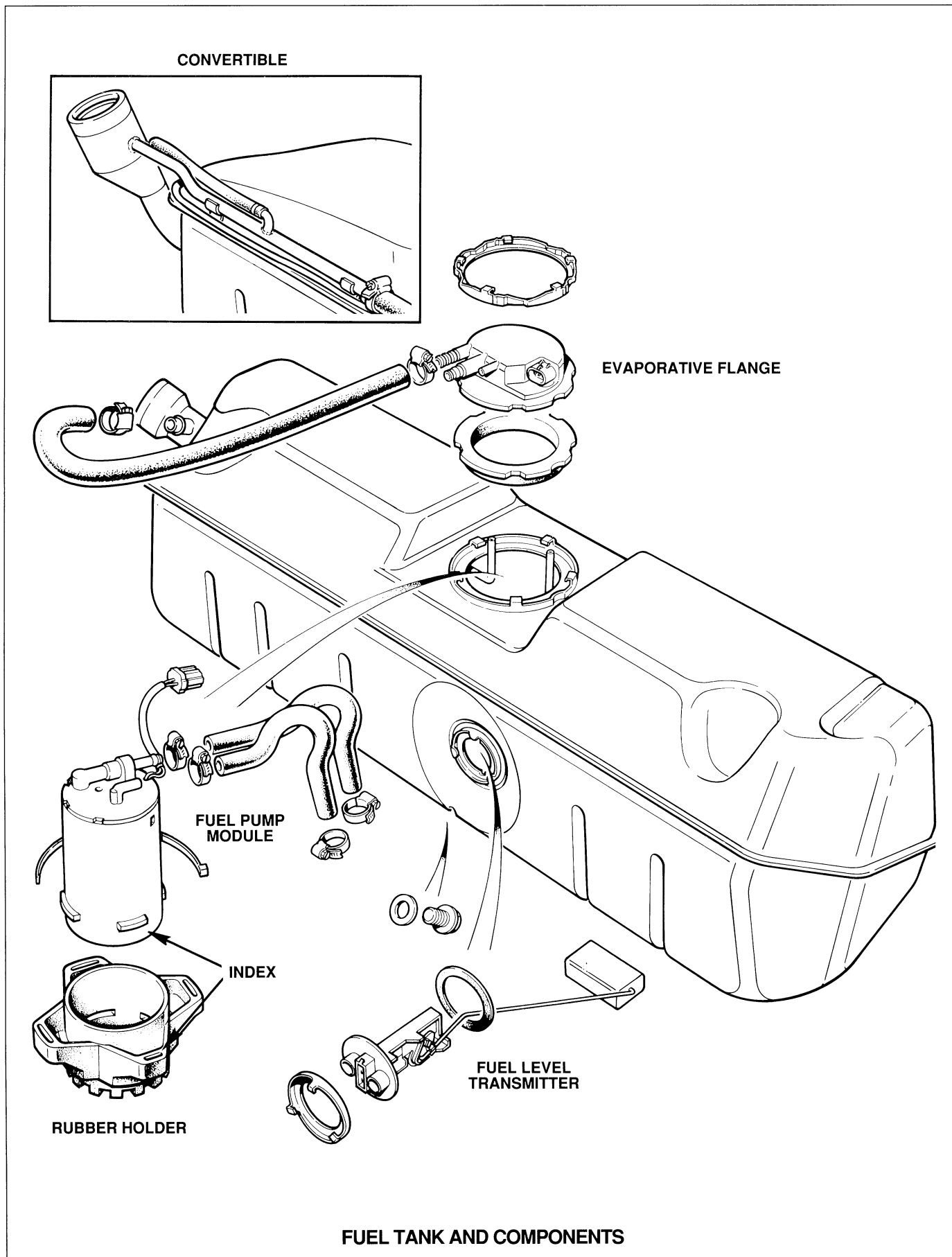
Note: Tool JD 175 is a non-ferrous wrench for use when loosening / tightening in-tank fuel hose clamps. Using JD 175 will eliminate the possibility of a spark being created.

Evaporative loss flange

The removable evaporative loss flange allows installation and removal of the fuel pump assembly, provides two outlet ports for evaporative loss and provides electrical connection to the fuel pump. Additionally, the flange incorporates a pressure relief valve in the vent port and a roll-over valve in the evaporative emissions port. The flange is retained by a locking ring that requires special tool JD 174 for installation and removal.

Fuel level sensing

The instrument pack low fuel warning illuminates with approximately 3.2 gallons of fuel remaining in the tank. An anti-slosh module in the circuit dampens the low level warning by delaying the signal 20 seconds.



Electronic Fuel Injection and Emission Control

The XJS “P” electronic fuel injection (EFI) system has a new electronic control unit (ECU) and revised components and subsystems.

The EFI system maintains optimum fuel flow control over the entire engine operating range by precisely metering the fuel into each cylinder. The main parameters for determining fuel flow requirement are engine load and speed. The ECU senses engine load from intake manifold absolute pressure and engine speed from the ignition pulses.

The ECU incorporates a manifold pressure sensor (transducer) and has a memory with stored fuel-flow strategy for various combinations of engine load and speed. The ECU receives inputs from sensors, switches and the ignition system that are applied to its memory to determine the required fuel flow.

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The revised ECU has an expanded strategy to provide more precise control over the full range of EFI control. In particular, starting, and warm-up control has been expanded and refined. A facility for on-board diagnostics (OBD) that stores fault data during engine operation has been added and CHECK ENGINE fault codes are displayed on the center console message display. Additionally, a JDS serial communications serial link is used to access the stored fault data and test the system.

The complete range of EFI ECU functions is as follows:

- ECU self-test
- Fuel delivery (fuel pump)
- Fuel injection
- Cold start
- Warm-up
- Hot start
- Exhaust emissions feedback
- Fuel cut-off during engine over-run
- “Limp home” capability
- Collision safety
- Fuel monitoring (trip computer)
- On-board diagnostics (OBD)
- Serial Communications (ISO) with JDS

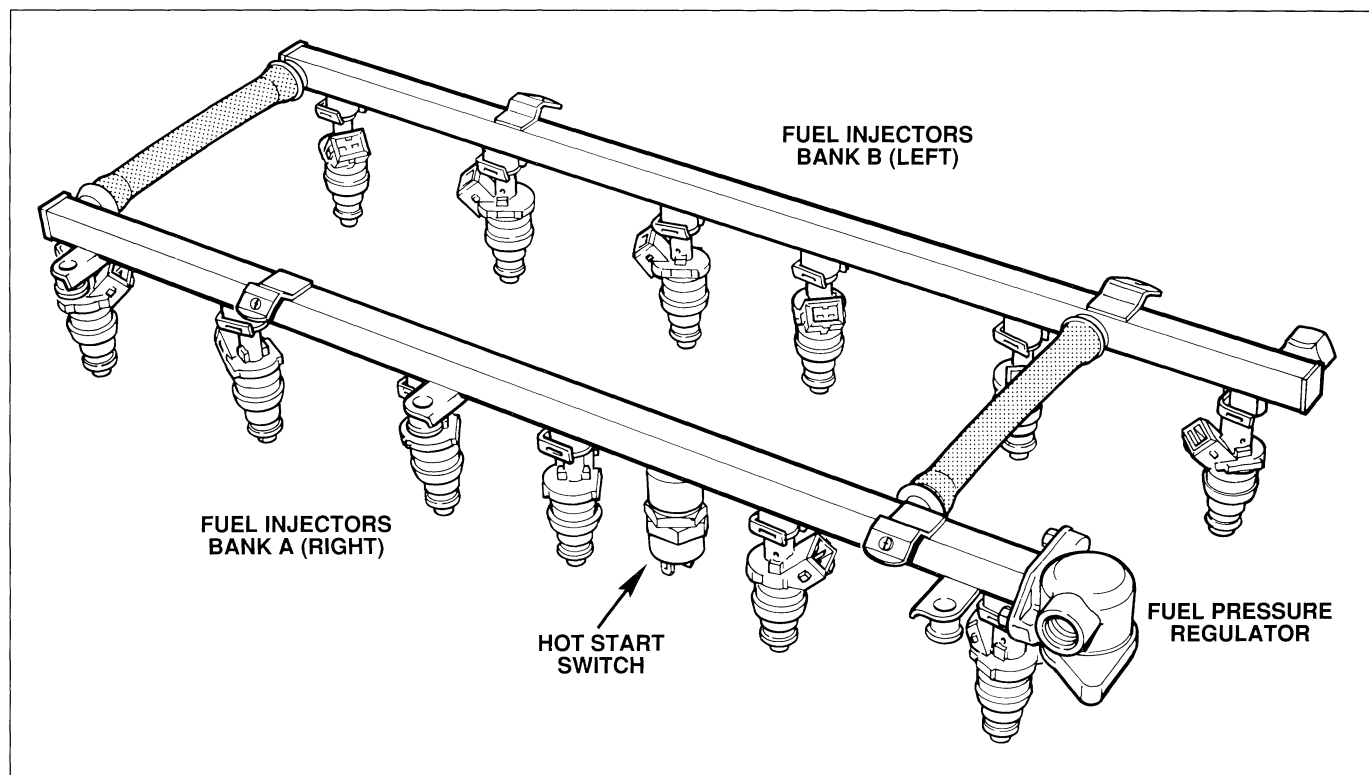
Note: The sensors and switches are unique to the EFI system and are not used or shared by the digital ignition system.



Electronic Fuel Injection and Emission Control

Fuel Distribution

The fuel rail assembly, fuel injectors, and fuel pressure regulator are all new in the revised system.



Injectors

The injectors are smaller and lighter and allow a lower mounted fuel rail. The injectors are refined to give improved control of fuel flow at small pulse widths. The injectors connect to the fuel rail by "O" rings and clips.

Fuel rail

The fuel rail has improved flow characteristics to allow equal injector fuel flow. The rail assembly is comprised of two separate rails joined by two hoses. The assembly is secured to the manifolds by integral lugs. The need for a fuel cooler is eliminated by the improved hot fuel handling capacity of the new system.

Fuel pressure regulator

A single 36 psi regulator mounts in a cast housing connected to the fuel rail. The vacuum signal from the right intake manifold to the regulator passes through a solenoid vacuum valve that is a component of the hot start system (page 26).

Fuel Injection — Primary Inputs

The fuel injectors are triggered and held open by electrical pulses that operate the injector solenoid valves. Injector "on time" (pulse duration) determines the quantity of fuel injected and is primarily determined by engine load and speed. The ECU uses the input from the manifold absolute pressure sensor and ignition pulses to output the required injector "on time" from its memory. The injectors are triggered via the power resistors, in staggered groups of six. Except during starting and sudden throttle opening, injector pulses occur every third ignition pulse (once per engine revolution).

Fuel Injection — Correction Inputs

Additional correction inputs are used by the ECU to vary injector "on time" as necessary.

Cranking enrichment

At engine cranking speeds, the ECU increases the number of injector pulses to three per engine revolution. It also increases the injector "on time" in relation to coolant temperature sensor input. As engine speed increases, cranking enrichment is reduced to transition to the warm-up phase.

Engine warm-up correction

During warm-up, the ECU lengthens the injector "on time" in response to the input received from the coolant temperature sensor. Enrichment is reduced as engine speed increases.

Air density correction

Intake air density is sensed by temperature measurement and supplied to the ECU as an input. The ECU alters the injector "on time" to lean or enrich the fuel flow as necessary.

Demand corrections

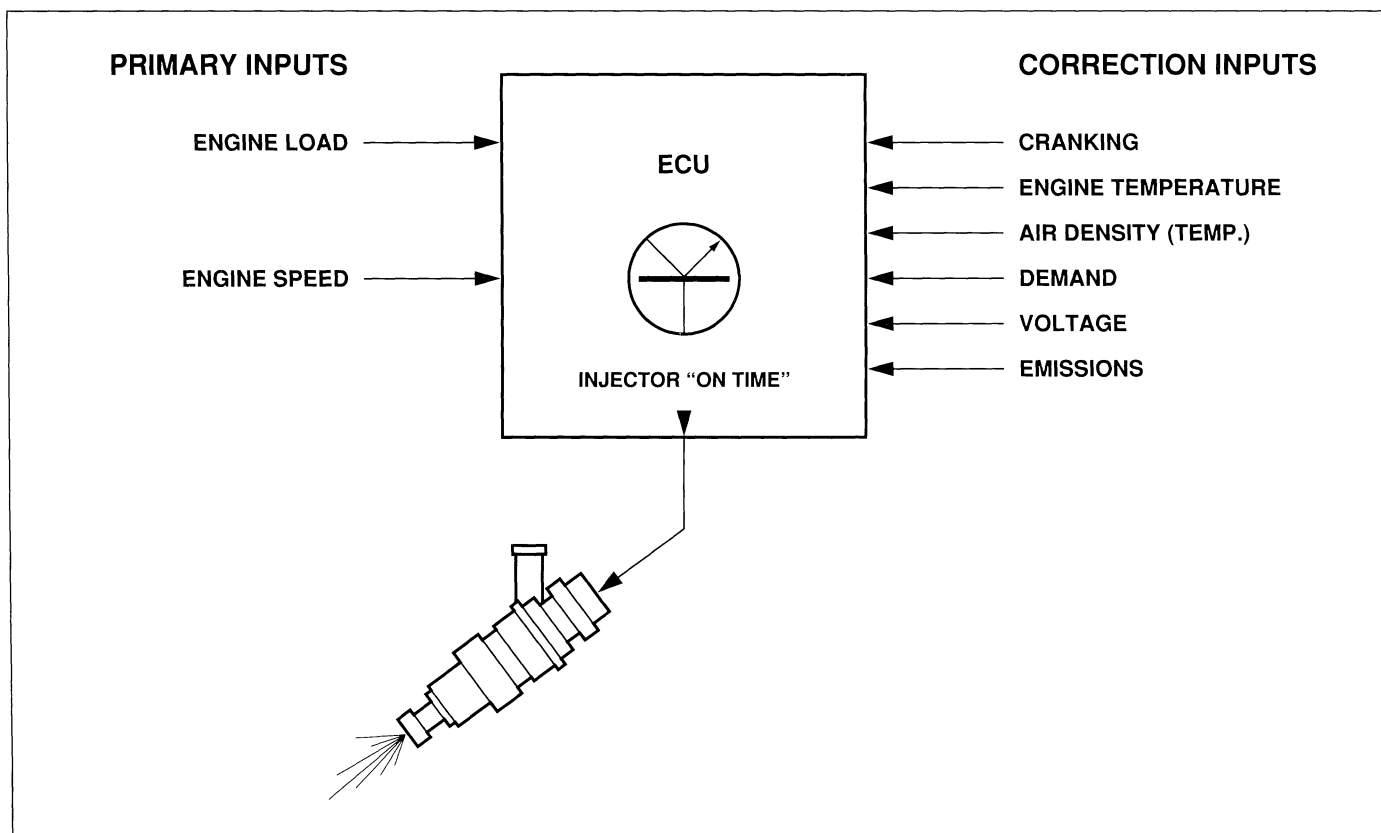
During acceleration and full power demands, the injector "on time" is lengthened by the ECU in response to input received from the throttle potentiometer.

Voltage correction

The EFI system uses stabilized voltage for sensing and injector operation.

Emissions corrections

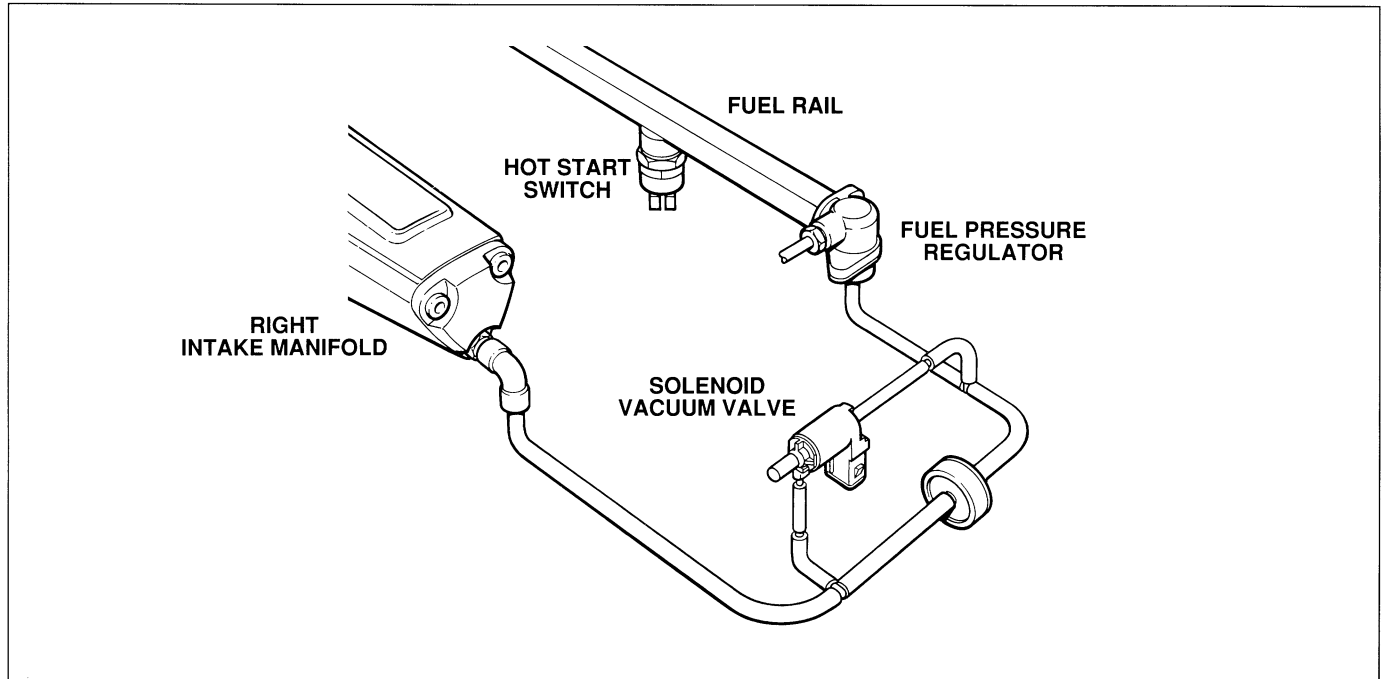
"Closed loop" exhaust emissions control is provided by inputs from the two heated oxygen sensors. At coolant temperatures below 95° F and for 45 seconds after start-up, air injection is applied to the exhaust manifolds. During this period, inputs from the oxygen sensors are not used by the ECU.



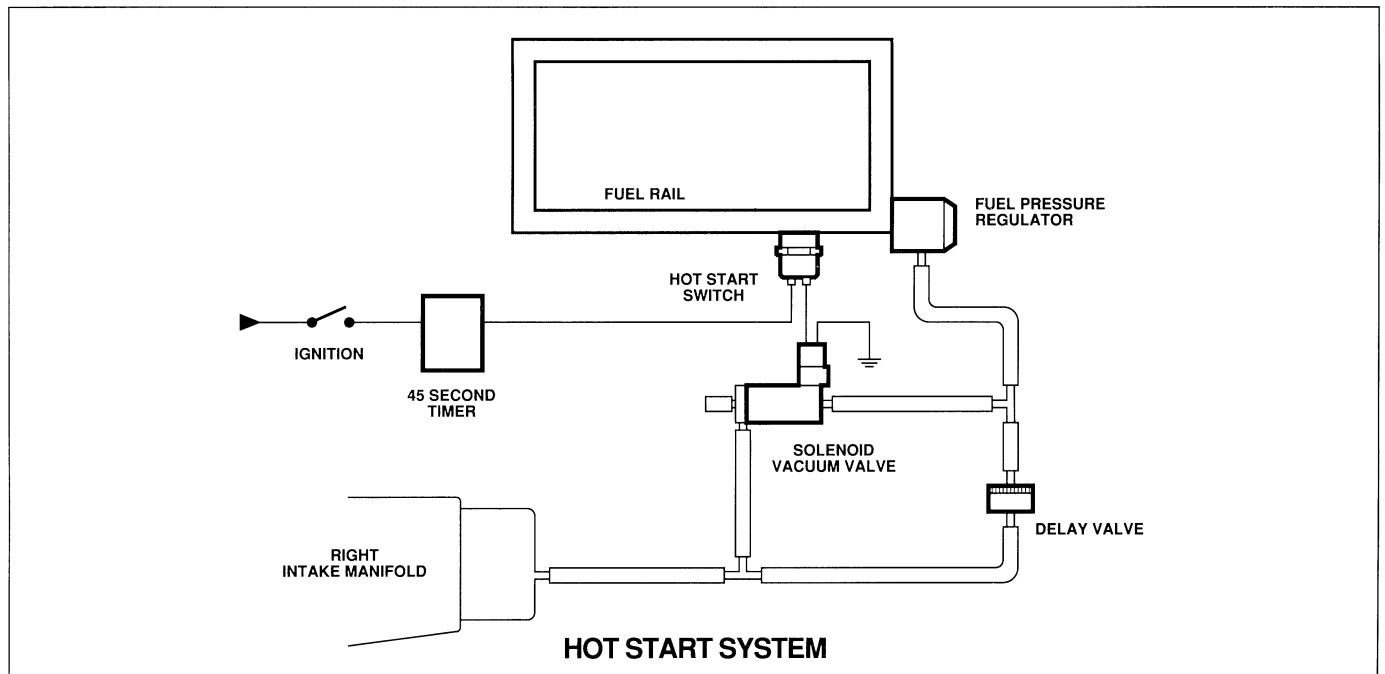
Electronic Fuel Injection and Emission Control

Hot Start

During conditions of high underhood temperatures, a hot start system aids in engine starting by increasing fuel pressure and purging the fuel rail. The system consists of: a fuel rail temperature sensitive switch, a 45-second timer, and a normally open solenoid vacuum valve located in the fuel pressure regulator vacuum line. During normal operation, vacuum is applied to the regulator through the solenoid vacuum valve.



Each time the ignition is switched ON, the 45-second timer is activated and applies current to the hot start switch. If the fuel rail temperature is 158° F or above, the switch closes and allows current flow to close the solenoid vacuum valve. Vacuum to the regulator is delayed causing the regulator to momentarily increase fuel pressure to purge the fuel rail.



Idle Speed

Base idle

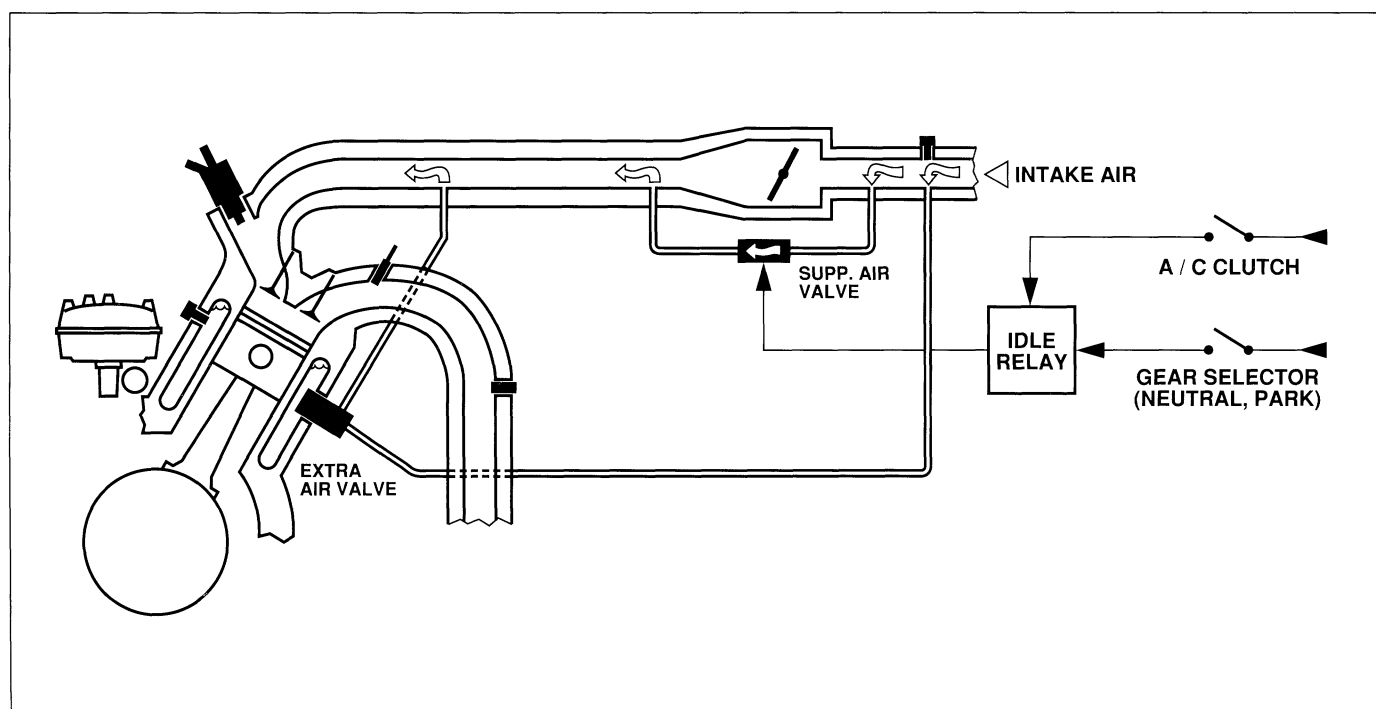
The base idle speed is set with the adjustment screw on the extra air valve. The adjustment regulates the throttle valve bypass idle air flow.

Warm-up

Dependent on engine coolant temperature, the extra air valve allows additional air to bypass the throttle valve to maintain idle speed during warm-up.

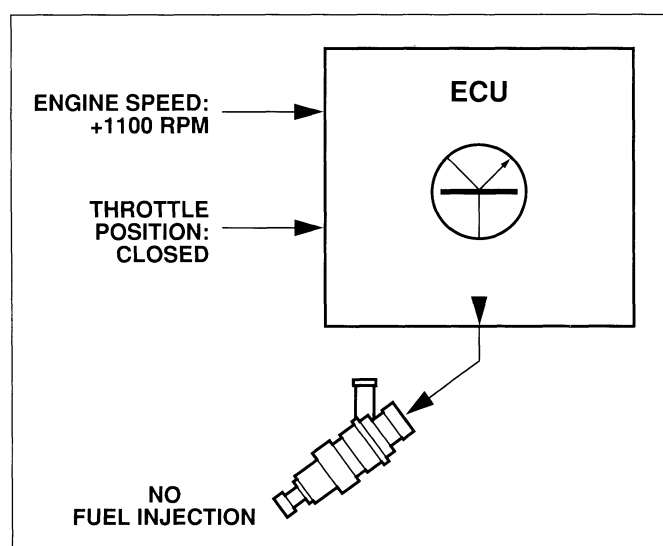
Idle stabilization

During air conditioning compressor operation, the supplementary air valve is opened via the de-energized idle relay, allowing additional throttle-valve-bypass and stabilizing the idle speed. To prevent excessive idle speed with no engine load (neutral, park), the idle relay is energized to switch off the supplementary air valve.



Over-run Fuel Cut-off

To improve fuel economy and aid in controlling exhaust emissions, the ECU cuts off fuel injection during engine over-run conditions. The ECU determines over-run conditions from throttle position (throttle potentiometer) and engine speed (ignition pulses).

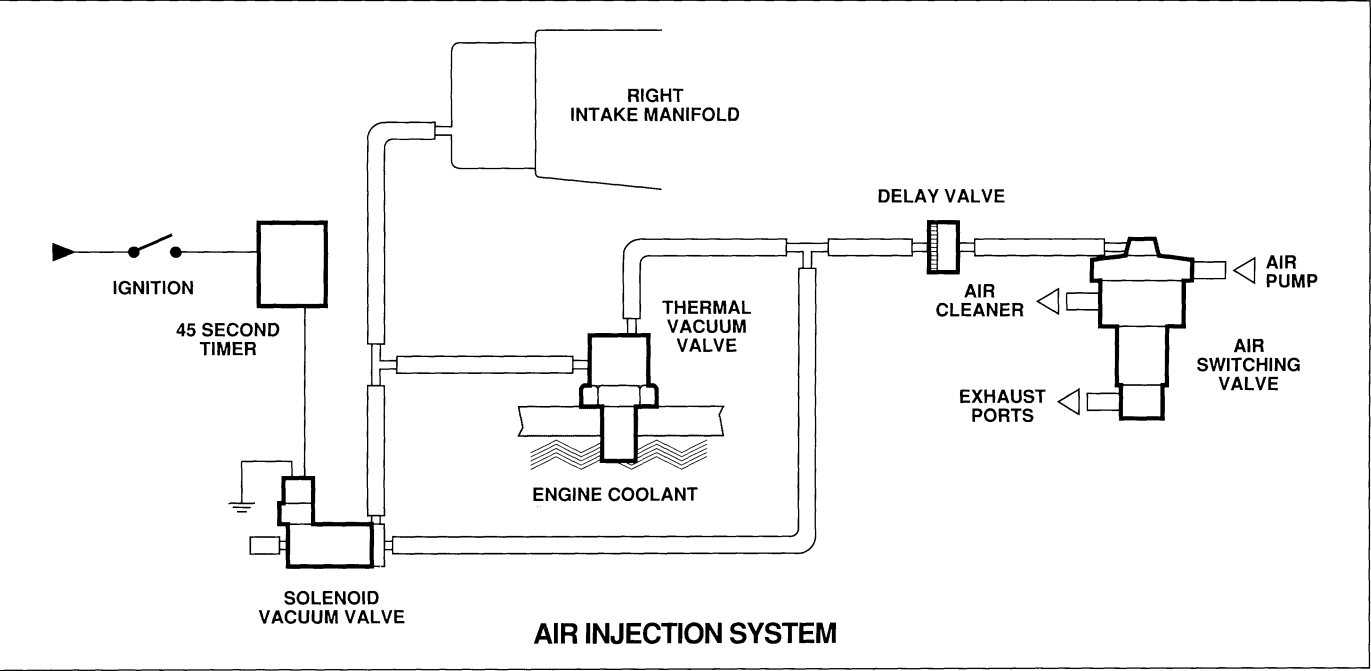


Electronic Fuel Injection and Emission Control

Air Injection

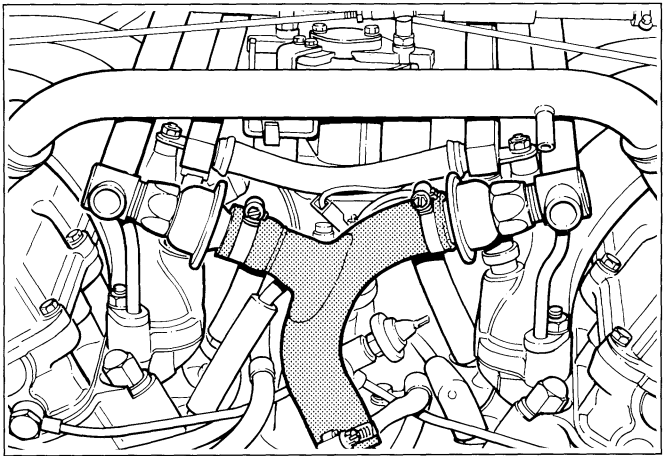
Secondary air is delivered to the exhaust manifolds during the initial engine warm-up period to aid oxidation. The rotary vane air pump is belt driven from the crankshaft pulley. Air is delivered to the exhaust manifolds via the air switching valve, which is controlled by either a thermal vacuum valve or the 45-second timer via a solenoid vacuum valve. The vacuum circuit also contains a delay valve.

Each time the ignition is switched ON, the 45-second timer is activated and the normally closed solenoid vacuum valve is opened. If the coolant temperature is below 95° F, the thermal vacuum valve opens. Manifold vacuum is applied to the air switching valve for 45 seconds after start-up or until the coolant temperature reaches 95° F, which ever is longer. The delay valve prevents vacuum loss to the air switching valve when the throttle is suddenly opened.



Air injection rails

New air injection rails have been designed to clear the new fuel rail. This arrangement uses two check valves located at the rear of the engine.



Collision Safety

In the event of a vehicle impact, the inertia switch will switch off all power supply to the EFI system. The fuel pump will cease to operate, preventing fuel flow to the engine compartment.

Limp Home

A “limp home” facility is provided in the memory of the ECU. This facility will allow engine operation in the event EFI system failure(s). The ECU will substitute a nominal value for missing inputs from the coolant temperature sensor, air temperature sensor, throttle potentiometer, oxygen sensor(s), and the manifold pressure sensor.

On-Board Diagnostics

A facility for on-board diagnostics (OBD) that stores fault data during engine operation is contained in the ECU.

Serial Communications (ISO)

A JDS serial communications serial link is used to access stored fault data in the OBD facility. In addition, the serial link allows ECU input and output values to be transmitted to JDS to check the current status of the EFI system. The serial link connector is the brown PM 4 located under the passenger’s center console kick panel.

Check Engine; Fuel Fail Codes

If a fault occurs in the EFI system, a fuel fail (FF) code is generated. The CHECK ENGINE warning is immediately displayed on the center console message display. If the ignition is switched off, and then on, the CHECK ENGINE warning is displayed with the fail code appearing five seconds later. When the engine is cranked, the message is cleared and the clock displays. The CHECK ENGINE warning and FF code will be displayed at every ignition cycle.

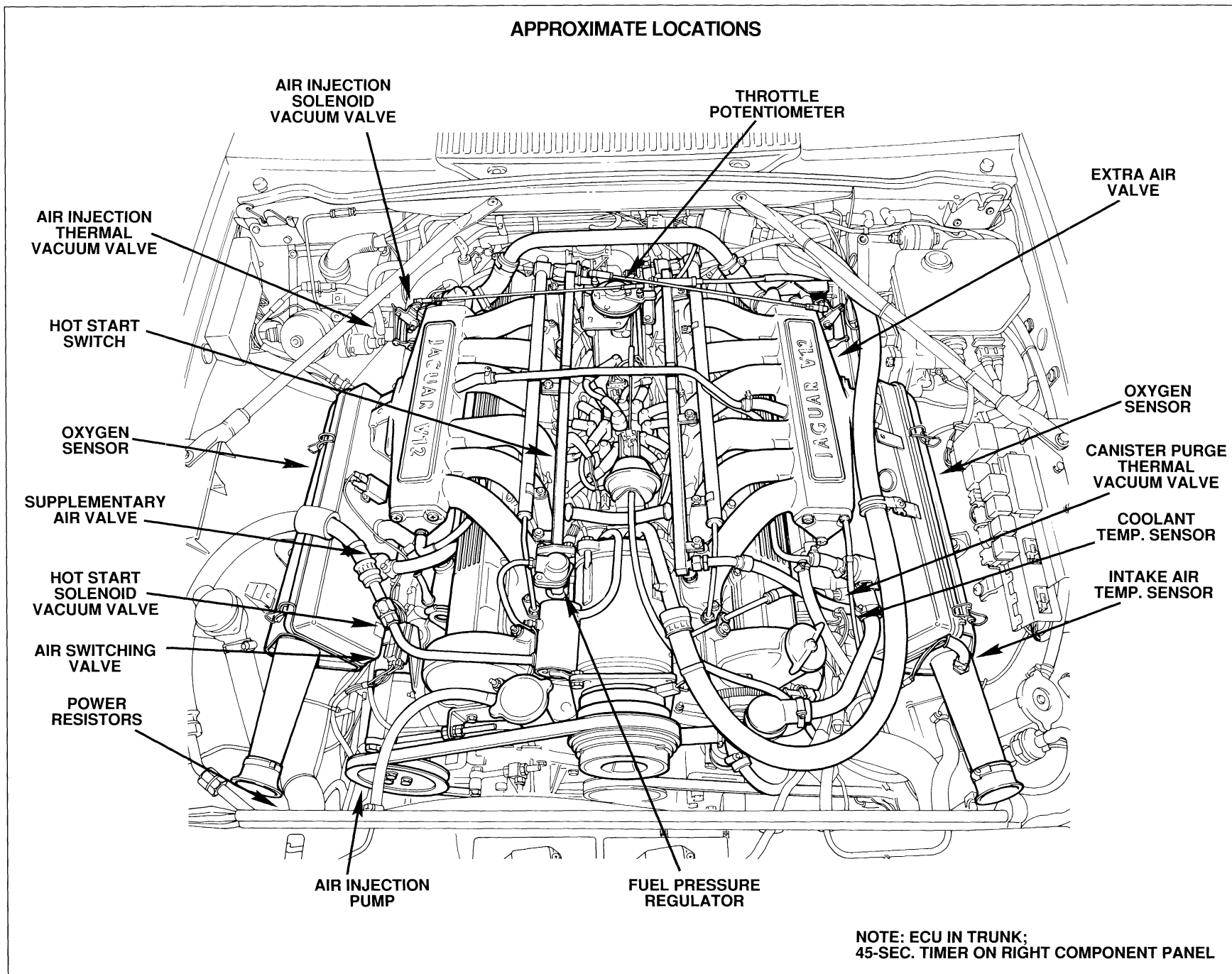
Fuel fail codes (listed in order of priority):

Code	Fault area	Limp home	Failure
29	ECU self test	NO	Checks microprocessor function
44	Oxygen sensor — bank A (right)	YES	No oxygen sensor response to fueling change (bank A)
45	Oxygen sensor — bank B (left)	YES	No oxygen sensor response to fueling change (bank B)
13	Manifold absolute pressure sensor	YES	Manifold pressure does not change on engine starts or manifold pressure is out of range
34	Fuel injectors or air leak — bank A (right)	NO	Poor feedback control — rich or lean (bank A)
36	Fuel injectors or air leak — bank B (left)	NO	Poor feedback control — rich or lean (bank B)
14	Coolant temperature sensor	YES	Sensor voltage does not change after engine start or sensor voltage is out of normal range
17	Throttle potentiometer	YES	Throttle potentiometer voltage is out of normal range
18	Calibration 1 (engine speed, manifold pressure, throttle position)	YES	High throttle potentiometer voltage / low load (manifold pressure)
19	Calibration 2 (engine speed, manifold pressure, throttle position)	YES	Low throttle potentiometer voltage / high load (manifold pressure)
23	Fuel supply	NO	Poor feedback control — both banks rich or lean
49	Power resistors	YES	No current through power resistors
11	ECU idle potentiometer	YES	Idle trim potentiometer is out of normal range
16	Air temperature sensor	YES	Sensor voltage is out of normal range

NOTE: When multiple faults occur, only the highest priority code will be displayed.

Electronic Fuel Injection and Emission Control

EFI and Emission Control Component Locations

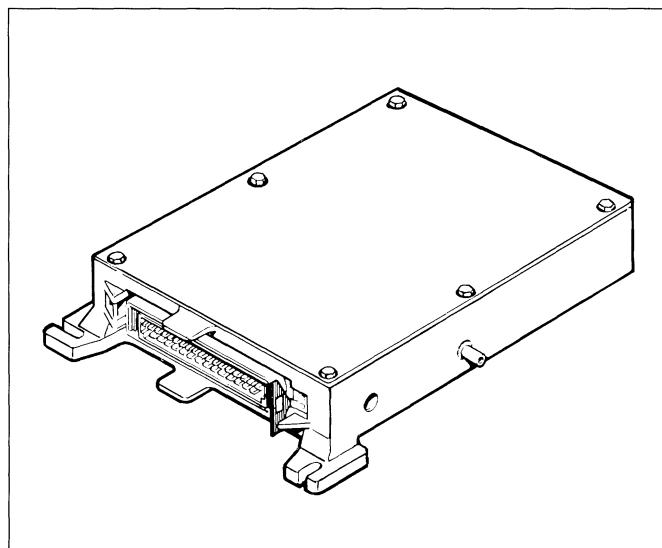


EFI and Emission Control Components

Electronic Control Unit (ECU)

Location Trunk, right front.

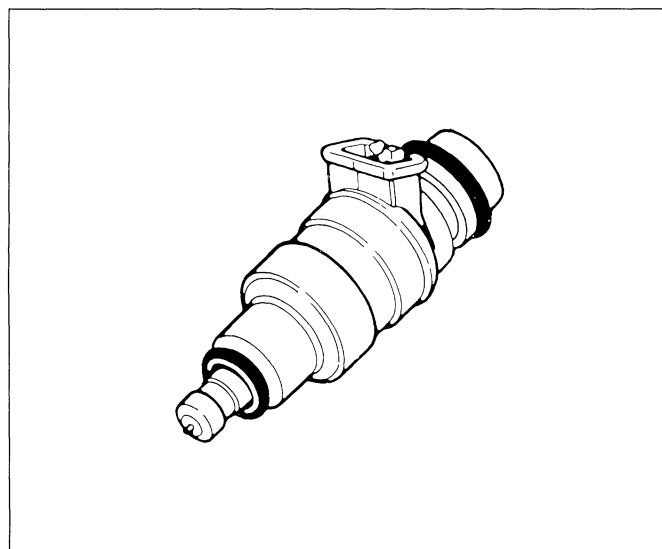
Description The ECU contains an integrated circuit for a dedicated fuel injection control chip and an analog / digital converter for the manifold pressure input. A manifold absolute pressure sensor (transducer) is built into the ECU. Fuel injection information is stored in ROM (read only memory), so that for a given combination of manifold pressure and engine speed, the memory assigns a number proportional to the required injector "on time". The ECU also contains facilities for OBD and serial communications.



Fuel injectors

Location Intake manifolds.

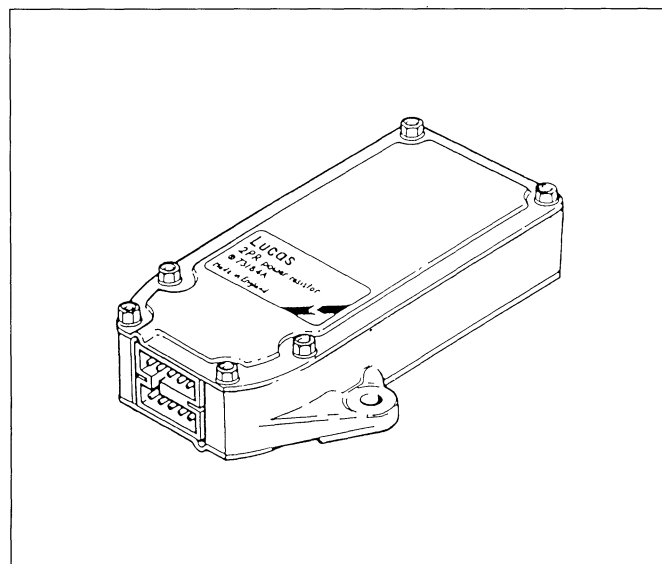
Description Each fuel injector contains a solenoid-operated needle valve, which is held against a seat by spring pressure. When energized, the coil moves the needle away from the seat, allowing pressurized fuel to flow through the tip.



Power resistors

Location Engine compartment, right front.

Description The power resistors (one per injector group of three) are used to limit current flow to the injectors to a safe level in order to protect the ECU.



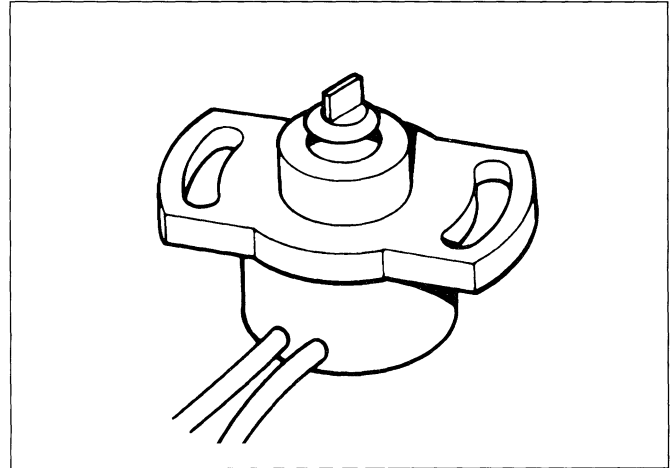
Electronic Fuel Injection and Emission Control

EFI and Emission Control Components (continued)

Throttle potentiometer

Location Under the throttle turntable.

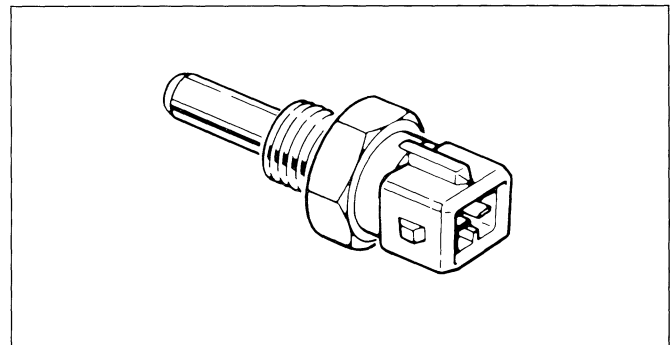
Description The throttle potentiometer is mechanically connected to the throttle valve shaft and provides a reference voltage input to the ECU dependent on throttle position.



Coolant temperature sensor

Location Left thermostat housing.

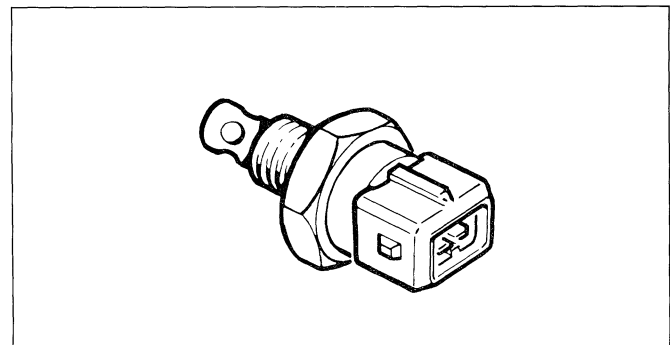
Description The coolant temperature sensor is a temperature-sensitive resistor. As the coolant temperature rises, the electrical resistance decreases providing a coolant temperature input to the ECU.



Intake air temperature sensor

Location Left air cleaner intake.

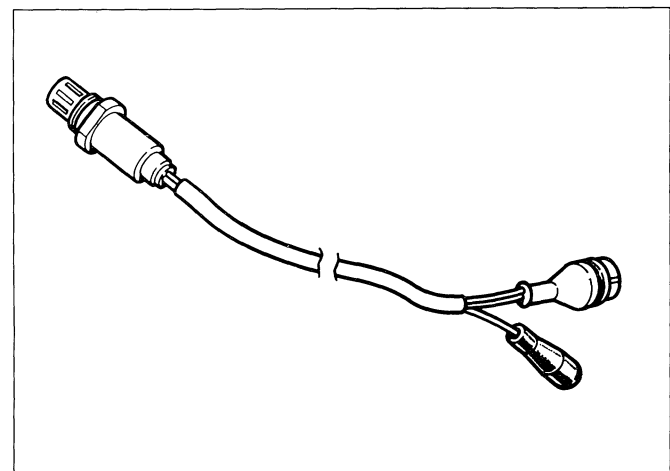
Description The air temperature sensor is a temperature-sensitive resistor. As the ambient (intake) air temperature rises, the electrical resistance decreases, providing an input to the ECU. The ECU uses this input as a measure of intake air density (as air temperature rises, its density decreases).



Oxygen sensor

Location Exhaust down-pipes.

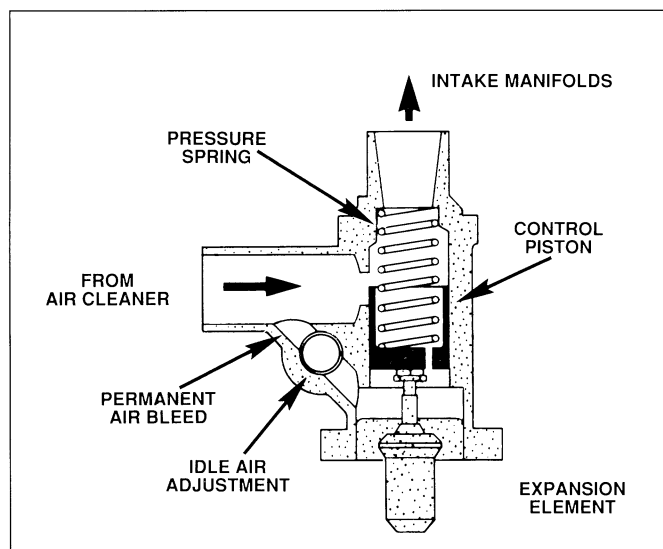
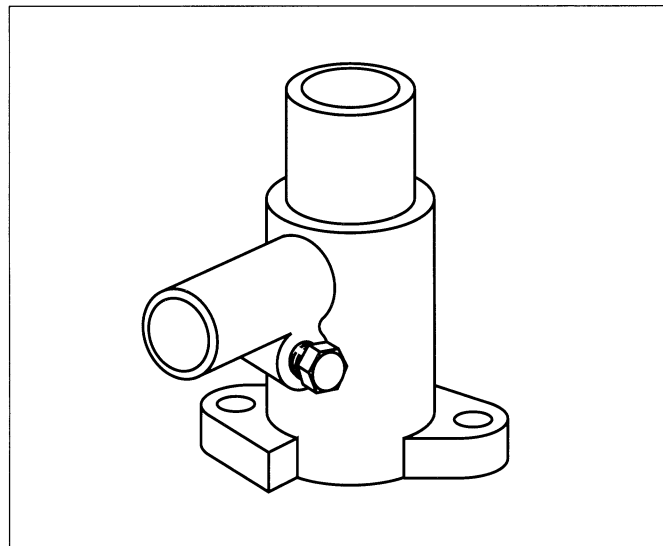
Description The oxygen sensors measure the oxygen concentration in the exhaust gases and provide input to the ECU.



Extra air valve

Location Left cylinder head, rear.

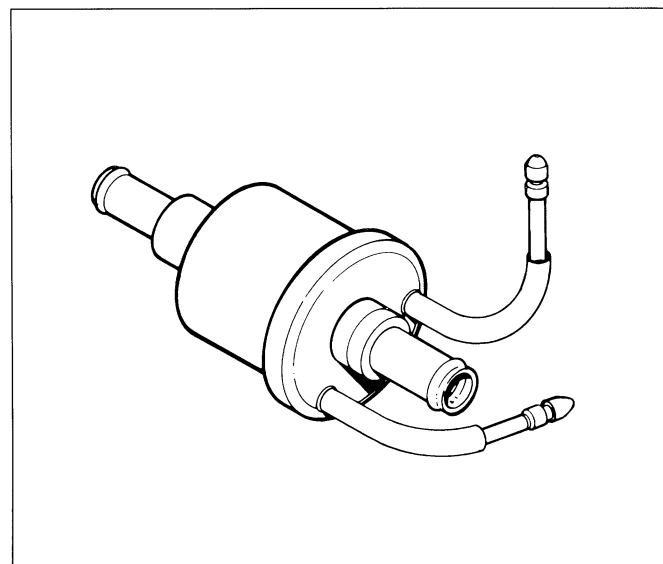
Description The extra air valve has two functions: it provides the engine base idle speed through the adjustable idle air bleed and it provides warm-up idle speed stabilization through the variable air duct. The duct area is varied by a temperature-sensitive expansion element, in contact with engine coolant, that moves a control piston. As the coolant temperature increases, the area of the duct is gradually reduced until, at a coolant temperature of 140 – 158° F, it closes completely.



Supplementary air valve

Location Right air cleaner back plate.

Description The supplementary air valve allows additional throttle bypass air into the intake manifolds to stabilize the idle speed during air conditioning compressor operation (except when in neutral or park).



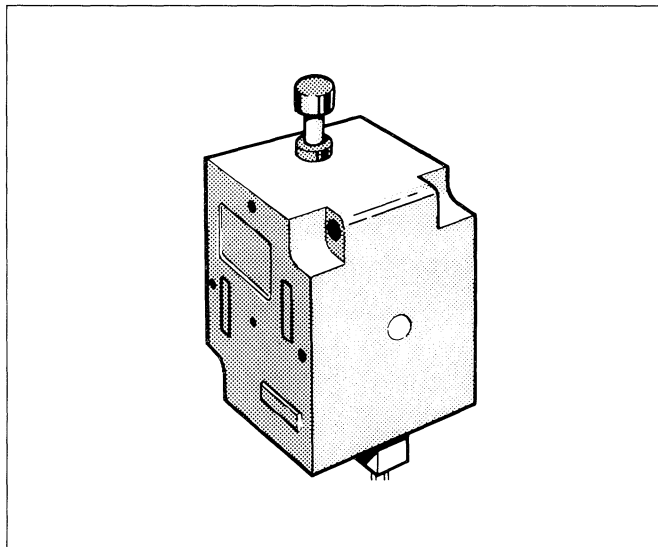
Electronic Fuel Injection and Emission Control

EFI and Emission Control Components (continued)

Inertia switch

Location Passenger's side "A" post.

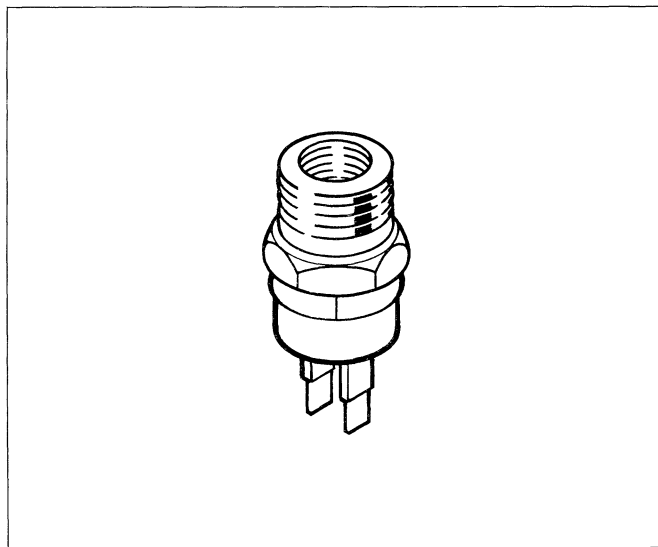
Description In the event of a vehicle impact, the inertia switch switches off all power supply to the EFI system.



Hot start switch

Location Fuel rail, right.

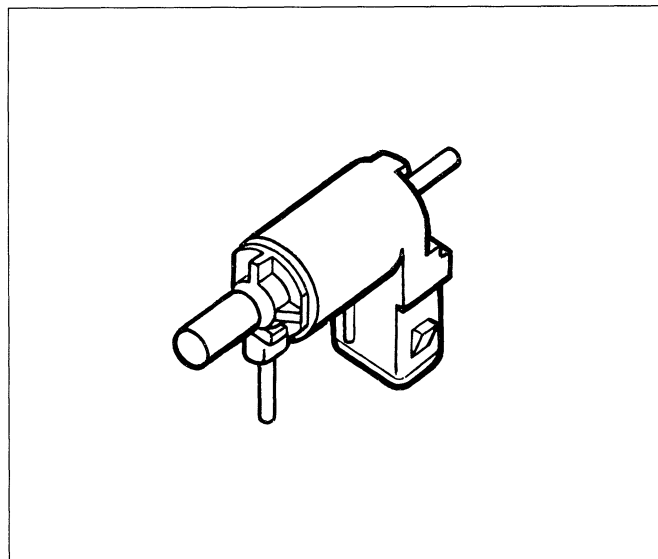
Description The hot start switch switches current between the 45-second timer and the hot start solenoid vacuum valve. The switch contacts close at 158° F and above.



Hot start solenoid vacuum valve

Location Above right thermostat housing.

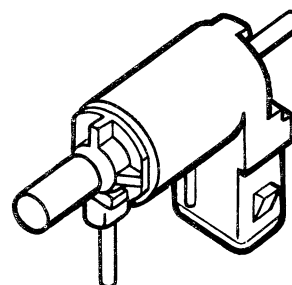
Description The normally open solenoid valve closes when current is applied via the 45-second timer and the hot start switch.



Air injection solenoid vacuum valve

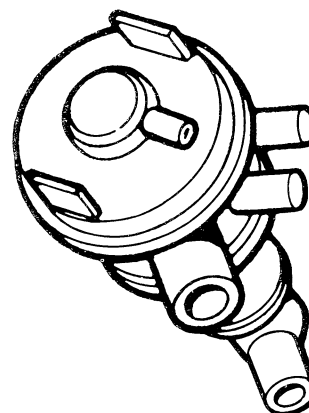
Location Right cylinder head, rear.

Description The normally closed solenoid vacuum valve opens when current is applied via the 45-second timer.

**Air switching valve**

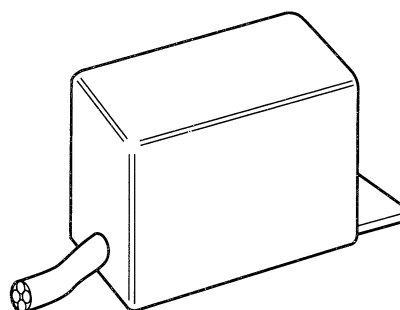
Location Engine, right front.

Description The air switching valve directs air injection to the exhaust manifolds or the air cleaner dependent on vacuum signal.

**45-second timer**

Location Right component panel.

Description The 45-second timer applies current to the hot start switch and the air injection solenoid vacuum valve for 45 seconds after every engine start.



Digital Ignition

The ignition system has a new ECU incorporating minor software changes.

The ignition system is a digital microprocessor-controlled system that eliminates vacuum and mechanical advance controls. The microprocessor memory contains ignition timing strategy with precise timing for engine speeds, loads, and modes of operation. The microprocessor, in the ECU, receives inputs from engine sensors to program the necessary ignition timing. The double-deck two-rotor distributor distributes the high tension voltage to bank A (right) via the lower deck and to bank B (left) via the upper deck. The low-voltage circuit is switched by the ECU via the two power modules to the two ignition coils. High voltage is generated by the ignition coils and supplied to the distributor.

The inputs supplied to the ECU from the engine sensors form two groups of control parameters: primary inputs and correction inputs. The crankshaft position and engine-speed inputs are necessary for the engine to start. The remaining inputs affect engine operation but are not necessary for engine start.

1992 Model Year

The coolant temperature compensation to the ignition timing strategies for cranking, idle, and main operation have been made more flexible.

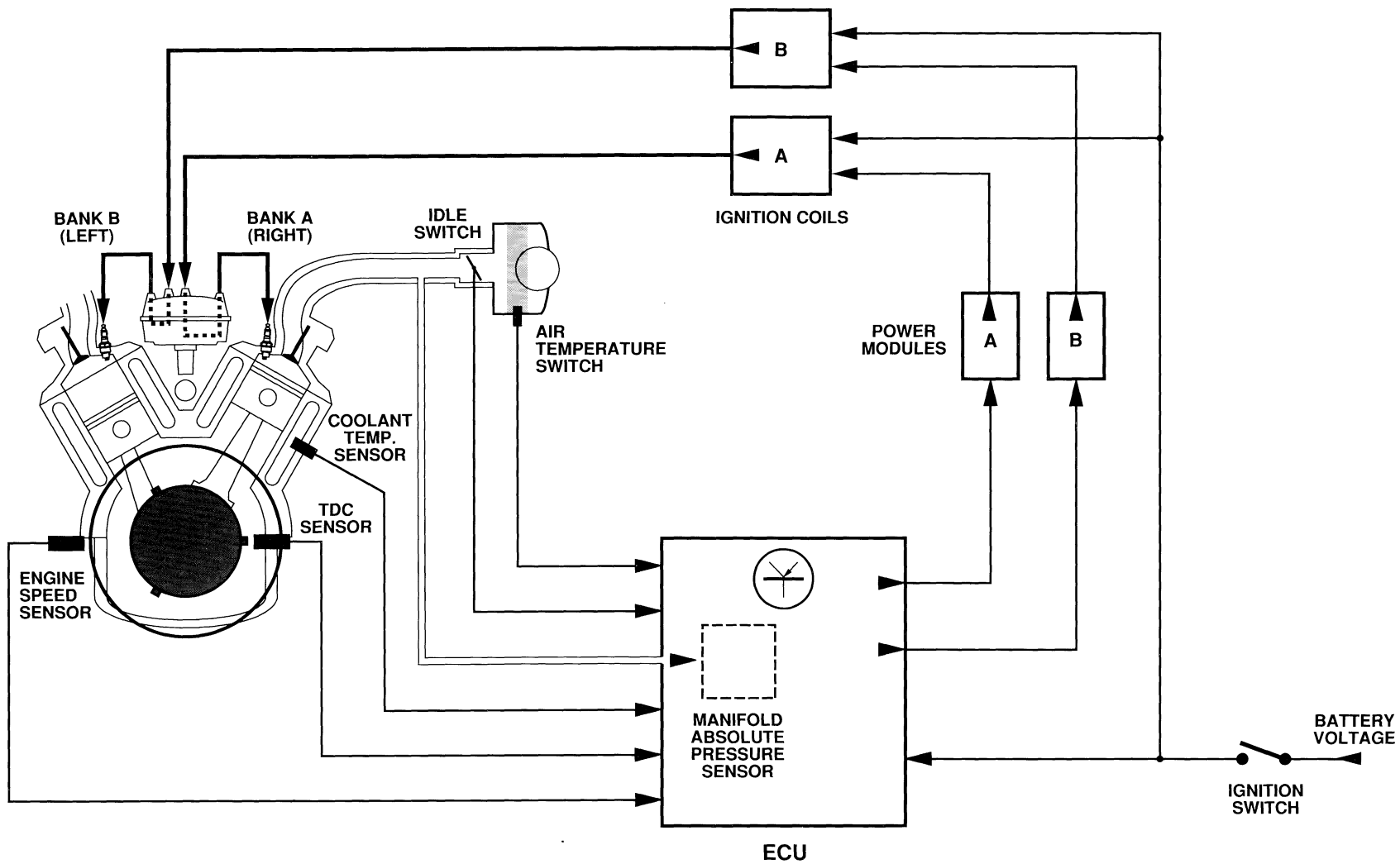
Primary inputs:

- Crankshaft position — TDC sensor
- Engine speed — Engine speed (flywheel) sensor
- Engine load — Manifold absolute pressure sensor

Correction inputs:

- Throttle position — Idle switch
- Engine coolant temperature — Coolant temperature sensor
- Intake air temperature — Air temperature switch

NOTE: The sensors and switches are unique to the digital ignition system and are not used or shared by the EFI system.

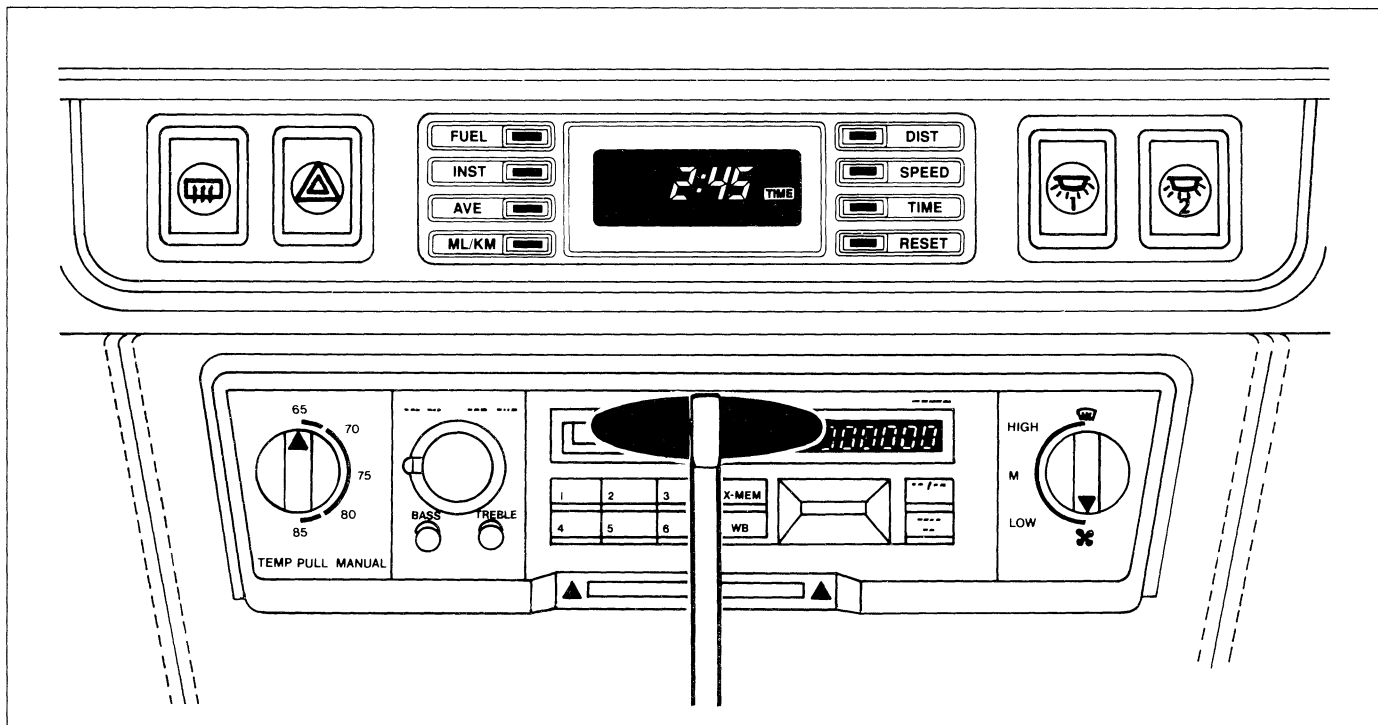


Climate Control

The climate control system has undergone minor changes to stabilize performance and accommodate the new fuel delivery system.

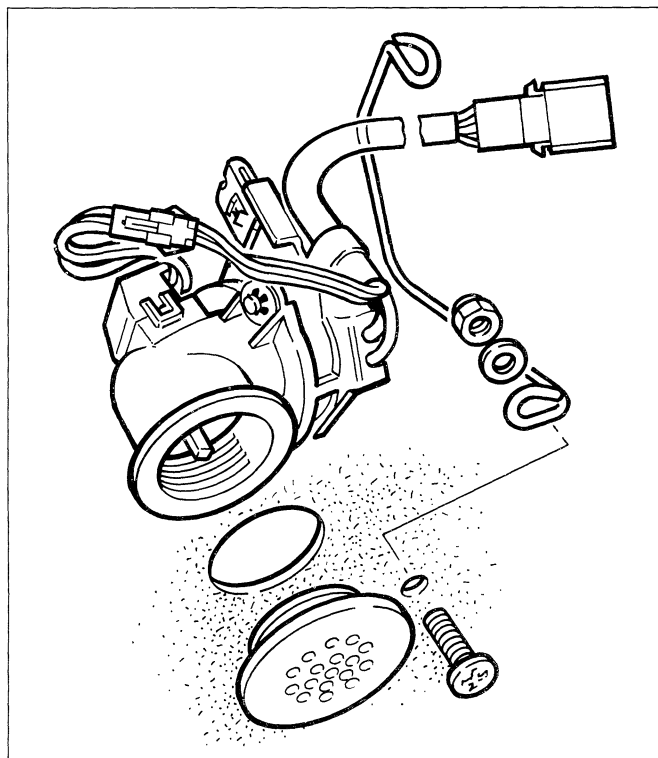
Control panel

The control panel has revised temperature and blower range knobs and new graphics. Locate lighting bulbs replace the former fiber optic system.



Motorized aspirator

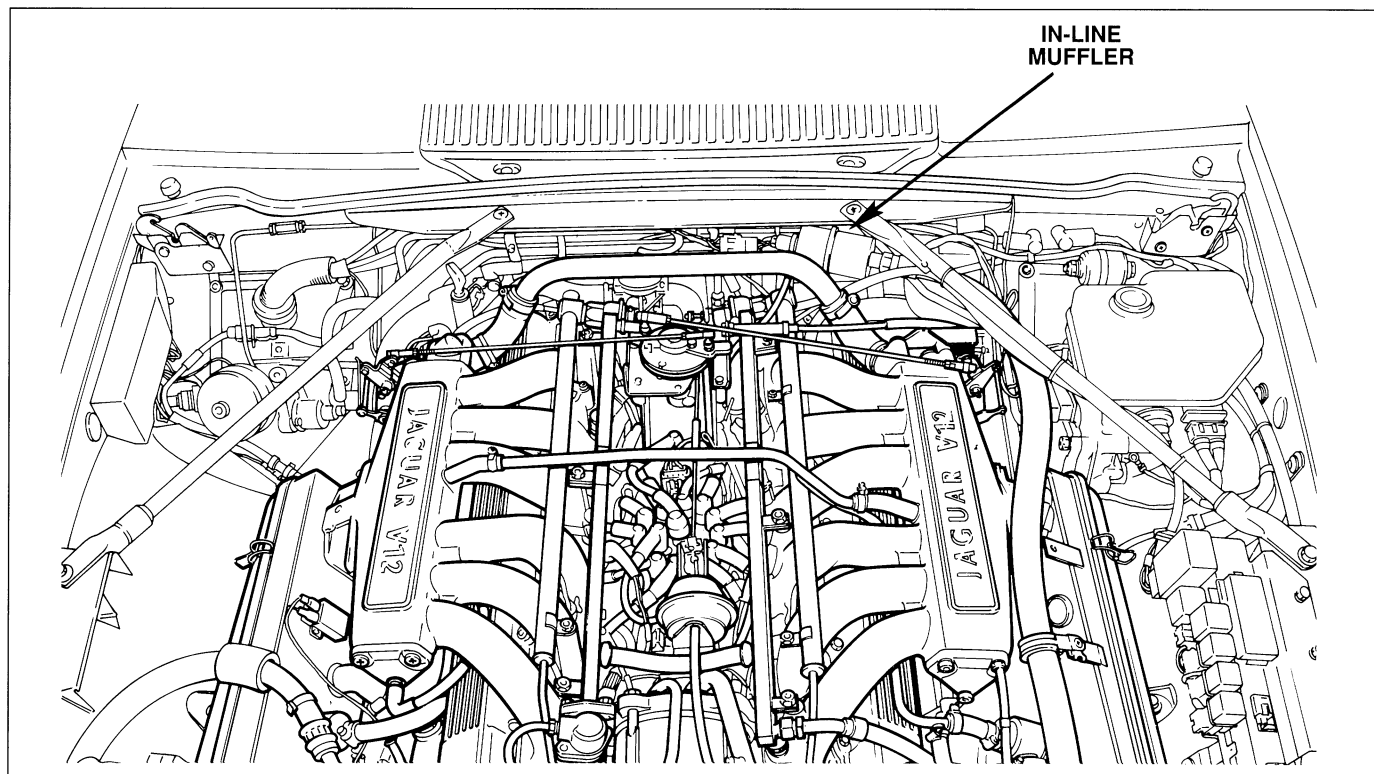
A motorized aspirator provides more stable system performance by continually drawing interior air over the in-car temperature sensor. This arrangement helps prevent temperature drift and overshoot. The aspirator assembly is located in the passenger's under-dash panel.



Fuel cooling

With the introduction of the new fuel delivery system, the necessity of the previous fuel cooler is eliminated. The internal climate control circuit that was used to operate the air conditioning system at all times on convertible models has been likewise eliminated.

Air conditioning



An additional muffler has been added to the low pressure return line to the compressor. This in-line muffler is in addition to the compressor mounted muffler.

The high and low side charging ports have different diameters, 7/16 in. and 3/8 in. respectively.

Electrical System Design and Layout

The XJS Range electrical system retains a conventional design with no distinct logic ground or power ground systems. Circuits are switched on both the power side and the ground side. Electronics are used where appropriate to provide precise control and/or increased convenience.

Much of the vehicle electrical componentry is new as described earlier. To compliment these, many additional changes have been made:

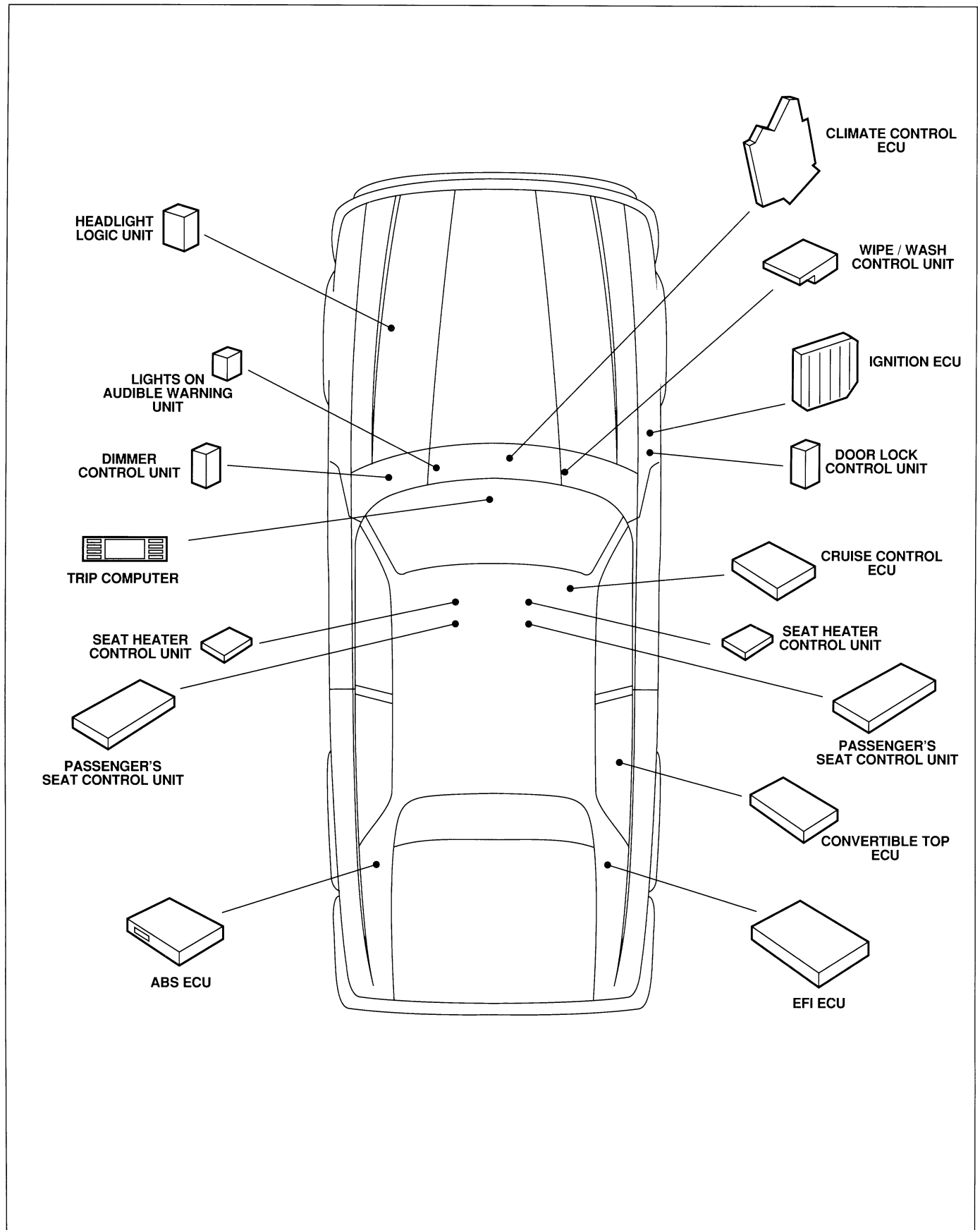
- The wiring harness is completely redesigned. The new harness design provides uniformity, efficient construction, and reliable mating.
- Reduced wire size reduces bulk and weight.
- New connectors make up the majority of connections.
- Bulkhead connectors are replaced by in-line connectors.
- Circuits have been redesigned to improve operation and reliability.
- System relays have been upgraded to a single high quality specification.
- Logic control has been added to circuits.
- All the switch gear is new.
- All exterior lighting is new.
- The fuse panels are redesigned.
- Additional fuse panels replace in-line fuses.
- Rerouting of harnesses in exposed areas improves underhood appearance.
- Pre-wiring for optional security system.

JDS (Jaguar Diagnostic System)

The JDS software release accompanying the new XJS contains expanded system coverage and incorporates serial communications (ISO) to interface with the On-board diagnostics (OBD) in the fuel injection ECU and the driver's seat and mirrors ECU.

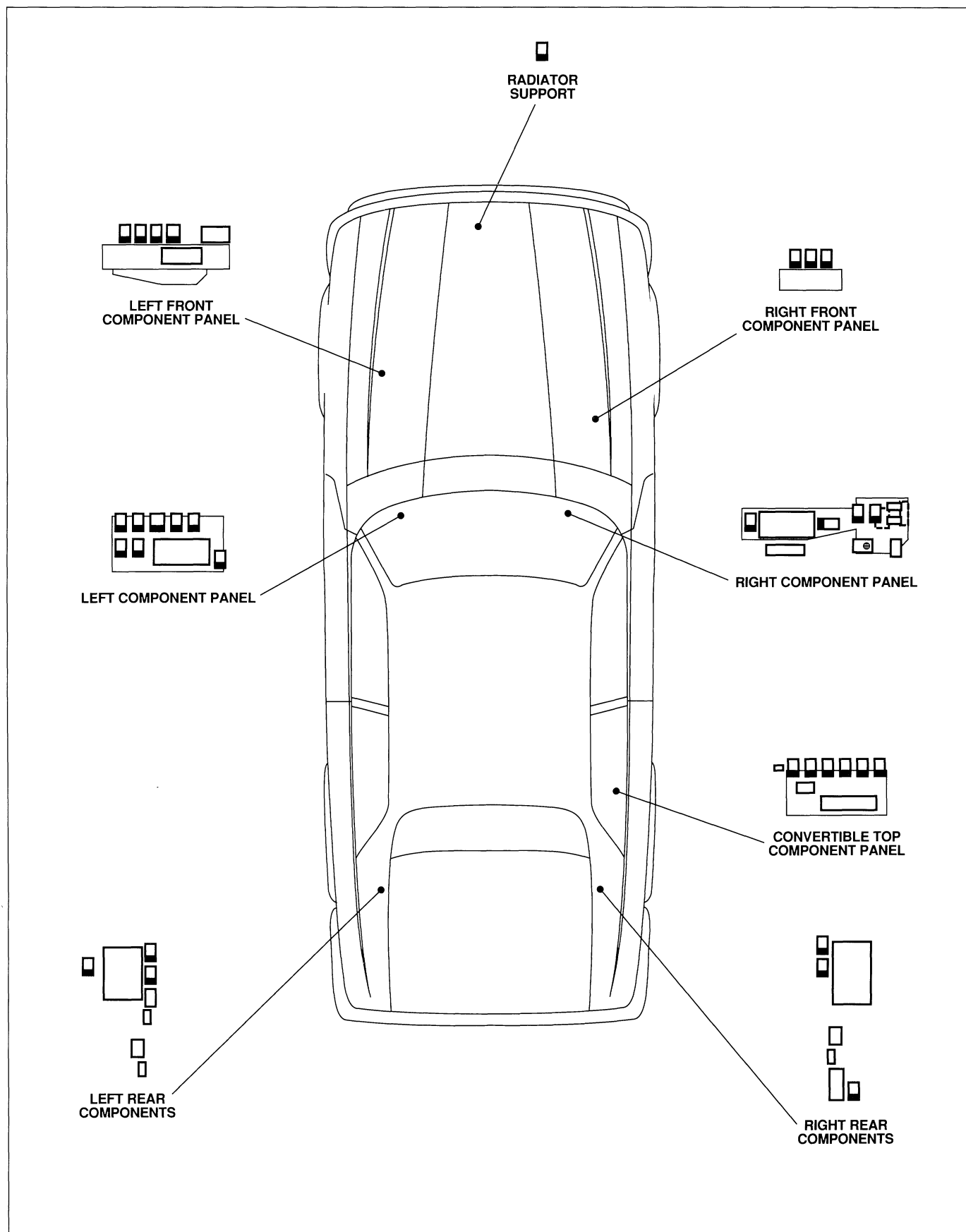
- The menu structure is simplified and allows faster and easier test selection.
- The MULTIMETER MODE adds frequency measurement and pulse recognition.
- The MEASUREMENT PROBE has on-screen measurement display and allows retaking of measurements.

Electronic Control Units; Logic and Control Units



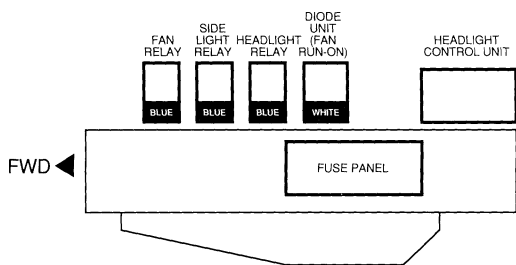
Electrical System Design and Layout

Component Panels, Fuses and Relays — Locations and Identifications

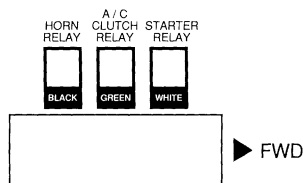




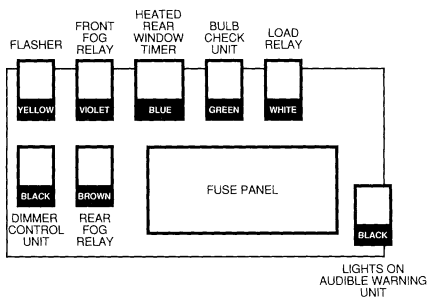
RADIATOR SUPPORT



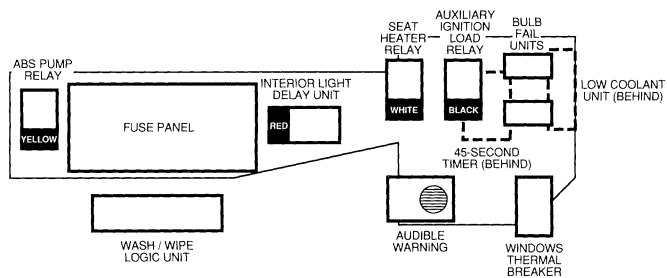
LEFT FRONT COMPONENT PANEL



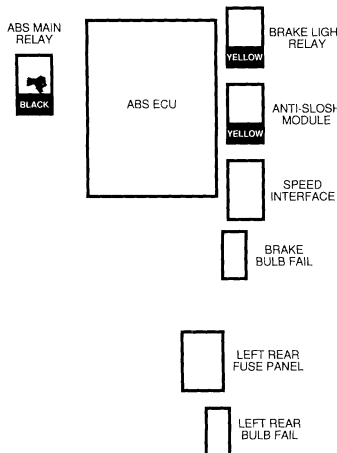
RIGHT FRONT COMPONENT PANEL



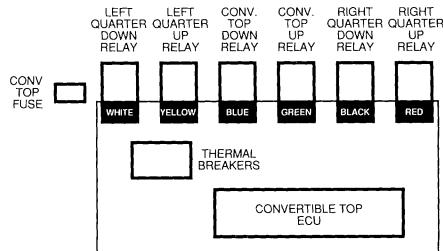
LEFT COMPONENT PANEL



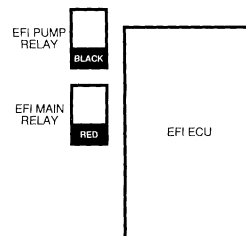
RIGHT COMPONENT PANEL



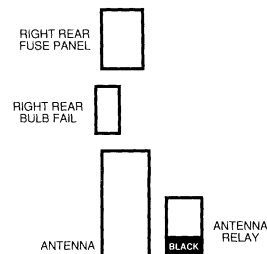
LEFT REAR COMPONENTS



CONVERTIBLE TOP COMPONENT PANEL



RIGHT REAR COMPONENTS



Electrical System Design and Layout

Fuse Panels and Identifications

Left fuse panel

Number	Color	Value	Circuit
1	Lt. Blue	15A	Driver's seat movement – fore, aft, lumbar
2	Violet	3A	Kick down
3	Yellow	20A	Left blower
4	Pink	4A	Telephone ignition power (optional); 45-second timer
5	Tan	5A	Telephone battery power (optional)
6	Tan	5A	Radio memory
7	Red	10A	Radio power
8	Red	10A	Windshield washer pump
9	Red	10A	Driver's seat heater
10	–	–	Not used
11	Red	10A	Trunk lighting
12	Yellow	20A	Driver's seat movement – recline
13	Violet	3A	Trip computer memory
14	Violet	3A	Power mirrors; door switch packs; seat memory
15	Pink	4A	Heated washer jets
16	Tan	5A	Reverse lights; trip computer
17	Tan	5A	Rear fog lights
18	Orange	7.5A	Locate lighting; instrument pack lighting
19	Orange	7.5A	Hazard warning; seat belt warning logic
20	Lt. Blue	15A	Front fog lights
21	–	–	Not used
22	Lt. Blue	15A	Heated rear window; heated door mirrors

Right fuse panel

Number	Color	Value	Circuit
1	Yellow	20A	Passenger's seat movement – fore, aft, recline
2	Violet	3A	Cruise control
3	Yellow	20A	Right blower
4	Tan	5A	Interior lighting
5	Brown	7.5A	Turn signals
6	Red	10A	Central door locking
7	Red	10A	Cigar lighter
8	Lt. Blue	15A	Windshield wipers
9	Lt. Green	30A	Headlight power wash
10	Violet	3A	Solenoid vacuum valves
11	Lt. Green	30A	ABS main
12	Tan	5A	Passenger's seat movement – lumbar
13	Violet	3A	Left front side lights
14	Violet	3A	Right front side lights
15	Violet	3A	Climate control (ECU and control circuit); cooling fan run-on
16	Tan	5A	Air conditioning relay
17	Red	10A	Passenger's seat heater
18	Lt. Blue	15A	Horns
19	Lt. Blue	15A	Stop lights
20	Lt. Blue	15A	Not used
21	–	–	Not used
22	Lt. Green	30A	ABS pump

Left front fuse panel

Number	Color	Value	Circuit
1	—	—	Not used
2	—	—	Not used
3	—	—	Not used
4	—	—	Not used
5	Red	10A	Left headlight high beam
6	Red	10A	Right headlight high beam
7	Red	10A	Cooling fan
8	Lt. Blue	15A	Not used
9	Brown	7.5A	Left headlight low beam
10	Brown	7.5A	Right headlight low beam
11	—	—	Not used
12	Violet	3A	Not used

Left rear fuse panel

Number	Color	Value	Circuit
1	Violet	3A	Left tail, left license plate lighting
2	Violet	3A	Not used
3	Violet	3A	Not used

Right rear fuse panel

Number	Color	Value	Circuit
1	Violet	3A	Right tail, right license plate lighting
2	Red	10A	Antenna
3	Tan	5A	Not used

Convertible top fuse

Number	Color	Value	Circuit
1	Lt. Green	30A	Convertible top

In-line fuses

Color	Value	Circuit	Location
Tan	5A	EFI diagnostic	Passenger footwell cheek panel (diagnostic socket)
Violet	3A	Driver's lumbar motor	Driver's seat back
Violet	3A	Passenger's lumbar motor	Passenger's seat back

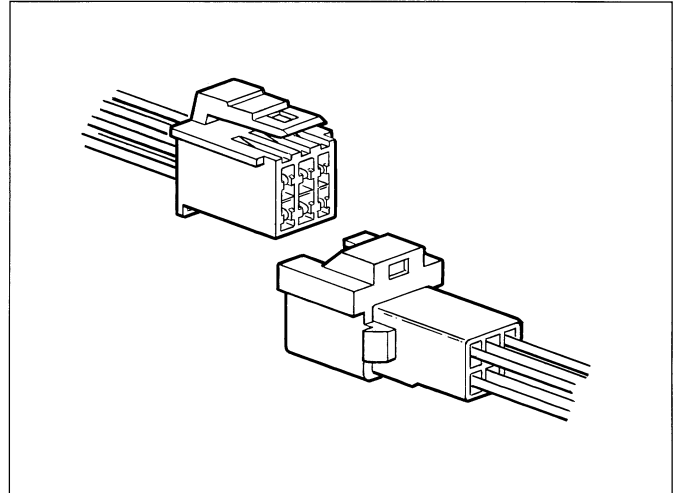
Electrical System Design and Layout

Connectors

In an effort to ensure maximum reliability, a new generation of connectors was developed for use in the new XJS Range electrical system. Each connector type housing is color coded in one of a range of colors for easy identification. Three new connectors manufactured by Sumitomo are introduced on the XJS. All three are the HM 090 series that use 0.090 in. blade connectors.

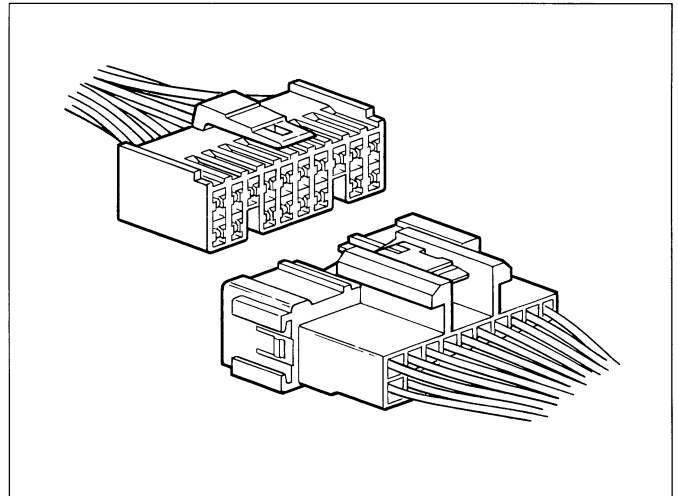
Sumitomo HM 090 Standard

Standard connectors are used primarily in the interior of the vehicle to make final connection to a component. The connector has positive mate and anti-backout features and either latch or reject when making.



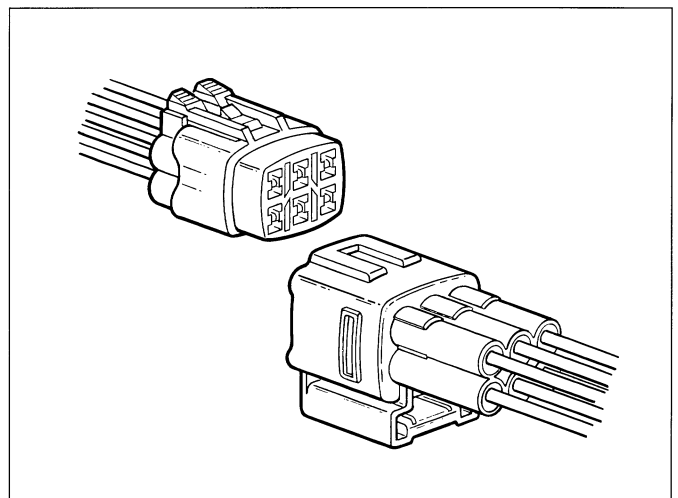
Sumitomo HM 090 Block

Block connectors are used for making connections at major harness junctions. The connector has positive mate and anti-backout features and either latch or reject when making. These block connectors replace the previous bulkhead connectors at the "A" posts.



Sumitomo HM 090 Sealed

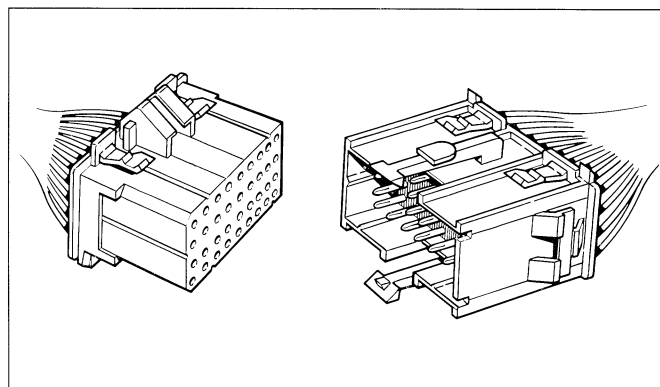
Sealed connectors are used in exposed areas of the vehicle. The connector has positive mate and anti-backout features and either latch or reject when making. A mounting lug is incorporated into the housing to allow attachment to a fixed location.



PM-5 and Multilock connectors previously used only on the Sedan Range vehicles have been incorporated into the XJS Range.

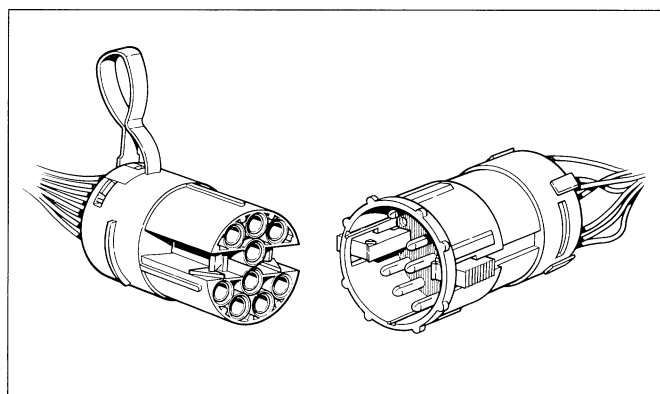
PM HD (Positive Mate — high density)

PM HD high-density rectangular connectors with up to 36 contact sets are used in a limited number of applications. The connector has positive mate and anti-backout features and either latch or reject when making.



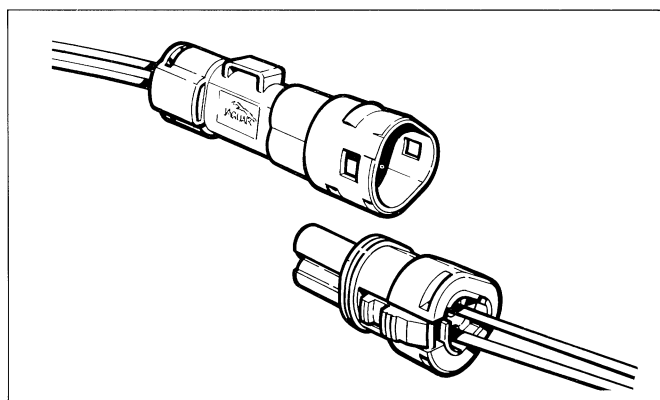
PM 4 (Positive Mate — 4th generation)

PM 4 round connectors with up to 9 contact sets are used in a number of applications. The connector has the same features as PM HD with the addition of weather sealing, which allows them to be used in areas that are exposed to weather.



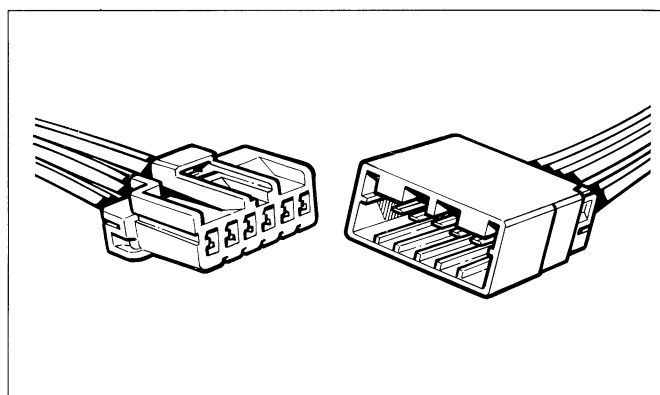
PM 5 (Positive Mate — 5th generation)

PM 5 round connectors are used to reduce connector bulk and are primarily located in the engine compartment. They are supplied in both sealed and unsealed types with 1-, 2- and 3-way connections.

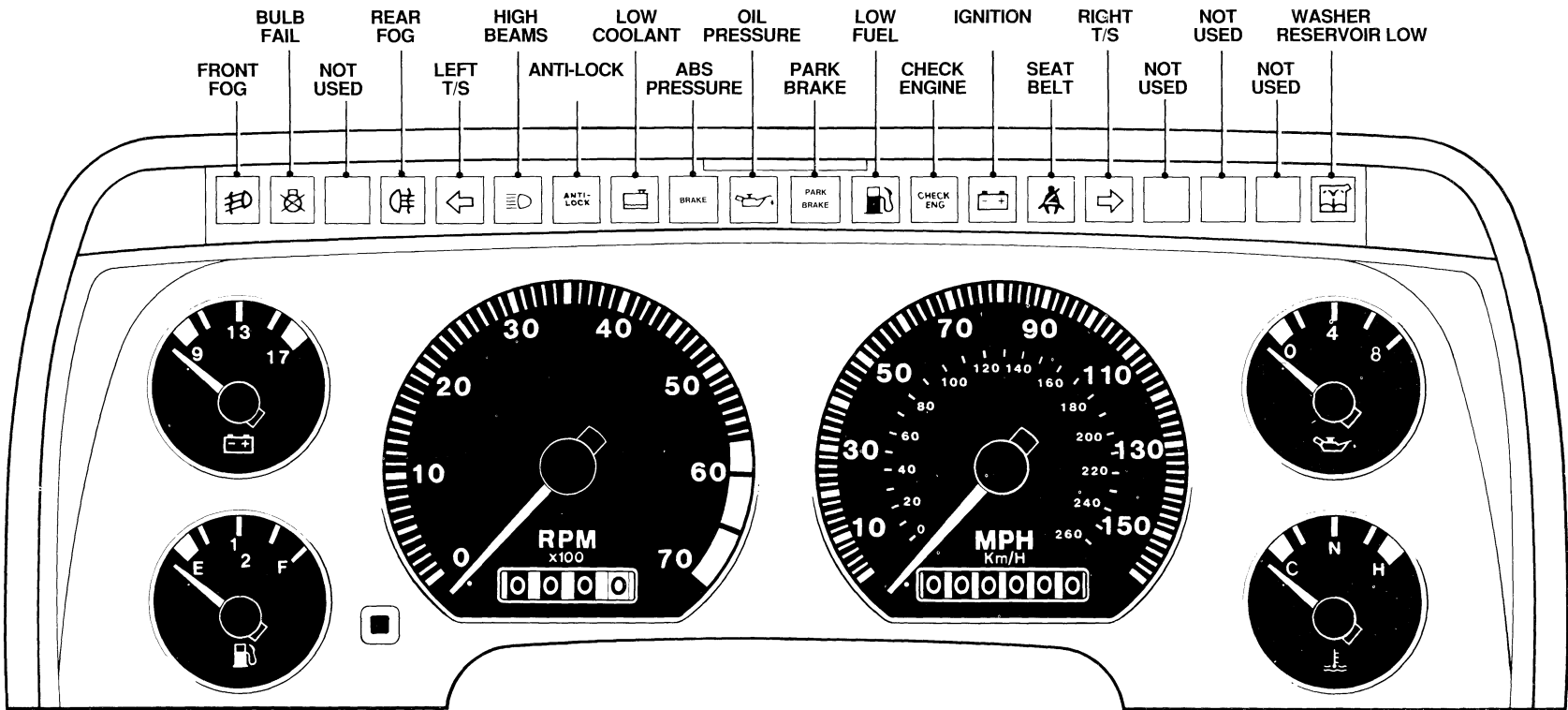


Multilock

Multilock rectangular connectors have blade-type contacts in two sizes (dependent on current load). The connector can be used for in-line harness connection, as shown, or as a "board" connector where direct connection to a component is made.



INSTRUMENT PACK



Instrument Pack

The instrument pack is of conventional design incorporating analog gauges and a warning indicator system. The speedometer and tachometer are supported by four supplementary gauges. The warning indicators are arranged in a row across the top. Back lighting is used to provide even illumination.

BRAKE FAIL warning inverter

The instrument pack incorporates the BRAKE FAIL signal inverter eliminating the previous inverter relay.

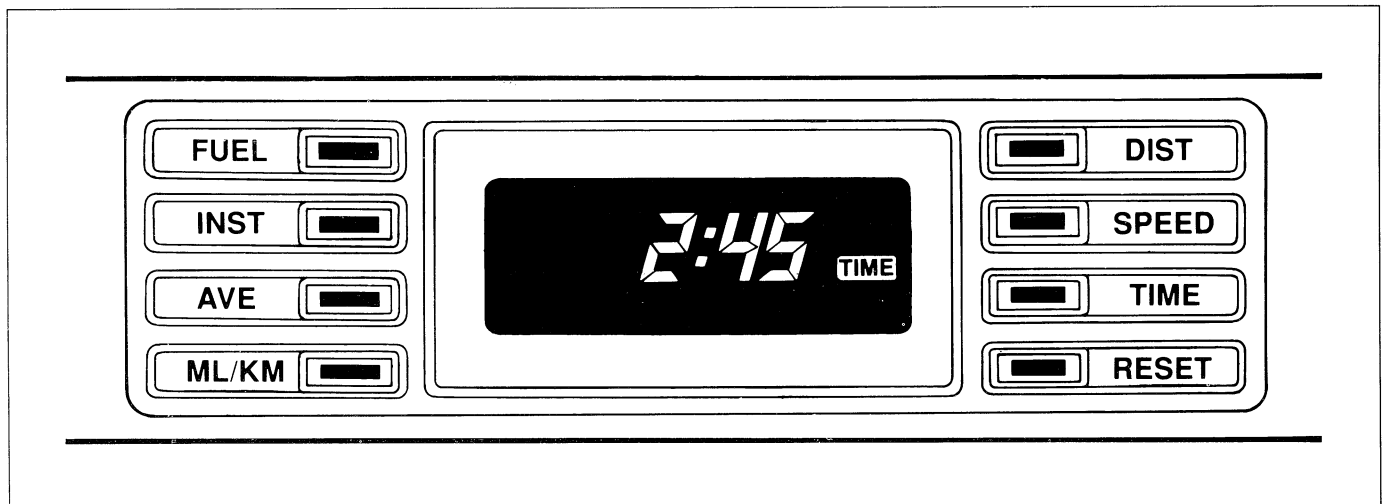
Trip Computer; Clock

The new trip computer uses a liquid crystal display (LCD), new graphics, and a new layout. When the ignition is turned ON, the LCD message display back lighting comes on and the trip computer defaults to the time of day. Except for the time functions, the function displays are to either side of the time display.

Key functions are as follows:

- FUEL: fuel used since last reset
- INST: instantaneous fuel consumption
- AVE: average fuel consumed since last reset
- ML / KM: miles / km selector
- DIST: Distance traveled since last reset
- SPEED: average speed since last reset
- TIME: time of day / elapsed time*
- RESET: clears memory

* The TIME key has two functions: the first press produces the time of day, the subsequent press displays the elapsed time since RESET. After five seconds, the time of day is once again displayed.



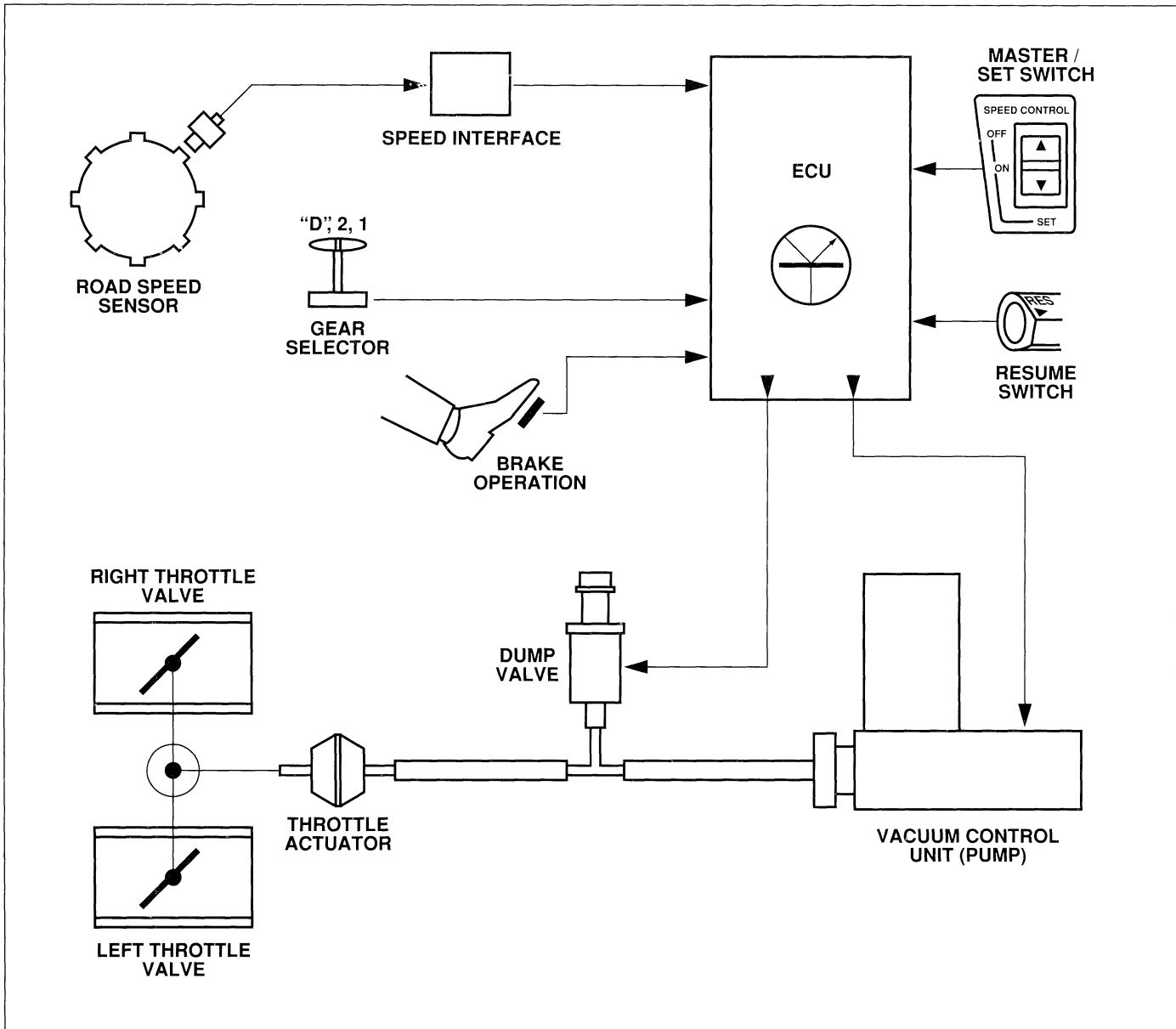
Message Display

The message display also serves as a CHECK ENGINE warning in the event of an EFI fuel failure.

If a fault occurs in the EFI system, a fuel fail (FF) code is generated. The CHECK ENGINE warning is immediately displayed on the message display. If the ignition is switched off, and then on, the CHECK ENGINE warning is displayed with the fail code appearing five seconds later. When the engine is cranked, the message is cleared and the clock displays. The CHECK ENGINE warning and FF code will be displayed at every ignition cycle. Refer to page 29.

Cruise Control

The new cruise control system is similar to the Sedan Range system. The system maintains the vehicle at a selected speed by controlling the position of the throttle over a wide range of movement, from idle to full throttle. The system has an independent vacuum source to operate the throttle movement under varying road conditions. The ECU (electronic control unit) interprets sensor and control panel inputs to activate the vacuum control unit and the dump valve.



System Operation

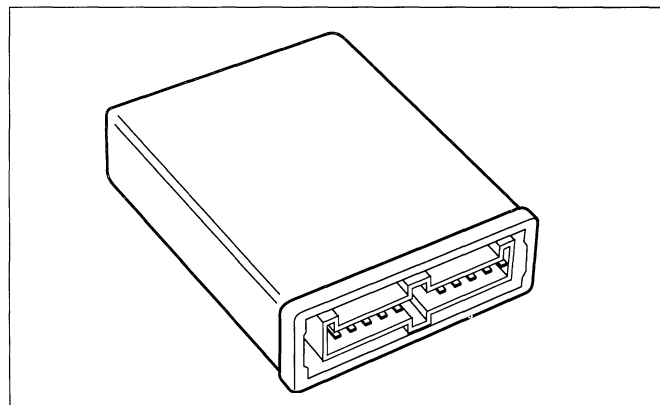
System operation is straight forward with the exception of "coast down". To "coast down" with cruise control engaged, momentarily press RESUME and the car will decelerate. To return to the set speed, press RESUME again. The system operates in all forward gears.

Cruise Control Components

Electronic Control Unit (ECU)

Location In front of the passenger's seat.

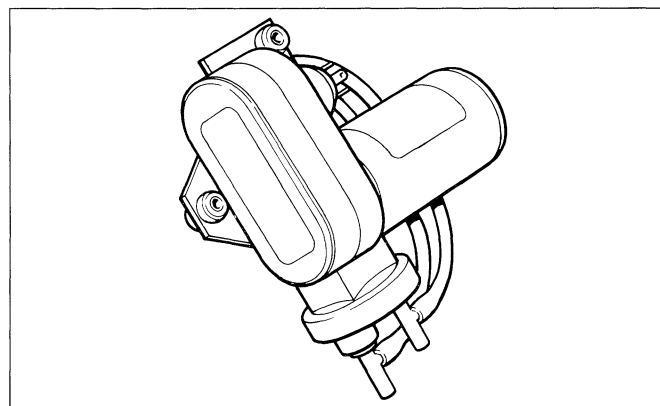
Description The ECU interprets sensor and control panel inputs to activate the vacuum control unit and the dump valve thereby positioning the throttle actuator to maintain the selected road speed.



Vacuum control unit

Location Engine compartment, right front.

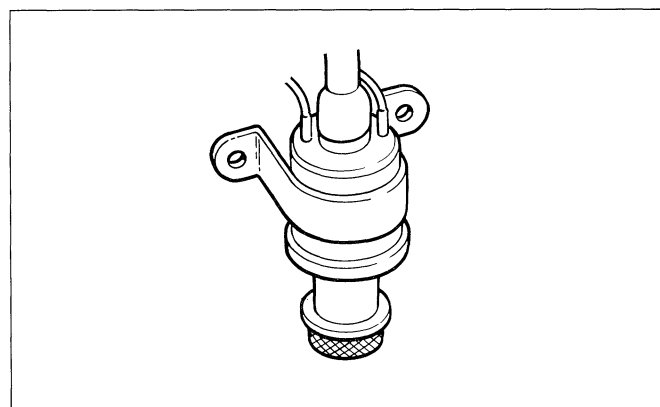
Description The vacuum control unit receives signals from the ECU and activates to create vacuum with the internal pump. The vacuum is used to position the throttle actuator.



Dump valve

Location Engine compartment, right front.

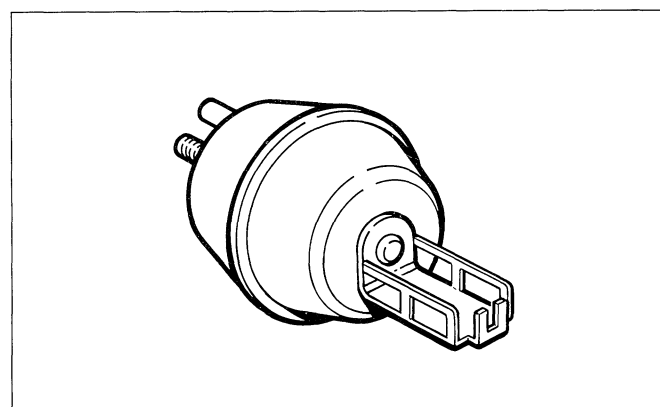
Description The dump valve receives signals from the ECU and releases vacuum to reposition the actuator.



Throttle actuator

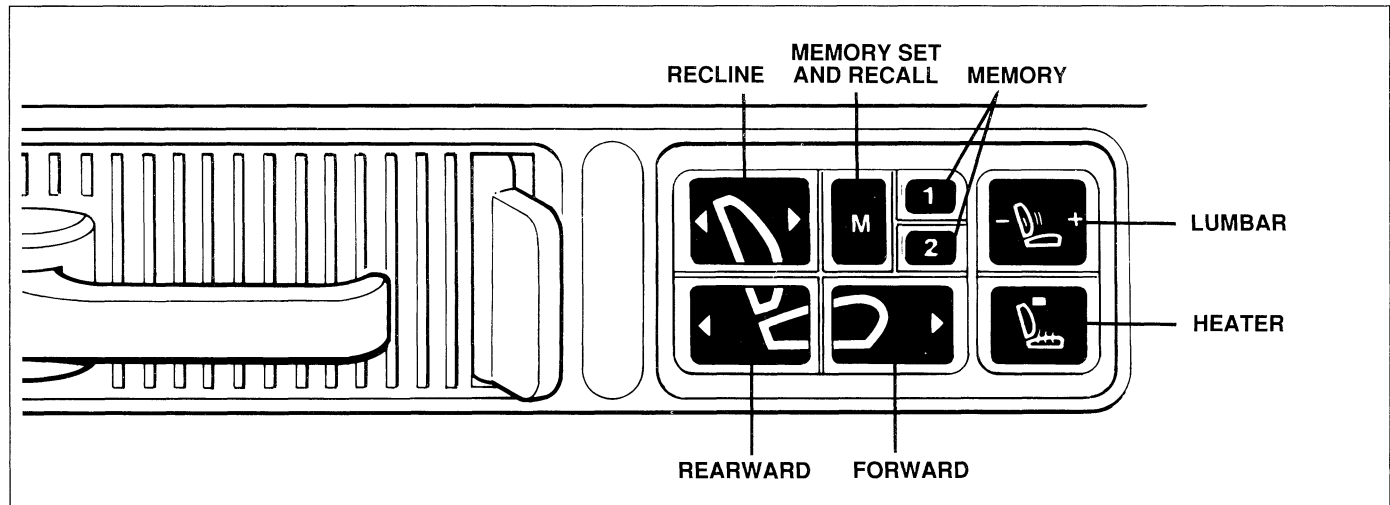
Location Engine vee.

Description The throttle actuator moves, under vacuum, to position the throttle turntable as necessary to maintain the selected road speed.

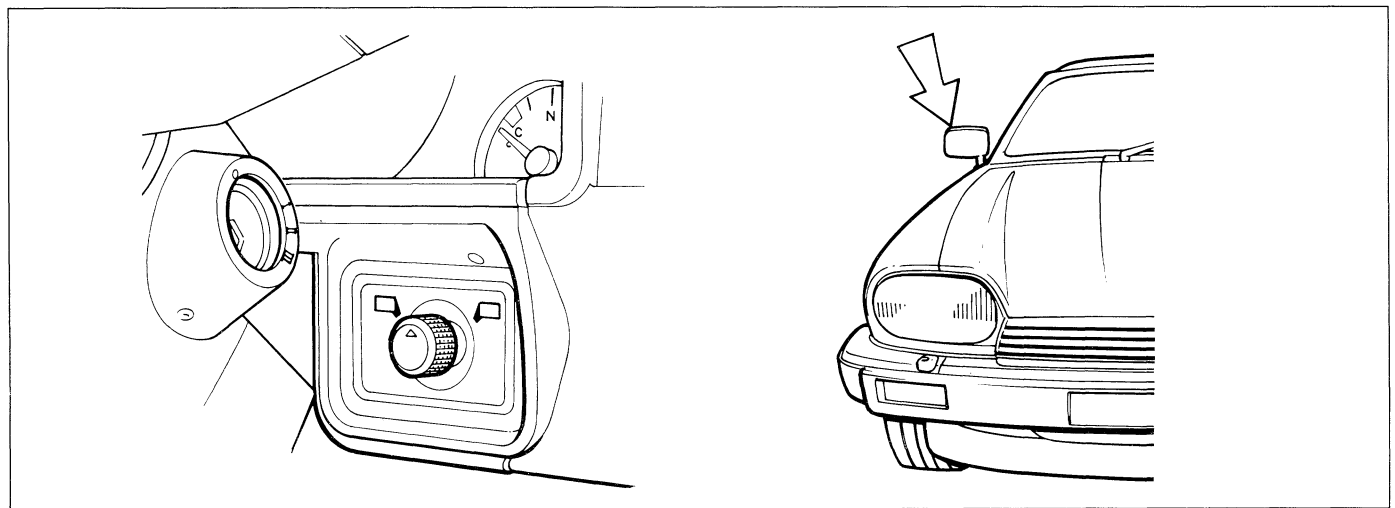


Powered Seats and Door Mirrors

The completely new front seats have full power control of movement, high efficiency heaters, and power lumbar supports. Additionally, the driver's seat has a two-position memory linked with a corresponding mirror position memory. When REVERSE gear is selected, the passenger's side mirror can be dipped to allow viewing of the rear wheel area.



The seats can be adjusted rearward when the doors are open (ignition OFF) to allow easy entry. The driver's seat memory is linked to the door mirrors so that the seat and door mirrors can be reset at the touch of the memory switch. Seat operation with the doors closed occurs only with the ignition in position I or II. The mirrors are adjusted with a single control. Turn the control left or right for the desired mirror, then move the control as a "joy stick" to position the mirror. Return the control to the center position.



Driver's seat and mirrors memory

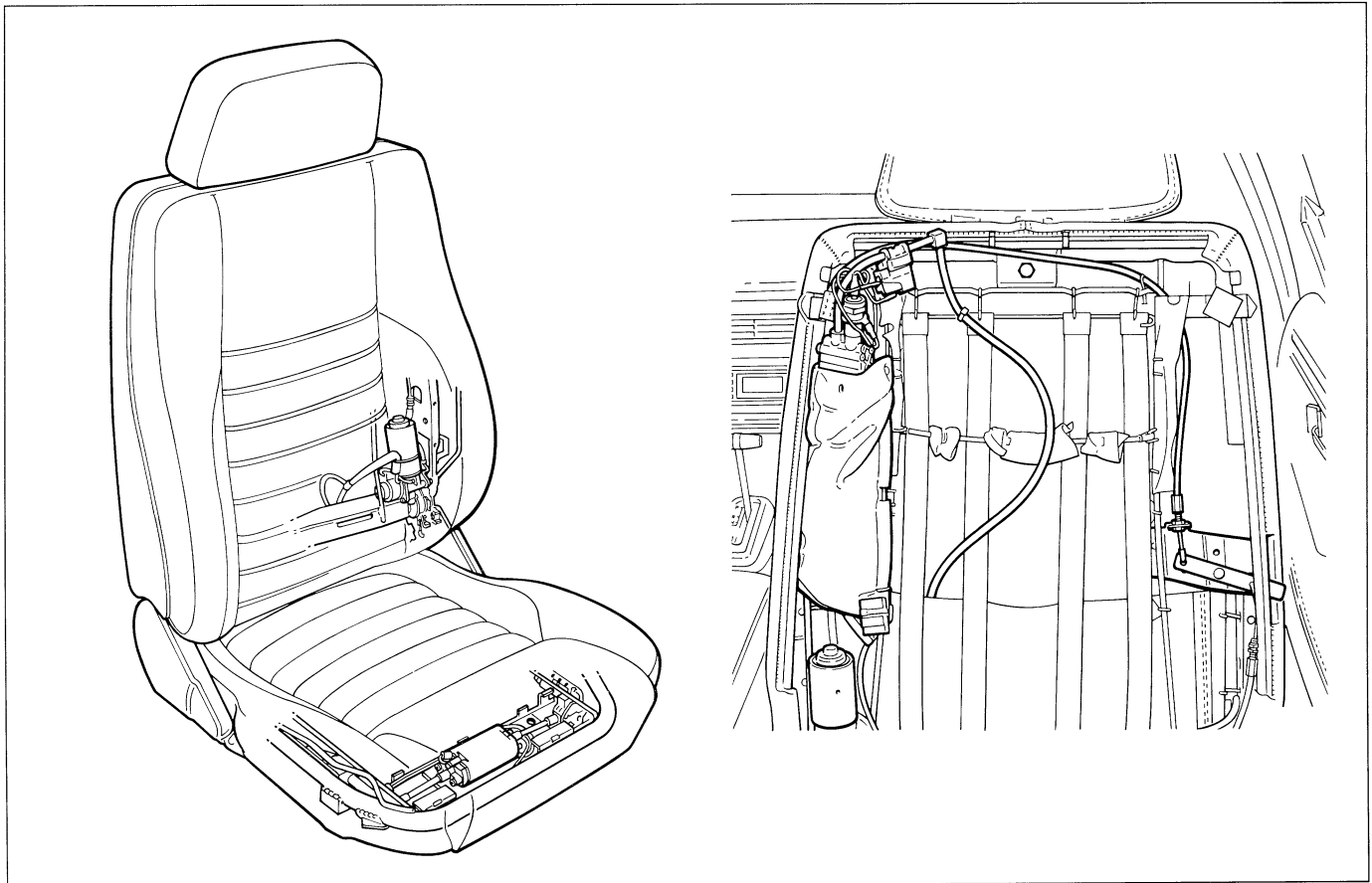
Two sets of seat and door mirror positions may be programed into the memory with the ignition in positions I or II. After adjusting the driver's seat and door mirrors to suit, simultaneously press the M (memory set) and 1 (memory position 1) switches and hold for three seconds. A second set of positions can be programed into the system by repeating the process and pressing switch 2. The memory function operates only if the ignition is in positions I or II, or the driver's door is open. To activate the memory to position the seat and mirrors, press and hold the desired memory switch (1 or 2) until the seat movement stops. Once the seat is positioned, the mirrors will move to the position set in the memory.

Passenger door mirror dipping

When REVERSE is selected, the passenger mirror can be dipped by simply moving the mirror control in any direction. The remainder of the mirror movement circuit is disabled when REVERSE is selected. When the gear selector is moved out of REVERSE, the mirror returns to the memory position.

Seat heaters

The new seat heaters incorporate a closed loop temperature sensing system in addition to the timing function. The control units employ field effect transistors to replace the previous relays. This system ensures faster warm-up and improved temperature stability. It also eliminates clicking noises associated with relays. The seat heaters operate only if the ignition is in position I or II. State illumination in the switch indicates heater operation.



Lumbar supports

The new lumbar support system delivers silent and smooth operation. The pump is quiet during inflation. Deflation is virtually silent and is accomplished via a pressure relief valve. The lumbar support motor is enclosed in a sound insulating bag and located in the seat back assembly. The lumbar supports operate only if the ignition is in positions I or II.

Seat slides and motors

A new seat support and slide mechanism is used in conjunction with the new seats. The fore / aft motor unit is located at the front of the seat cushion. The seat back recline motor unit is located at the base of the seat back. Coupe seat slides have one inner seat belt anchor. Convertibles have an inner and an outer seat belt anchor.

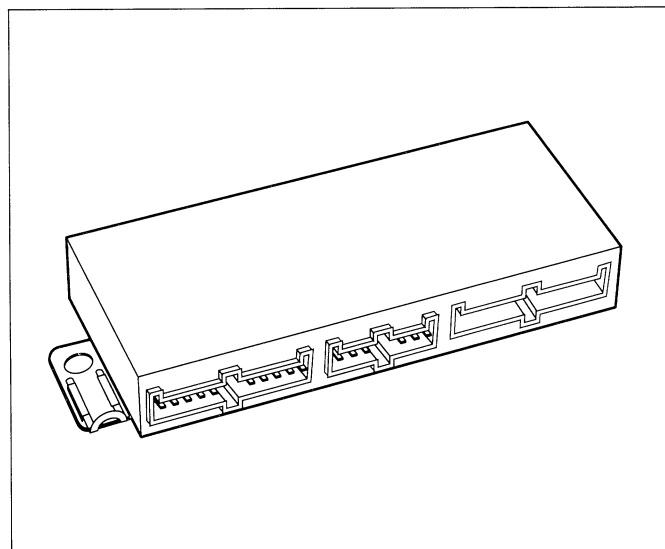
Powered Seats and Door Mirrors

Powered Seat and Door Mirror Components

Driver's seat and mirror Electronic Control Unit (ECU)

Location In front of driver's seat.

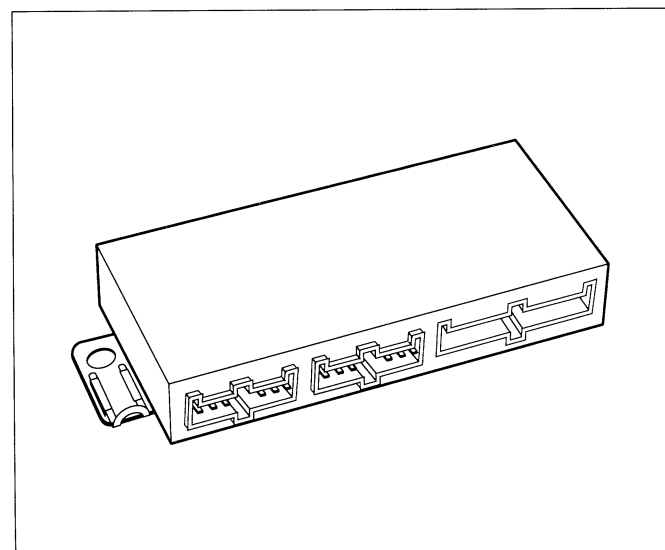
Description The ECU drives the seat position and mirror position motors. Memory position inputs to the ECU are received from potentiometers that are linked to the various position motors. A serial communications (ISO) link is provided for JDS testing. The diagnostic socket is a brown PM 4 connector located adjacent to the ECU.



Passenger's seat control unit

Location In front of passenger's seat.

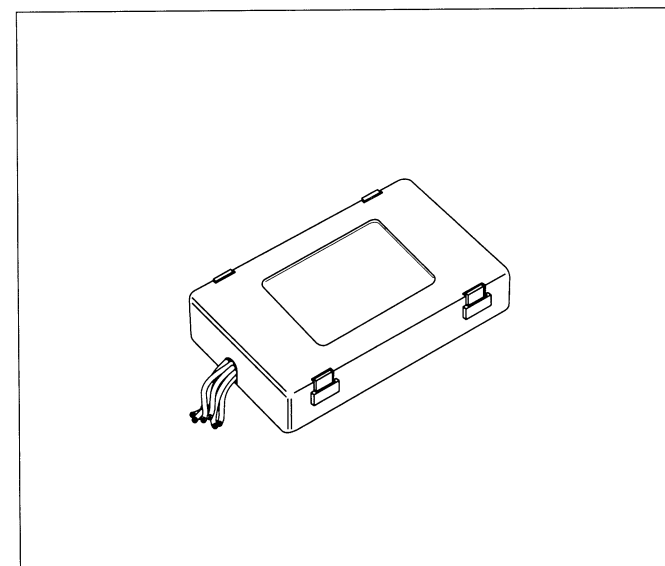
Description The control unit drives the passenger's seat position from signals received from the seat switch pack.



Seat heater control units

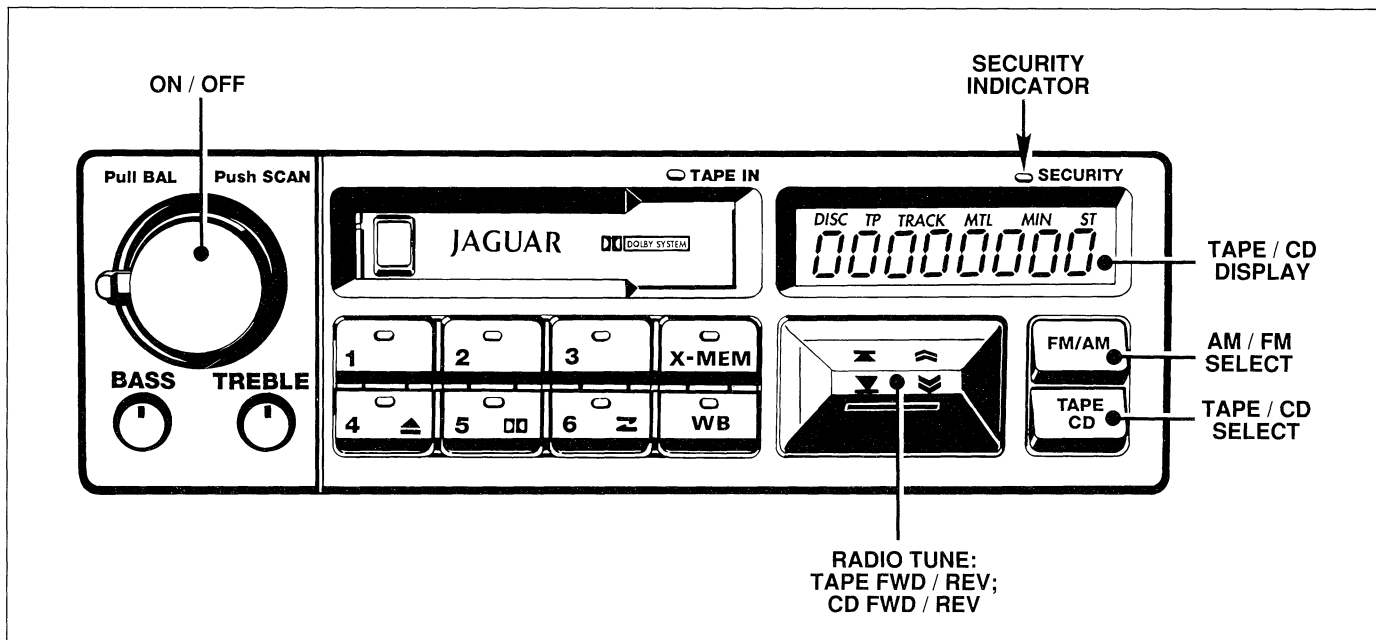
Location In front of each front seat.

Description The units control the seat heater timing and switching functions. The control units employ field effect transistors.



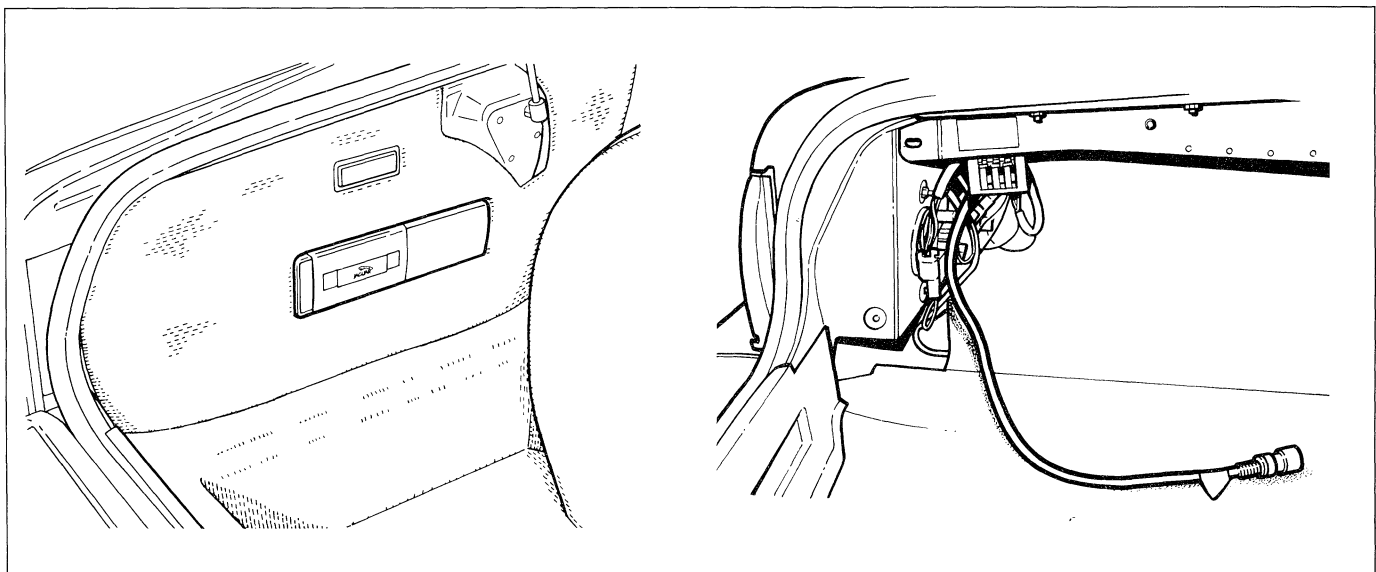
In-Car Entertainment

The new Alpine AJ 9150 audio unit incorporates a tuner, cassette deck, amplifier, CD control and anti-theft code system. The tuner provides manual tuning as well as seek, scan and auto-store. The new speaker system uses four 6 inch co-axial speakers, one each in the doors and two in the rear compartment side panels.



Optional Compact Disc Autochanger

All vehicles are pre-wired for installation of an optional trunk mounted compact disc autochanger. A separate harness is located on the left side and makes connection to the audio unit and the CD unit trunk. The audio unit provides complete control over the CD autochanger and includes error messages such as "no cont" meaning no continuity in the CD harness.

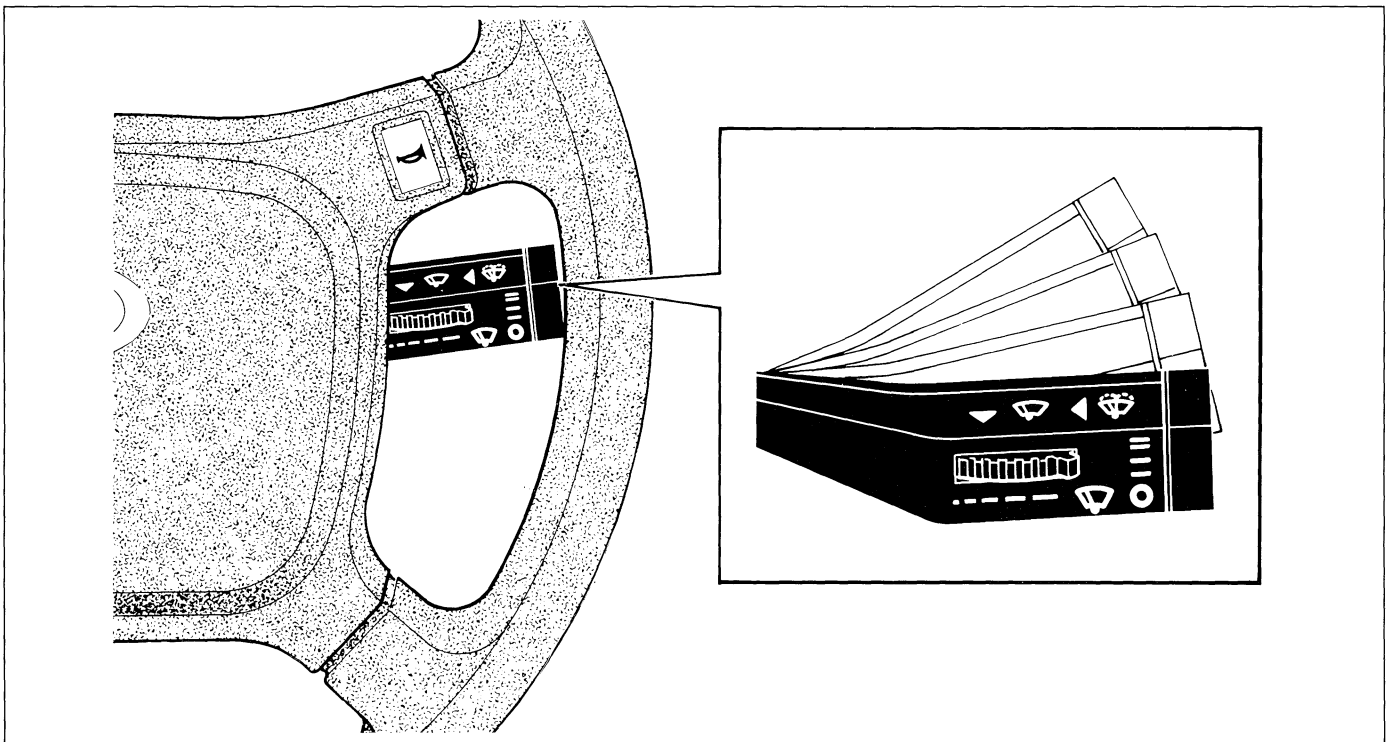


Wash, Wipe System

The programmed wash, wipe requires a single push of the stalk to activate a 1.5-second windshield wash followed by four complete wiper cycles. If the headlights are turned ON, the headlight power wash is activated for 1/2 second. Intermittent wiper cycle times can be varied between 2 and 16 seconds by rotating the thumb wheel on the stalk switch.

The new wash, wipe system has all new components and incorporates improvements to upgrade quality and increase reliability. New-type tubing with improved temperature handling characteristics is used for the wash lines. The redesigned plenum grille is color keyed to the body and has improved mounting.

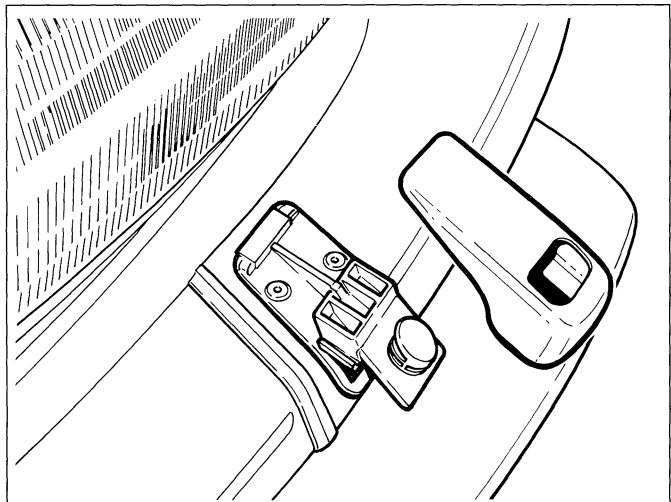
The headlight power wash system is similar to the Sedan Range system, using the same pump assembly. The wash jets are riveted to the front bumper and are accessed by sliding the finisher forward.



Wash, Wipe System Components

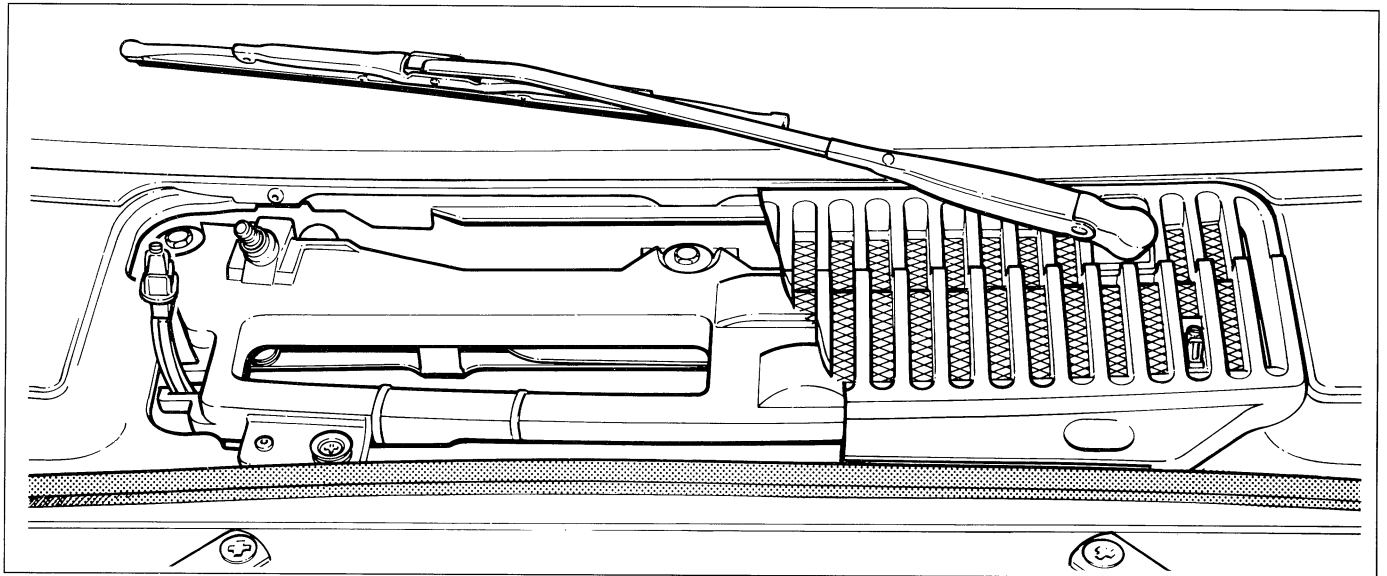
Heated washer jets

Both the windshield washer and headlight power wash jets have heated nozzles. All jet heaters operate simultaneously from the same temperature sensing system.



Wiper assembly

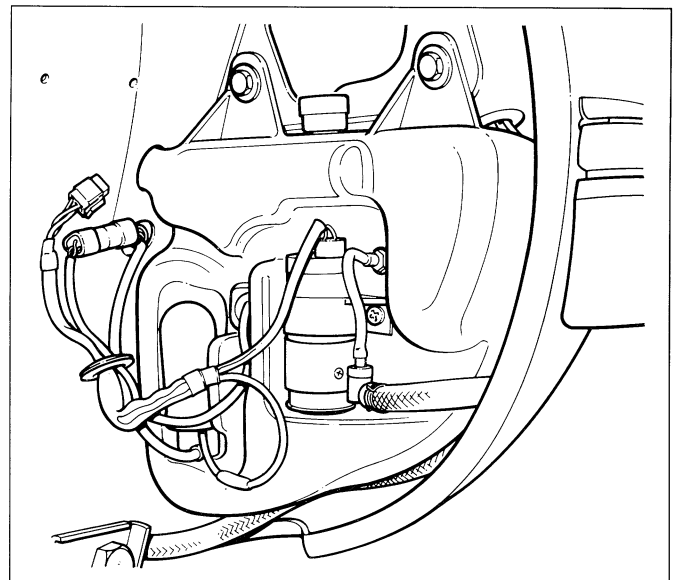
The wiper assembly features an improved mounting arrangement, a repositioned wiper motor to prevent water leaks, and a sealed electrical connector.



Reservoir assembly

Location Right front fender.

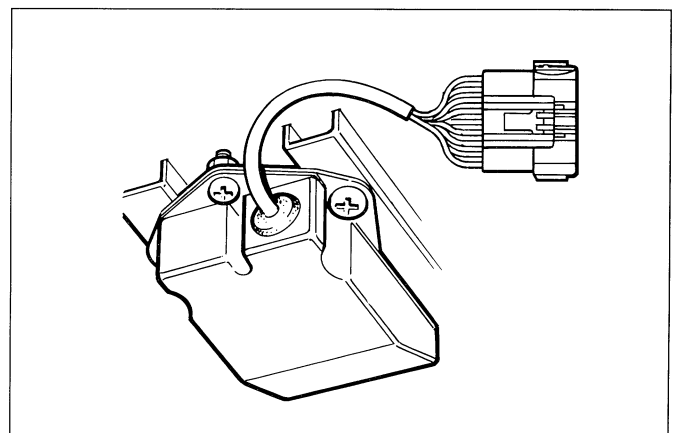
Description The assembly consists of the reservoir, windshield washer pump, power wash pump and a low level warning transmitter.



Wiper logic unit

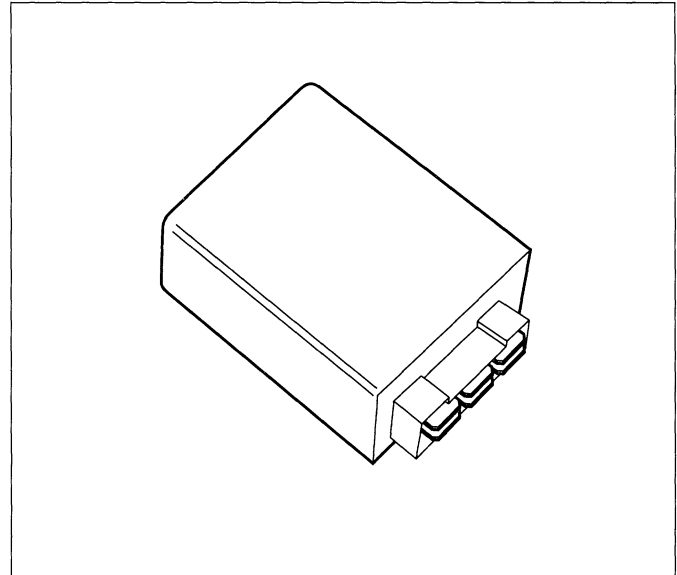
Location Under right component panel.

Description The wiper logic unit receives inputs from the stalk switch and the reservoir low level transmitter and provides outputs to the windshield washer pump, the wiper motor and the power wash pump.



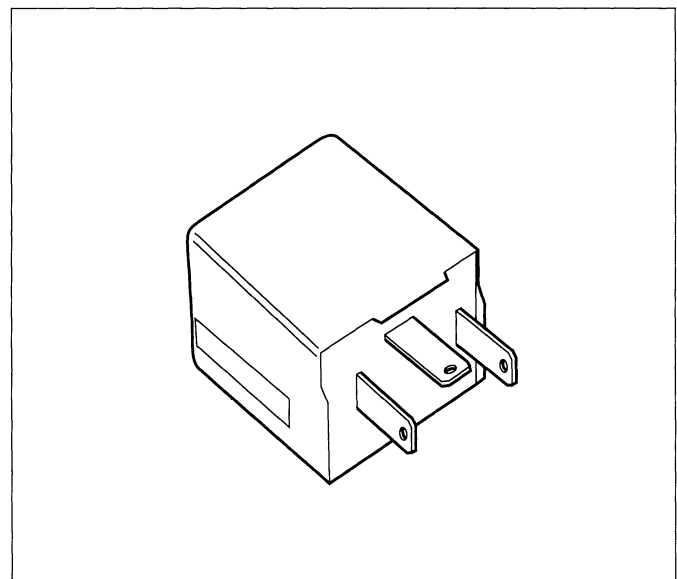
Headlights

The headlight circuit incorporates a new logic unit located on the underhood component panel. The headlights operate only when the ignition is in position I or II. The logic unit provides switching between high and low beams and defaults to low beams each time the ignition is switched ON.



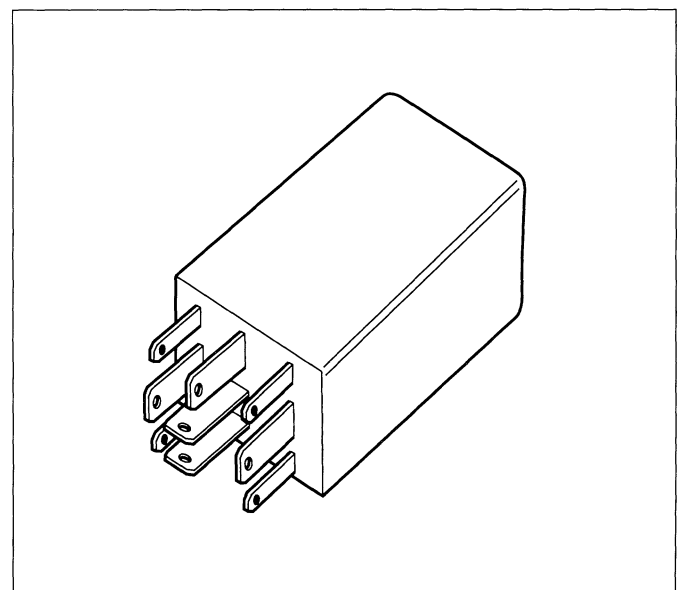
Lights On Audible Warning

A lights on audible warning is provided in the event that the side lights are left ON with the ignition OFF. The audible warning unit is located on the left component panel.



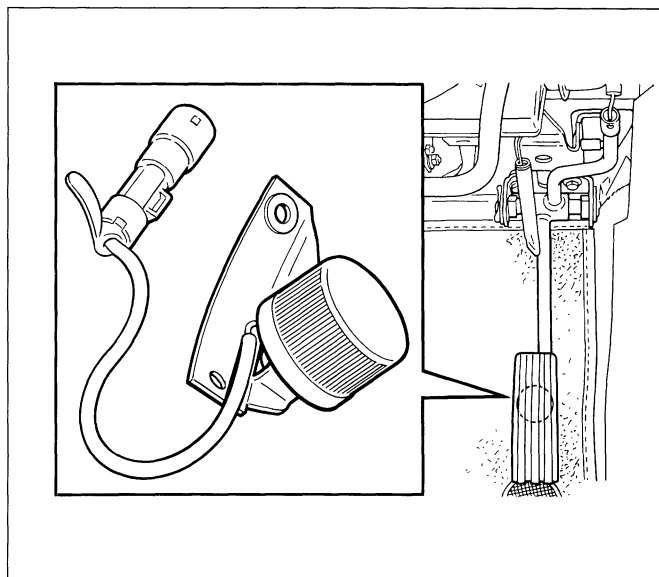
Locate Lighting Dimming

The intensity of locate lighting for the center console panels and switches, seat switch packs, dash panel switches and stalk switches is controlled by the dimmer control. The system incorporates a dimmer control unit located on the left component panel.



Kickdown switch

The transmission kickdown switch, formerly located on the throttle cable, has been replaced or relocated to under the accelerator pedal. Switch adjustment is accomplished using JDS.

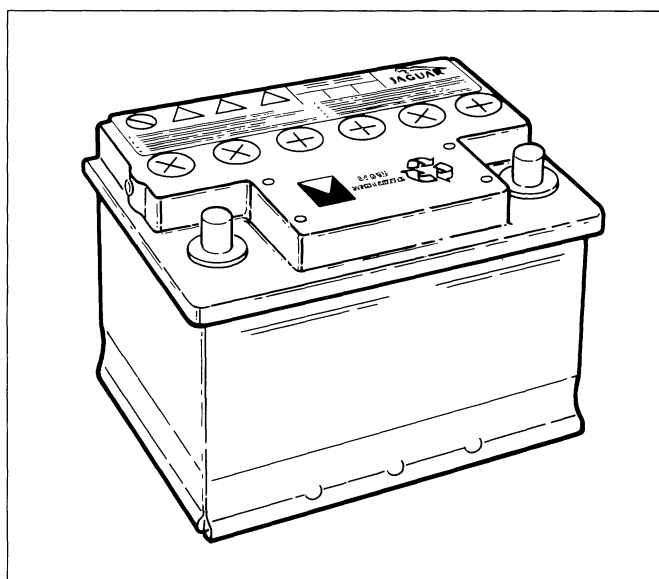


Battery

The battery type and specification have been changed to match the Sedan Range.

Battery Specifications:

Type	Varta DIN 55
Capacity	52 amp hr. (min)
Reserve capacity	85 minutes
Cold cranking	43 amps



Optional Security System

The wiring harness is provided with the connections for the optional dealer installed security system. The Coupe and Convertible have a common installation with the ECU, motion detector, and battery back-up located in the trunk right side. An improved antenna is supplied with the system

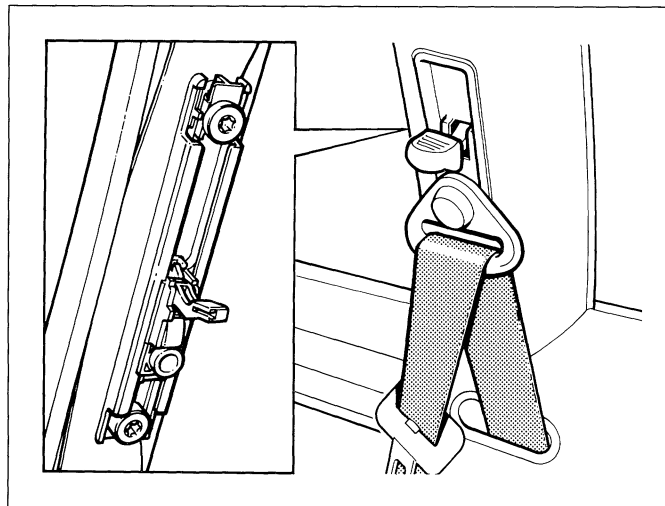
Service Notes

Seat Belt Anchors — Coupe

The shoulder belt anchors have a five-position adjustment range of 3 3/4 in. The anchor bracket is attached to the "B" post with torx bolts coated with thread locking compound. THESE ARE SAFETY CRITICAL INSTALLATIONS. Removed bolts must be replaced by new coated bolts and torqued to specification.

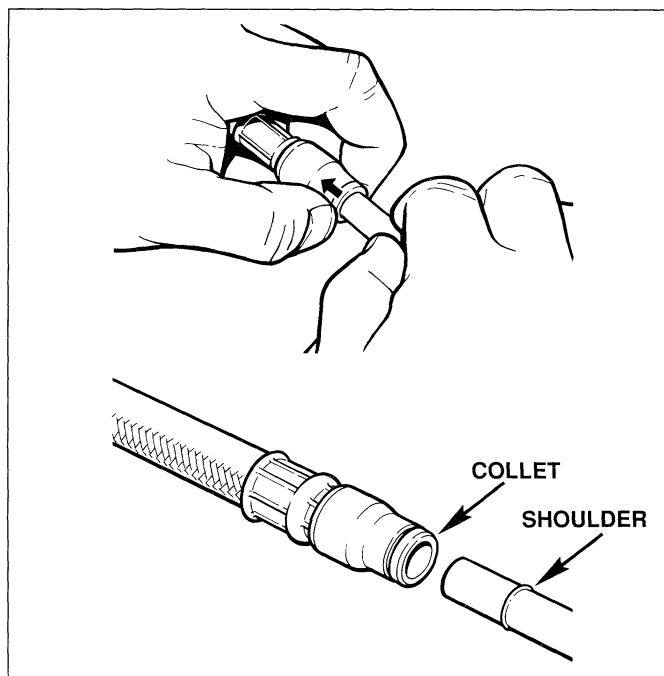
Torque Specification:

Anchor bracket bolts	27 Nm (20 lb ft)
Belt loop bolts	35 Nm (26 lb ft)



Fuel System Connectors

Fuel line connectors make and break by sliding back the collet. Be sure the connector area is cleaned before disconnection. Exercise care that the "O" rings are not damaged and the tubing is not scratched. During reassembly, push the connector fully home and ensure that the collet is contacting the shouldered ring on the tubing.



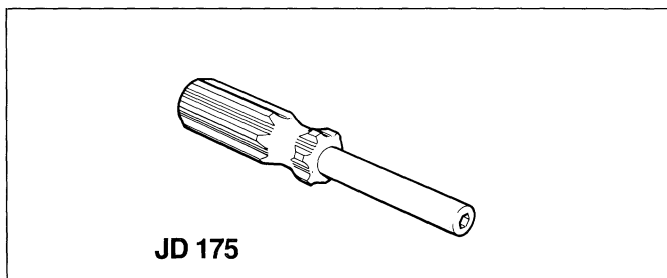
Fuel System Tools

In-tank fuel hose clamps

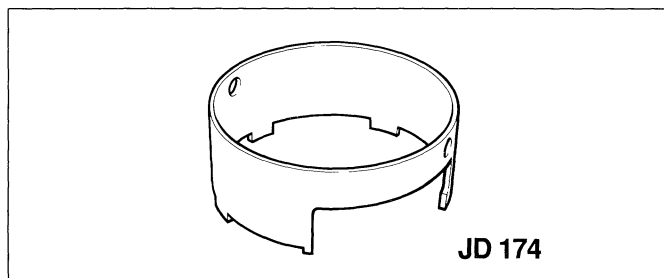
Tool JD 175 is a non-ferrous wrench for use when loosening / tightening in-tank fuel hose clamps. Using JD 175 will eliminate the possibility of a spark being created.

Evaporative loss flange

The evaporative loss flange is retained by a locking ring that requires special tool JD 174 for installation and removal.



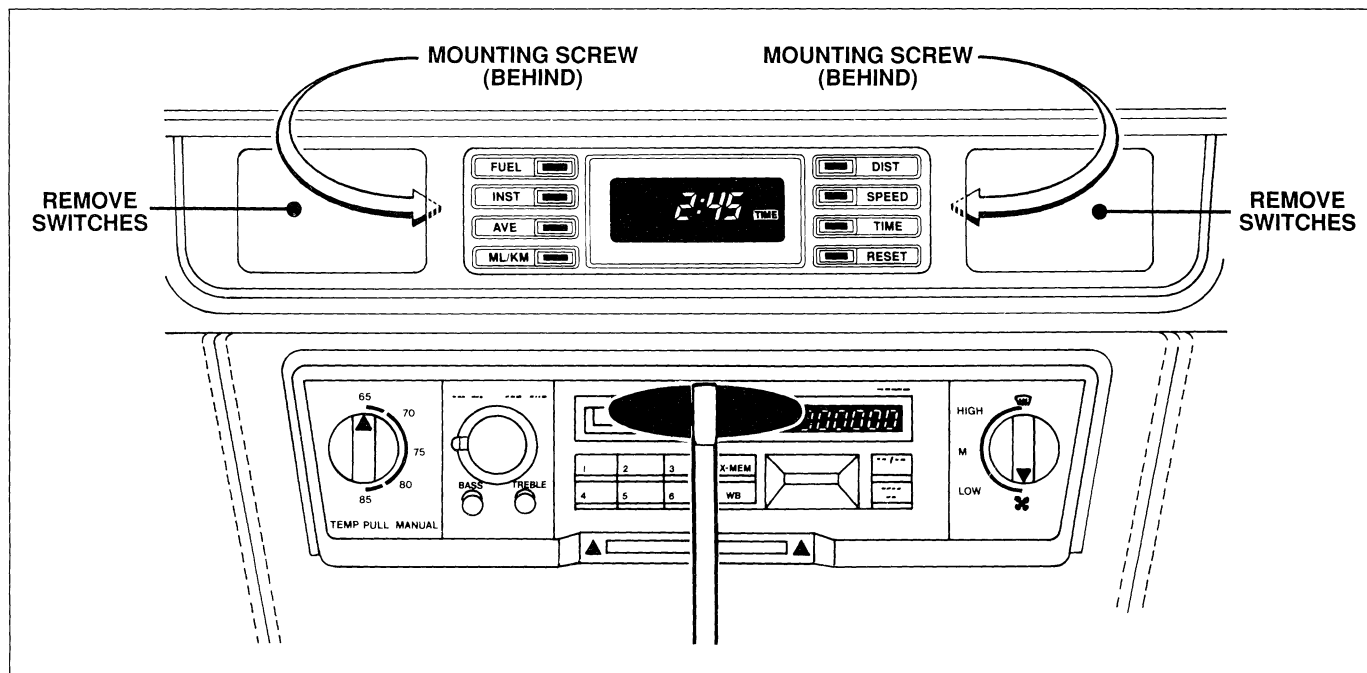
JD 175



JD 174

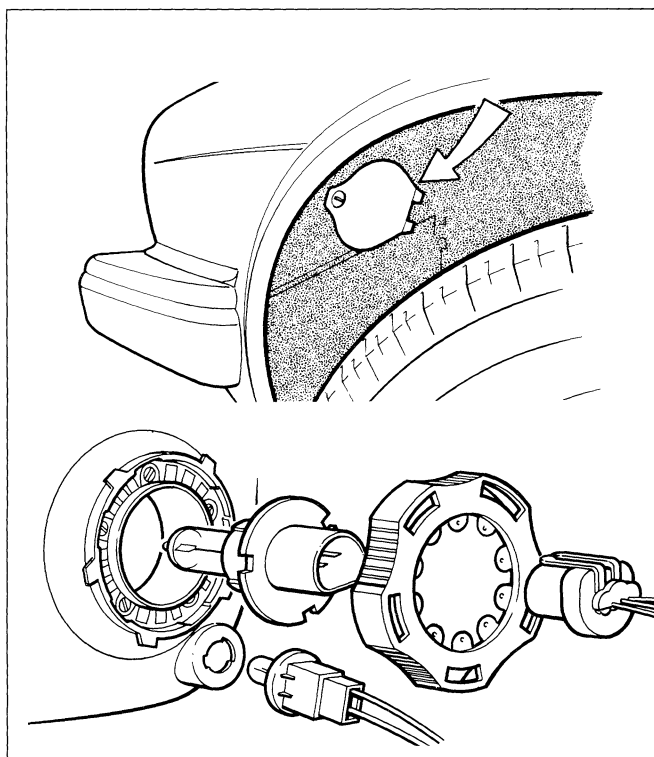
Trip Computer Removal

The trip computer unit is retained in the center console by screws. To remove it, first remove the switches on either side to allow access to the trip computer unit retaining screws. Remove the screws, then withdraw the unit from the center console.



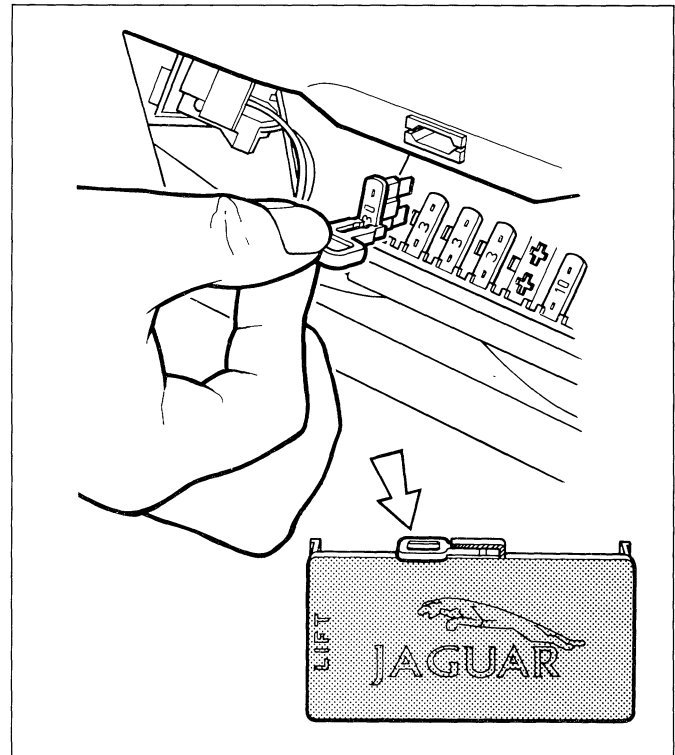
Headlight Bulb Replacement

Headlight bulbs are replaced through removable access panels located in the front fender liners.



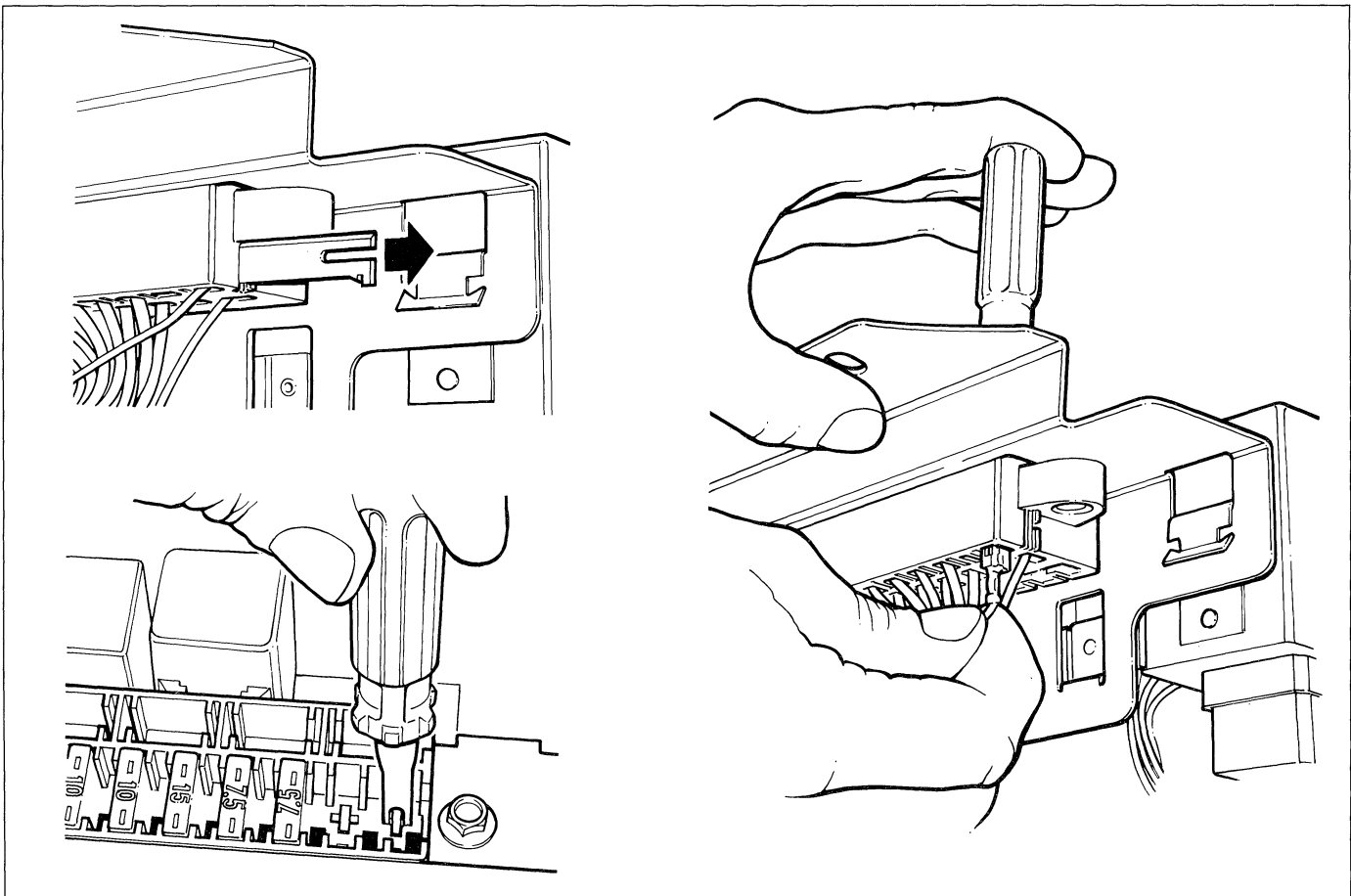
Fuse Removal Tool

A fuse removal tool is located on the covers of the left and right fuse panels.



Fuse Connector Pin Removal

Special tool JD 177 is used for fuse panel connector pin removal.





XJS Range
Model Year Update

1993



XJS Range
Model Year Update

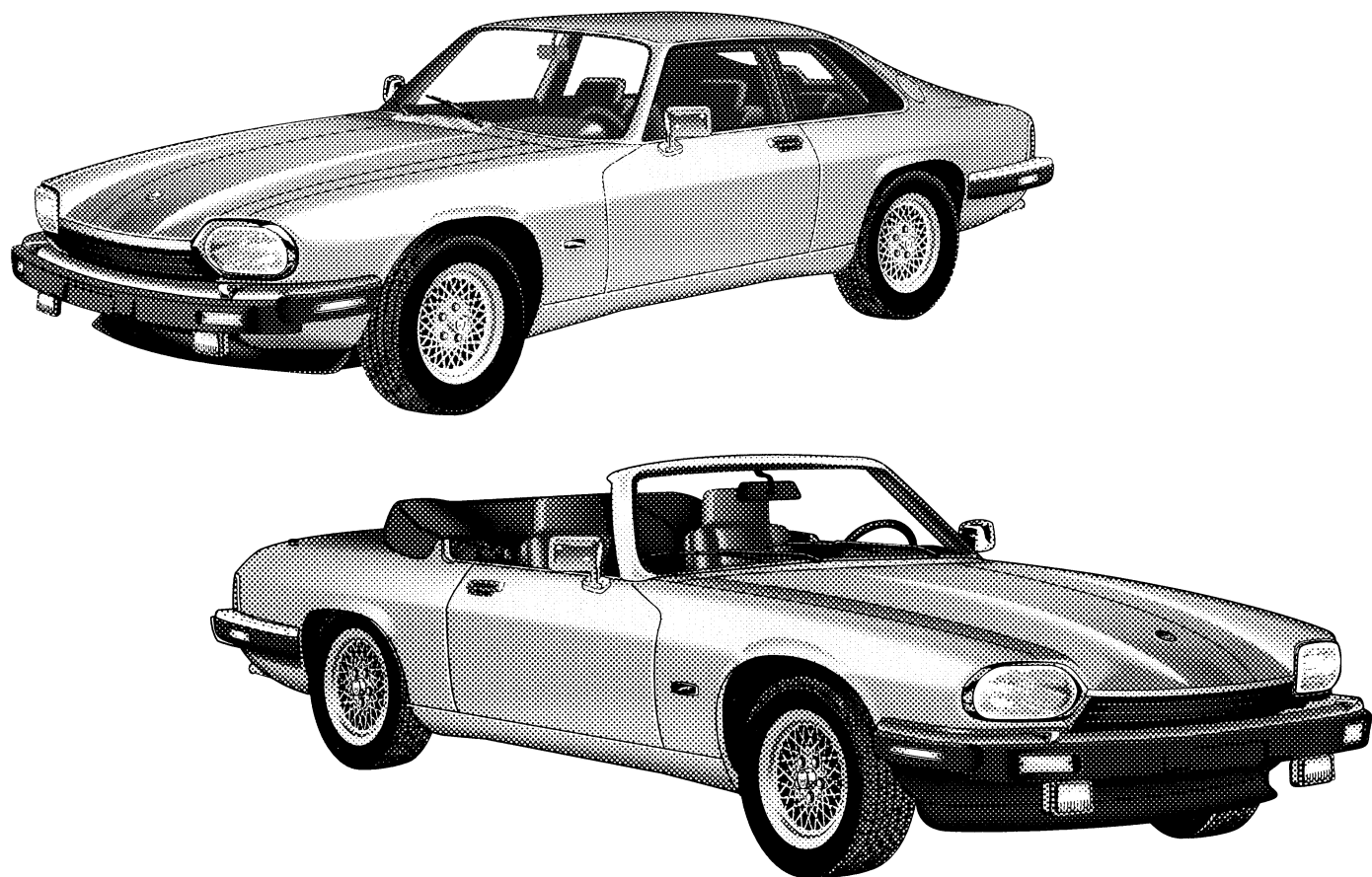
1993

Publication number S-79

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The 1993 model year technical information contained in this publication should be considered preliminary information. Certain “running changes” that occurred during the 1992 model year are included where appropriate.

Vehicle Identification Number (VIN)

COUPE (A4) SAJNW574()PC (serial number)
COUPE (M5) SAJNW578()PC (serial number)

CONVERTIBLE (A4) SAJNW474()PC (serial number)
CONVERTIBLE (M5) SAJNW478()PC (serial number)

NOTE: () = Check digit P = 1993 MY

Standardized Terminology

Starting with the 1993 model year, emission related components and systems must conform to industry standardized terminology. The following is a summary of the new or revised terminology included in this publication:

Standardized Terminology	Previous Terminology
Generator	Alternator
Engine Control Module (ECM)	Engine Management ECU
Mass Air Flow Meter	Air Flow Meter
Malfunction Indicator Lamp	Check Engine Indicator
Diagnostic Trouble Code (DTC)	OBD Code
Data Link Connector (DLC)	Diagnostic Socket

1993 XJS Range

The 1993 model year XJS Coupe and Convertible are powered by the six-cylinder 4.0-litre AJ6 engine. Both models are standard equipped with the ZF four-speed electronically controlled automatic transmission. A manual five-speed gearbox is optional. Automatic transmission equipped models will be abbreviated as A4; manual gearbox equipped models will be abbreviated as M5. The following table summarizes the various new and optional technical features of the models.

X Standard equipment

O Optional equipment

N/C No cost option

— Not available

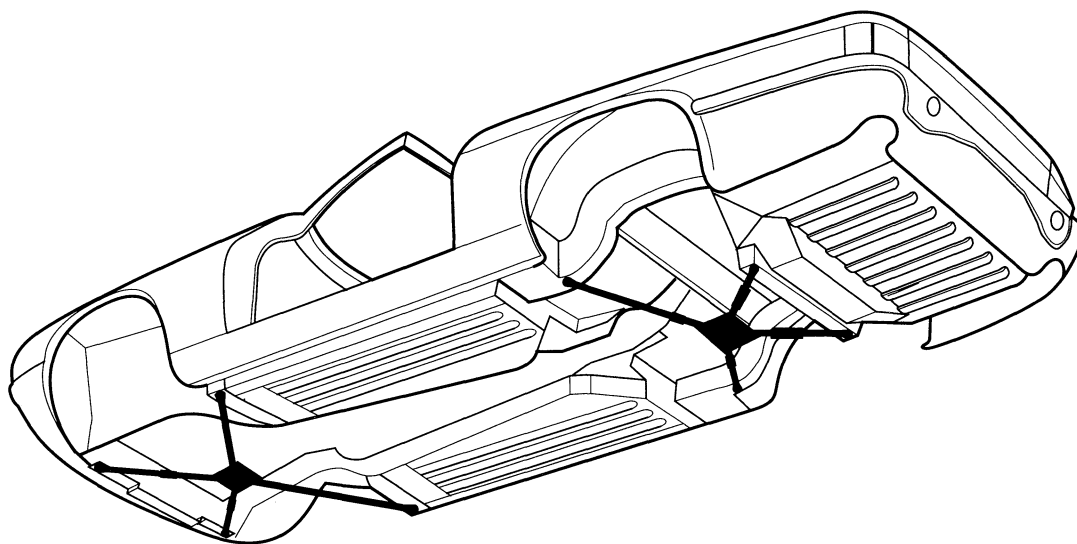
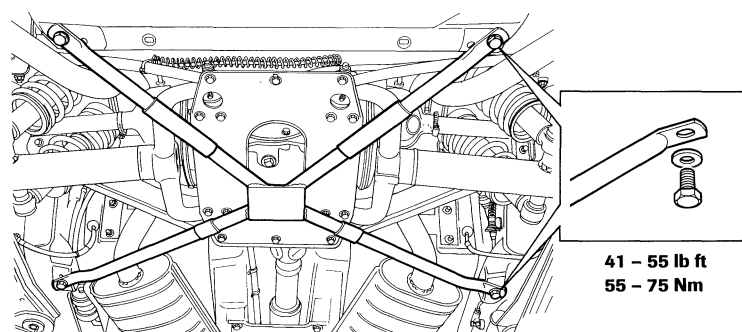
Technical Feature	XJS Coupe	XJS Conv.
Driver's side air bag	X	X
Child seat tether	X	—
Tilt steering wheel	X	X
Gear shift interlock system	X (A4 only)	X (A4 only)
Electronically controlled automatic transmission with Normal and Sport modes	X	X
Five-speed manual gearbox	N/C	N/C
120 amp generator	X	X
72 amp hour battery	X	X
Mechanical plus auxiliary electric fan engine cooling system	X	X
Goodyear 235/60 VR 15 tires	X	X
Lattice alloy road wheels	X	X
Front and rear fog lights	X	X
Limited slip differential	X	X
Security system	X	X
Remote CD autochanger	O	O
Cold Weather package (engine block heater, heated headlight power wash)	O	O
Metallic paint	N/C	N/C

NOTE: All Canadian vehicles are equipped with the Cold Weather package and the Canadian compliance package including: daytime running lights, metric speedometer / odometer, ISO brake warning symbol, Canadian VIN, metric certification, and glove box label.

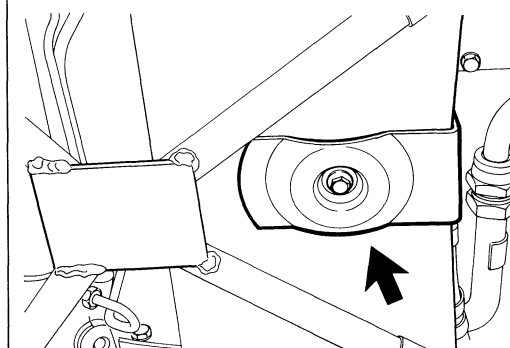
Body Structure**Convertible torsional rigidity "X" bracing**

The torsional rigidity of the convertible body shell has been 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 (tightening torque: 55-75 Nm; 41-55 lb ft).

CONVERTIBLE "X" BRACING**REAR "X" BRACE**

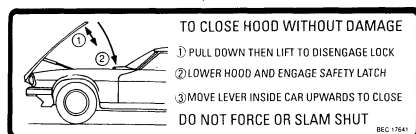
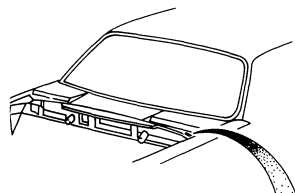
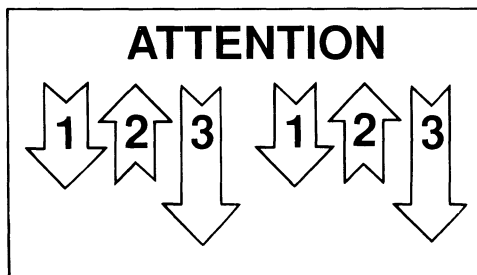
CAUTION: Do not jack the vehicle on the center of the X braces. Jack only as described in the Service Manual and the Owner's Handbook. A jacking pad is provided on the front suspension subframe at the rear of the X brace reinforcement plate. If the rear of the vehicle must be jacked from the center point,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

FRONT JACKING PAD

Locking hood support strut

A locking, gas-filled support strut is used to retain the hood in the open position. The method of unlocking and opening remains unchanged; however, the hood must be fully opened to engage the locking strut. To unlock the hood, pull down slightly then raise to the upper limit to disengage the lock. Close the hood in the normal manner. A warning label indicating the unlocking sequence is located on the strut. An instruction label detailing the procedure is located on the engine compartment flange.

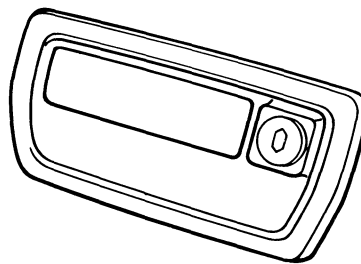
HOOD SUPPORT WARNING AND INSTRUCTION LABELS



Door handles

During the 1992 model year, the door handles and locks were changed to the type used on the Sedan Range. This type of door handle provides a smoother and more positive operation, and ensures normal operation during winter ice conditions. A single key operates the ignition as well as the door, trunk and glove box locks.

DOOR HANDLE

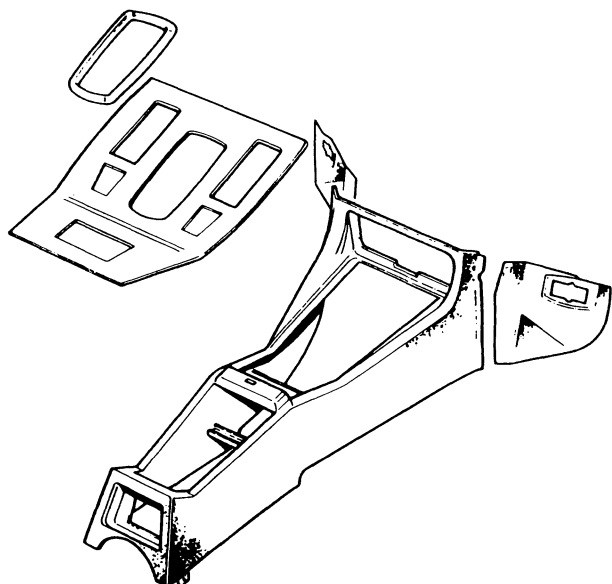


Interior Design

Center console

The center console top finisher is made by a new process that laminates wood and aluminum. This process controls expansion and eliminates cracking. Removal of the top finisher is simplified by the deletion of the threaded side mount fasteners.

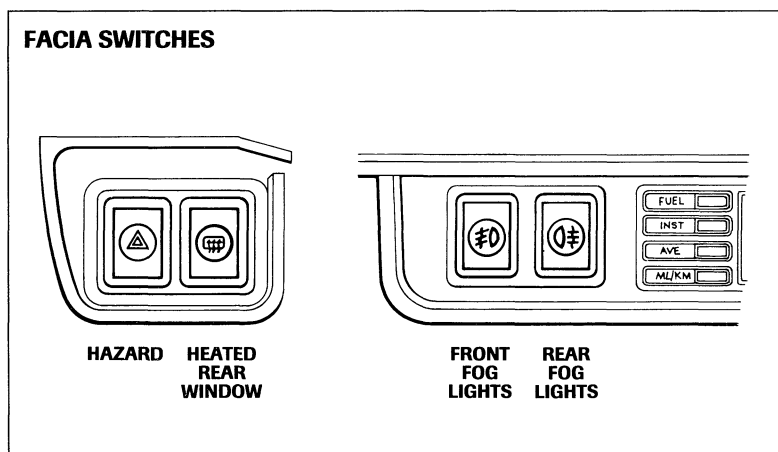
CENTER CONSOLE



Interior Design (continued)

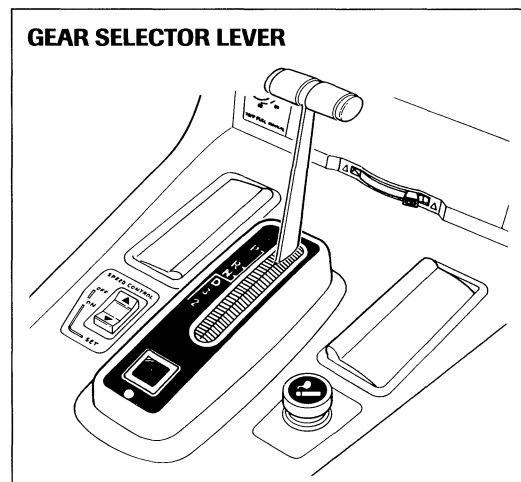
Facia switches

The facia-mounted switches are constructed in twin combinations with revised locations. The front and rear fog light switches relocate to the center console to the left of the trip computer. The hazard warning and heated rear window switches relocate to the left of the steering column.



Gear selector lever

Ergonomic design considerations have led to a redesign of the automatic transmission gear selector knob. The shape and size of the knob have been altered to provide a more positive feel during gear selection.

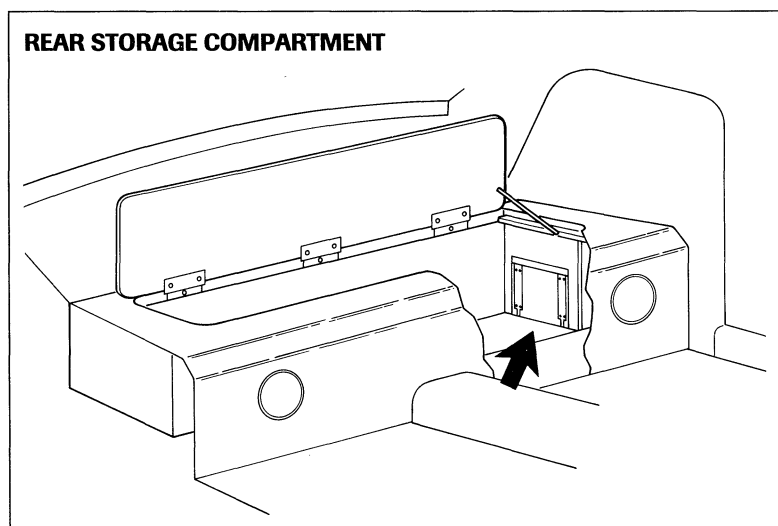


Seat slides

Increased leg room for both occupants is made available by relocated seat slides. The new slide location allows an additional $\frac{13}{16}$ inch (20mm) of rearward seat movement.

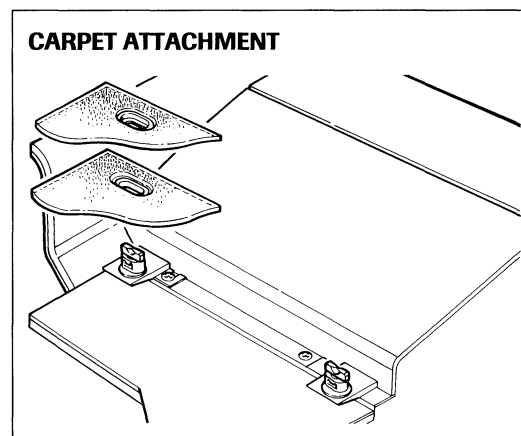
Convertible rear storage compartment

Access to the transmission control ECU (A4 models only) is provided by a split inner side panel on the left side of the convertible rear storage compartment.



Carpet attachment

Positive location of the carpets is ensured by two half-turn fasteners at the rear of the carpets. These fasteners are also used to retain the accessory Jaguar floor mats.



Engine Design / Construction

Power for the 1993 XJS Range is supplied by the spirited AJ6 engine formally used only in the XJ6 Sedan Range. Engine power and torque are altered slightly in the XJS installation.

AJ6 4.0 litre: XJS

Power (DIN)	219 hp @ 4750 rpm
Torque (DIN)	273 ft lbs @ 3650 rpm

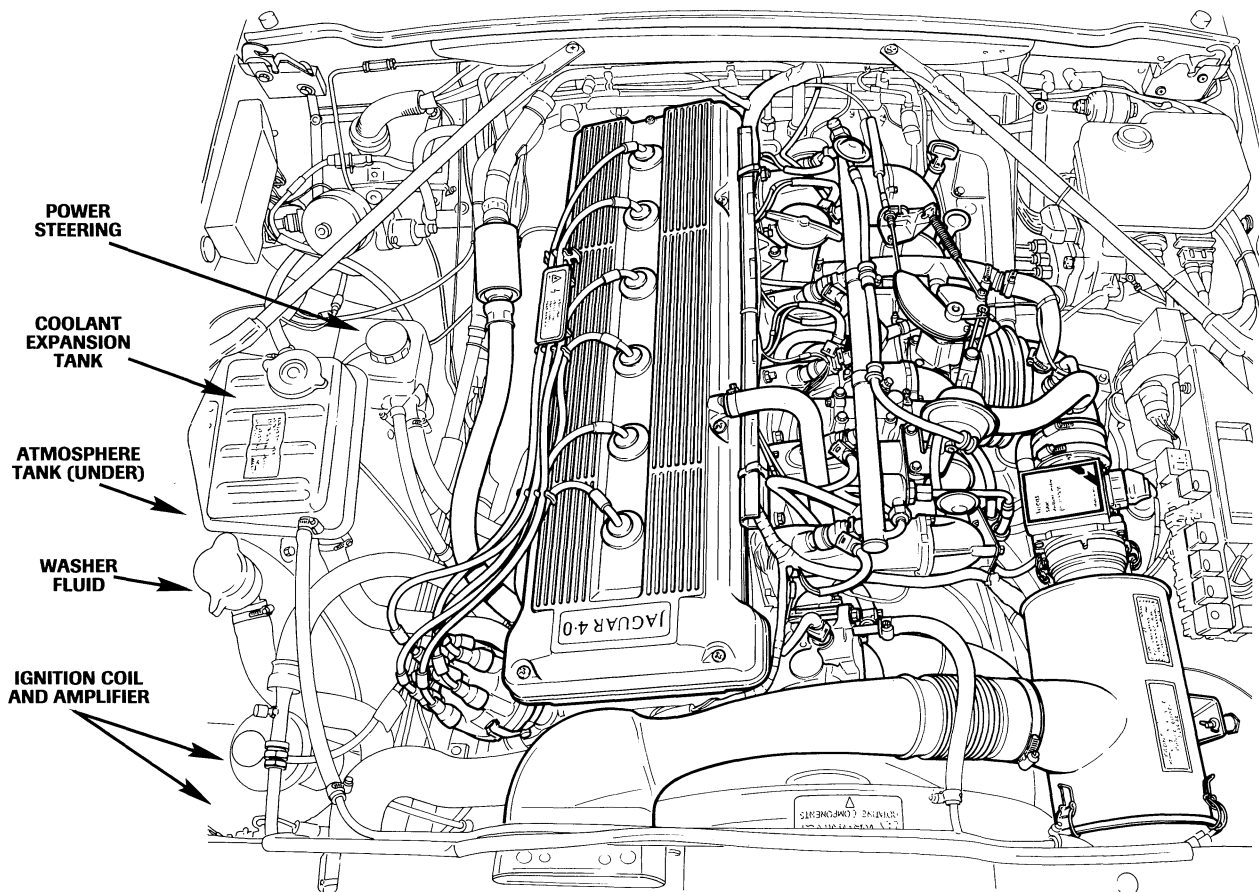
Air cleaner

The paper element air cleaner has a sheet metal housing and intake neck with the intake air entering at the center of the radiator support through a molded horn.

Installation of the engine and associated systems in the XJS Range differs in the following areas:

- Air cleaner
- Oil cooling system
- Cooling system
- Exhaust system and oxygen sensor.

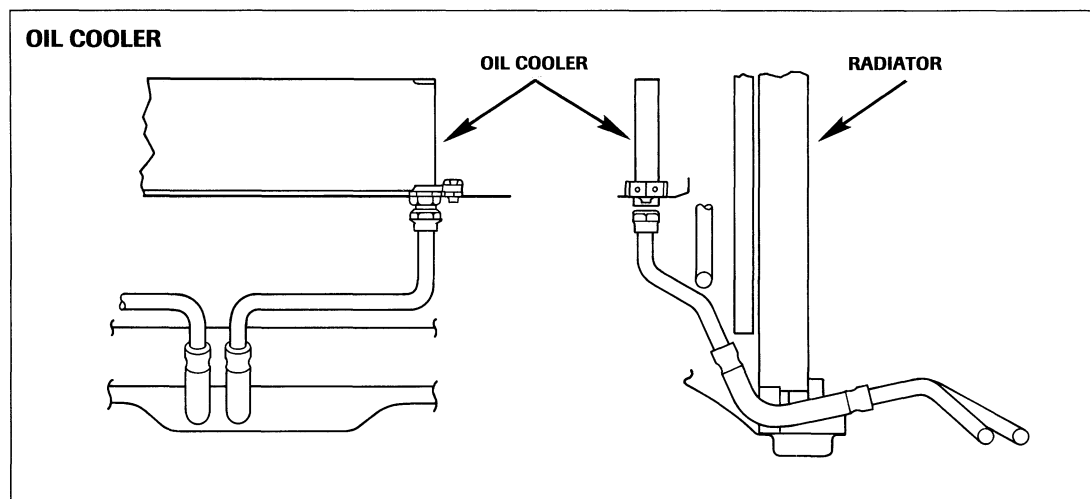
ENGINE COMPARTMENT



Engine Design / Construction (continued)**Oil cooling**

An external oil cooling system is used for the AJ6 engine installation in the XJS. The separate oil cooler is mounted in front of the radiator with lines running to and from the engine routed under the radiator.

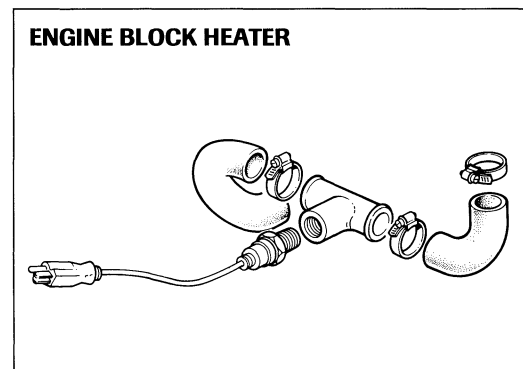
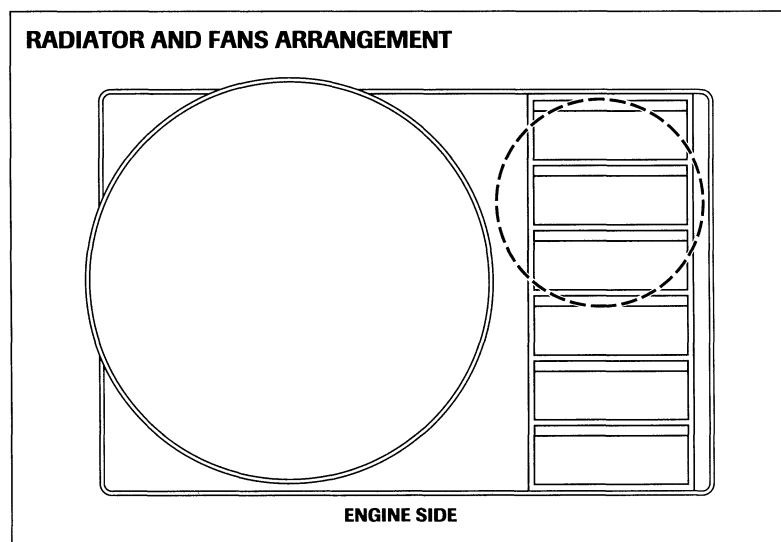
NOTE: During the 1992 model year (VIN 184574 ON) the V12 engine oil cooler system was changed to a full flow design. At the same time, the cooler was resized and relocated to the front of the radiator.

**Cooling system**

The cooling system fans consist of an engine driven mechanical fan with a thermostatic viscous coupling plus a high capacity auxiliary electrical cooling fan mounted ahead of the radiator. The transmission oil cooler is incorporated into the right side of the radiator.

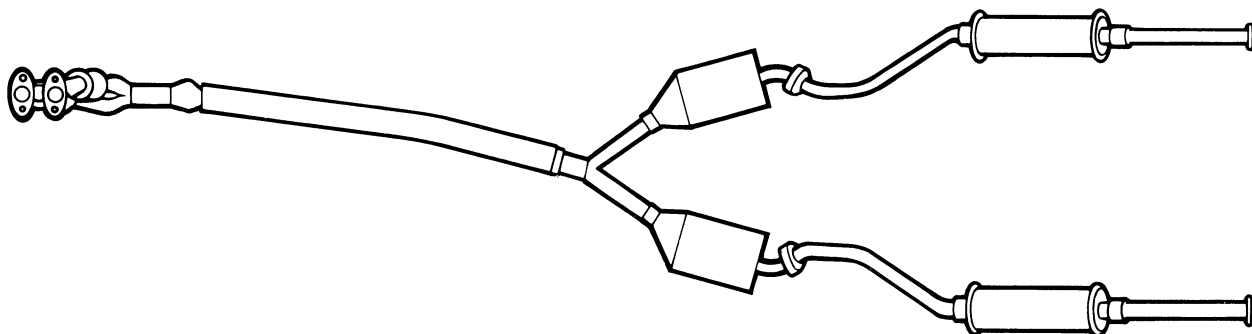
Engine block heater

An engine block heater, located in the lower radiator hose, is available as part of the optional cold weather package.

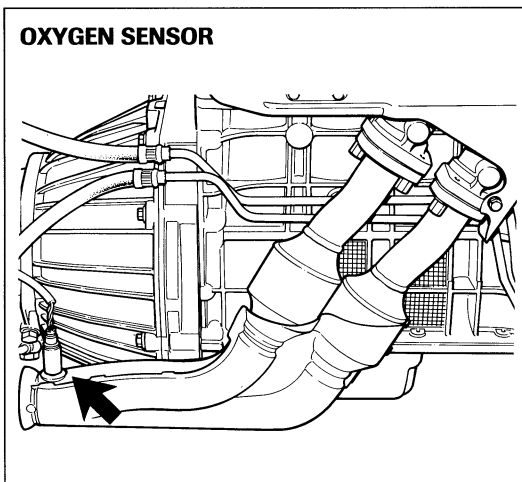


Exhaust system

The exhaust system employs two primary catalysts in the down-pipes with two combined catalyst / mufflers acting as secondary catalysts.

EXHAUST SYSTEM

The oxygen sensor is located just to the rear of the down-pipe "Y" connection.

OXYGEN SENSOR

Engine Design / Construction (continued)**AJ6: 1993 model year**

The improvements and revisions made to the AJ6 for 1993 model year are the same for both the XJS Range and XJ6 Sedan Range.

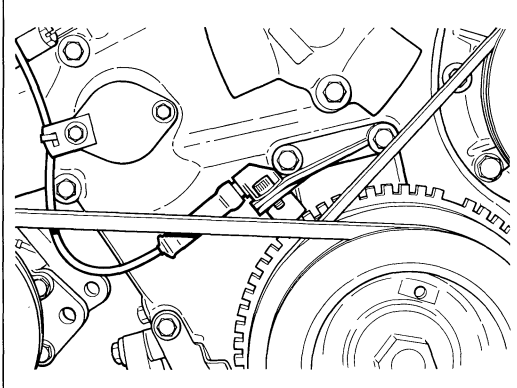
NOTE: The new generator is described in the Electrics / Electronics section of this publication.

Camshafts and valve springs

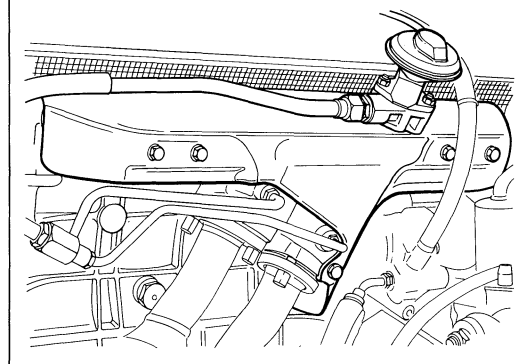
The AJ6 engine is equipped with redesigned camshafts and improved valve spring assemblies. The camshaft lobe profiles are altered to reduce valve gear noise at higher engine speeds. The valve springs, spring seats and collars are modified to extend life.

Crankshaft pulley and engine speed sensor bracket

The crankshaft pulley has a five-groove drive for the new generator drive belt. In order to accommodate the wider pulley, the serrated engine speed reluctor has been narrowed. A new offset engine speed sensor bracket is used to center the sensor on the narrower reluctor.

ENGINE SPEED SENSOR**Exhaust gas recirculation valve heat shield**

The exhaust manifold heat shield is modified so that it is cut out around the EGR valve and is no longer sandwiched between the manifold and the gasket. The gasket between the manifold and the EGR valve is increased in thickness to compensate. This arrangement allows easier service operations.

EGR VALVE AND HEAT SHIELD

Engine Management System

NOTE: Except as described in this publication, the engine management system is identical to the AJ6 system installed in the XJ6 Sedan Range.

Fuel delivery and evaporative emission control

The fuel delivery and evaporative emission control system is unchanged from the V12 version except for the engine and evaporative canister portions of the system.

Fuel delivery A recirculating fuel system is used to provide a continuous supply of pressurized, cool fuel to the fuel rail. Fuel is drawn from the fuel tank by an electric pump and a jet pump integral with the fuel pump module and is delivered to the fuel rail through a renewable filter.

The pressure regulator, incorporated on the fuel rail, senses engine intake manifold absolute pressure (manifold vacuum) and maintains a constant pressure across the fuel injectors. Fuel pressure varies from 36 psi at idle to 44 psi

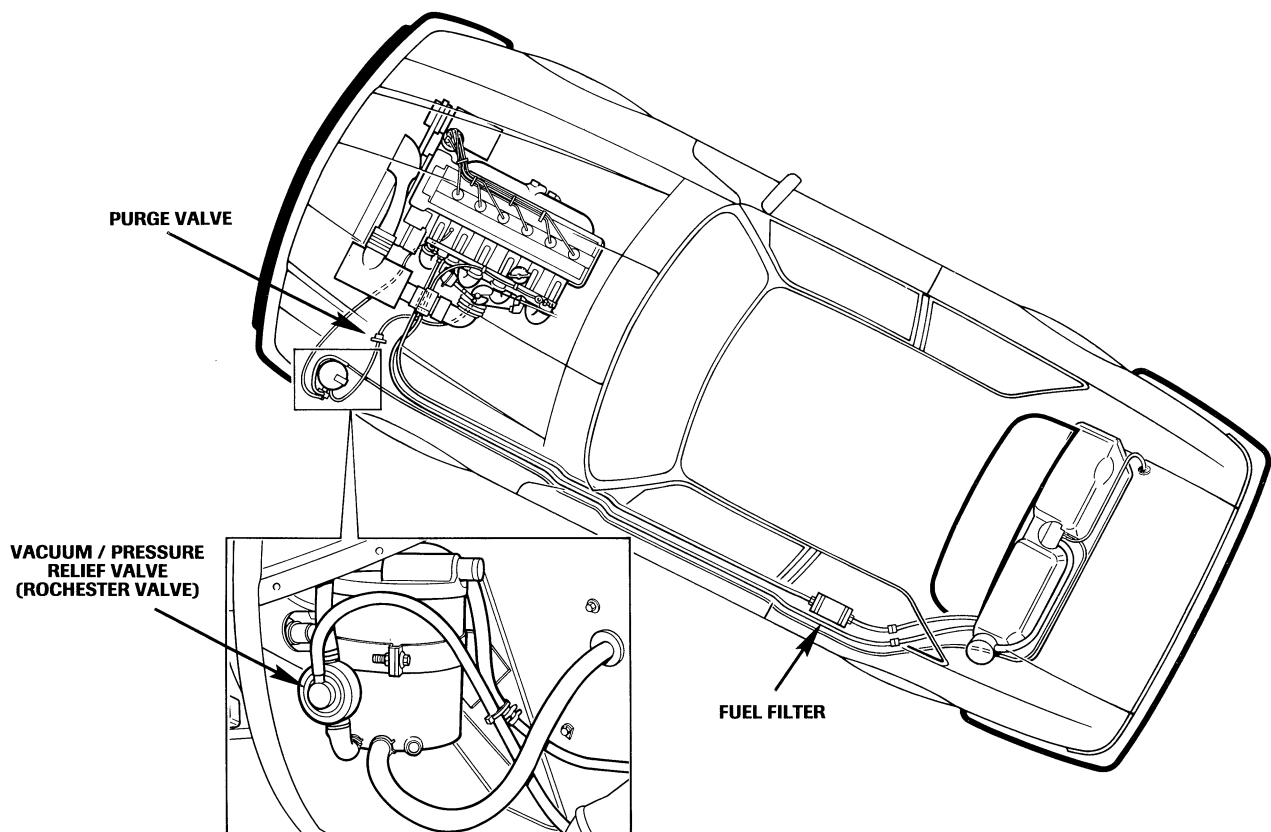
at full throttle depending on manifold absolute pressure. The varying fuel pressure ensures that the quantity of fuel injected for a given "injector on" time is constant regardless of intake manifold pressure.

Unused fuel is returned to the fuel pump module where it mixes with the remaining fuel in the tank. This action cools the returning fuel.

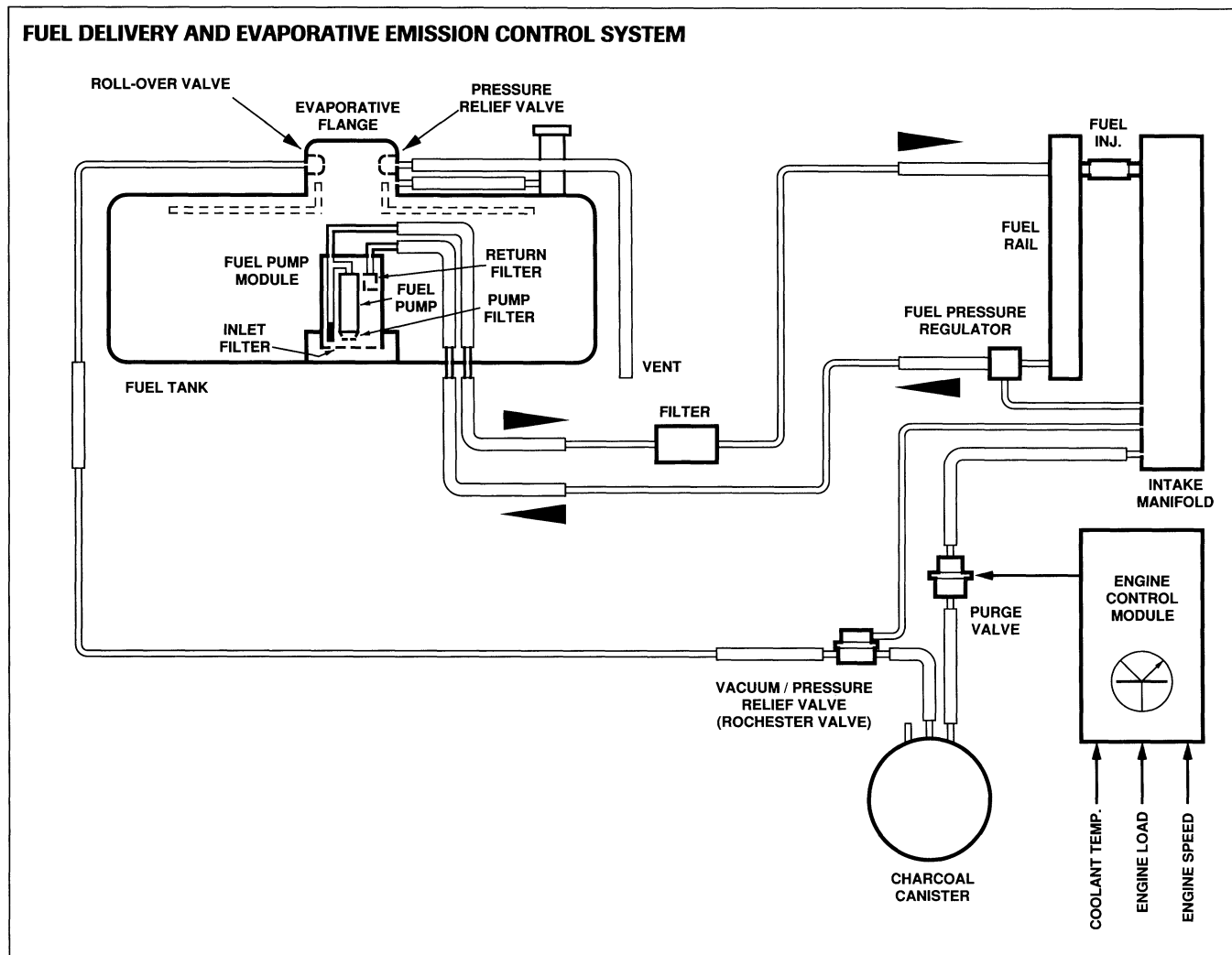
The fuel pump is energized via a relay when the Engine Control Module (ECM) senses an engine "cranking" or "running" input.

Evaporative emission control Canister purging to the intake manifold is controlled by the ECM via the purge valve. The ECM activates the purge valve to control the rate of purge flow, dependent on engine speed, load, temperature and canister saturation.

FUEL DELIVERY SYSTEM



Engine Management System (continued)

**Engine Control Module (ECM)**

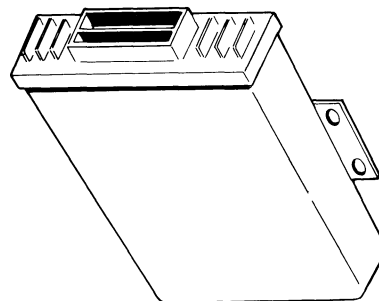
The AJ6 ECM, located at the base of the right 'A' post, is revised to include changes in the following areas:

- Recalibration to accommodate the new engine camshaft design and the new fuel injectors
- Hardware change to eliminate radio injector noise
- Incorporation of adaptive idle fueling
- Improved On-Board Diagnostics (OBD).

The ECM connects to the serial communications data link for JDS diagnosis.

NOTES: The tachometer input to the instrument pack is from the ignition coil negative terminal via a 6.8 K ohm resistor.

The transmission inputs and outputs associated with the A4 installation are not used in the M5 installation.

ENGINE CONTROL MODULE

Engine Management System (continued)

Engine Control Module (ECM) (continued)

Adaptive idle fueling In order to ensure optimum performance, the ECM contains an adaptive idle fueling software function that automatically trims the fuel "injector on" time (pulse width) at idle, throughout the life of the vehicle. The total available trim to the nominal injector on time at idle is $\pm 20\%$. Adaptive fueling is performed by the ECM software only when the listed diagnostic trouble codes (DTC) are cleared, and the listed preconditions are met.

Diagnostic trouble codes that must be cleared for adaptive idle fueling to occur:

- 12 Mass air flow meter
- 14 Coolant temperature sensor
- 17 Throttle potentiometer
- 18 Throttle potentiometer and mass air flow meter calibration
- 19 Throttle potentiometer and mass air flow meter calibration
- 23 Fuel supply
- 26 Oxygen sensor feedback (lean)
- 34 Injectors
- 37 EGR drive
- 39 EGR temperature sensor
- 44 Oxygen sensor
- 48 Idle speed control valve
- 68 Road speed sensor
- 89 Purge valve drive

Adaptive idle fueling preconditions:

- throttle is closed
- engine speed is below 1000 rpm
- road speed is below 3 mph (6 kph)
- engine coolant temperature is above 170°F (76°C)
- idle speed adaptive delay is complete (vehicle speed reached 3 mph for approximately 100 yards traveled)
- closed-loop fueling is operating and in control
- integrator voltage less than two volts or greater than three volts

If the DTCs are cleared and the preconditions are met, the ECM cancels purge flow and adapts the idle fueling. Between fueling adaptations, there is a delay of approximately eight minutes during which the preconditions must be met. If the preconditions are interrupted, the delay will be longer.

On-Board Diagnostics JDS engine management testing will access all stored Diagnostic Trouble Codes (DTC).

JDS reports additional information associated with each code to assist in correct diagnosis. Examples of this additional information include:

- If the fault was present during the last driving cycle
- If the fault was present at the last ignition switch ON
- The number of times the fault occurred
- The mode of failure (open or short circuit, rich or lean, high or low voltage).

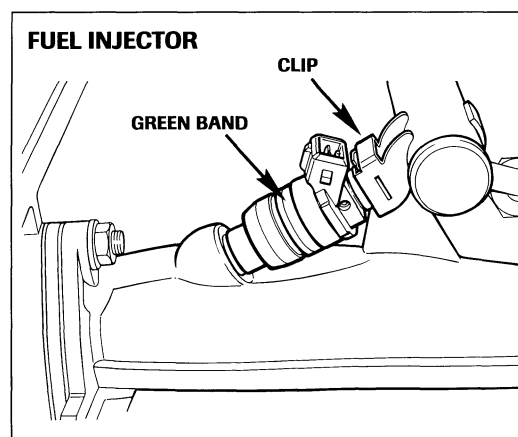
This information can only be accessed through JDS. Details of the expanded information will be supplied with the applicable JDS Software User Guide.

Mass air flow meter

The idle trim adjustment on the mass air flow meter is deleted with the introduction of adaptive idle fueling.

Fuel injectors

New plate-type, twin spray fuel injectors replace the previous pintle-type injectors. The injectors are secured to the fuel rail with custom clips that ensure the twin jets of fuel are directed to the intake valve throats. This type of injector is quieter in operation and is less prone to orifice contamination than the pintle type. A green band is used to identify the plate-type injector.

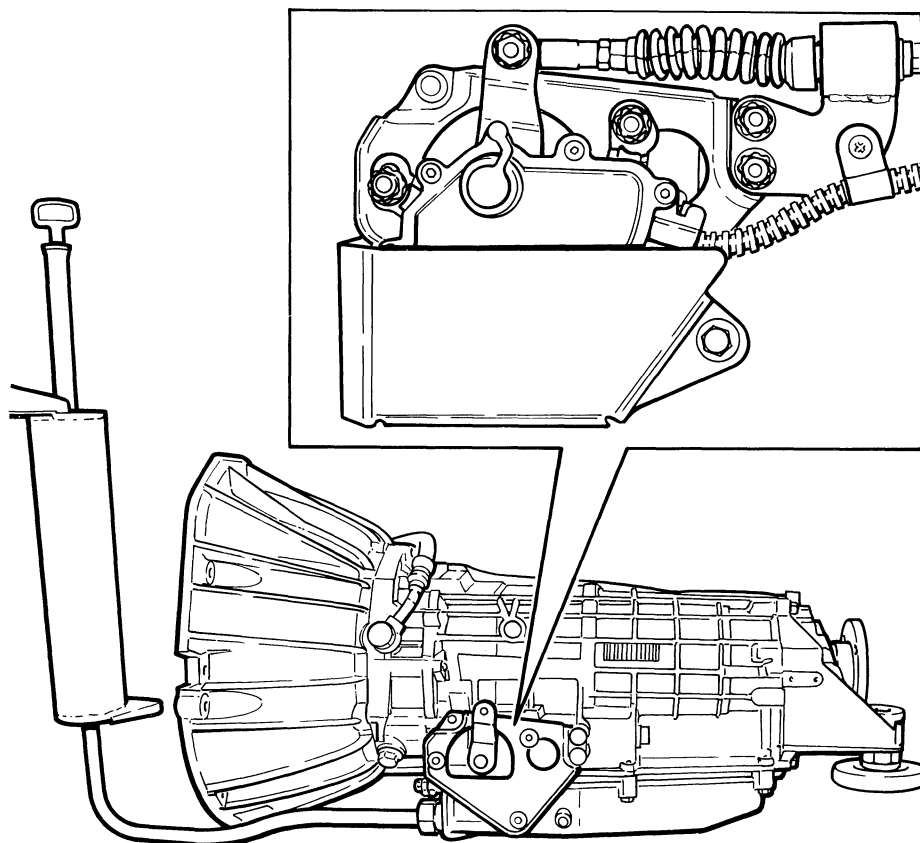
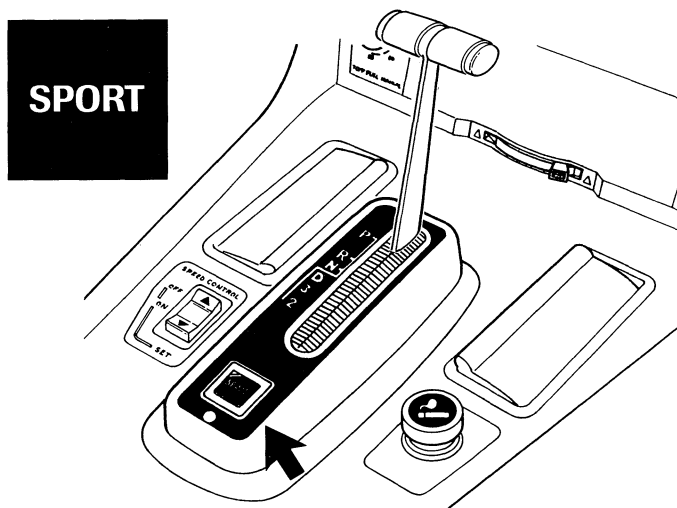


Throttle potentiometer

The throttle potentiometer has increased linear calibration thereby providing greater accuracy in measuring the throttle valve angle.

Provisional wiring diagram

An Engine Management System provisional wiring diagram is shown on pages 36 – 37 of this publication.

Four-Speed Automatic Transmission**TRANSMISSION AND ROTARY SWITCH****SPORT MODE SWITCH**

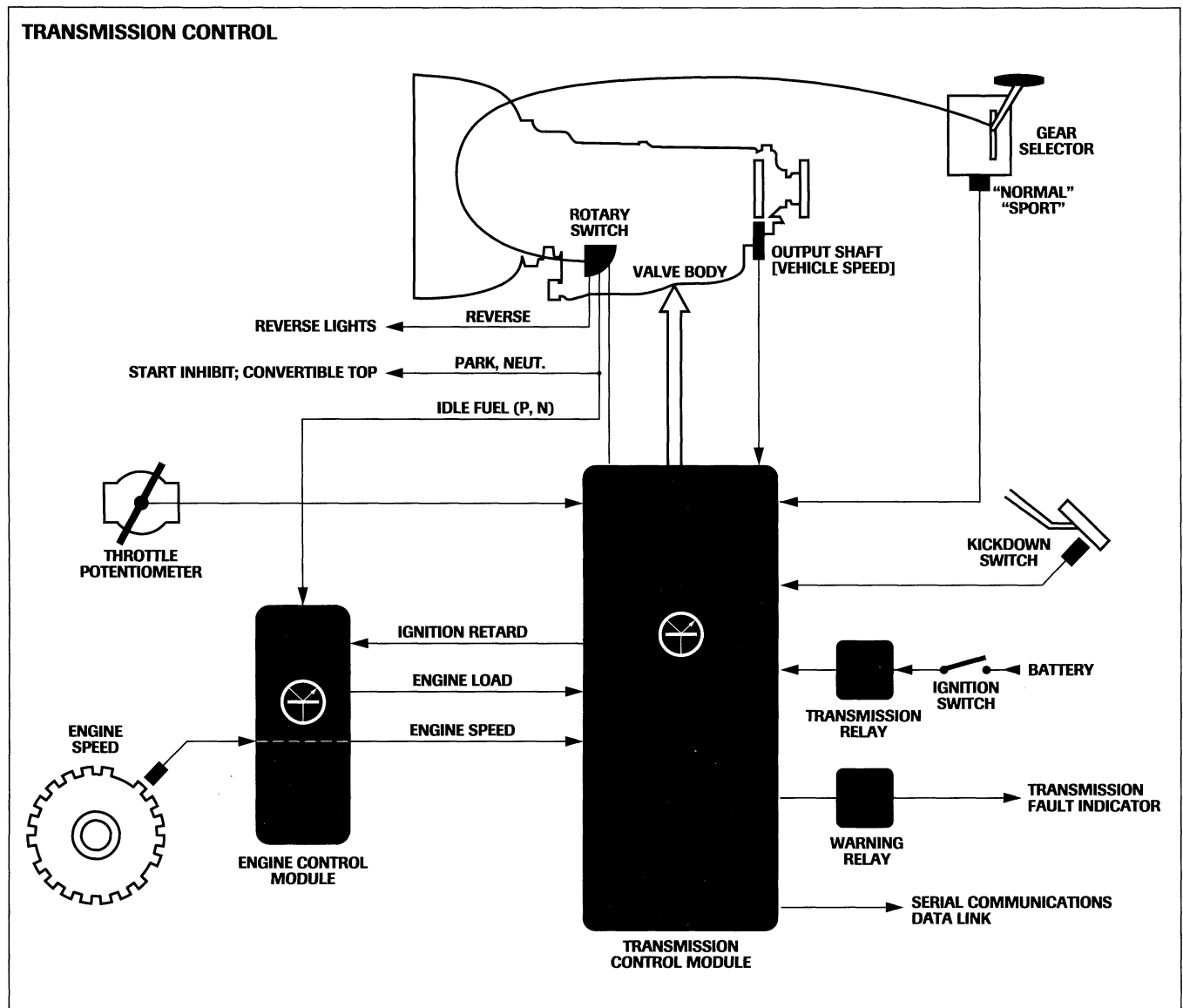
The ZF 4HP 24E four-speed automatic transmission in the XJS remains basically the same as the transmission used in the XJ6 Sedan Range. The installation of the transmission differs in the gear selector mechanism and cable, the fill tube assembly and the fluid pan. The enlarged fill tube area allows for fluid expansion during operation. This expansion area is made necessary by the shallow fluid pan.

Transmission modes

Two transmission modes are available: NORMAL and SPORT. The transmission mode switch is a momentary push type for selecting NORMAL or SPORT modes. The instrument pack has an indicator that illuminates when SPORT mode is selected.

Transmission control

Operation and control of the transmission remains the same as the XJ6 Sedan Range; however, the decoder module is not used in the XJS, and certain inputs and outputs are either revised or not used.

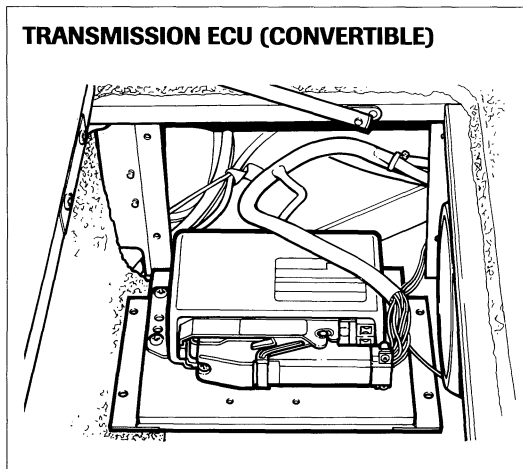


Four-Speed Automatic Transmission (continued)**Transmission control (continued)**

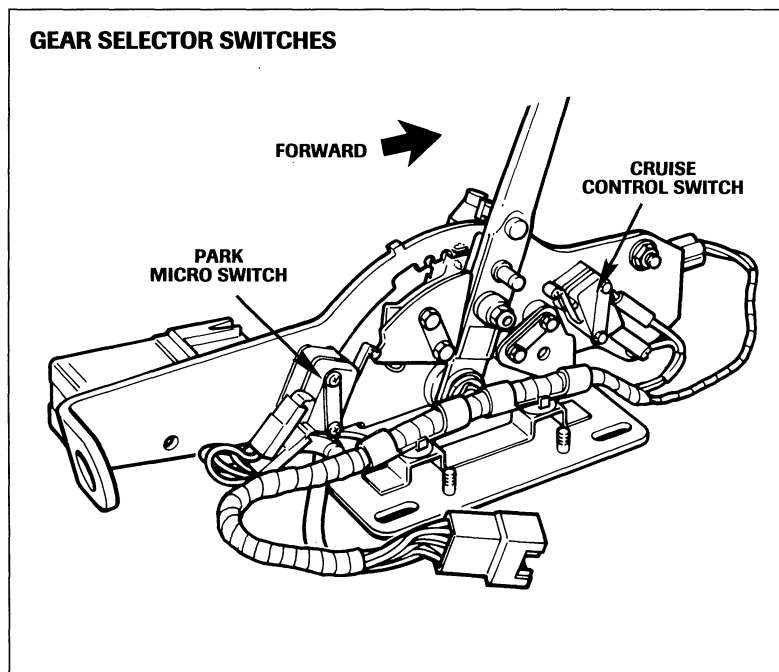
Transmission control module The transmission control module is located at the base of the right B/C post on Coupe models and behind a spot panel at the left side of the rear storage compartment on Convertible models. The module is connected to the serial communications data link for JDS diagnosis.

Provisional wiring diagram

A Transmission Control provisional wiring diagram is shown on pages 38 – 39 of this publication.

TRANSMISSION ECU (CONVERTIBLE)**Gear selector switches**

The gear selector mechanism incorporates two micro switches that provide signals for the gear shift interlock system (park micro switch) and the cruise control system.

GEAR SELECTOR SWITCHES

Gear shift interlock

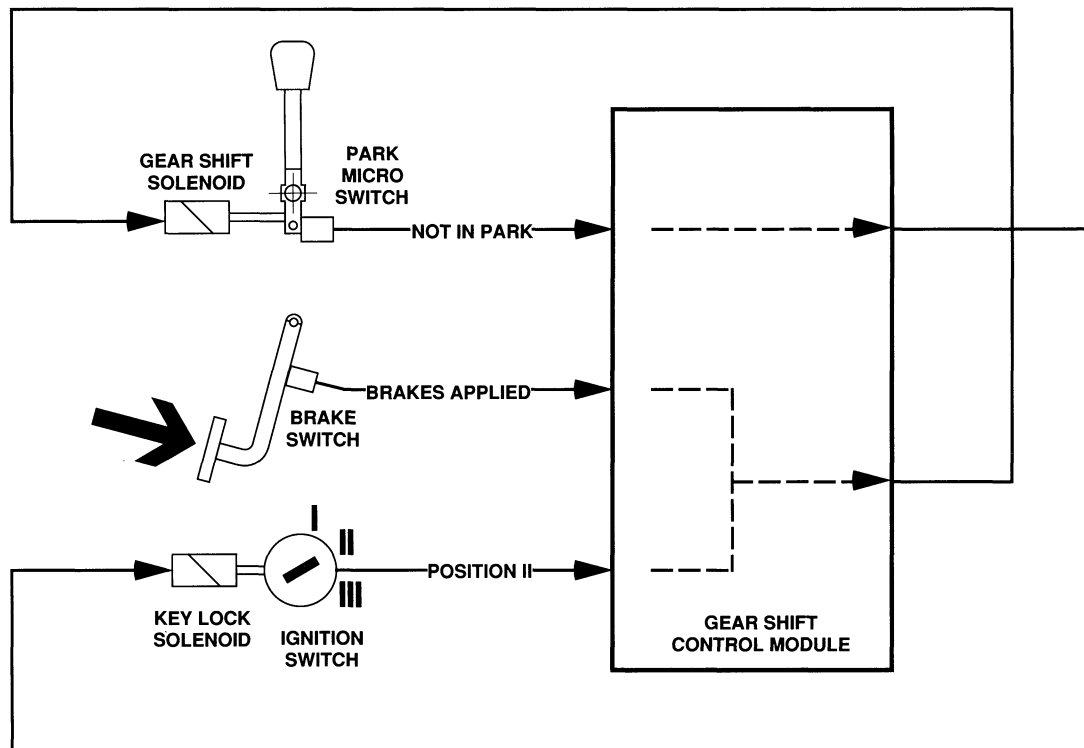
A gear shift interlock system is introduced for the 1993 model year. The system prevents movement of the gear selector from PARK unless the ignition switch is in position II and the brake pedal is applied. In addition, the ignition key cannot be removed from the ignition switch unless the gear selector is in PARK.

System operation

The system is controlled through the gear shift control module with inputs for brake pedal applied, PARK position and ignition key in position II. The brake pedal applied input is sourced from the brake switch; the PARK position input is sourced from the PARK micro switch on the selector assembly and the ignition switch position II input is sourced from the ignition power supply circuit.

The gear shift control module energizes the gear shift solenoid when the ignition is in position II and the brakes are applied. The energized solenoid releases the locking mechanism, allowing the gear selector to be moved out of PARK. When the gear selector is moved out of PARK, the gear shift control module energizes the key lock solenoid to prevent ignition key removal. The gear shift control module de-energizes the key lock solenoid when the gear selector is in PARK, thus allowing ignition key removal.

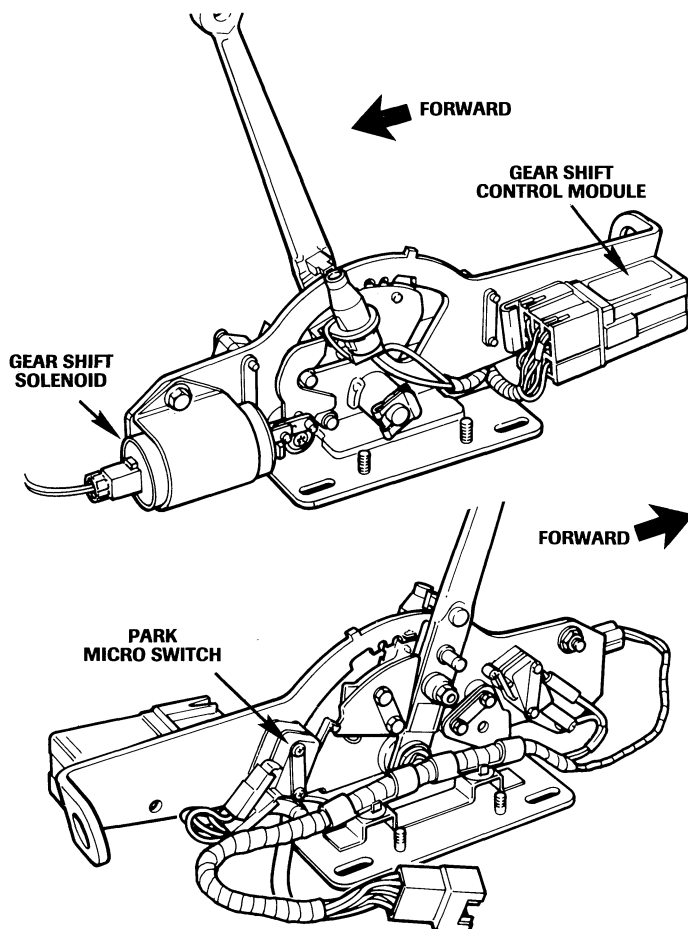
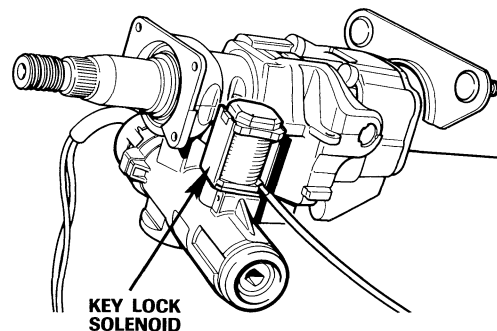
GEAR SHIFT INTERLOCK



Gear Shift Interlock (continued)**System components**

The system components are as follows:

- Gear shift control module mounted on the gear selector assembly
- Gear shift solenoid located on the gear selector assembly
- PARK micro switch located on the gear selector assembly
- Key lock solenoid located on the steering column.

GEAR SHIFT INTERLOCK MECHANISM**GEAR SHIFT INTERLOCK – KEY LOCK**

Manual override If the vehicle must be moved without power, the gearshift locking mechanism can be disengaged. The release requires removal of the center console top finisher (the slotted side mount fasteners have been deleted). Reach under the gear selector assembly from the left front and manually release the lock by moving the cam forward while moving the selector lever out of PARK.

Five-Speed Manual Gearbox

Gearbox design

The model 290 gearbox is a five-speed unit incorporating synchromesh on all forward gears. Gear selection is accomplished by a centrally mounted lever connected to the selector shaft via a pivoting joint. All of the gears are engaged by the single selector shaft operating three rods that, in turn, move the selector forks.

Drive pinion The drive pinion is supported at the rear by a duplex ball bearing in the front housing and at the front by a needle roller bearing in the flywheel (through the first motion shaft).

Main shaft The main shaft is supported in three places: at the front by a caged roller bearing in the drive pinion counter bore, at the center by a roller bearing in the intermediate housing, and at the rear by a duplex bearing in the rear housing. Each of the forward speed mainshaft gears incorporates an integral synchromesh mechanism. The synchromesh clutch hubs are splined to the main shaft and located between each pair of gears.

Counter shaft The counter shaft is supported by three roller bearings located in the front, center and rear housings.

Reverse idler gear The reverse idler gear rotates on a stationary shaft and is in constant mesh. Two caged roller bearings support the gear. Location of the idler gear is maintained by a spacer on the shaft.

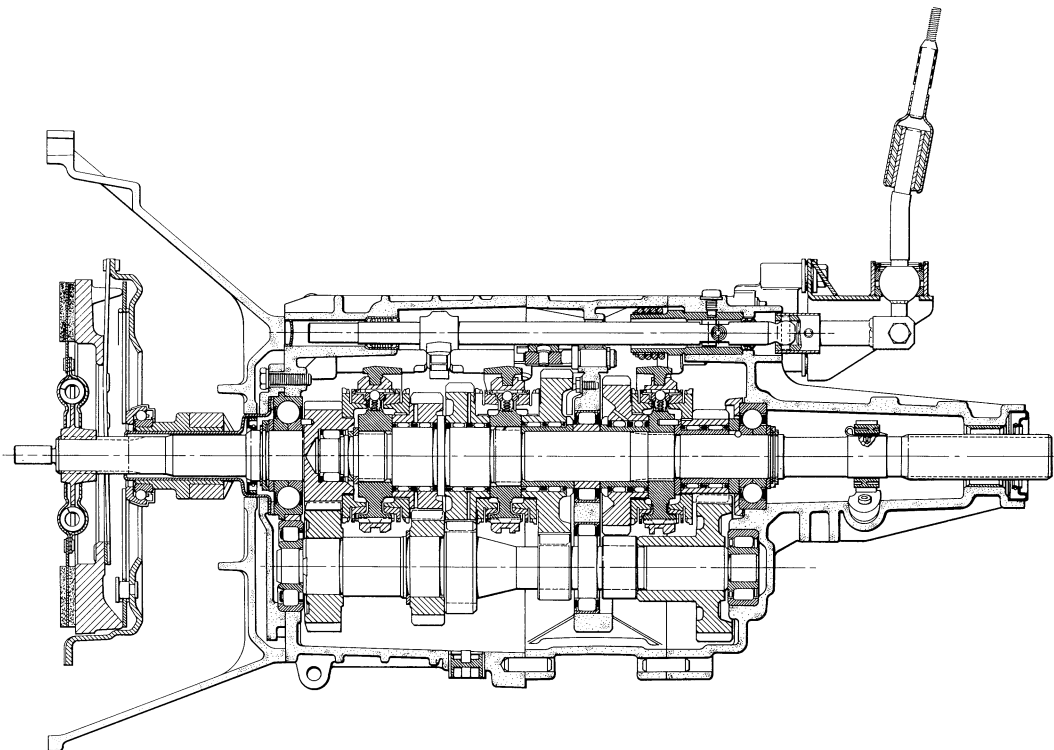
Gear ratios

First	3.553:1
Second	2.041:1
Third	1.4:1
Fourth	1.00:1
Fifth	0.755:1
Reverse	3.553:1

Lubricating fluid

Fluid type	Dexron II E
Quantity	1.5 quarts (U.S.) (1.65 litres) (drain and refill)

FIVE-SPEED MANUAL GEARBOX



Five Speed Manual Gearbox (continued)

Clutch and flywheel

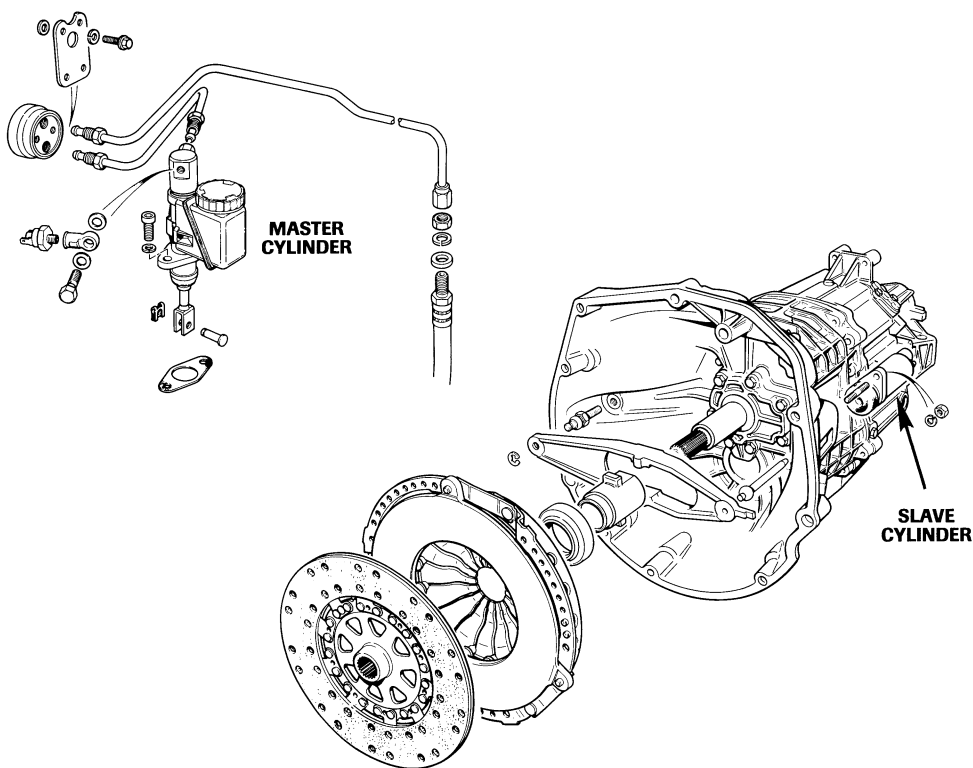
The clutch is a hydraulically actuated single-plate, diaphragm type. A slave cylinder mounts on the bell housing and is hydraulically operated by a clutch master cylinder through a damper. Mechanical motion to the bulkhead mounted master cylinder from the clutch pedal is via a push rod. The flywheel is a heavy twin-mass design with

built-in springs. This type of flywheel provides a smooth power transfer from the engine to the gearbox.

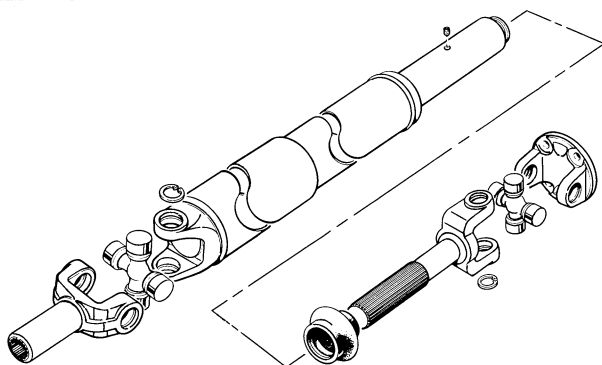
Hydraulic fluid

Fluid type DOT 4 brake fluid

CLUTCH ASSEMBLY



PROPELLER SHAFT



Propeller shaft

The propeller shaft used with the manual gearbox has two universal joints with a reverse spline-type coupling to the gearbox. The rear flange is the same as the automatic transmission shaft.

Final drive

The differential unit has a ratio of 3.54:1 and is similar in construction to the unit used in the previous V12 models. An integral road speed sensor provides a road speed output to the speed interface unit.

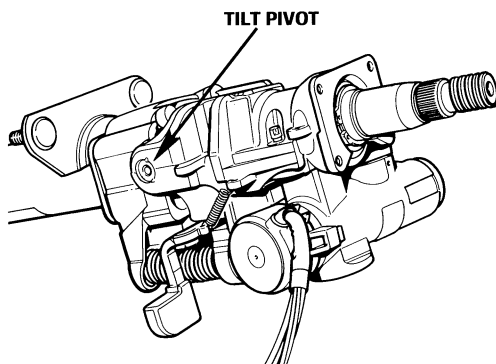
Power Steering

The power steering system uses the steering rack and pinion unit from the previous XJS models with a new shortened steering column. Operating pressure for the system is provided by the engine-driven power steering pump. There is no power steering fluid cooler.

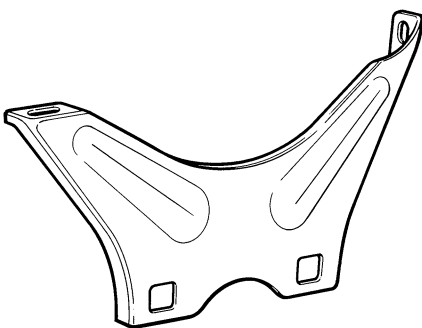
Steering column and support brackets

The driving position is improved by the shortening of the steering column by approximately two inches. Four tilt position adjustments are available. A new steering column upper mounting bracket replaces the previous longitudinal strut and slide mount arrangement.

STEERING TILT UNIT



STEERING COLUMN BRACKET

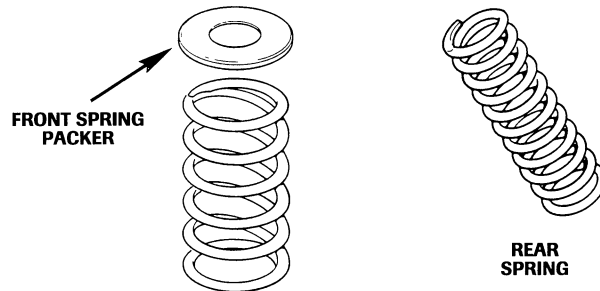


Suspension

Convertible road springs

Convertible normal road clearance is maintained by the installation of front spring packers and longer rear road springs to compensate for the space occupied by the X bracing system.

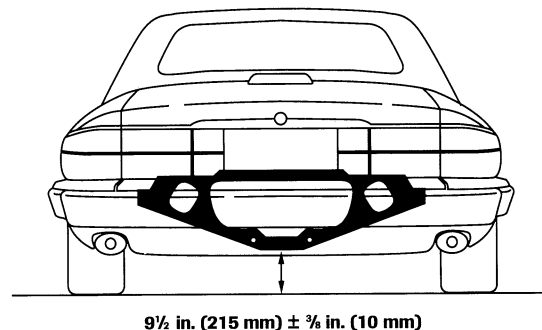
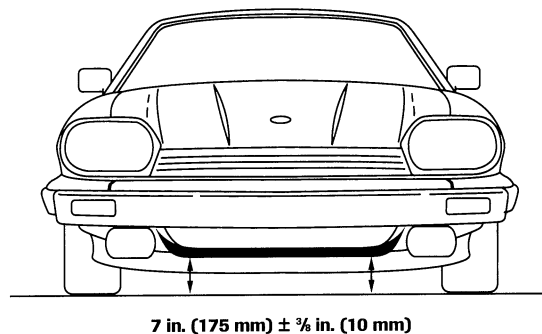
CONVERTIBLE ROAD SPRINGS



Convertible ride height

Due to the change in road springs, the ride height of the convertible in the "kerb condition" is increased. This change does not affect the steering and suspension alignment specifications, nor does it change the method for checking and adjusting the steering and alignment. The existing "mid-laden" tools are used for these procedures.

CONVERTIBLE RIDE HEIGHT



Power Supply

The battery and generator have been upgraded to ensure adequate power supply under all operating conditions.

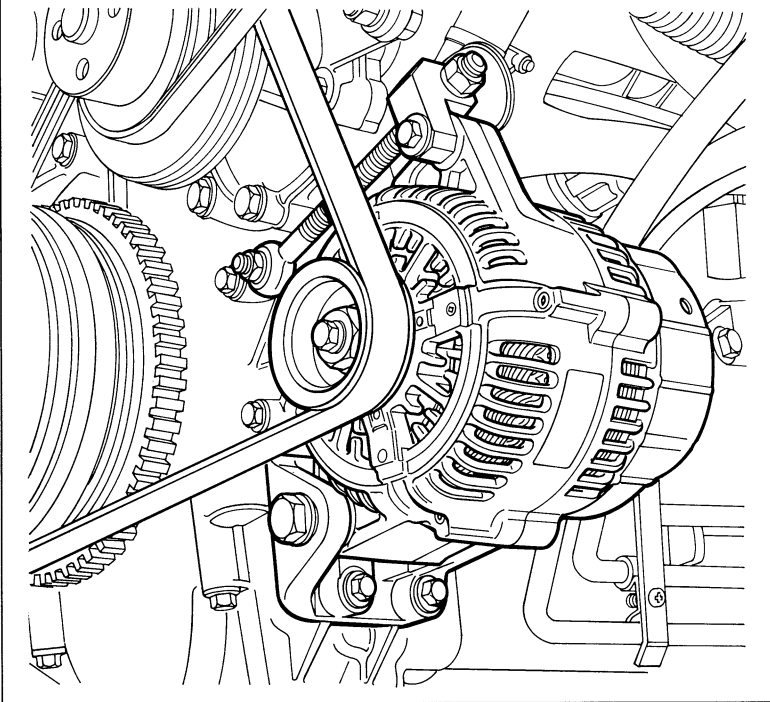
Battery

A low-maintenance DIN 66 battery with a 72 amp hour capacity is installed in the existing trunk location. The battery tray, support brackets and trim are modified to accommodate the increased height of the new battery.

Generator

A new 120 amp generator provides the necessary current to satisfy the electrical loads of the vehicle. Drive from the crankshaft pulley is by a five-rib belt that also drives the coolant pump and fan. The mounting and adjustment arrangement is the same as the generator in previous Sedan models; however, the mounting is now by a two-lug bracket.

GENERATOR



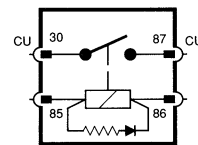
The new generator has increased low speed output characteristics to provide an improved battery load balance. The improvement is made possible by a different type of regulator and smaller diameter pulley. As the new generator has an internal overload protection circuit, the previous load dump module is no longer required. The generator provides the instrument pack with the correct signal for charge warning making an instrument pack excitation resistor unnecessary.

Wiring Harness and Components

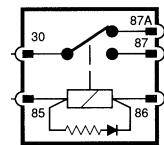
Relays

All of the XJS relays are the individual type with color-coded connectors. Most of the relays incorporate transient protection as an internal circuit. Two types of relays make up the bulk of those used in the electrical system: the normally-open single-contact relay (87 terminal, light blue case), and the change-over contact relay (87 and 87A terminals, violet case). Adjacent to the relay base, the wiring harness is color-coded to the relay case color. Gray is used to indicate a silver relay. If the harness does not have a color code, the component is not a relay.

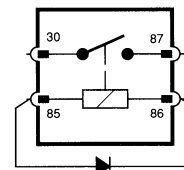
RELAY CIRCUITS



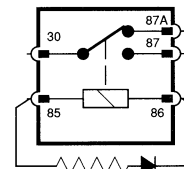
**NORMALLY OPEN
(LIGHT BLUE CASE)**



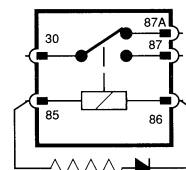
**CHANGE-OVER
CONTACT
(VIOLET CASE)**



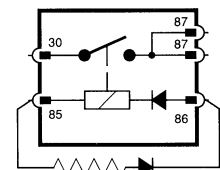
**ABS PUMP
(YELLOW CASE)**



**ABS MAIN
(WHITE CASE)**



**CHANGE-OVER
CONTACT
(SILVER CASE)**



**EMS MAIN
(SILVER CASE
WITH RED STRIPE)**

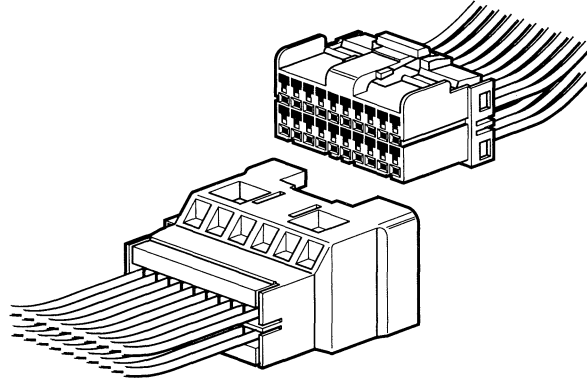
Connectors

Two connectors are new to the wiring harness: Multilock 040 and Econoseal III HC connectors.

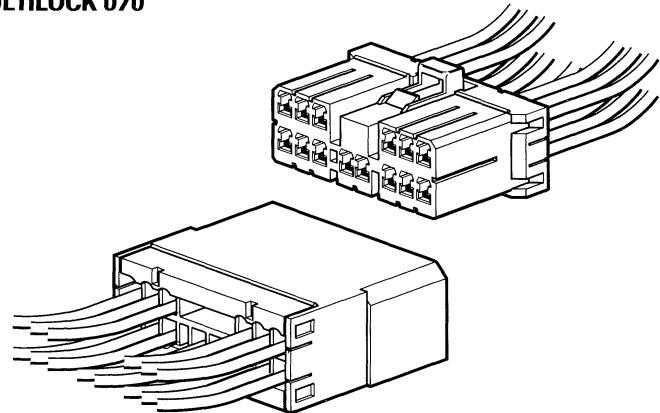
Multilock 040, 070 Multilock 040 and 070 connectors are 2 to 20-pin connectors that can be used for both wire to wire and wire to board connectors. Multilock 040 have a current-carrying capacity of up to 4.5 amps per contact; Multilock 070 have a current-carrying capacity of up to 12 amps per contact. Multilock 070 have previously been used for limited vehicle applications.

Econoseal III HC Econoseal III HC connectors are 2, 4 or 8-pin high current connectors that feature wire sealing to prevent corrosion.

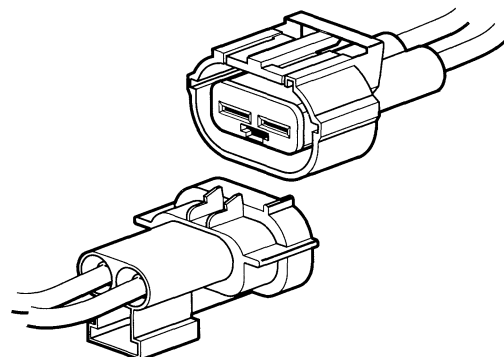
MULTILOCK 040



MULTILOCK 070



ECONOSEAL III HC

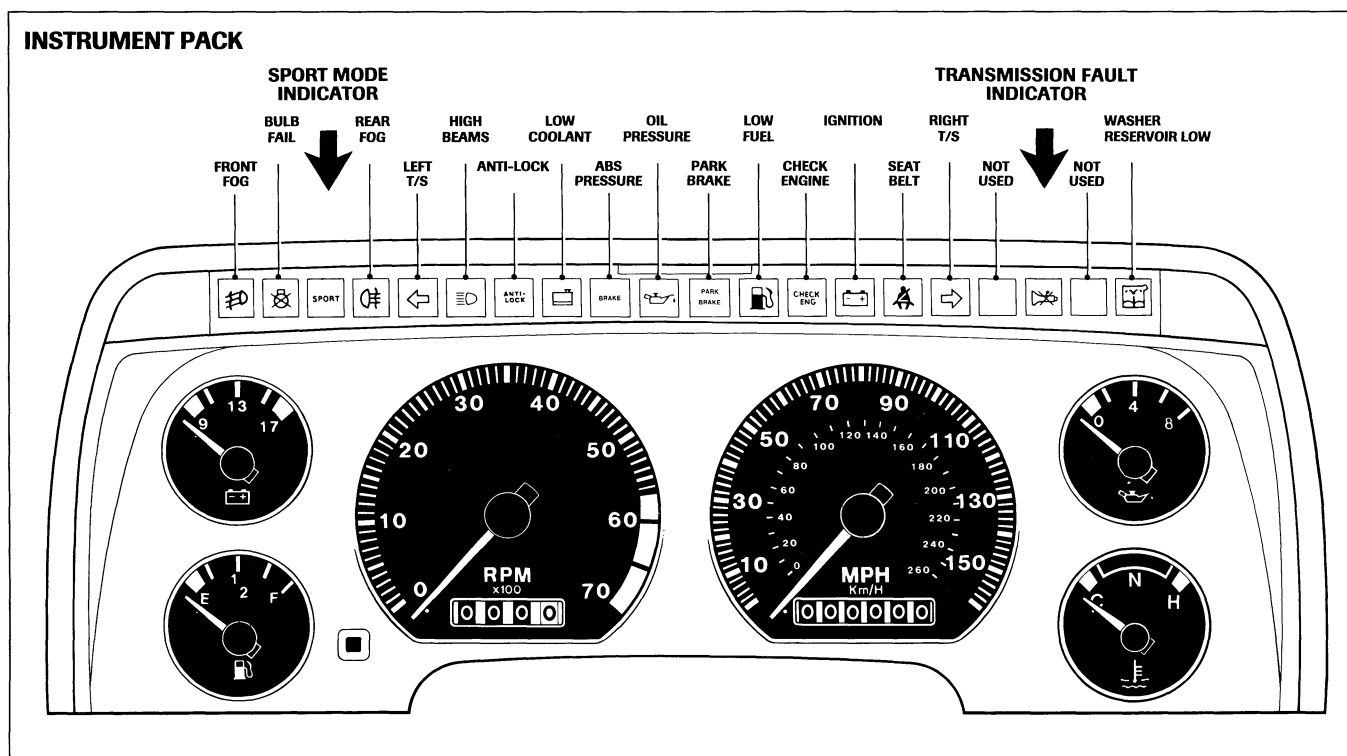


Instrument Pack

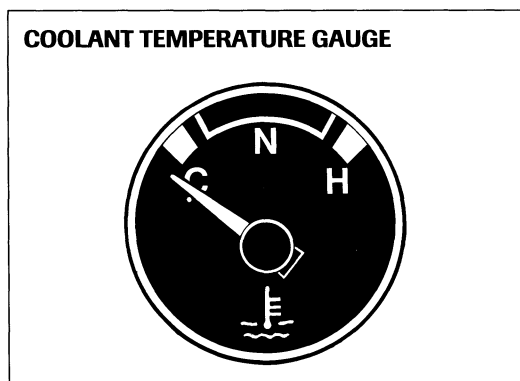
A redesigned engine coolant temperature gauge is included in the revised instrument pack. The previous generator excitation resistor located behind the instrument pack has been deleted.

SPORT mode indicator

The automatic transmission SPORT indicator is included in the top row of indicators.

**Coolant temperature gauge**

A recalibrated coolant temperature gauge with revised graphics is designed to prevent mistaken high coolant temperature readings. The normal band (N) is extended to occupy more of the temperature needle sweep.



Cruise Control

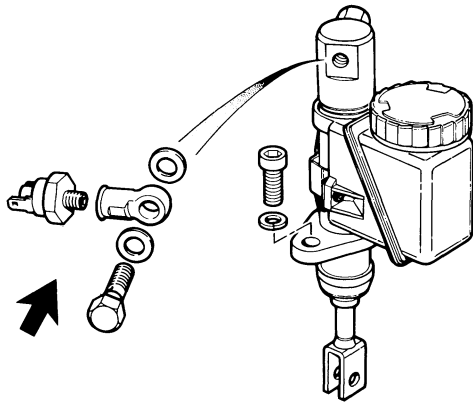
The cruise control system is the same system as previously used in the 1992 model year V12 models and can be engaged in all forward speeds.

Inhibit and disengage switches

The A4 models use the gear selector mechanism micro switch to input the PARK and NEUTRAL positions to the cruise control ECU.

The M5 models use a clutch master cylinder switch (clutch pedal depressed) to input "clutch disengaged" to the cruise control ECU.

CLUTCH SWITCH



Interior Electrical Components

Column switch gear

The column switch gear is modified to adapt to the shortened steering column.

Door guard lights

The bulb for the door guard lights has been changed to a festoon type.

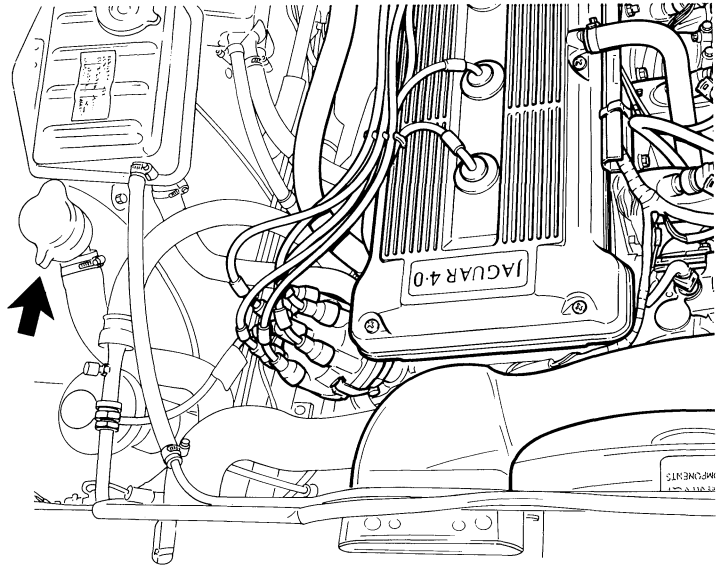
Windshield Washers / Headlight Power Wash

Washer fluid reservoir

The washer fluid reservoir is altered and combines a new pump and connector. The location remains in the right front fender.

NOTE: Headlight power wash is optional equipment, included in the Cold Weather package.

WASHER FLUID RESERVOIR



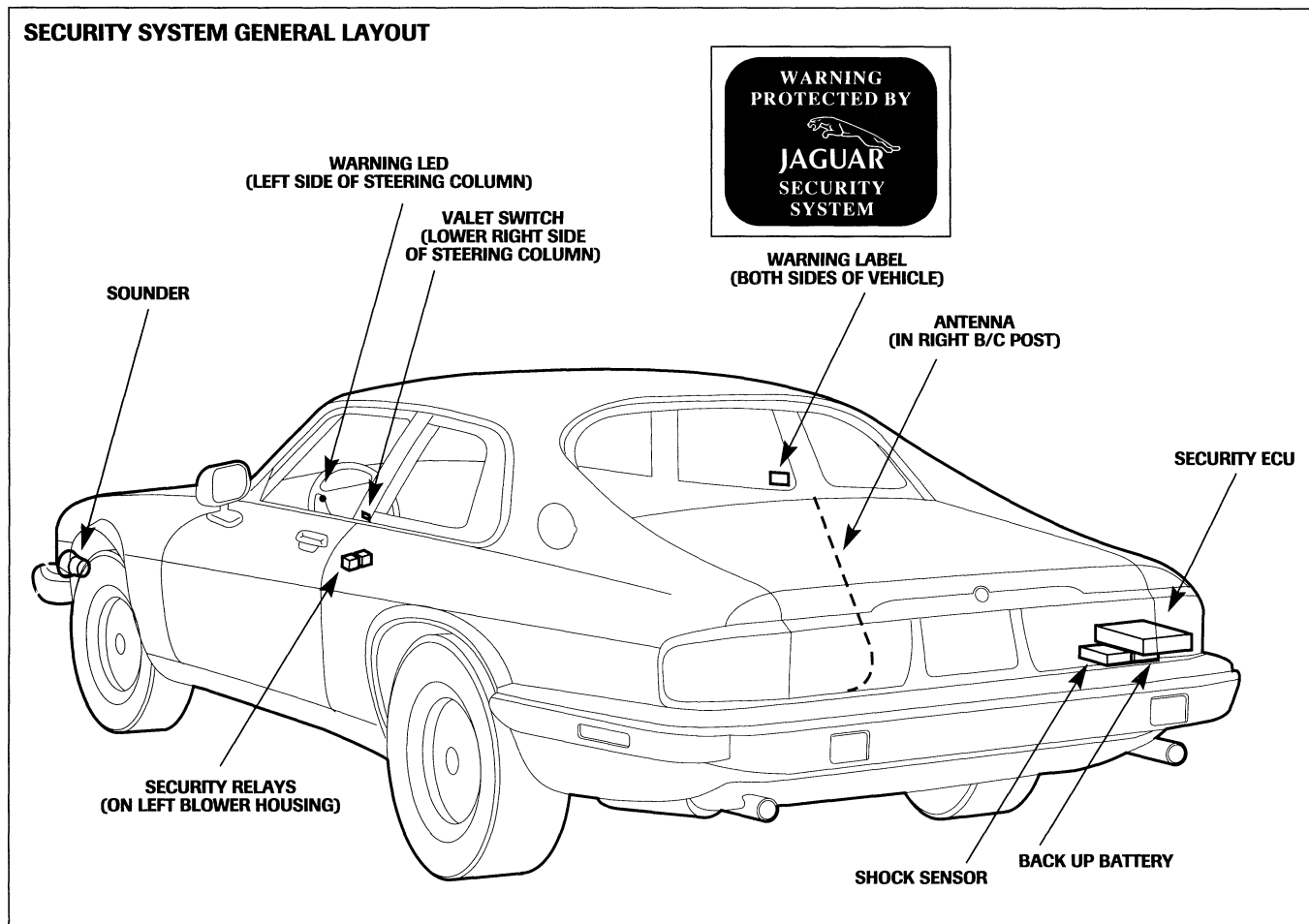
Jaguar 19K Security System

Initial 1993 Model Year vehicles will include a Jaguar "19K" accessory security system as standard equipment. Later production vehicles will be equipped with a factory-integrated system.

System layout and features

The 19K security system combines theft protection and operating convenience features. Theft protection is provided by audible and visual alarms, and starter disable. The system is supplied with two radio frequency (RF) key fob transmitters.

SECURITY SYSTEM GENERAL LAYOUT

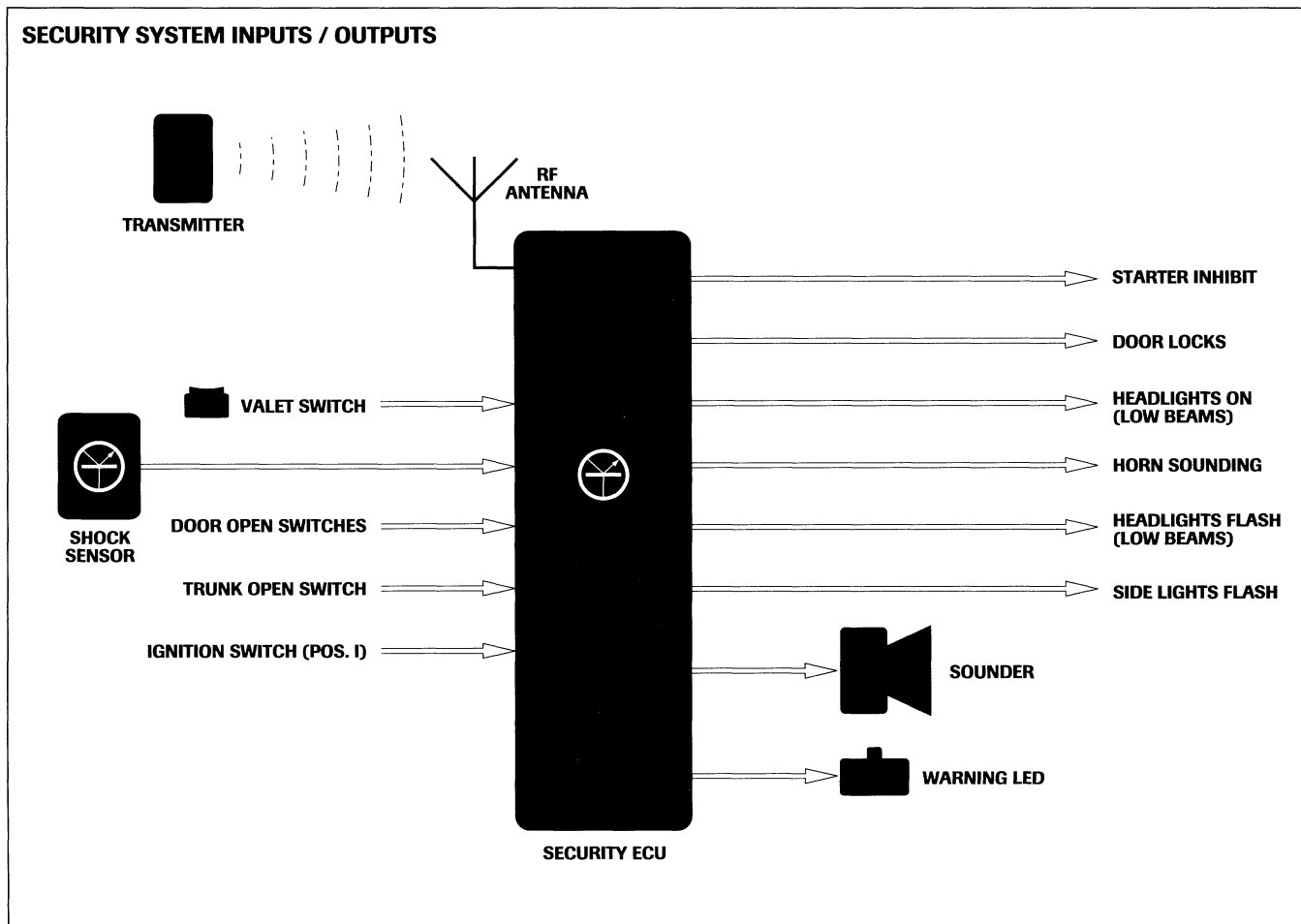


Audible and visual alarms (FULL ALARM) The audible alarm begins as an escalating tone that builds to full volume after ten seconds. The visual alarm consists of flashing of the headlights (low beams) and the side lights.

Standard convenience features Remote central locking / unlocking and headlight low beams ON are standard features of the security system.

Other standard features Engine starter disable, panic alarm, shock sensor "warn away" (two-second tone), transmitter signal received indication (chirp and side lights flash), valet reminder (four tones) and LED history readout are additional security system features.

Dealer-installed accessory security features Passive arming (automatic arming with door closing) is a dealer-installed feature.



Inputs to the security ECU The ECU receives inputs from the following sources:

- Door open switches
- Trunk open switch
- Ignition switch (position I)
- RF transmitter (via antenna)
- Shock sensor
- Valet switch.

Vehicle function control The ECU controls the following vehicle functions:

- Starter inhibit
- Central door locking
- Headlights ON (low beams).

Outputs from the security ECU The ECU outputs to the following systems and components:

- Headlights flash (low beams)
- Side lights flash
- Horn sounding
- Security system sounder tones
- Warning LED.

Jaguar 19K Security System (continued)

System components

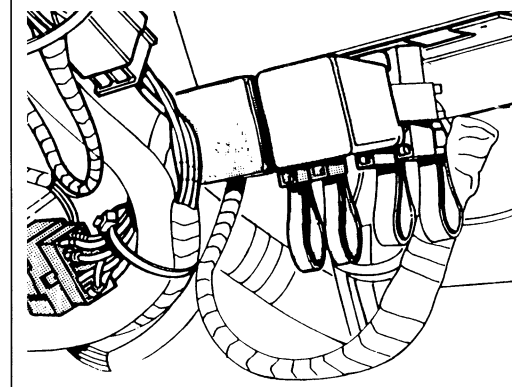
Security system ECU The security system ECU is microprocessor based for direct interface with vehicle inputs, RF transmitter reception, alarm outputs and control of certain vehicle systems. The ECU is mounted behind the right rear trunk trim panel.

Shock sensor The standard equipment shock sensor detects impacts or jarring motions and inputs directly to the security system ECU. The shock sensor is mounted to the ECU case.

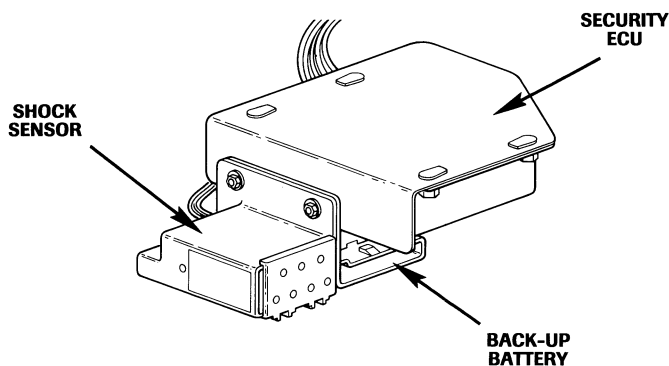
Back-up battery The back-up battery will power the security system ECU and drive the alarm sounder in the event of vehicle battery disconnection. The back-up battery is also mounted to the ECU case.

Relays Two relays are included in the security system: a normally-open (light blue case) relay for headlight operation, and a change-over (violet case) relay for starter disable. The relays are mounted on a bracket located on the left blower housing.

SECURITY SYSTEM RELAYS

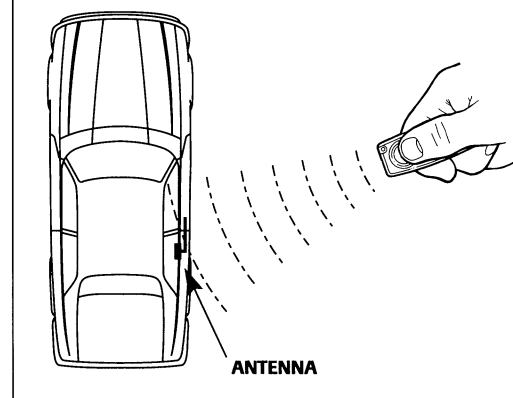


SECURITY SYSTEM ECU, SHOCK SENSOR AND BACK-UP BATTERY



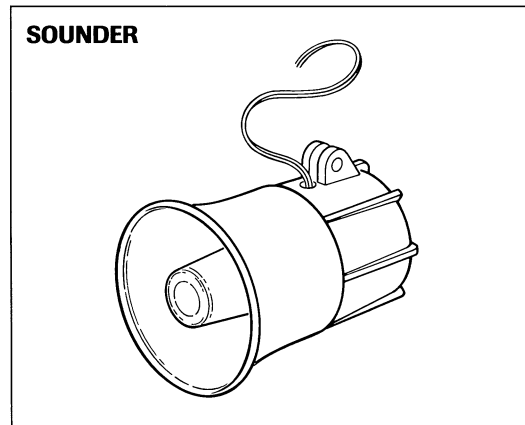
Key fob RF transmitter The transmitter has a single button to operate all security system functions. Since the transmitter is RF (radio frequency), it does not have to be aimed at the vehicle. The operating range of the transmitter is approximately 20 feet.

TRANSMITTER



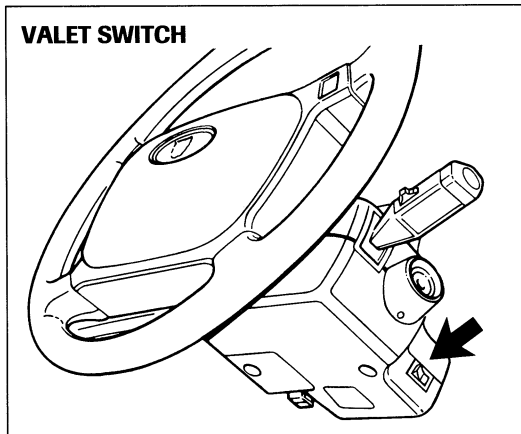
Security sounder The sounder is a powerful speaker located ahead of the left front wheel arch.

SOUNDER

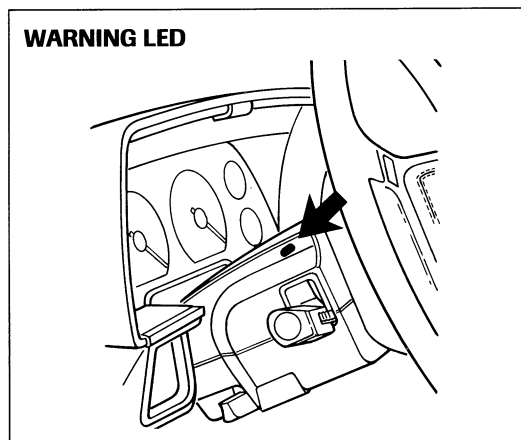


Antenna The antenna receives RF transmissions from the key fob transmitter and is positioned behind the right rear quarter interior trim panel.

Valet switch The valet switch disables the security system theft protection functions while allowing the use of the convenience features (remote central locking and headlights ON). The valet switch is located on the right side of the steering column cover.



Warning LED The warning LED provides a visual indication of the security system status (one flash per second with the system enabled and armed, or with the system disabled and the doors locked). The warning LED is positioned at the top of the steering column cover.

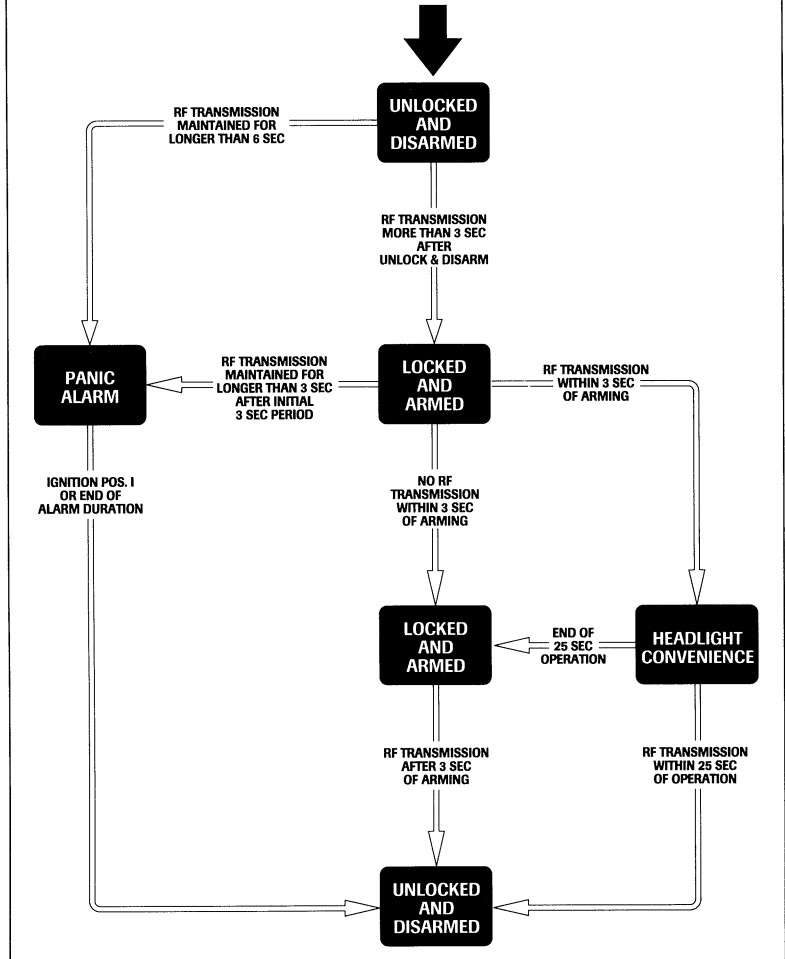


Operating the security system

The basic operation of the security system requires a single press of the transmitter that will cause the system to lock and arm the vehicle, or to unlock and disarm the vehicle.

Prior to locking and arming, the system emits a short chirp and flashes the side lights once.

SECURITY SYSTEM OPERATION



When the vehicle is unlocked and disarmed, the system emits two chirps and flashes the side lights twice. The security system ceases to monitor for alarm violations. If the alarm was triggered while armed, it will emit a third chirp and visual flash.

Remote headlight convenience Pressing the transmitter for a second time within three seconds of locking and arming will activate the headlight low beams for 25 seconds. Remote headlights is a standard feature.

Remote panic alarm The panic alarm is triggered by a maintained press of the transmitter for three or more seconds. The alarm will sound at full volume for ten minutes unless turned off by switching the ignition to position I or by pressing the transmitter for ten or more seconds. Panic alarm is a standard feature.

Jaguar 19K Security System (continued)

Operating the security system (continued)

Valet mode By moving the valet switch to ON, the security system theft protection functions are disabled. Valet mode should be switched ON only when the system is not armed, otherwise the full alarm will be triggered. In valet mode, convenience features will operate and the LED will flash to deter theft.

Security functions

In addition to monitoring the door and trunk switches, and shock sensing, the security system has a number of other features.

Passive arming (automatic arming) The security system will automatically arm if the vehicle is left with the ignition off and the doors and trunk closed for more than 30 seconds. The doors will not lock when the system passively arms. To disarm a passively armed vehicle requires that the transmitter be pressed or the ignition switched on. Passive arming is a dealer-installed accessory feature.

Alarms and warning tones The system provides several warnings and alarms:

ERROR TONE The error tone is a high-pitched tone emitted when the transmitter is pressed to arm the system while one or more of the following conditions exist:

- a door is open; the trunk is open
- the ignition is on
- the driver's door has not been closed since the ignition was switched off.

VALET REMINDER TONES With the valet switch in the ON position, four alternating tones (low - high - low - high) are sounded when the doors are opened or the transmitter is pressed.

WARN AWAY A low-pitched warning tone sounds for 2 seconds if the shock sensor detects a jarring motion. The full alarm is triggered if there are three warn away signals within a 15-second period.

ESCALATING RESPONSE An alternating tone that starts at low volume and builds over a 10-second period to the full alarm if the system is not disarmed by pressing the transmitter.

AUDIBLE TICKING A ticking tone that has a 15-second duration is the equivalent to the escalating response when the system has been passively armed. If the system is not disarmed during this 15-second period, the system will activate the full alarm.

FULL ALARM The full alarm is the combined audible and visual alarm that will last for 2 minutes unless turned off with the transmitter.

Anti-scan If the system receives more than 10 different RF transmissions within a short period of time (approximately one minute), the security system will not disarm for approximately one hour. This feature prevents defeat of the system by thieves employing frequency scan.

Battery back-up

If the vehicle battery is disconnected with the security system armed, the alarm will sound using the back-up battery as its power source. This alarm can also occur if the vehicle battery is completely discharged. The alarm will continue until the vehicle battery is reconnected and the system is disarmed by pressing the transmitter. The back-up battery is charged during the time the ignition is ON.

Low voltage vehicle battery If the vehicle battery is in a low state of charge, the security system may not disarm when the transmitter is pressed. If, after the vehicle is jump started, the sounder chirps at a rate of once per second, the system must be recoded for each transmitter. Refer to "Coding for new transmitters".

LED history readout After the alarm has been triggered and has stopped, the LED will show groups of flashes rather than the normal one-per-second. When the system is disarmed, two chirps will be followed by a pause and then a third chirp. The LED flash groups indicate the type of security violation that has occurred:

FLASHES PER GROUP	VIOLATION
2 or 3	door opened
4	shock sensor triggered
5	anti-scan violation
7	trunk opened or valet switch turned ON
8	ignition switched ON

The history memory is cleared when the system is disarmed and the ignition is switched to position I.

Jaguar Diagnostic System

Coding for new transmitters

Two transmitters are supplied with each vehicle; however, the system may be coded for use with up to five transmitters. If new or additional transmitters are requested, the system must be recoded with all of the transmitters for the vehicle at hand (from two to five transmitters).

Coding for new transmitters is completed as follows:

- record the radio preset stations
- disconnect the security system back-up battery
- disconnect the vehicle battery negative terminal
- reconnect the vehicle battery and then the back-up battery — the sounder emits a tone indicating that the system is awaiting code entry.

Press each transmitter button one or more times until five transmissions are made, noting that each transmitter must be pressed at least once. The sounder emits a tone with each code entry to indicate that the code was accepted. When the system has accepted five code entries, coding is complete. Reset the radio station memory and the clock.

Jaguar Diagnostic System (JDS) is used for serial communications with three of the vehicle's ECUs (electronic control units/modules):

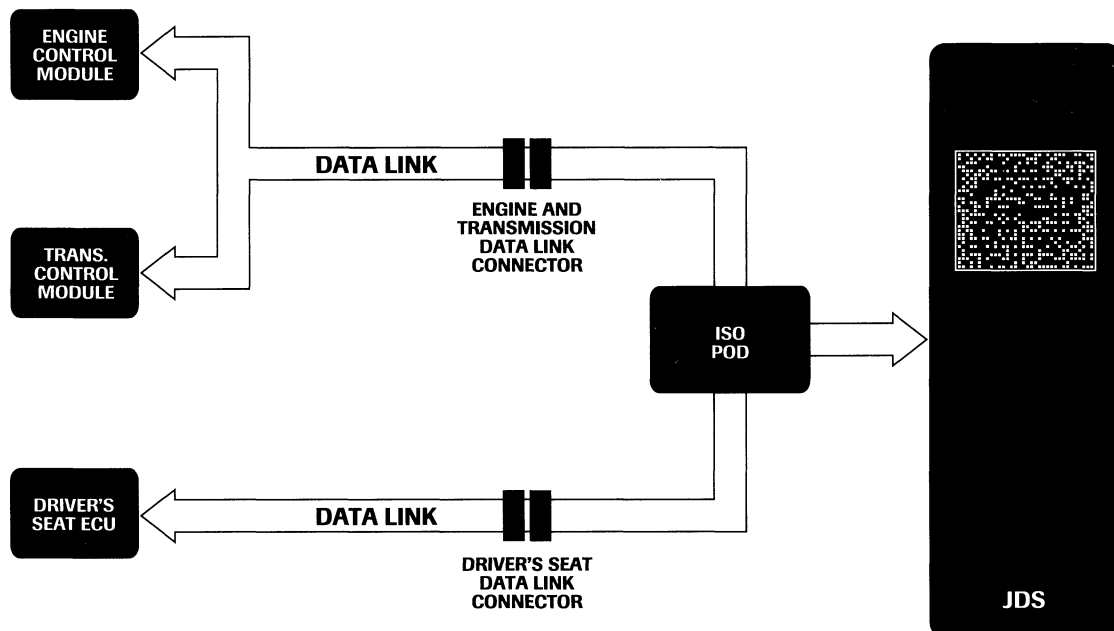
- Engine control module
- Transmission control module (A4)
- Driver's seat ECU.

Two serial communications Data Link Connectors (DLCs) are provided for connection to JDS. Serial communication is used for Diagnostic Trouble Code (DTC) retrieval and fault diagnosis.

In addition to upgraded serial communications, the new JDS software issues feature circuit diagnosis "down to the wire" and determine if the fault is open circuit or short circuit.

The ABS ECU and the Climate Control ECU have individual diagnostic connection to JDS.

SERIAL COMMUNICATIONS DATA LINKS



Fuse Identification and Location**Left fuse panel**

Number	Color	Value	Circuit
1	Lt. Blue	15A	Driver's seat movement – fore, aft, lumbar
2	Violet	3A	Not used
3	Yellow	20A	Left blower
4	Pink	4A	Telephone ignition power (optional)
5	Tan	5A	Telephone battery power (optional)
6	Tan	5A	Radio memory
7	Red	10A	Radio power
8	Red	10A	Windshield washer pump
9	Red	10A	Driver's seat heater
10	–	–	Not used
11	Red	10A	Trunk lighting
12	Yellow	20A	Driver's seat movement – recline
13	Violet	3A	Trip computer memory
14	Violet	3A	Power mirrors; door switch packs; seat memory
15	Pink	4A	Heated washer jets
16	Tan	5A	Trip computer; gear shift interlock
17	Tan	5A	Rear fog lights
18	Orange	7.5A	Locate lighting; instrument pack lighting
19	Red	10A	Hazard warning; seat belt warning logic
20	Lt. Blue	15A	Front fog lights
21	–	–	Not used
22	Lt. Blue	15A	Heated rear window; heated door mirrors

Right fuse panel

Number	Color	Value	Circuit
1	Lt. Blue	15A	Passenger's seat movement – fore, aft, lumbar
2	Violet	3A	Cruise control
3	Yellow	20A	Right blower
4	Tan	5A	Interior lighting
5	Brown	7.5A	Turn signals
6	Red	10A	Central door locking
7	Red	10A	Cigar lighter
8	Lt. Blue	15A	Windshield wipers
9	Lt. Green	30A	Headlight power wash
10	Violet	3A	Solenoid vacuum valves
11	Lt. Green	30A	ABS main
12	Yellow	20A	Passenger's seat movement – recline
13	Violet	3A	Left front side lights
14	Violet	3A	Right front side lights
15	Violet	3A	Climate control (ECU and control circuit); cooling fan run-on
16	Tan	5A	Air conditioning relay
17	Red	10A	Passenger's seat heater
18	Lt. Blue	15A	Horns
19	Lt. Blue	15A	Stop lights
20	Lt. Blue	15A	Not used
21	Red	10A	Transmission control (A4 only)
22	Lt. Green	30A	ABS pump

Fuse Identification and Location

Left front fuse panel

Number	Color	Value	Circuit
1	–	–	Not used
2	–	–	Not used
3	–	–	Not used
4	–	–	Not used
5	Red	10A	Left headlight high beam
6	Red	10A	Right headlight high beam
7	Red	10A	Cooling fan
8	Lt. Blue	15A	Not used
9	Brown	7.5A	Left headlight low beam
10	Brown	7.5A	Right headlight low beam
11	–	–	Not used
12	Violet	3A	Not used

Left rear fuse panel

Number	Color	Value	Circuit
1	Violet	3A	Left tail, left license plate lighting
2	Violet	3A	Not used
3	Violet	3A	Not used

Right rear fuse panel

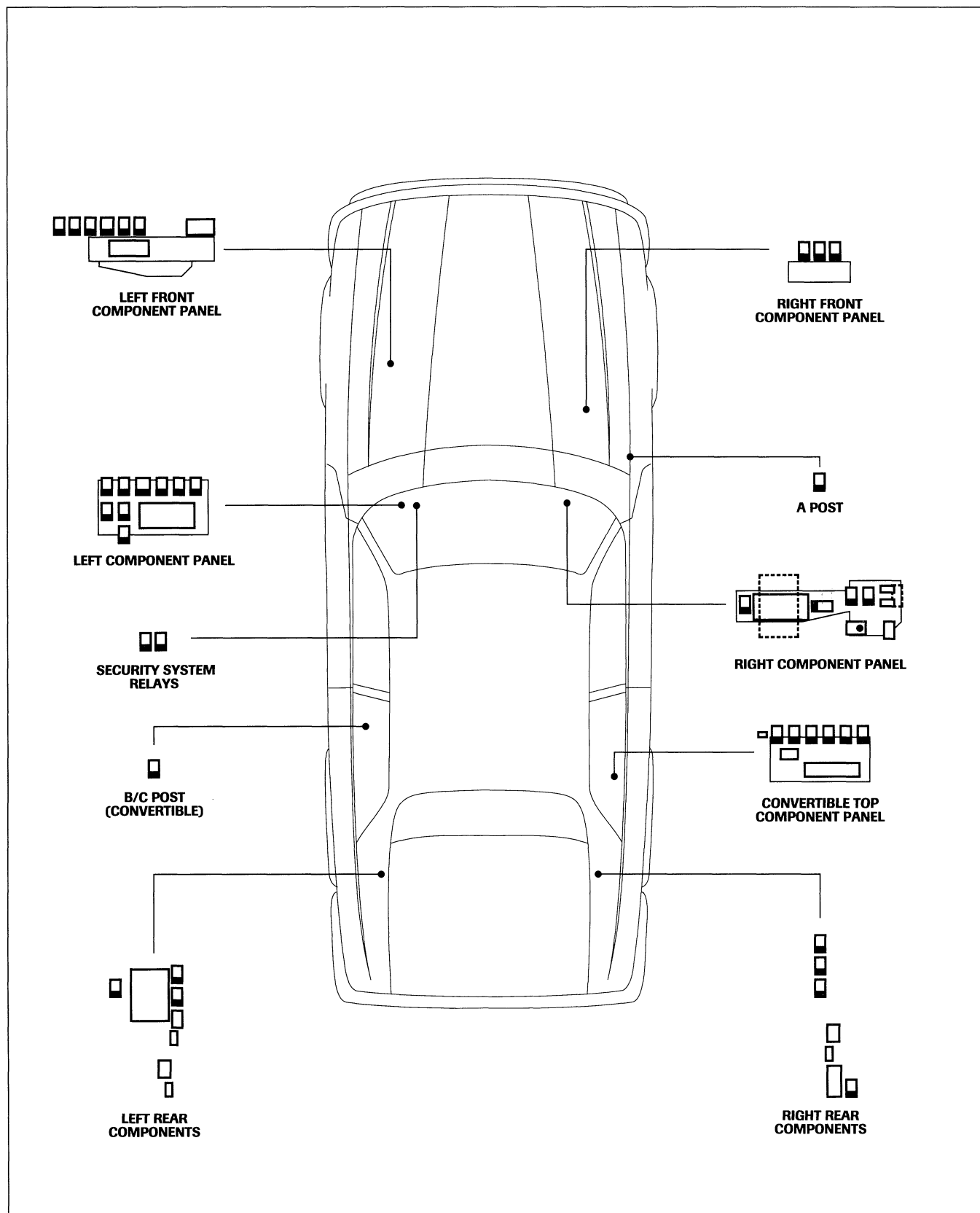
Number	Color	Value	Circuit
1	Violet	3A	Right tail, right license plate lighting
2	Red	10A	Antenna
3	Tan	5A	Reverse lights

Convertible top fuse

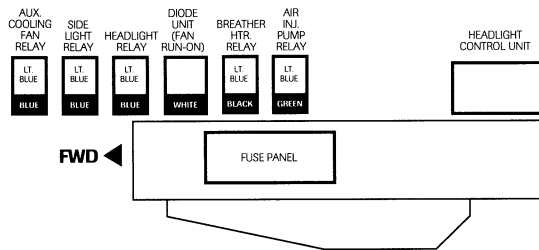
Number	Color	Value	Circuit
1	Lt. Green	30A	Convertible top

In-line fuses

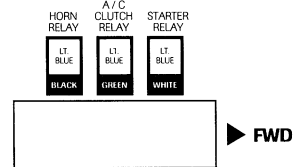
Color	Value	Circuit	Location
Violet	3A	Driver's lumbar motor	Driver's seat back
Violet	3A	Passenger's lumbar motor	Passenger's seat back
Tan	5A	Serial communications data link	Center console, right side
Brown	7.5A	Security system	Trunk, right rear
Tan	5A	Right rear side lights	Trunk, right rear
Tan	5A	Left rear side lights	Trunk, left rear

Component Panel Location

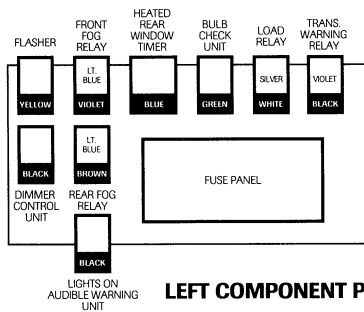
Relay Identification and Location



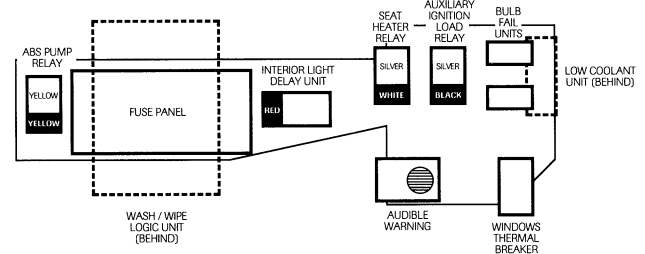
LEFT FRONT COMPONENT PANEL



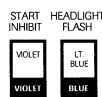
RIGHT FRONT COMPONENT PANEL



LEFT COMPONENT PANEL



RIGHT COMPONENT PANEL



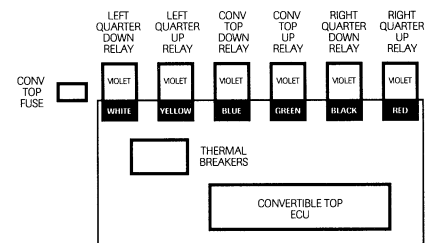
SECURITY SYSTEM RELAYS



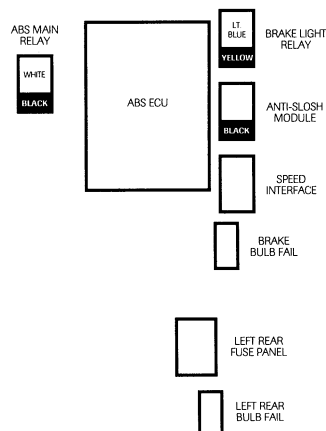
RIGHT A POST



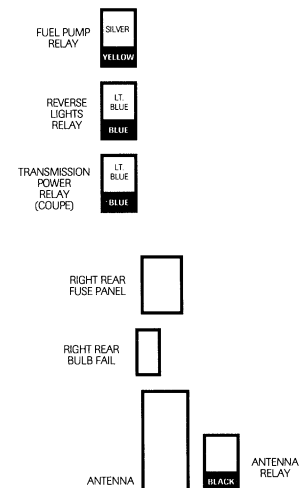
LEFT B/C POST (CONVERTIBLE)



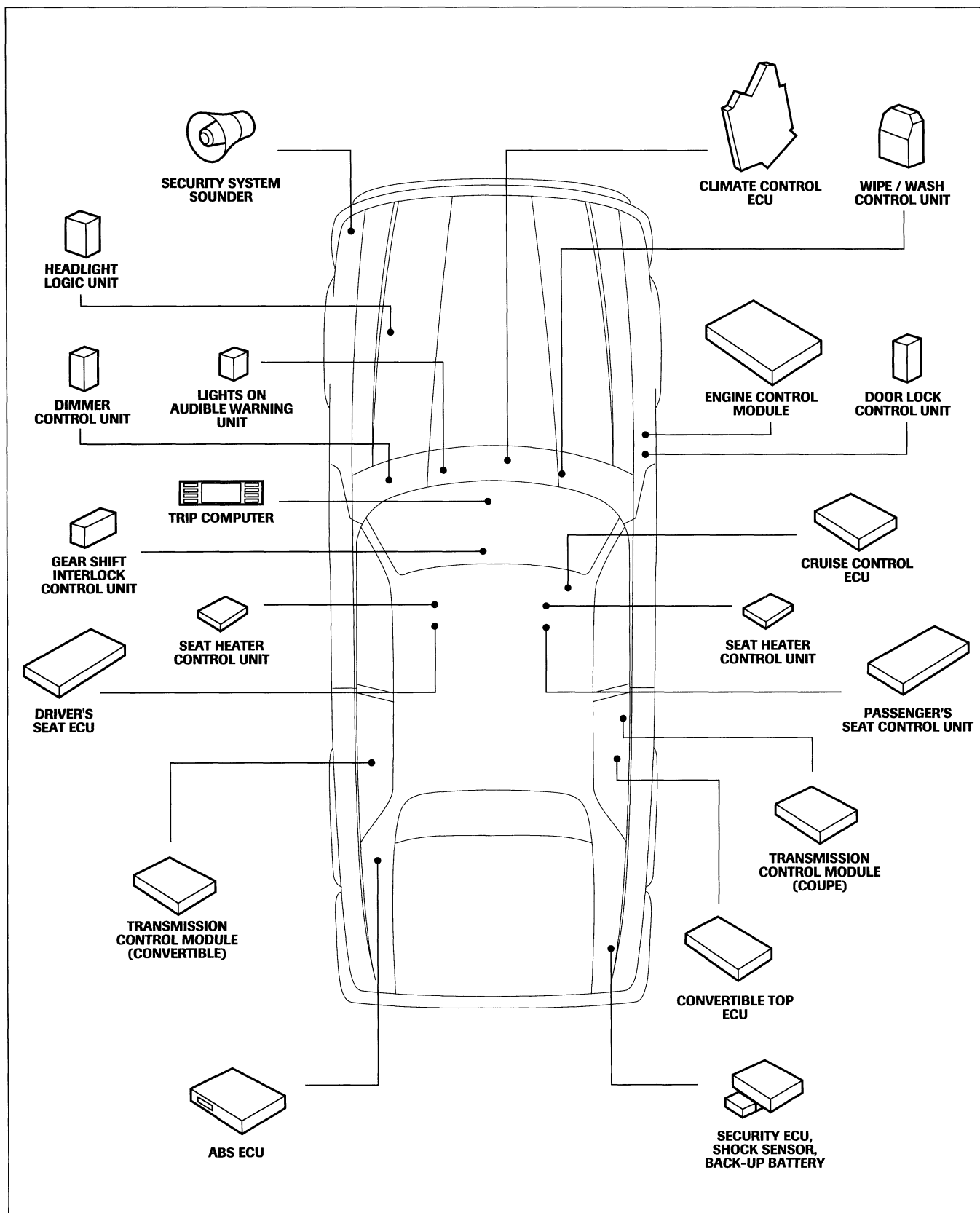
CONVERTIBLE TOP COMPONENT PANEL



LEFT REAR COMPONENTS



RIGHT REAR COMPONENTS

ECU and Component Identification and Location

Driver's Air Bag

The existing driver's air bag supplementary restraint system is continued for 1993 model year.

Air bag identification symbol

The vehicle data plate includes an air bag symbol. The purpose of this graphic symbol is to alert emergency and service personnel that the vehicle is air bag equipped. In the event of a road accident in which the air bag does not deploy, emergency and service personnel must proceed with caution when handling the steering system.

AIR BAG LABEL

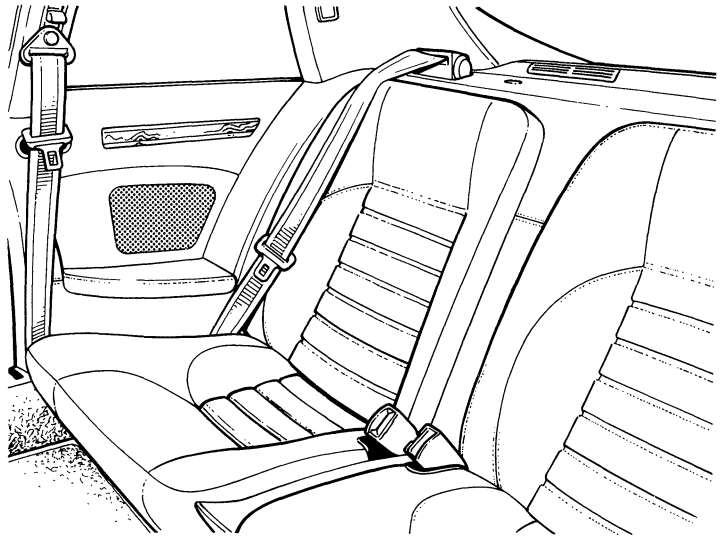


Seat Belts

Rear seat belt anchors

The rear belts have revised anchor positions and anchor hardware. No other changes to the belts or the body structure have been made.

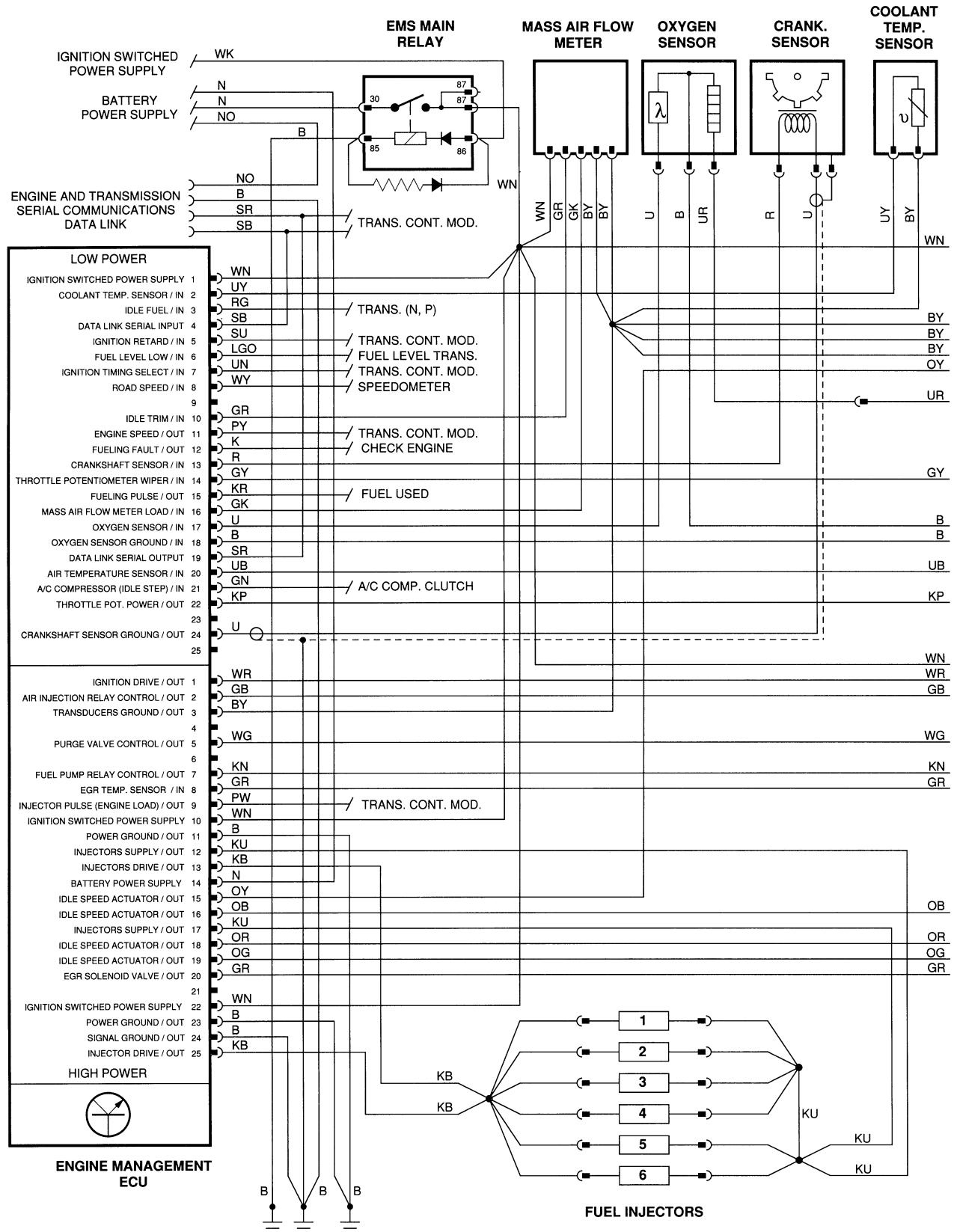
REAR SEAT BELTS

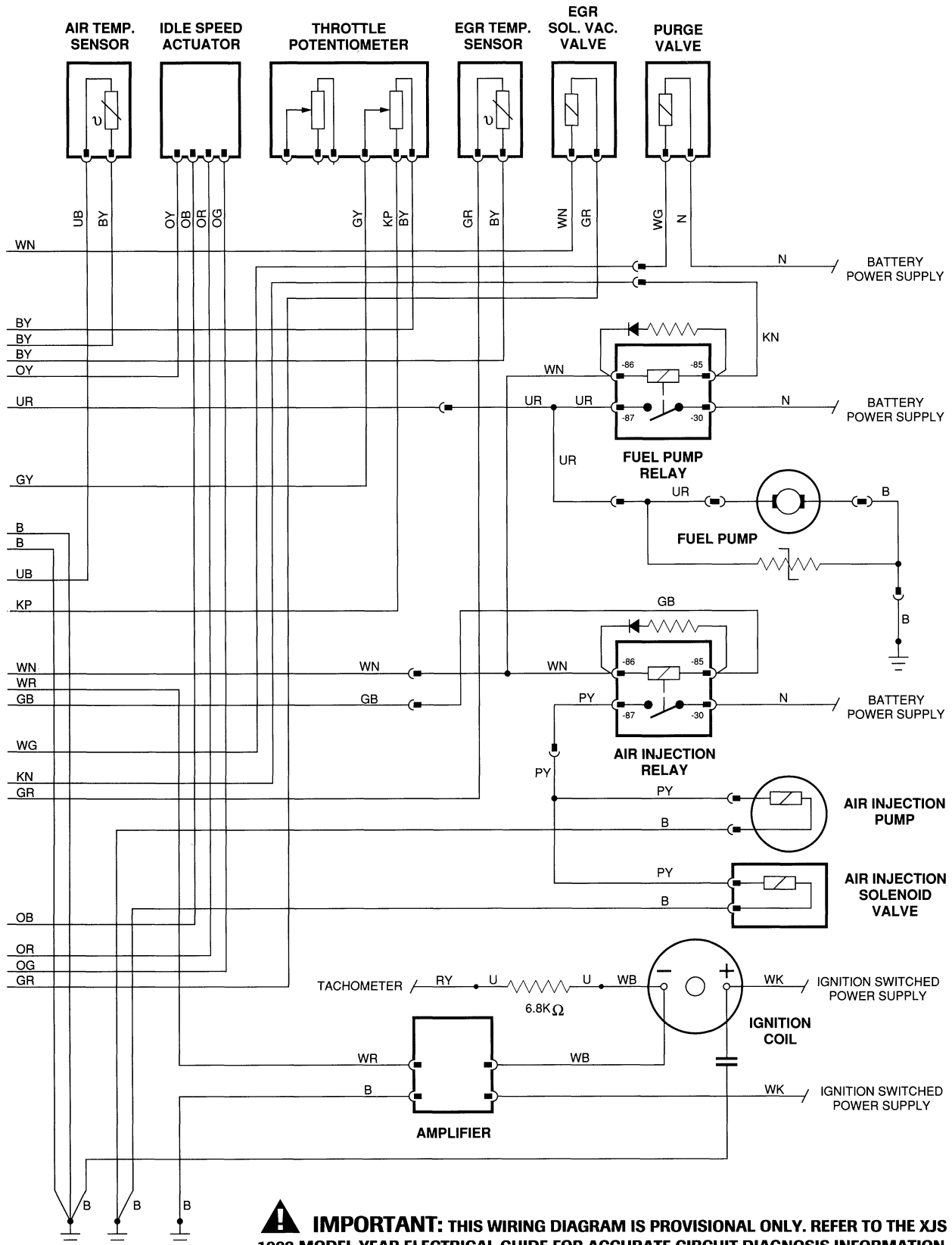


Child's seat tether

Coupe models will be supplied with a child's seat tether that can be installed to one of the three attachment points under the rear shelf trim panel. Instructions for the installation of the tether will be issued in a Technical Bulletin.

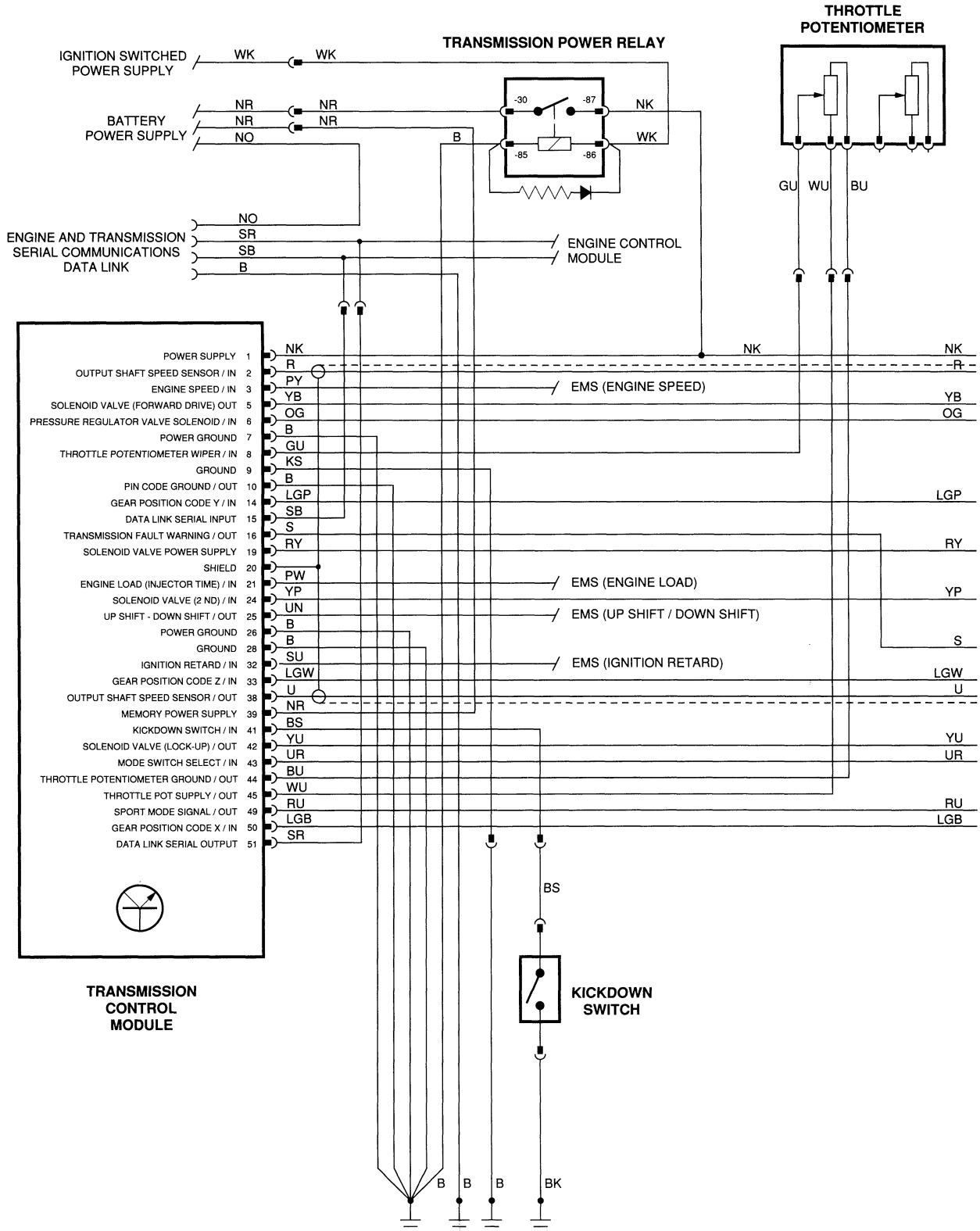
4.0 LITRE ENGINE MANAGEMENT SYSTEM XJS RANGE 1993 MY

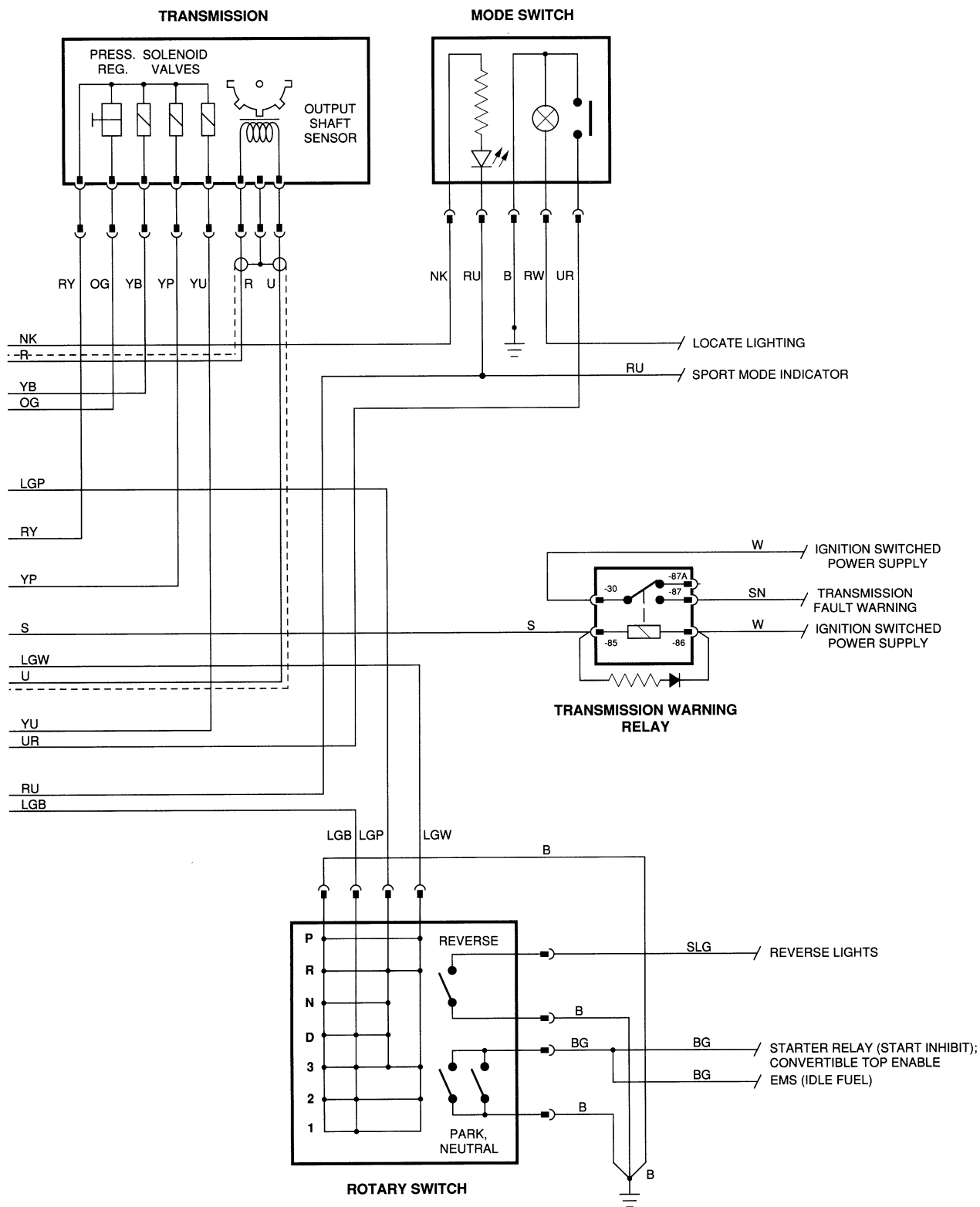




IMPORTANT: THIS WIRING DIAGRAM IS PROVISIONAL ONLY. REFER TO THE XJS 1993 MODEL YEAR ELECTRICAL GUIDE FOR ACCURATE CIRCUIT DIAGNOSIS INFORMATION. REFER TO PAGE 40 OF THIS PUBLICATION FOR WIRING COLOR CODES.

TRANSMISSION CONTROL XJS RANGE 1993 MY





! IMPORTANT: THIS WIRING DIAGRAM IS PROVISIONAL ONLY. REFER TO THE XJS 1993 MODEL YEAR ELECTRICAL GUIDE FOR ACCURATE CIRCUIT DIAGNOSIS INFORMATION. REFER TO PAGE 40 OF THIS PUBLICATION FOR WIRING COLOR CODES.

Wiring Color Codes

N	Brown	Y	Yellow
B	Black	O	Orange
W	White	S	Slate
K	Pink	L	Light
G	Green	U	Blue
R	Red	P	Purple

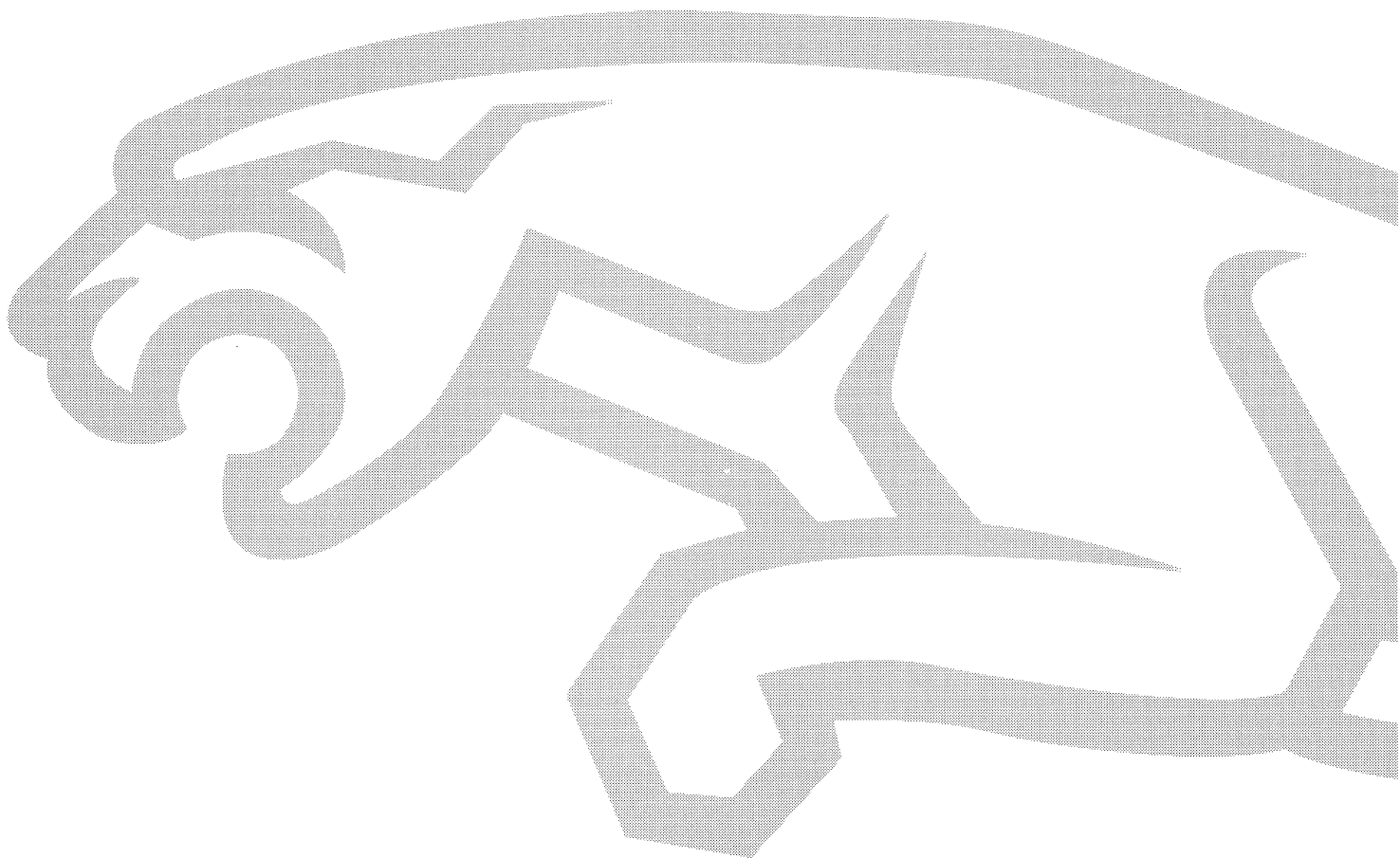


Printed in USA
Jaguar Cars Inc.



XJS Range
Model Year Update

1994



XJS Range
Model Year Update

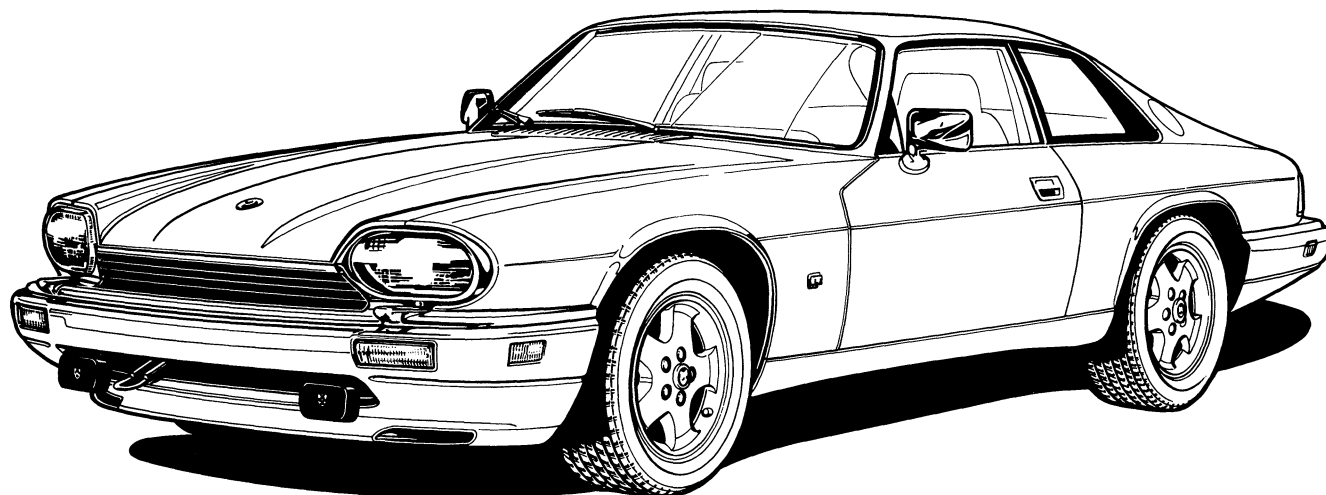
1994

Publication number S-83

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The 1994 Jaguar XJS Range, consisting of XJS and XJS V12 models, is readily distinguished by its newly styled color-keyed bumper system. The addition of a 2+2 convertible with seating for two occasional passengers will extend the appeal of the range. The XJS V12 employs the new 6.0 litre V12 engine coupled to the Hydra-matic 4L80-E4 four-speed electronically controlled automatic transmission introduced in the XJ12 Sedan.

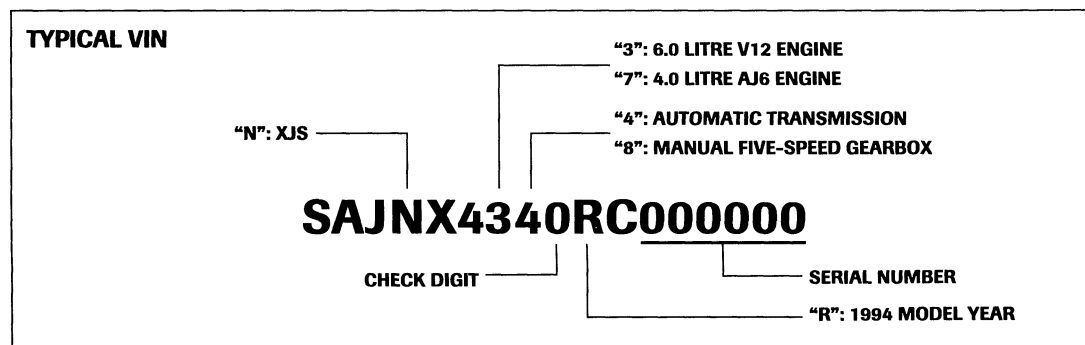
Revisions in the suspension and braking systems complement the new range of power plants and transmissions. In addition to improved overall vehicle road performance, improvements to panel and trim fitment and materials, and the refinement of existing systems result in an enhanced environment for driver and passengers and ease vehicle serviceability for the technician.

The 1994 model year XJS will have a phased launch that includes model configuration and technical features. Initially, convertibles will be two-place only. After the 2+2 convertible becomes available, the two-place convertible will be discontinued. The XJS V12 will not be available at the beginning of the model year. In addition, certain features such as HFC air conditioning systems will be phased-in during the first months of production.

IMPORTANT: This Model Year Update publication will describe the technical features, upgrades and improvements for 1994 as the vehicle will be configured when the launch is complete.

The 1994 model year technical information contained in this publication should be considered as preliminary information.

Vehicle Identification Number (VIN)



1994 XJS Range

The 1994 Jaguar XJS Range is made up of two model groups — the XJS and the XJS V12. The AJ6 4.0 litre powered XJS is available in both coupe and convertible form and is available with a four-speed automatic transmission or an optional five-speed manual gearbox. The XJS V12 is also available in both coupe and convertible form and is powered by the new 6.0 litre V12 engine introduced in the XJ12 Sedan. The XJS V12 is available only with a four-speed automatic transmission. Early 1994 convertibles will be two-place models as in previous years. A 2+2 convertible will replace the two-place model later in the model year.

X Standard equipment

O Optional equipment

N/C No cost option

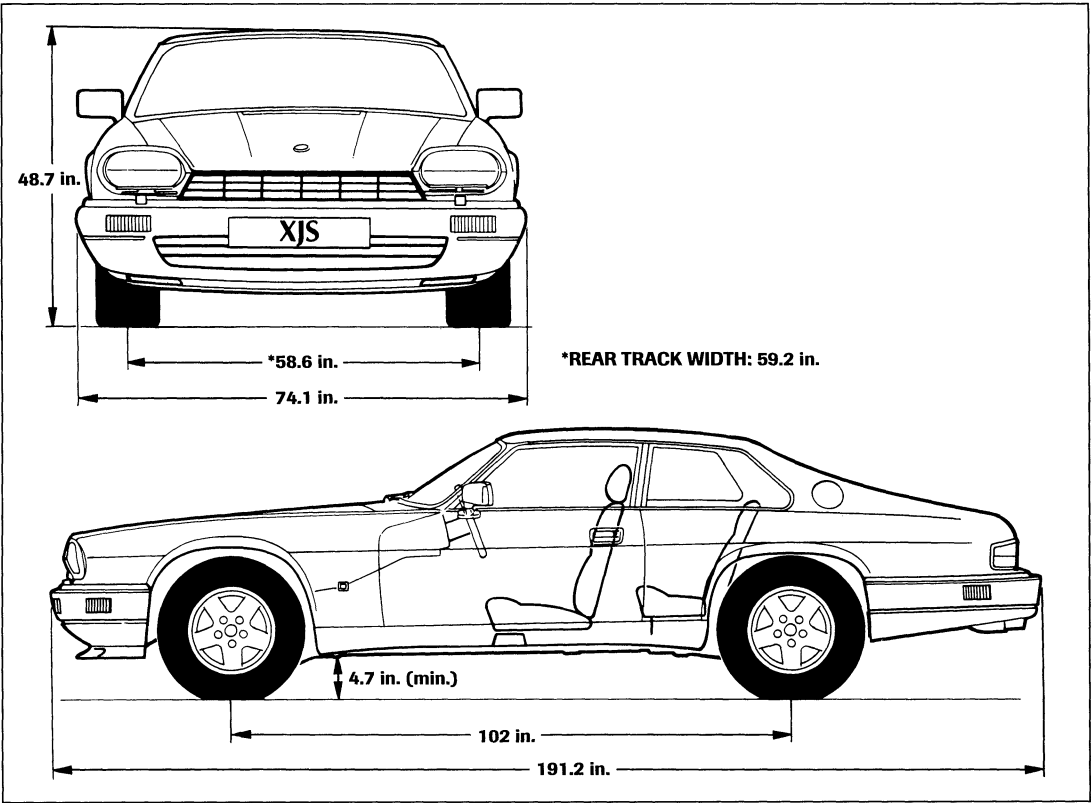
CDN Canada

Technical Feature	XJS	XJS V12
Driver and front passenger air bag supplementary restraint systems	X	X
All metric body fasteners	X	X
4.0 liter 219 hp AJ6 engine	X	
Four-speed electronically controlled ZF automatic transmission with Normal, Sport, and Delete First modes (A4)	X	
Five-speed manual gearbox (M5)	N/C	
6.0 liter 278 hp V12 engine		X
Engine management system with ECM air injection and canister purge control		X
Twin fuel pump modules with phased control		X
Low loss exhaust system		X
Four-speed electronically controlled Hydra-Matic automatic transmission with Normal and Sport modes		X
Gear shift interlock with manual override	X	X
"Lattice" alloy 15 inch wheels with 235/60 ZR 15 tires	X	
"Diamond turned gold" five-spoke alloy 16 inch wheels with 225/60 ZR 16 tires		X
"Space saver" spare wheel		X
Full size spare wheel	X	O*
Rear suspension with outboard brakes	X	X
HFC air conditioning system	X	X
Revised climate control ECM and control panel	X	X
Revised climate control vacuum system	X	X
High output generator — 120 amp	X	X
Electrical system "multi-function unit"	X	X
Self-regulating heated power wash jets	X	X
Security system (dealer accessory option available)	X	X
Front seat heaters	O	X
Rear deck spoiler		X
Connolly Autolux leather interior		X
Sports suspension and steering	X (M5); O (A4)	
CD autochanger	O*	O*
Cold Climate package (heated front seats, headlight power wash, engine block heater)	O (X CDN)	O (X CDN)
Metallic paint	O (N/C)	O (N/C)

* Dealer installed option

NOTE: All Canadian vehicles are equipped with the Cold Climate package and a Canadian compliance package including: daytime running lights, European metric speedometer / odometer, ISO brake warning symbol, Canadian VIN, metric certification, and glove box label.

Dimensions



V12 Engine

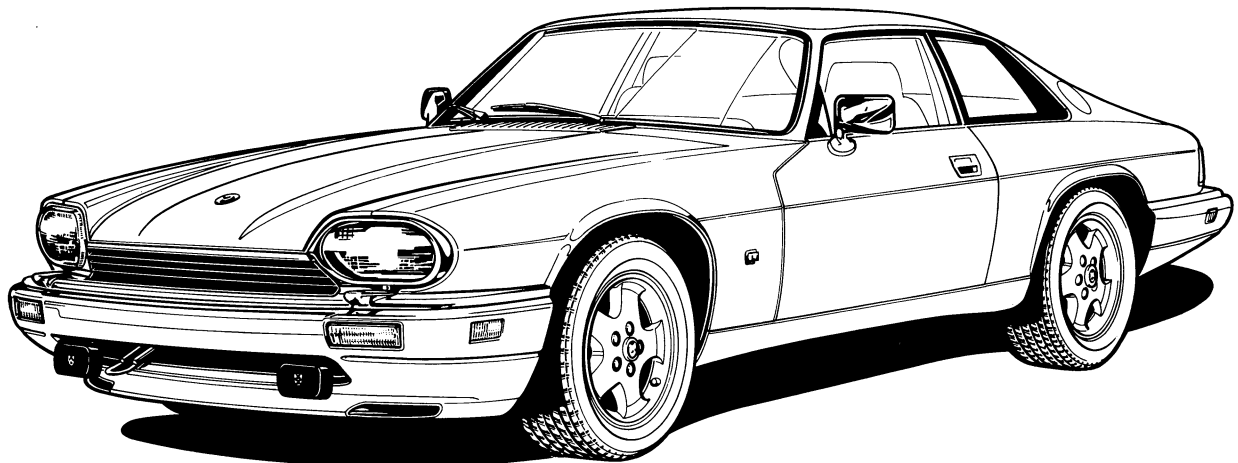
Configuration	12 cylinder, 60 degree Vee
Cylinder head	2 valves per cylinder
Displacement	5994 cc
Bore / stroke	90 mm x 78.5 mm
Compression ratio	11.0:1
Power (DIN)	278 hp @ 5400 rpm
Torque (DIN)	334 ft lbs @ 2800 rpm
Spark plugs	NGK BR7 EF – 0.025 in gap (0.64 mm)
Fuel requirement	Unleaded gasoline – 95 RON octane rating
Engine oil capacity (with filter)	10.5 quarts (10 litre)

V12 Transmission

	1st	2nd	3rd	4th	REV
Gear ratios	2.48 : 1	1.48 : 1	1 : 1	0.75 : 1	2.07 : 1
Max engine speed	6000 rpm	6000 rpm	6000 rpm		
Transmission fluid	Dexron II 'E' – approximate capacity from dry: 13.5 quarts (12.8 litre)				
	Drain and refill		7.7 quarts (7.3 litre)		
	Min – Max difference		0.3 quart (0.3 litre)		

Body Design

The XJS Coupe, Convertible and Convertible 2+2 bodies have many similarities and still retain the classic Jaguar XJS styling. Over 100 body panels are new or redesigned to accommodate new mechanical systems and add refinements to noise, vibration, and seam sealing control.



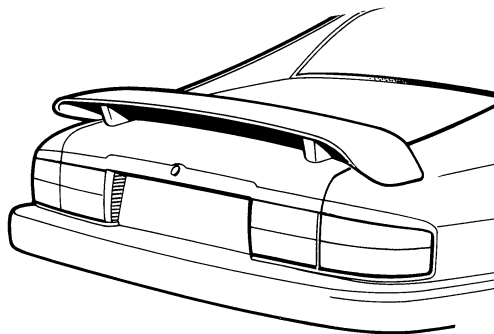
Rear spoiler: XJS V12

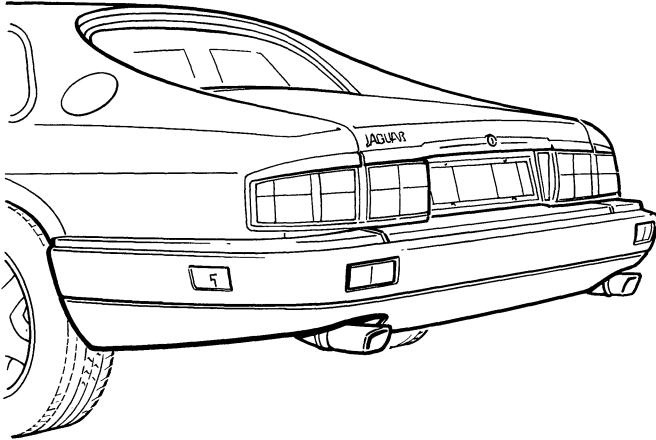
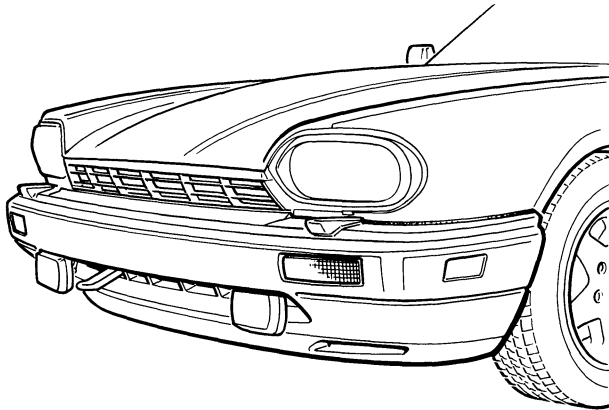
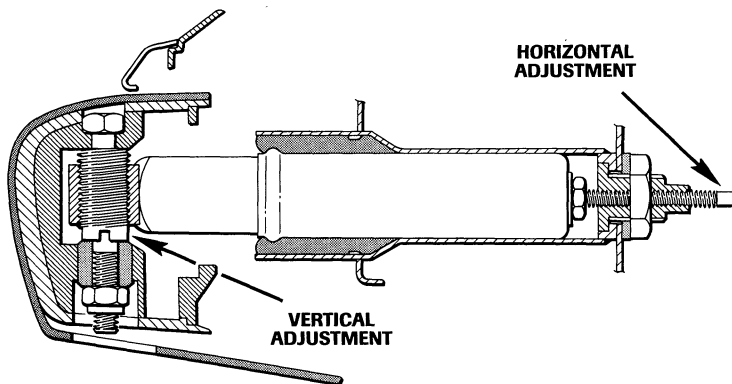
The XJS V12 is distinguished by a rear spoiler. To avoid radio antenna damage while opening the trunk, an antenna retraction override circuit has been added. When opening the trunk with the antenna extended, the operator must unlatch the lid and then wait for the antenna to retract completely before continuing to open the trunk.

The rear spoiler is available as an accessory option for the XJS (4.0).

⚠ CAUTION: Damage will result if the antenna is not fully retracted when the trunk is opened.

REAR SPOILER: XJS V12



FRONT AND REAR BUMPERS**FRONT BUMPER CROSS SECTION****Body Design (continued)****Color-keyed bumper system and body components**

Molded polyurethane bumper covers are color-keyed to the vehicle finish on all XJS models. In addition, headlight surrounds, rear view mirrors and the grill (V12 only) are color-keyed to the vehicle finish. Bumper cover paint damage can be repaired with standard refinishing materials. The bumpers are adjustable for height and extension.

Bumper adjustment Extension adjusters are located at the inboard ends of the energy-absorbing struts. Height adjusters are threaded sleeves at the outboard ends of the struts. The bumper must be removed to access the height adjusters. Bumper attachment and adjustment are similar for the front and rear bumpers.

Locks

For 1994, the entire XJS Range shares the one-key system. The vehicle key set includes three keys:

- Master key with integral flashlight
- Master key with plain black head
- Valet key with green head

The master keys open all locks and operate the ignition. The valet key opens the doors only and operates the ignition. If the trunk or glove box is locked using the valet key, they can only be unlocked with one of the master keys.

Fuel filler locks

Convertible model fuel fillers are equipped with Tibbe locks to provide the same one-key operation as found on Coupe models. The fuel filler manual release for the Coupe is located behind the trunk left side panel.

Tires and wheels

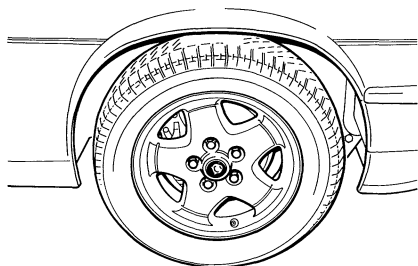
The two XJS model groups, XJS (4.0 litre AJ6) and XJS V12 (6.0 litre V12), have different wheel and tire specifications.

XJS Coupe and Convertible The 4.0 models retain the previous cast alloy "lattice" 6.5 x 15 inch road wheels fitted with Goodyear Eagle NTC 60 235/60 ZR 15 tires.

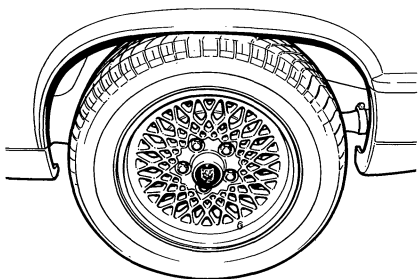
Sports suspension The sports suspension package includes alloy-painted five-spoke 7 x 16 inch road wheels fitted with Pirelli 225/55 VR 16 tires.

XJS V12 Coupe and Convertible The V12 models have cast alloy "diamond turned gold" five-spoke 7 x 16 inch road wheels fitted with Pirelli P4000E 225/60 ZR 16 tires.

WHEEL STYLES



**XJS V12:
"DIAMOND TURNED GOLD" FIVE-SPOKE WHEEL**



XJS: "LATTICE" WHEEL

Body Structure

General

Corrosion resistance has been significantly improved for the 1994 model year. Zinc coating of panels has been increased to 60 percent from the previous 40 percent. Drilled holes have been eliminated or incorporated in panels during forming, and all weld studs have been standardized. Improvements to joint seams and sealing, molded sound insulation material, and simplification of panel design have contributed to a quieter more secure interior environment.

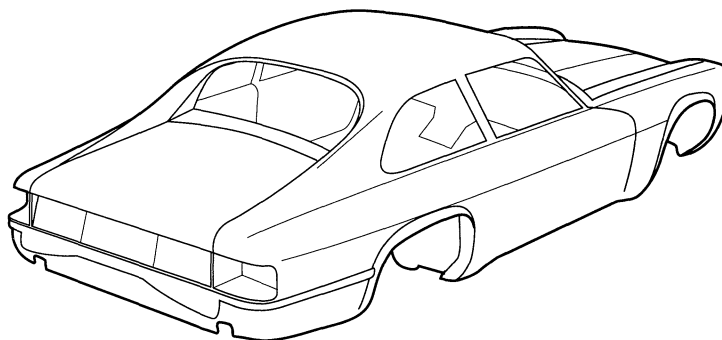
Floor panels

New front floor panels, required for the Hydra-Matic 4L80-E4 automatic transmission, are reshaped and have fewer seams. The rear floor panels have been similarly revised.

Body fasteners

The replacement of all existing imperial fasteners with metric sizes will standardize the vehicle and ease service and repair.

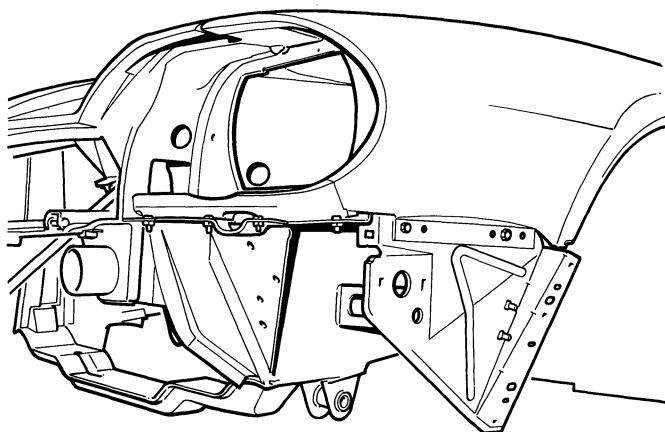
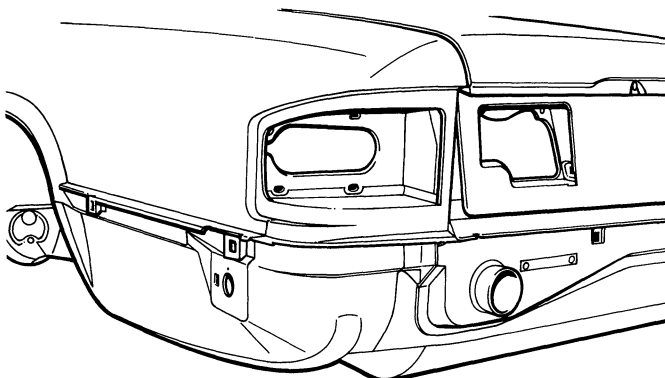
BODY STRUCTURE



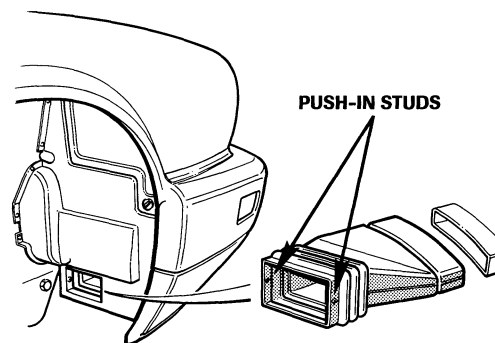
- ZINC COATING OF PANELS INCREASED TO 60%
- NEW FLOOR PANELS
- ALL METRIC FASTENERS

Body Structure (continued)**Bumper mounting**

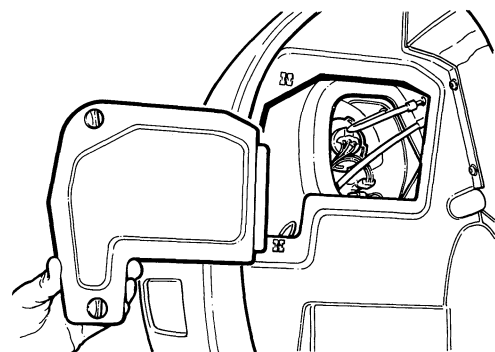
The new bumper mounting arrangement necessitated changes to the front and rear of the body structure panels.

FRONT AND REAR BUMPER PANEL CHANGES**FRONT****REAR****Front brake cooling ducts**

The forward wheel arch baffle in each front fender well has a rectangular hole to fit brake cooling ductwork. Each cooling duct is anchored with two push-in studs.

BRAKE COOLING DUCT**Headlight / side marker access**

A panel at the top of each front wheel arch baffle allows access to the side marker and headlight bulbs. The access panels are held with quarter-turn fasteners.

HEADLIGHT ACCESS PANEL**Sound deadening**

Molded sound-deadening panels are used throughout the vehicle. The panels have formed recesses for the vehicle electrical harnesses.

Convertible 2+2

With its top up, the new Convertible 2+2 looks like the two-seat convertible. The only visible difference is the shortened rear window. The revised rear window allows the 2+2 top to fold neatly behind the rear passenger seats while maintaining the folded top profile of the two-passenger convertible.

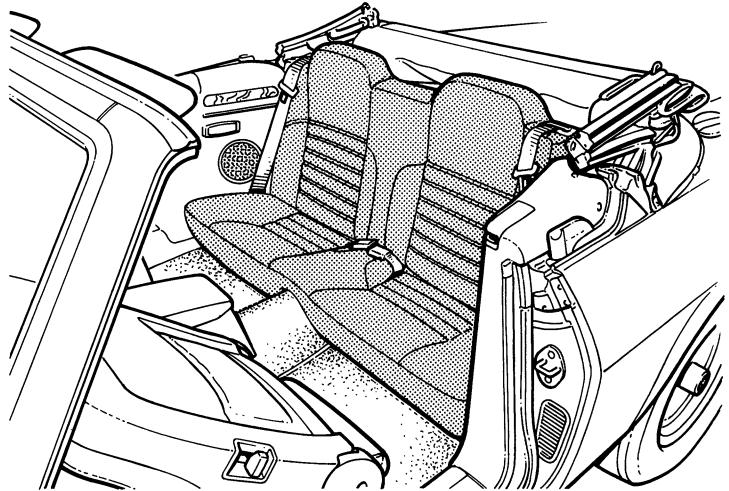
Rear seats

The Convertible 2+2 has a unique rear pan, trim, and carpeting, to accommodate occasional seating for two additional passengers.

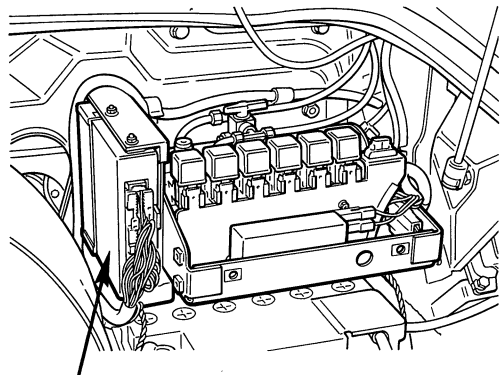
Hydraulic and electrical components

The Convertible 2+2 hydraulic pump, relays, fuses, and manual switch for the convertible top are in the trunk, concealed by a modified battery cover. Unique carpeting and trim cover the components. Note that the transmission control module (TCM) relocates to this area.

CONVERTIBLE 2+2

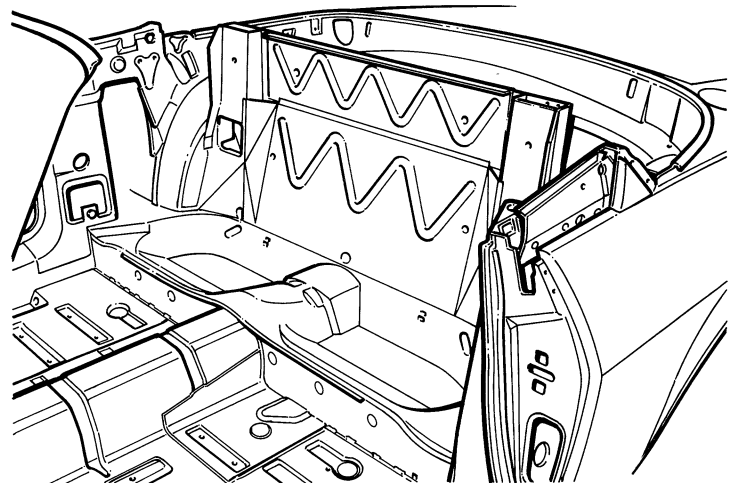


CONVERTIBLE 2+2 HYDRAULIC AND ELECTRICAL COMPONENTS



TRANSMISSION CONTROL MODULE

CONVERTIBLE 2+2 REAR SEAT PANEL



Interior Design

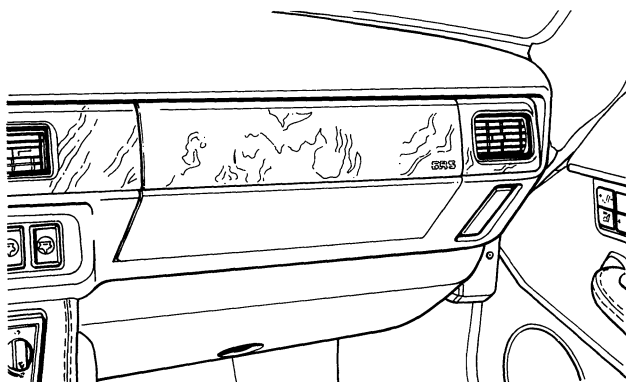
All-leather seats

All-leather seats are standard equipment throughout the XJS Range. A full Connolly Autolux leather interior with unique seat design is standard equipment on V12 models.

Facia and components

The facia construction is revised to accommodate the passenger side air bag. The air bag deployment door has an "SRS" (Supplementary Restraint System) logo on its right lower face. Numerous detail changes to the facia, its fastening hardware and its veneer sets improve appearance, serviceability and fit. The width of the facia mounting slots has been increased to provide improved panel fit and alignment.

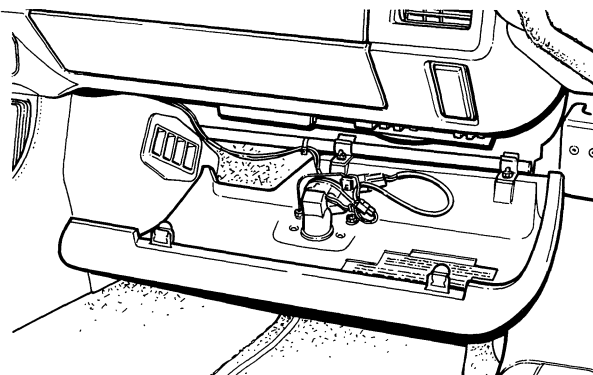
FACIA / AIR BAG DOOR



Passenger under dash panel

The passenger under dash panel has been revised to incorporate a knee bolster as part of the passenger supplementary restraint system (SRS). The knee bolster (under dash panel) is retained by clips and swings down for access to the right component panel.

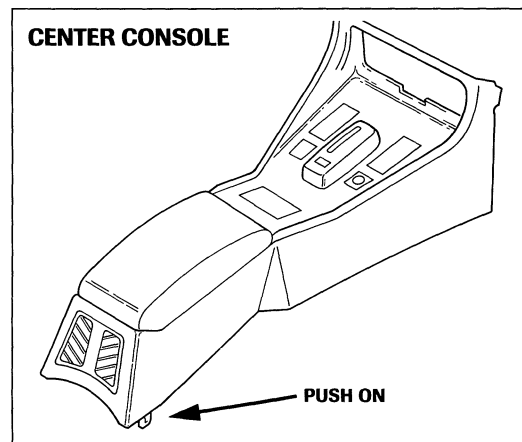
PASSENGER UNDER DASH PANEL



Center console

Improvements to the center console include: revisions to accommodate the seat belt tear-loop mechanism, a new non-adjustable rear air vent connected directly to its ducting instead of a separate air box as previous, injection molded glove box, and an SAE standard cigar lighter with illuminated glow ring. Rear fastenings have been simplified and improved. Push-on fittings to welded studs on the transmission tunnel replace the screws, washers and nuts of previous models.

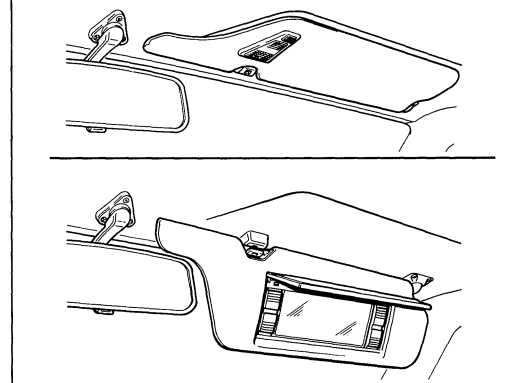
CENTER CONSOLE



Sun visor light and mirror

Driver and passenger sun visors are fitted with interior lights and separate illuminated vanity mirrors. The previous interior light, located above the rear view mirror, has been deleted. The new interior lighting provides courtesy illumination for the convertible and standardization throughout the XJS Range.

SUN VISOR LIGHT AND MIRROR



Rear storage compartment: Convertible 2+0

The front wall of the storage compartment has been revised to accommodate the new floor panels.

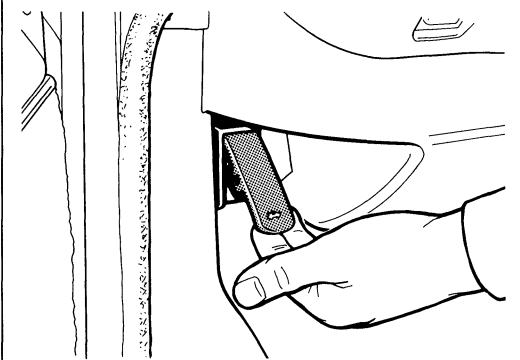
Engine Compartment

Hood release

The 1994 XJS hood release mechanism has been simplified to function as on the Sedan Range. To open the hood, simply pull the black hood release handle and lift the hood. A safety catch is not required. To close the hood, simply slam it shut. The hood release cable is now used only to release the hood, not retain it as on previous model year vehicles.

⚠ CAUTION: Do not bend the latch strikers in an attempt to adjust the hood profile.

HOOD RELEASE

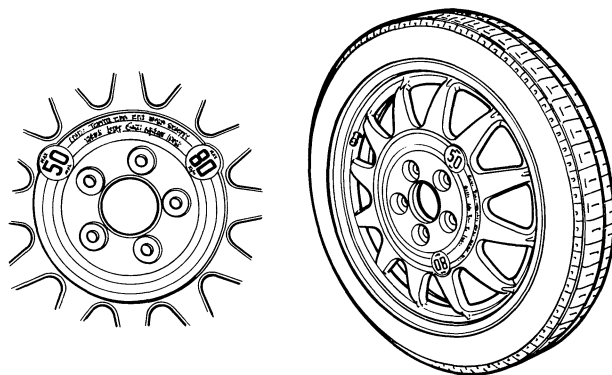


Spare wheel: XJS V12

A space-saver spare is fitted to the XJS V12. The Pirelli T115/85 R18 spare tire is mounted on an alloy 5-spoke 3.5 x 18 styled wheel. A road wheel that has been removed from the vehicle will stow neatly in place of the space-saver spare. Remove the center badge and reverse the wheel; secure it with the mounting bolt.

⚠ WARNING: Observe all warning label instructions associated with the space-saver spare tire.

SPACE-SAVER SPARE WHEEL: XJS V12



Trunk

Trunk liner

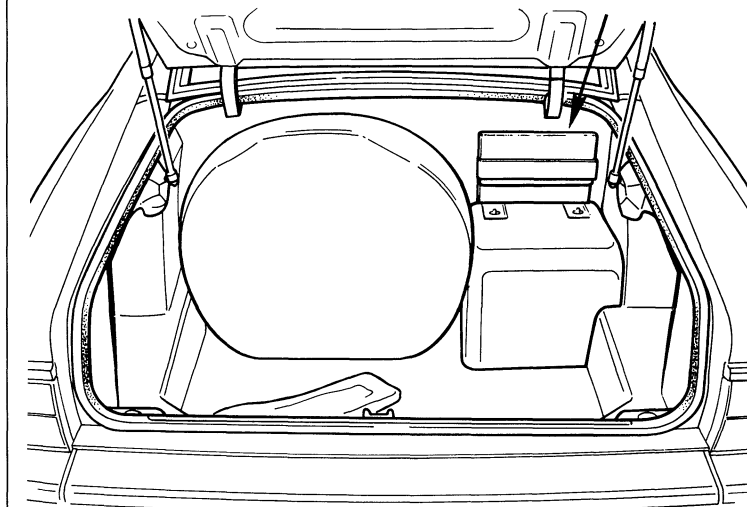
Revised "interlocking" carpet panels and a molded floor carpet improve fit. The new battery cover fits with tabs that locate in the floor. The back of the trunk is re-profiled to provide clearance for the adjustable bumper strut mounts.

Literature pack

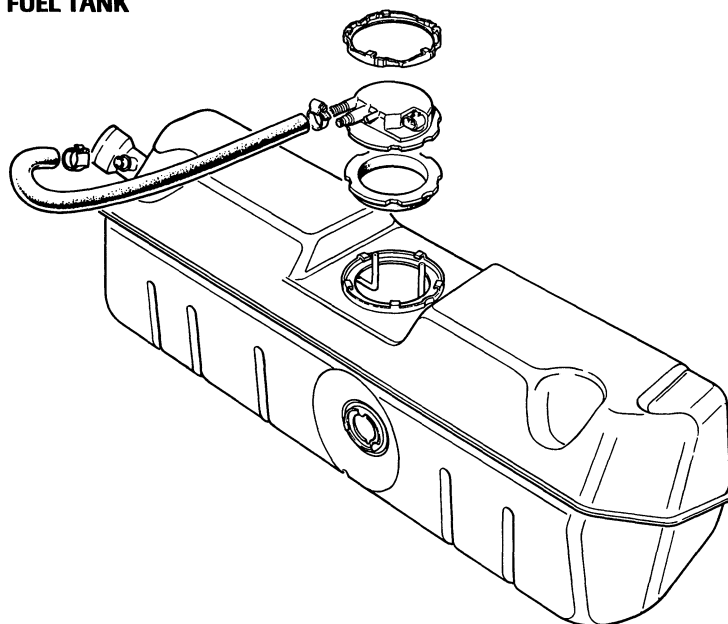
The literature pack is split into two sections. The driver's handbook is reduced in size but still covers essential driver's information. It is intended to be stowed in the interior. The remainder of the literature is contained in a slimmer wallet and is stowed in the trunk above the battery cover.

TRUNK ARRANGEMENT

LITERATURE PACK



FUEL TANK



Fuel Supply (all models)

Fuel tank

The fuel tank for the 1994 XJS Range features improved corrosion resistance. The tank is nickel flashed then lead coated and no longer requires painting.

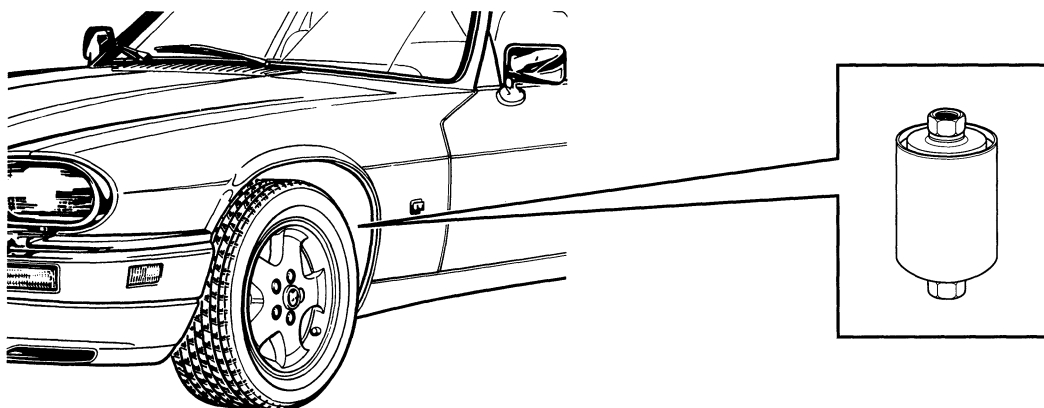
Fuel piping

A new under-floor fuel pipe cluster consisting of fuel feed, return and vapor pipes is used.

Fuel filter

The fuel filter is relocated to the rear of the left front wheel well. A plastic shield covers the filter and allows easy access.

FUEL FILTER LOCATION



AJ6 4.0 Litre Engine

Mechanical improvements have been made to the AJ6 engine. These changes improve serviceability and appearance, simplify construction and aid in reliability.

NOTE: The AJ6 changes will be phased into production during the launch period.

Camshaft cover

The revised camshaft cover incorporates the engine oil filler and features a new gasket made of improved materials. The number of camshaft cover bolts has been increased from 7 to 13. These changes improve cover sealing and overall appearance.

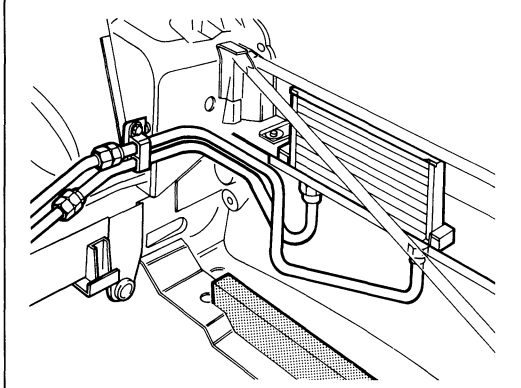
Throttle housing

The throttle housing is heated by engine coolant to improve cold weather breather performance. A standardized throttle quadrant and return spring from the XJ6 replaces the previous version.

Oil cooler pipework

Oil cooler pipes have been relocated to improve fit and avoid relocation of the horns.

AJ6 ENGINE OIL COOLER



EGR pipework

The exhaust gas recirculation system has been improved by the introduction of a flanged connection at the EGR valve. The flared connection at the intake manifold is retained.

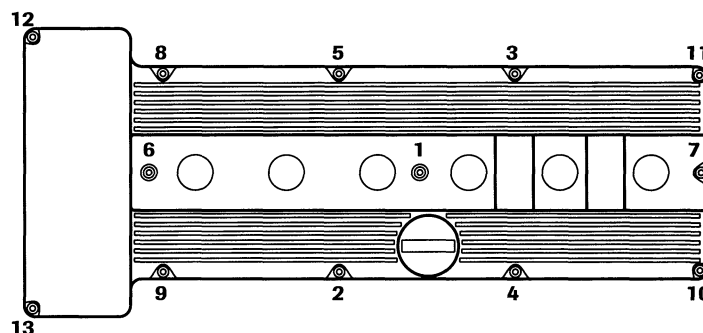
Engine breather system

Design changes to the intake manifold eliminate the need for an electrically heated breather system.

Exhaust system

The rear mufflers have been revised to accept the new rectangular section exhaust finisher.

AJ6 CAMSHAFT COVER WITH NEW TIGHTENING SEQUENCE

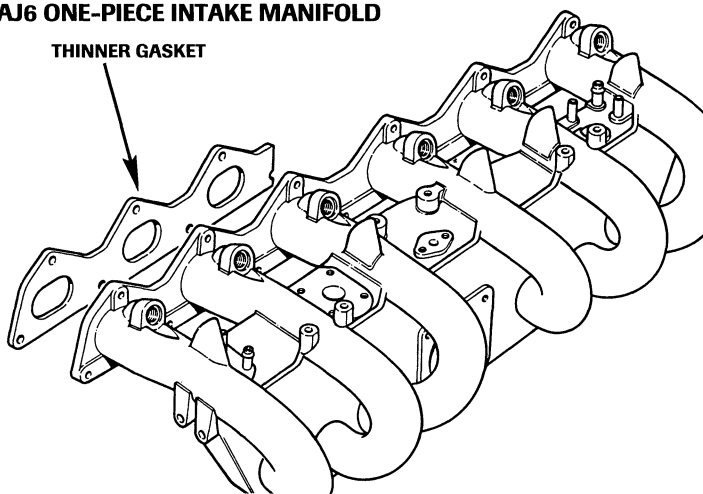


Intake manifold

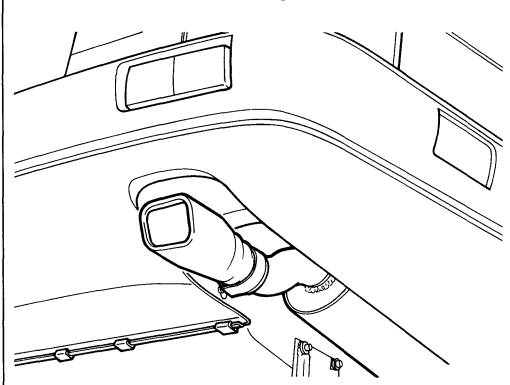
A new, simplified one-piece intake manifold with an integral coolant heated breather restrictor is fitted in conjunction with a thinner manifold gasket.

AJ6 ONE-PIECE INTAKE MANIFOLD

THINNER GASKET

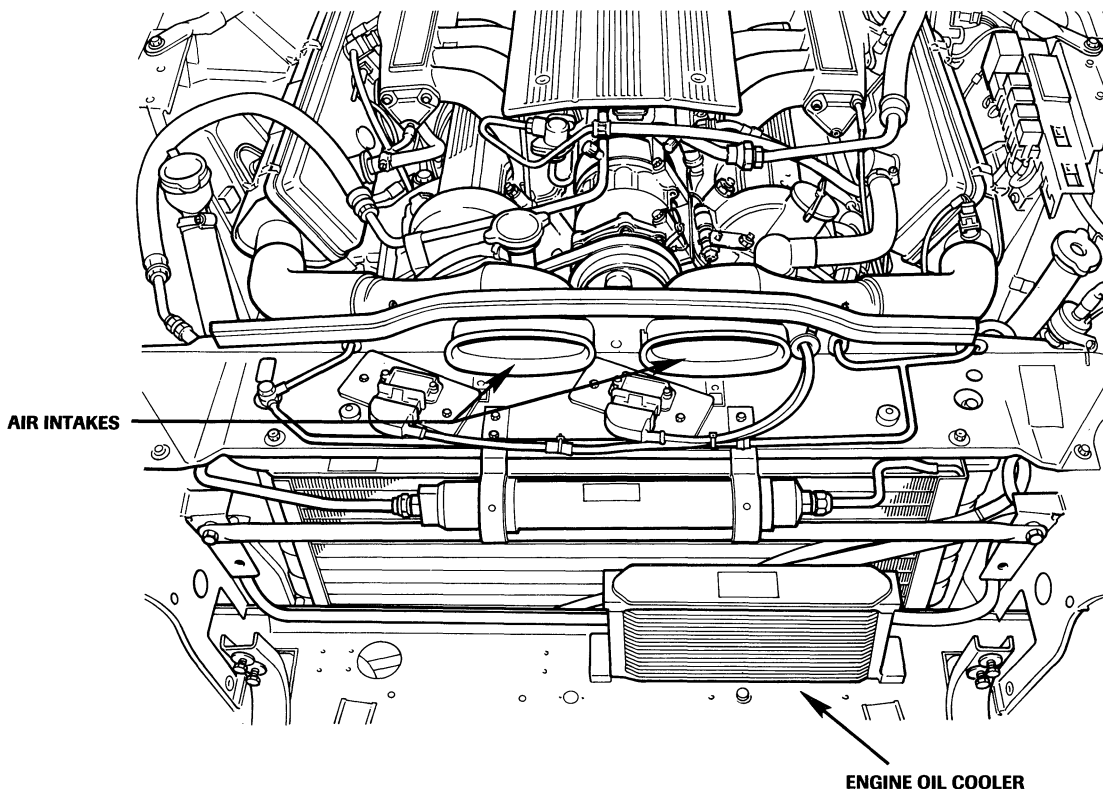


REAR MUFFLER AND SQUARE FINISHER



Engine Design / Construction**6.0 Litre V12 engine**

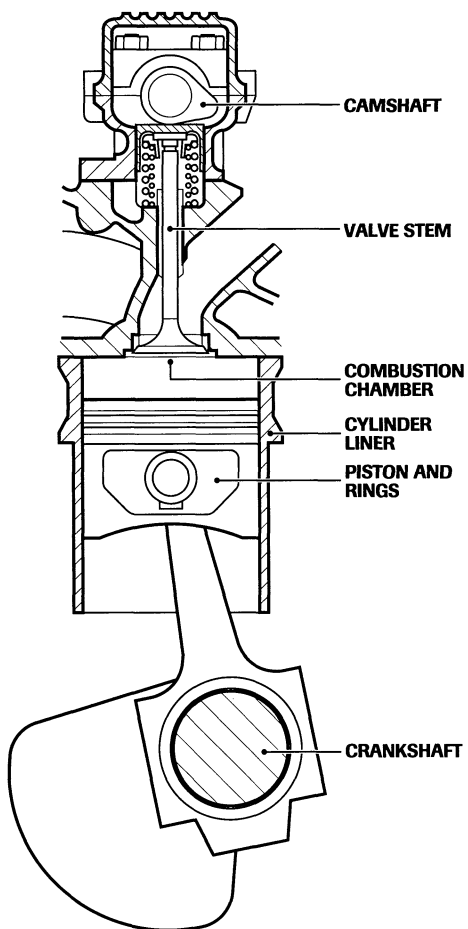
The 6.0 litre V12 engine provides a substantial increase in power and torque over the previous 5.3 litre engine. The engine size increase is achieved by lengthening the stroke to 78.5 mm (5.3 L: 70 mm stroke). The changes described here are based on the previous 1992 XJS V12 5.3 litre engine installation. Engine performance is improved by a low restriction air intake system drawing air from inlets located in front of the radiator. This arrangement supplies the engine with ambient temperature air instead of hot air off the back of the radiator.

6.0 LITRE V12 ENGINE

The following engine internal modifications are made:

- Revised cylinder block to accept the new transmission
- 78.5 mm stroke forged steel crankshaft with heavier webs
- Cylinder liners 0.135 in. shorter than previous (to clear the connecting rods)
- Pistons with reduced pin-to-crown dimension
- New piston rings to reduce combustion blow-by and oil consumption
- Camshafts with modified cam profiles to reduce noise at higher engine speed
- Enlarged combustion chambers to achieve 11.0:1 compression ratio
- Shorter stem intake valves to accommodate enlarged combustion chambers
- Redesigned oil pan with a shallow sump area and lengthened oil pick-up tube
- Crankshaft shield (windage tray) modified to clear the crankshaft and conform to the new sump
- High integrity engine gaskets

CYLINDER CROSS-SECTION



Oil sump and dip stick

The engine oil pan is shallow to accommodate the XJS installation. The level dip stick has been relocated to the left rear of the cylinder block.

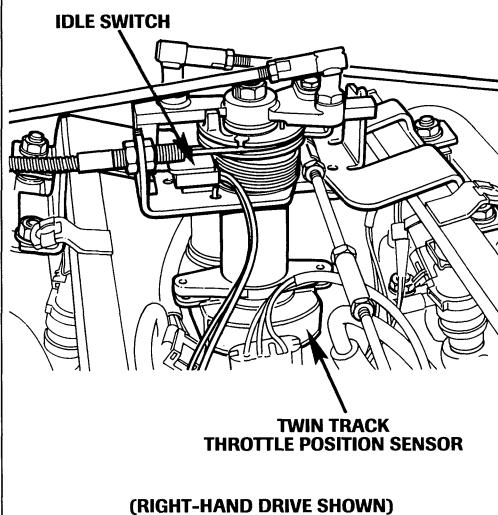
Engine mounts

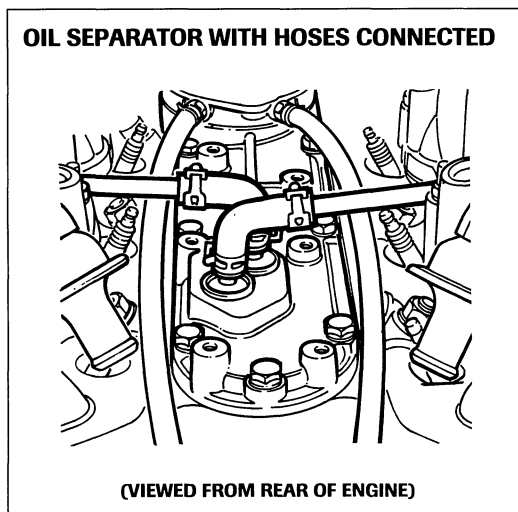
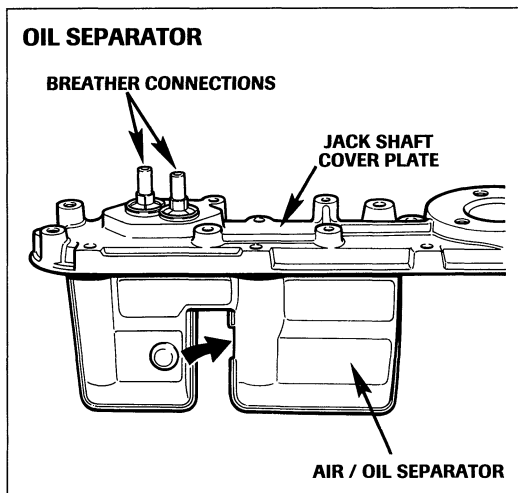
The front engine mounts are conventional rubber / metal mounts that bolt to the suspension sub frame.

Throttle turntable assembly

The throttle turntable has a smaller diameter pulley and is supported by a bracket spanning the intake manifold stubs. A twin track throttle position sensor is mounted beneath the turntable. The ignition idle switch has been relocated to the turntable.

THROTTLE TURNTABLE





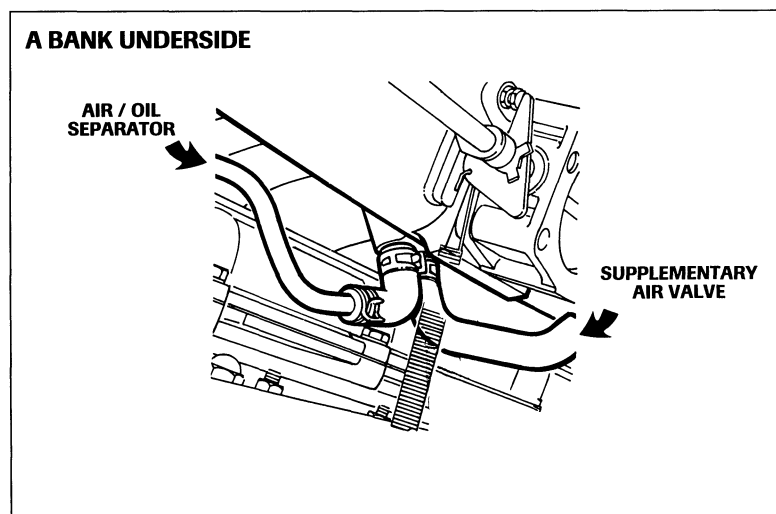
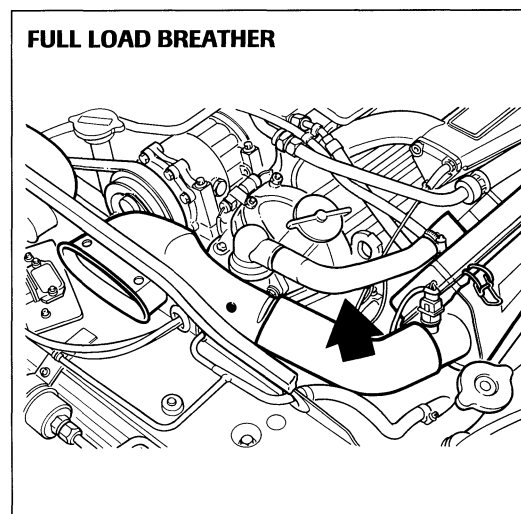
Engine Design / Construction (continued)

Part-load engine breather system

The part-load engine breather system consists of an air / oil separator chamber, integral with the jack shaft cover plate. The system connects to the rear of the intake manifold downstream of the throttle housings.

Full-load engine breather

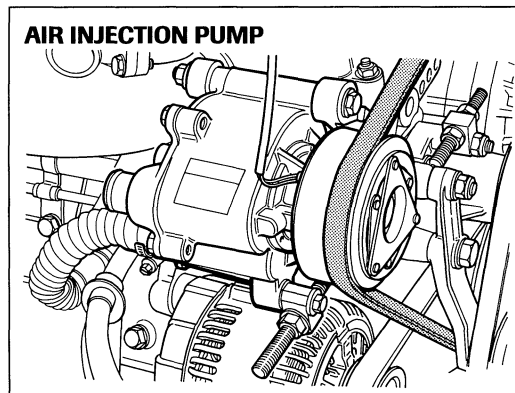
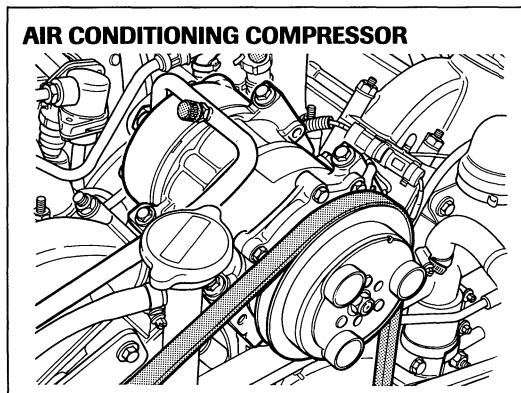
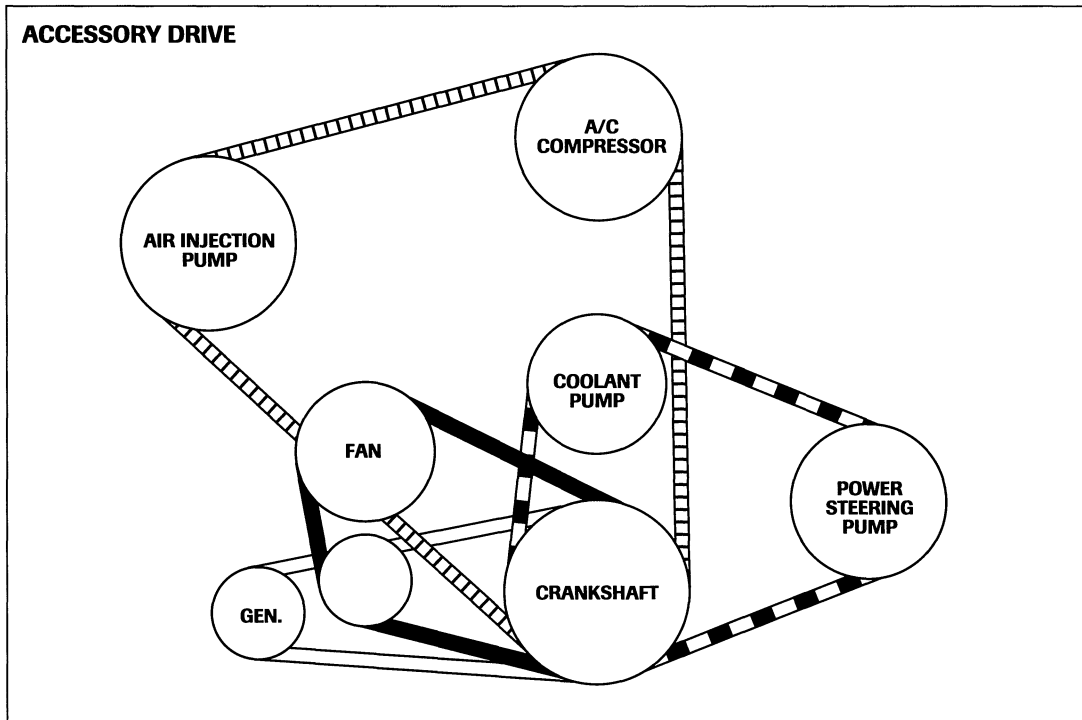
The full load breather is connected from the B bank timing cover to the B bank air cleaner housing.



Engine Accessory Drive

Accessory drive belts

The accessory drive arrangement is unchanged from the previous XJS V12 engine installation. Four single vee belts drive the various accessories. New accessories include: the air conditioning compressor, air pump and 120 amp generator. The power steering pump with an integral reservoir has been retained from previous XJS V12 models. Each belt is tensioned by an individual jack screw.



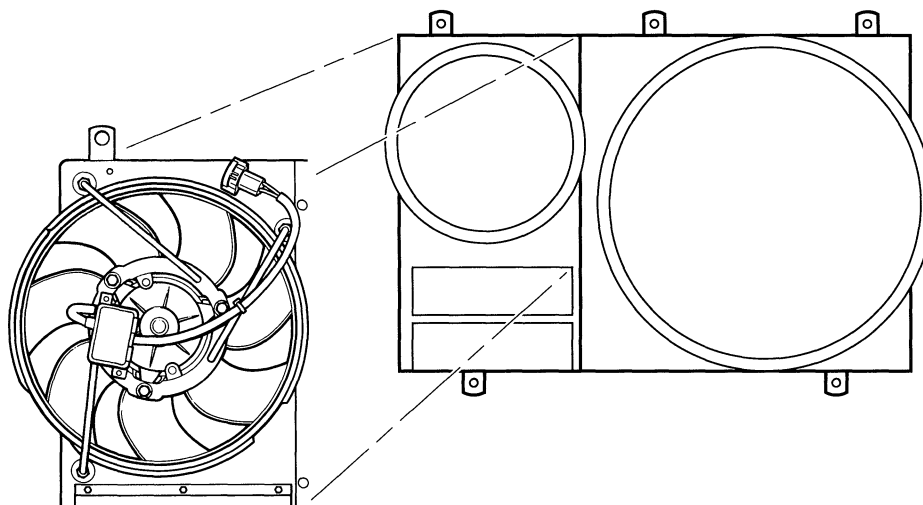
Belt tension specifications:

	New belt	In-service belt
Air conditioning compressor and air injection drive belt (measured midway between the air injection pump and the air conditioning compressor)	160 lbs.	140 lbs.
Power steering and coolant pump drive belt (measured midway between crankshaft and power steering pump)	160 lbs.	128 lbs.
Generator drive belt (measured midway between crankshaft and generator)	175 lbs.	90 lbs.
Fan drive belt (measured midway between crankshaft and fan)	149 lbs.	119 lbs.

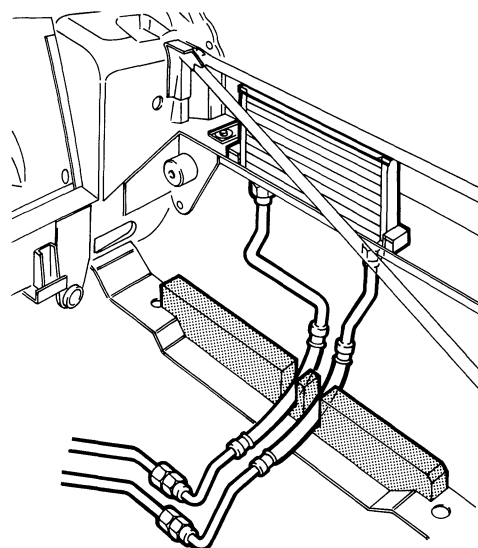
Cooling System

The 1994 XJS V12 uses an engine-driven viscous-coupled cooling fan in combination with a single electric auxiliary cooling fan mounted behind the radiator. The auxiliary cooling fan operates via a radiator thermal switch. The radiator includes "oil-to-water" coolers for the transmission and power steering fluids. A separate external engine oil cooler is mounted ahead of the air conditioning condenser.

V12 COOLING ARRANGEMENT



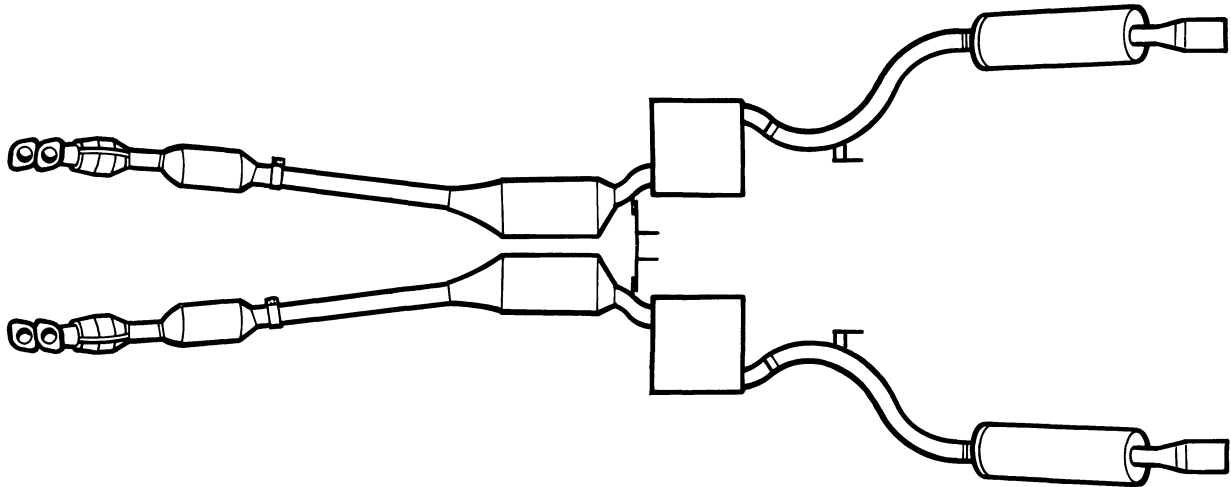
V12 ENGINE OIL COOLER



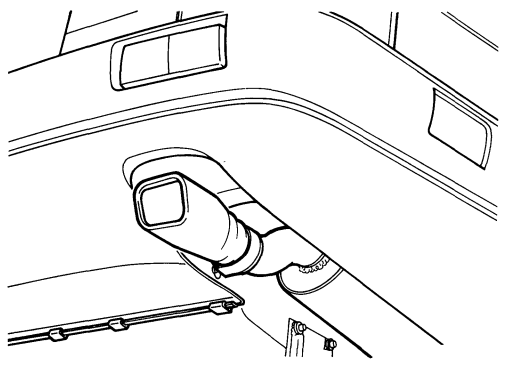
Exhaust System

The 6.0 liter low-loss exhaust system incorporates three catalysts and two mufflers for each cylinder bank. Oxygen sensors are located upstream of the primary catalysts. Increased catalyst area and relocation closer to the engine has resulted in lower HC emission. Less restrictive mufflers and catalysts combined with larger bore over-axle pipes reduced the exhaust system back pressure to improve engine performance. The use of slip-joint exhaust pipe joints and new clamps allows easier system alignment and increased integrity. Rectangular section exhaust tail finishers match the bumper aperture.

V12 EXHAUST SYSTEM

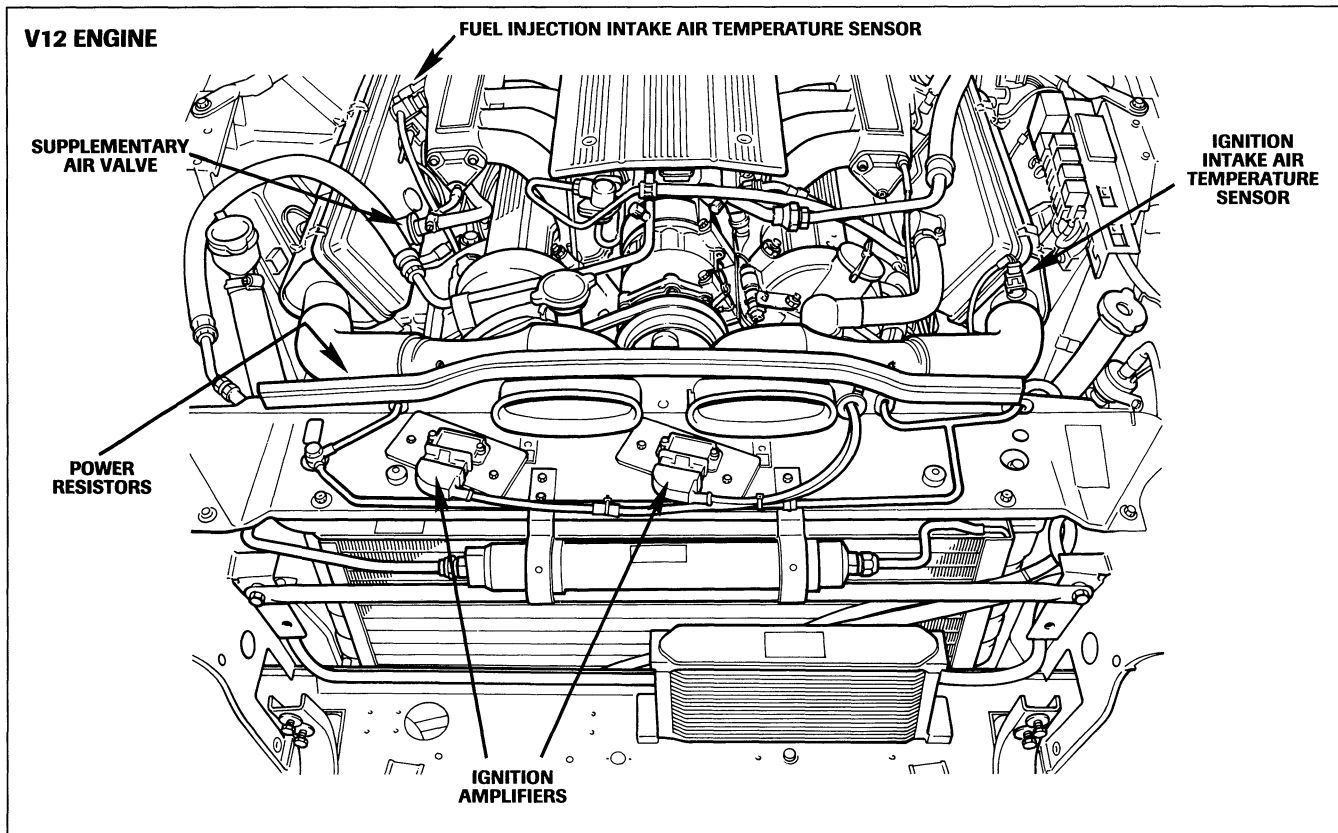


REAR MUFFLER AND SQUARE FINISHER



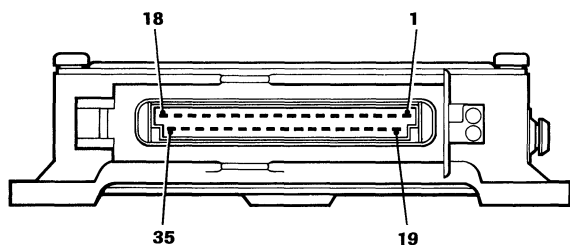
V12 Engine Management System Overview

The 6.0 V12 engine management system is the same for both the 1994 XJS V12 and the XJ12 Sedan. This system employs a combination Lucas / Marelli fuel injection / ignition system that incorporates revisions to include new and expanded functions over the previous XJS V12 system. In addition to revised ECM functions, subsystems that are not ECM controlled have been revised.

**Engine Management System: Fuel Injection****Engine control module (ECM): Fuel Injection**

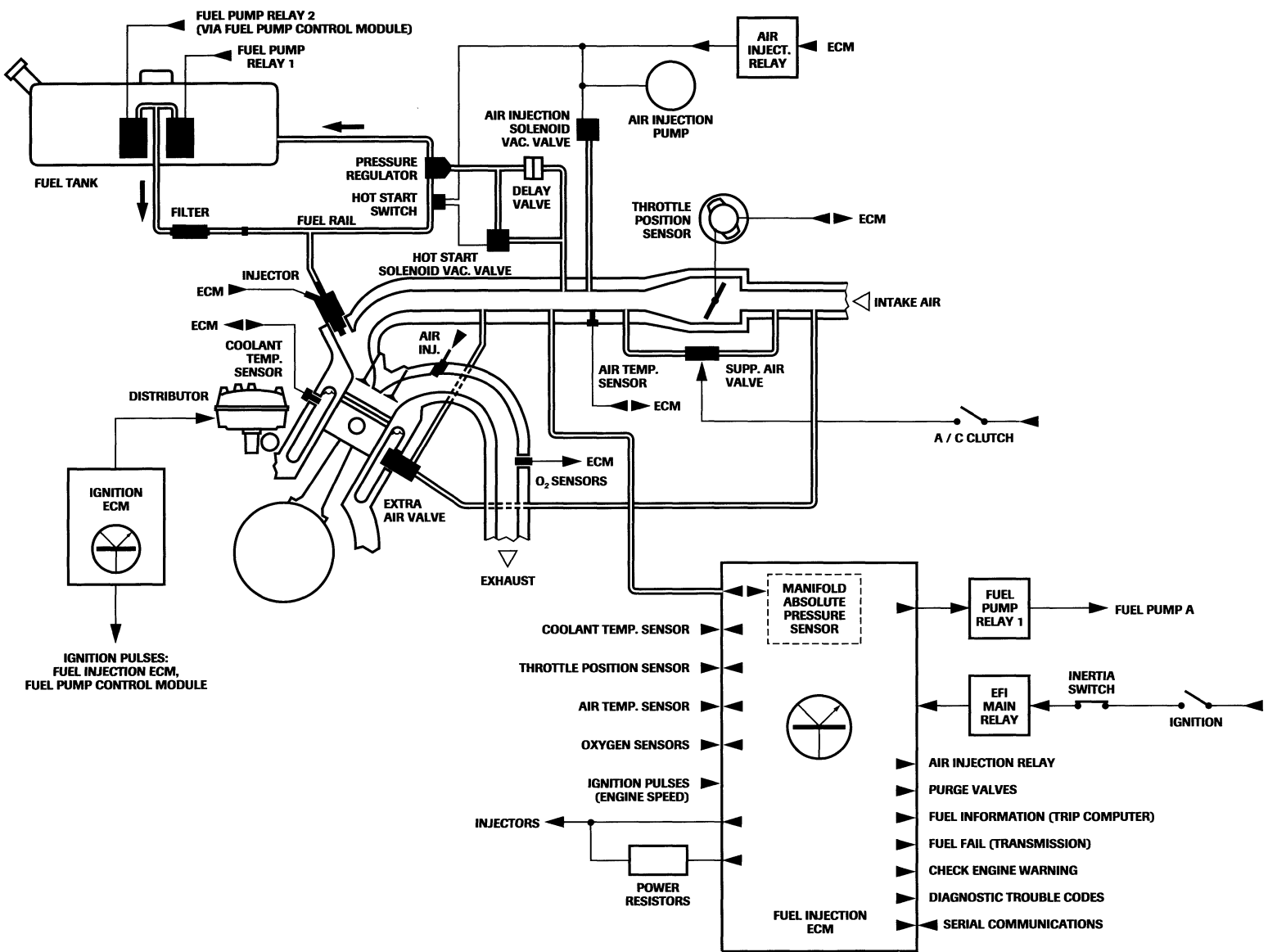
The fuel injection ECM (36CU) is revised to include the following new features:

- Evaporative canister purge control
- Adaptive idle fueling trim
- Air injection control
- Hot start system timing
- Expanded On Board Diagnostics (OBD)
- Fuel level sensing
- Fuel fail output to the transmission control module

FUEL INJECTION ECM PIN OUT INFORMATION

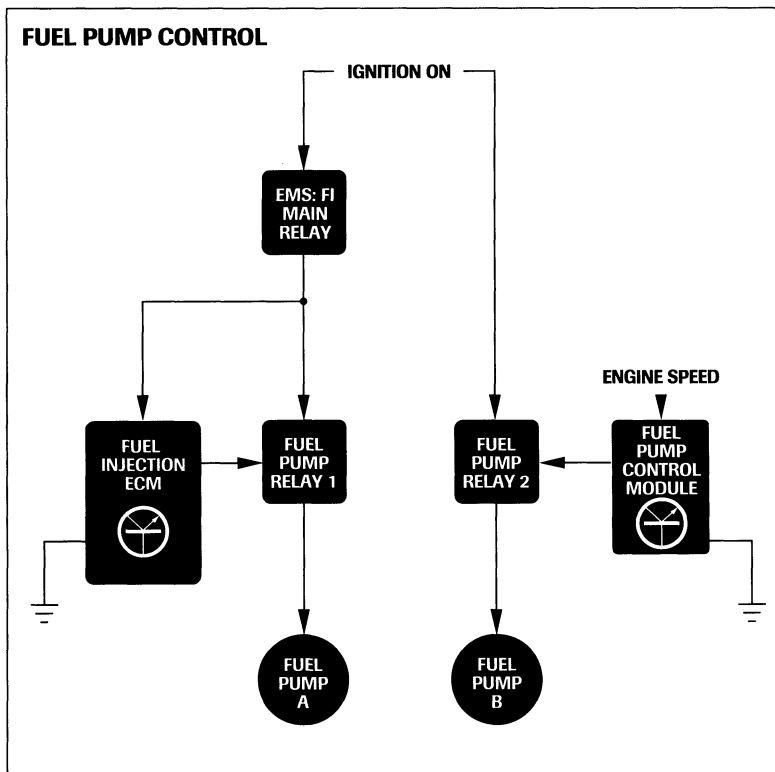
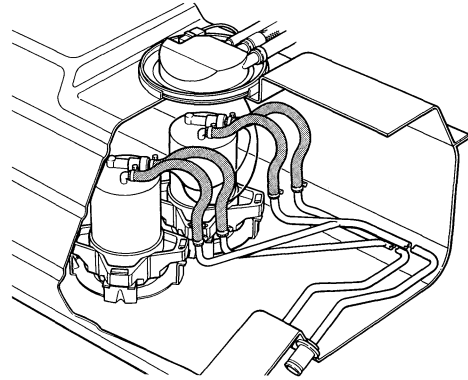
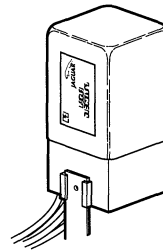
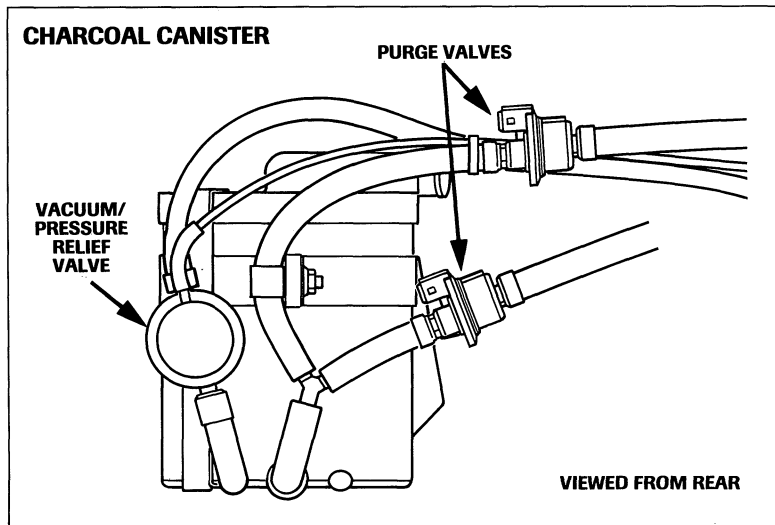
1 THROTTLE POSITION AND COOLANT TEMP SENSORS GROUND	18 ENGINE SPEED INPUT
2 FUEL USED	19 FUEL LEVEL
3 BATTERY POWER	20 THROTTLE POSITION AND AIR TEMP. SENSORS SUPPLY VOLTAGE
4 DATA LINK SERIAL INPUT	21 AIR TEMPERATURE SENSOR
5 COOLANT TEMP. SENSOR SUPPLY VOLTAGE	22 IGNITION POWER
6 A BANK OXYGEN SENSOR	23 OXYGEN SENSOR GROUND
7 THROTTLE POSITION SENSOR WIPER	24 B BANK OXYGEN SENSOR
8 B BANK INJECTORS (1, 3, 5) ON	25 PURGE CONTROL (GROUND)
9 B BANK INJECTORS (1, 3, 5) ON	26 AIR INJECTION CONTROL (GROUND)
10 DATA LINK SERIAL OUTPUT	27 B BANK INJECTORS (2, 4, 6) ON
11 B BANK INJECTORS (1, 3, 5) HOLD	28 B BANK INJECTORS (2, 4, 6) ON
12 A BANK INJECTORS (1, 3, 5) HOLD	29 B BANK INJECTORS (2, 4, 6) HOLD
13 A BANK INJECTORS (1, 3, 5) ON	30 A BANK INJECTORS (2, 4, 6) HOLD
14 A BANK INJECTORS (1, 3, 5) ON	31 A BANK INJECTORS (2, 4, 6) ON
15 OXYGEN SENSOR HEATERS AND FUEL PUMP SUPPLY	32 A BANK INJECTORS (2, 4, 6) ON
16 GROUND	33 FUEL FAIL OUTPUT (CHECK ENGINE)
17 GROUND	34 GROUND
	35 GROUND

ENGINE MANAGEMENT SYSTEM: FUEL INJECTION



Engine Management System: Fuel Injection (continued)**Fuel delivery**

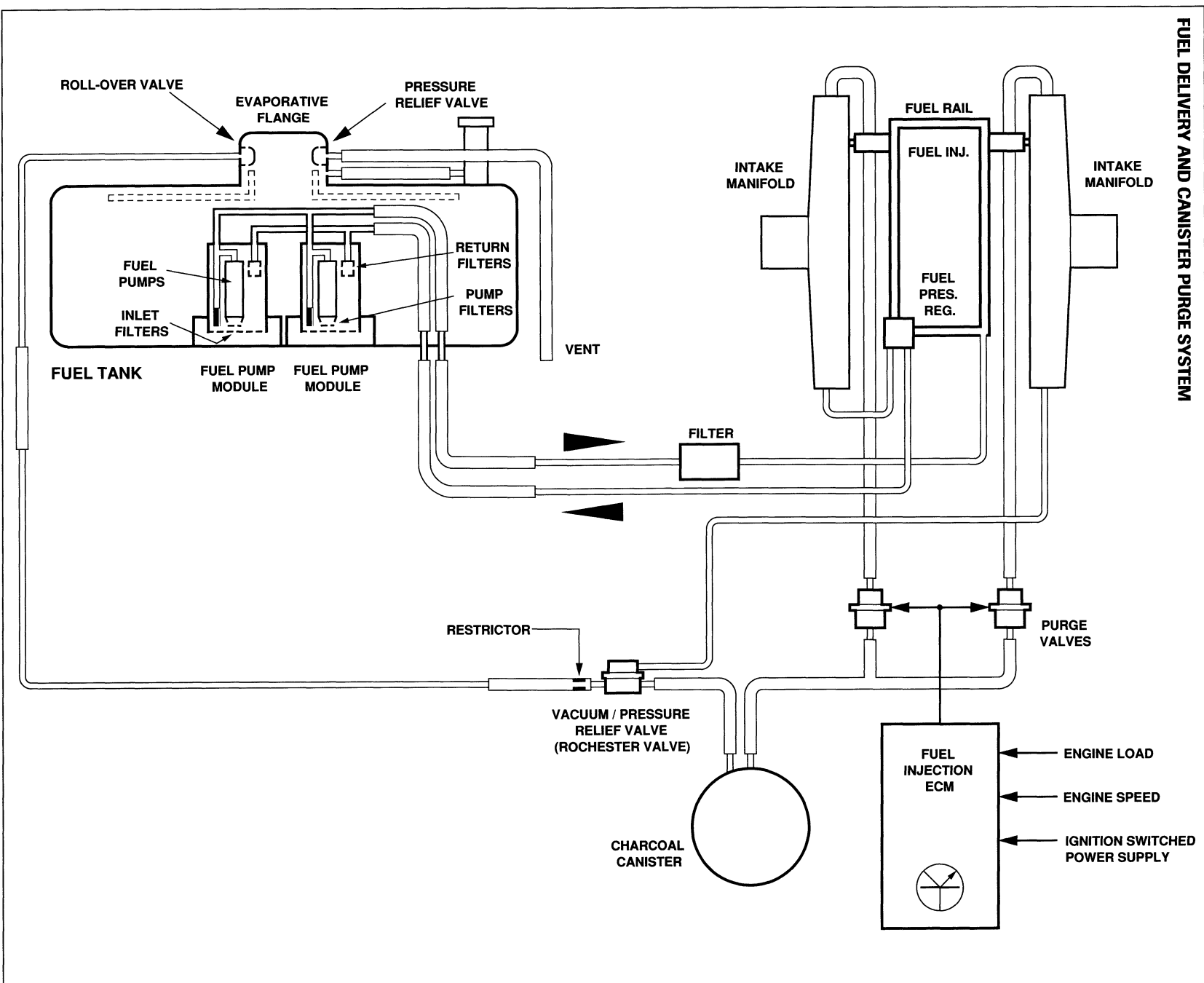
In order to meet the fuel requirements of the 6.0 liter engine, two fuel pump modules are used. The modules are identical but operate independently with staged control. One pump runs continuously when the engine is running, the other is activated when the engine speed exceeds 2840 rpm. Each pump is activated by a separate relay. Fuel pump relay 1 is switched by the fuel injection ECM. Fuel pump relay 2 is switched by the fuel pump control module. The fuel pump control module, located on the trunk right side, receives an engine speed input from the Ignition ECM and switches the relay 2 coil ground as follows: when the engine speed reaches 2840 rpm, the ground is completed; as the engine speed decreases, the ground is interrupted at 2000 rpm. Switching of fuel pump B requires just 1/4 of a second, ensuring instant response for additional fuel delivery.

**FUEL PUMPS****FUEL PUMP CONTROL MODULE****CHARCOAL CANISTER****Fuel pressure regulator**

The fuel pressure regulator maintains the fuel rail pressure at 44 psi (3 bar), which is much higher than previous 5.3L fuel pressure.

Evaporative emission control

The evaporative emission control system uses the same canister and vacuum / pressure relief valve as the 4.0 liter XJS and the Sedan Range. Two purge control valves, one for each cylinder bank, are located at the charcoal canister. The purge valves are controlled by the Fuel Injection ECM. The ECM opens the valves simultaneously, according to an engine load and speed strategy, allowing purge flow to both intake manifolds. Purge flow is enabled at idle after adaptive idle fueling is completed. The charcoal canister is located at the front of the left front wheel arch.



Engine Management System: Fuel Injection (continued)

Adaptive idle fueling trim

In order to ensure optimum performance throughout the life of the vehicle, the fuel injection ECM software contains an adaptive idle fueling function that automatically trims the fuel injector idle pulse duration strategy. The total available trim to the nominal injector pulse duration is $\pm 20\%$. This function eliminates the manual adjustment of idle trim. Adaptive fueling is performed by the ECM software only when there are no diagnostic trouble codes (DTCs) present and the following preconditions are met:

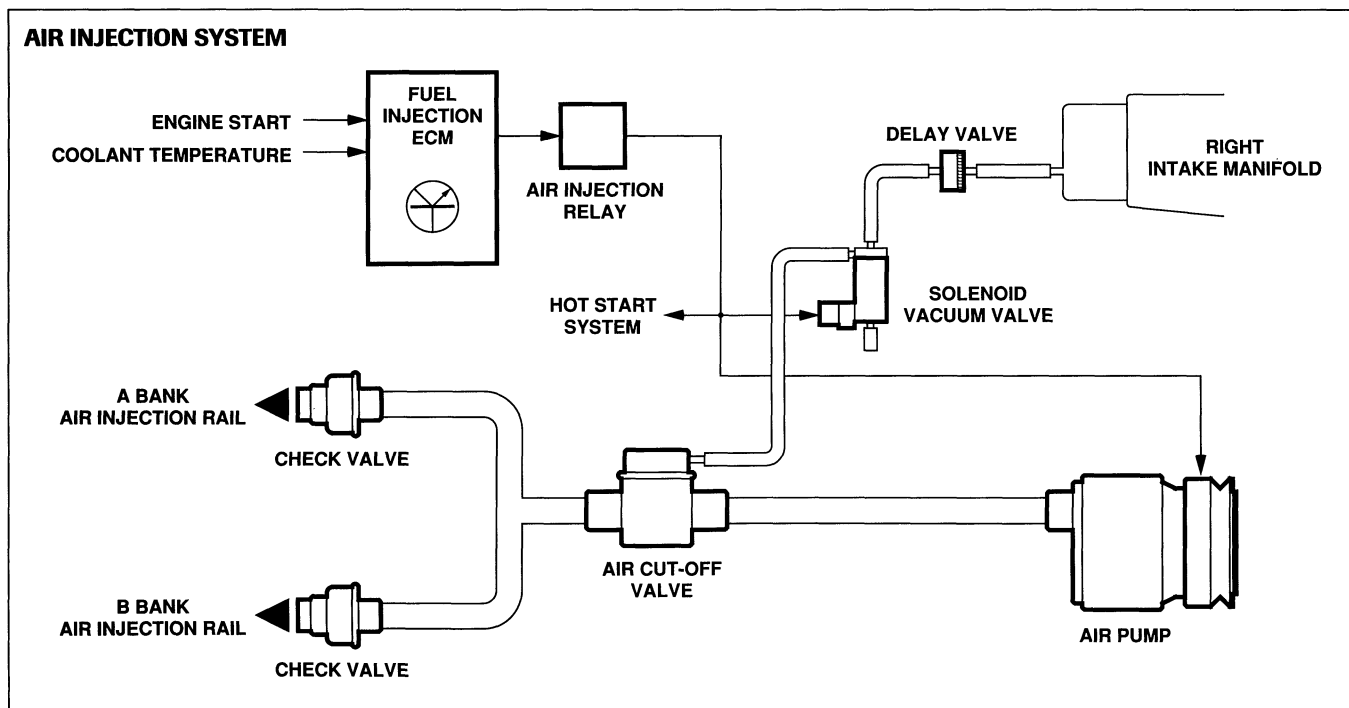
- Throttle closed
- Engine speed below 900 rpm
- Air injection disabled after engine start
- Closed loop fueling control enabled

If there are no DTCs present and the preconditions are met, the ECM cancels purge flow and adapts the idle fueling. Between fueling adaptations, there is a delay of approximately eight minutes during which the preconditions must be met. If the preconditions are interrupted, the delay will be lengthened.

Air injection

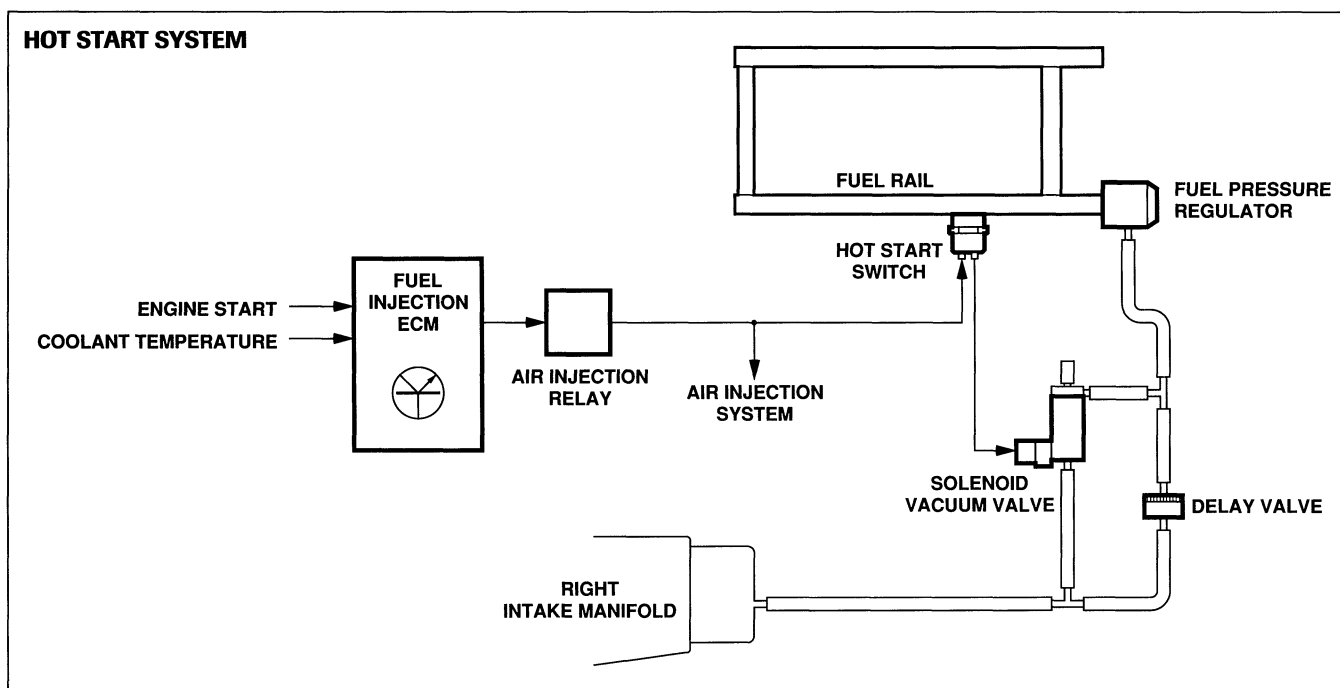
The 6.0 liter air injection system is similar to the AJ6 4.0 liter air injection system. An air injection pump with an electric clutch and a vacuum operated air cut-off valve are controlled by the fuel injection ECM. Air injection is enabled after all engine starts. The ECM uses a strategy comprised of a number of injector pulses versus engine coolant temperature for air injection switch-off. Air injection is enabled following all hot starts and always operates at engine coolant temperatures below 115°F (47°C). The air shut-off valve is operated by vacuum applied by the solenoid vacuum valve when signaled from the ECM.

NOTE: The air injection pump is operationally the same as the XJ12 pump but is manufactured by a different supplier.



Hot start system

The hot start system remains the same as the previous 5.3 liter system with the exception of the timing control. The function of the previous 45-second timer is replaced by fuel injection ECM control. When air injection is enabled, current is applied to the hot start switch. If the fuel rail temperature is 158°F (70°C) or above, the switch closes and activates the solenoid vacuum valve. The solenoid vacuum valve is mounted on the front of the right throttle body. The activated valve closes and directs vacuum to the fuel pressure regulator through the delay valve. The momentary vacuum delay increases fuel pressure to purge the fuel rail.



Idle speed control

Idle speed stabilization is enabled when the air conditioning compressor is operating. The supplementary air valve is activated (opened) when the compressor clutch is activated to allow throttle-valve-bypass air flow to the right intake manifold. The valve operates in all gear selector positions.

On-board diagnostics (OBD)

The OBD system has been expanded to include two new diagnostic trouble codes (DTCs): 67 and 77. In order to prevent the erroneous flagging of codes, a fuel level input (voltage) to the fuel injection ECM is supplied. The ECM will not flag DTCs 13, 18, 19, 23, 34, 36, 44 and 45 when the fuel tank level falls below approximately 1 gallon.

Diagnostic trouble code summary

The available DTCs are listed in order of priority on the following table. Limp home mode is available as indicated. When multiple faults occur, only the highest priority code will be displayed.

DTC	Limp Home Mode	Input or Component Checked	DTC	Limp Home Mode	Input or Component Checked
29		ECM Self-test	19	X	Manifold pressure transducer / throttle position sensor circuit (high throttle voltage / high MAP)
44	X	Oxygen sensor circuit — A bank	23		Fuel metering at idle — A and B banks combined
45	X	Oxygen sensor circuit — B bank	49	X	Power resistors electrical circuits
13	X	Manifold pressure transducer and sensing hose	11	X	Pressure transducer / throttle position sensor circuit
34		Injector electrical circuits — A bank	16	X	Intake air temperature sensor circuit
36		Injector electrical circuits — B bank	67		Air injection operation (oxygen sensor response)
14	X	Coolant temperature sensor circuit	77		Engine speed (loss of input from ignition ECM)
17	X	Throttle position sensor circuit			
18	X	Manifold pressure transducer / throttle position sensor circuit (high throttle voltage / low MAP)			

Clearing diagnostic trouble codes

All DTCs are held in the ECM memory until cleared using serial communication. If the vehicle battery is disconnected, the DTC(s) will be cleared.

Engine Management System: Ignition**Engine control module (ECM): Ignition**

The ignition ECM is revised to include a new manifold absolute pressure sensor and new software. The new software controls ignition retard at high intake air temperature, to prevent detonation, with minimal compromise of vehicle performance.

Intake air temperature sensor

An intake air temperature sensor located in the right intake replaces the previous coolant temperature sensor and air temperature switch. The intake air temperature input to the ECM is used to determine the ignition retard necessary to prevent detonation.

Idle switch

The idle switch remains in the system to signal the ECM to use the idle ignition strategy; however, a micro switch located on the throttle turntable replaces the previous linkage switch.

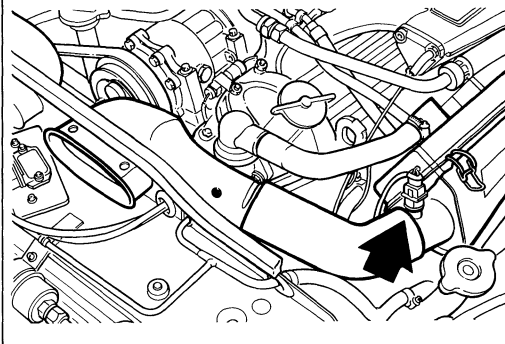
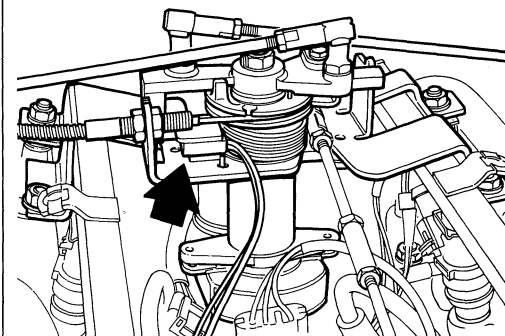
Ignition retard / transmission control

The ignition ECM receives an ignition retard request from the transmission control module during certain transmission apply and release functions. Before the transmission completes the function, an acknowledgment of the request is made by the ignition ECM.

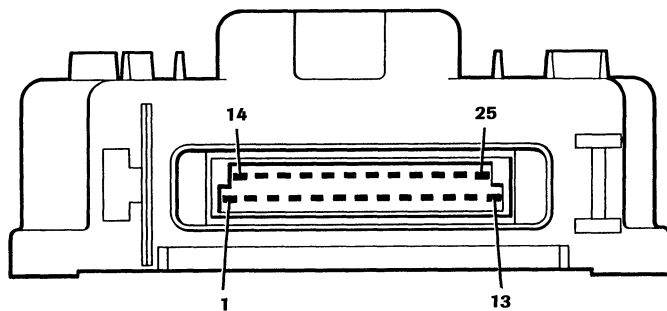
Engine speed outputs

The ignition ECM provides engine speed outputs for the following:

- Tachometer
- Fuel injection control
- Fuel pump B control
- Transmission control

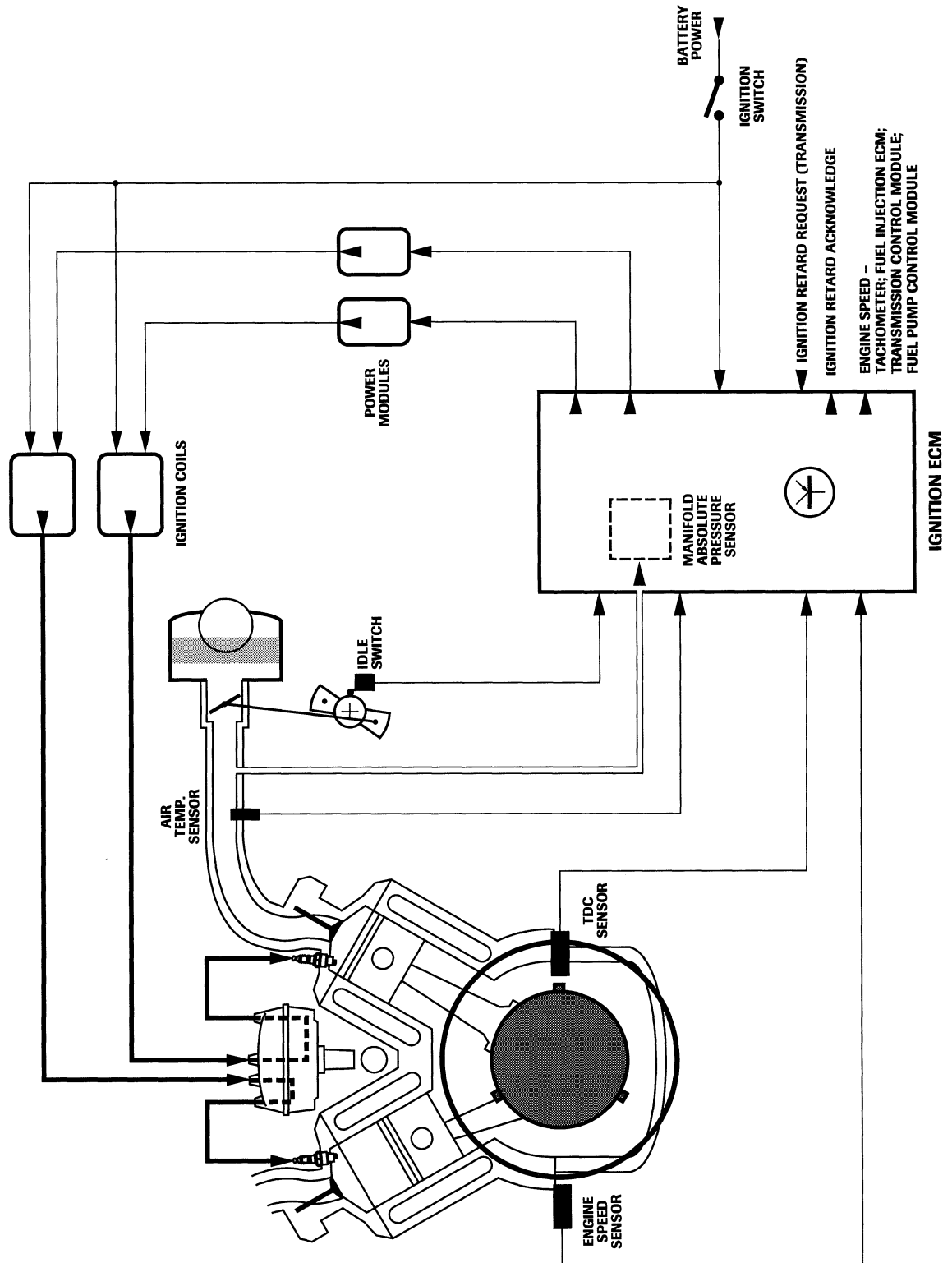
IGNITION INTAKE AIR TEMP. SENSOR**IDLE SWITCH**

(RIGHT-HAND DRIVE SHOWN)

IGNITION ECM PIN OUT INFORMATION

- 1 TDC SENSOR
- 2 TDC SENSOR SHIELD
- 3 ENGINE SPEED SENSOR SHIELD
- 4 GROUND
- 5 IDLE SWITCH GROUND
- 6 AIR TEMPERATURE SENSOR GROUND
- 7 ENGINE SPEED OUTPUT SHIELD
- 8 POWER MODULE SHIELD
- 9 B BANK POWER MODULE OUTPUT
- 10 B BANK POWER MODULE OUTPUT
- 11 GROUND
- 12 GROUND
- 13 IGNITION SWITCHED POWER SUPPLY
- 14 A BANK POWER MODULE OUTPUT
- 15 A BANK POWER MODULE OUTPUT
- 16 ENGINE SPEED SENSOR
- 17 STRATEGY SELECT
- 18 IDLE SWITCH
- 19 AIR TEMPERATURE SENSOR
- 20 NOT USED
- 21 IGNITION RETARD ACKNOWLEDGED
- 22 NOT USED
- 23 STRATEGY SELECT
- 24 ENGINE SPEED OUTPUT
- 25 IGNITION RETARD REQUEST

IGNITION CONTROL



XJS 4.0 A4 Electronic Four-speed Automatic Transmission

Driver selected operating modes

An additional transmission mode, DELETE FIRST, has been added to the ZF 4HP 24E transmission control for the XJS. DELETE FIRST provides second gear start-off to help prevent wheel spin on roads with poor traction. If DELETE FIRST is selected when the transmission is in drive, the transmission will momentarily engage first gear before shifting to second. The instrument pack has indicators that illuminate if SPORT or DELETE FIRST are selected.

Gear Selector and Mode Switch

XJS 4.0

A three-way rocker switch for selecting NORMAL, SPORT or DELETE FIRST mode is mounted on the center console gear selector bezel.

XJS V12

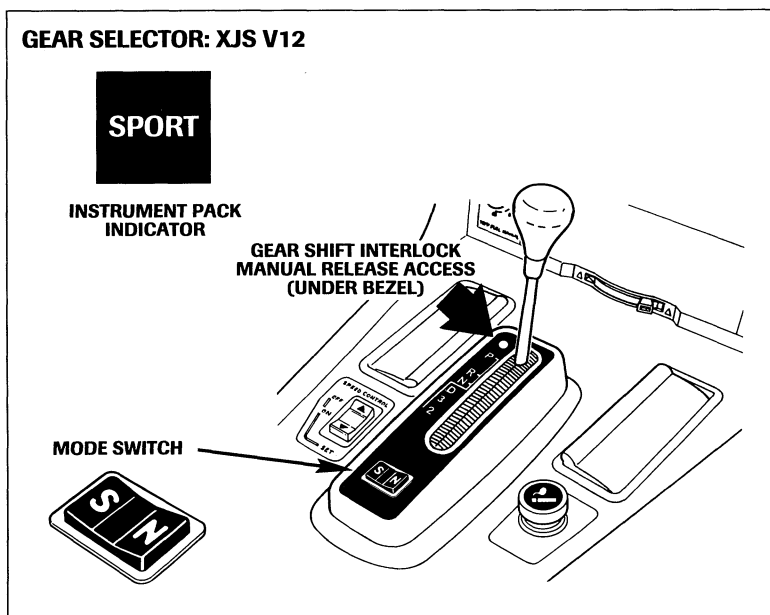
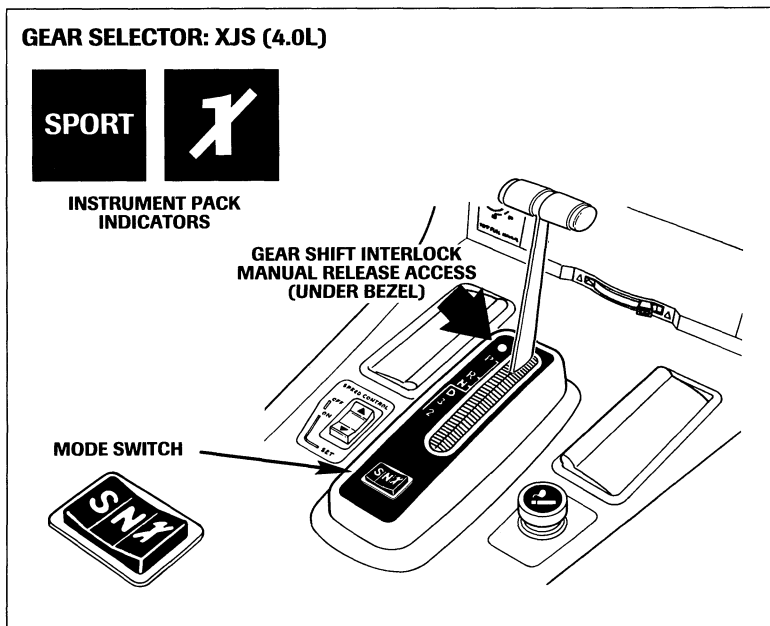
A two-way rocker switch for selecting NORMAL, or SPORT mode is mounted on the center console gear selector bezel.

Gear Shift Interlock

Manual override

The gear shift mechanism and electrical circuit remain unchanged from the 1993 model year XJS. A manual override access located under the gear selector bezel has been added. To override the interlock, remove the gear-shift lever bezel. Then, gently press down on the interlock release with a screwdriver through the access hole. Move the shift lever to neutral.

NOTE: The method suggested for vehicles without access holes — inserting a screwdriver through the shift lever slot — will not work.



XJS V12 Electronic Four-Speed Automatic Transmission

The Hydra-matic 4L80-E electronic four-speed automatic transmission incorporates electronic controls that utilize the transmission control module (TCM) to control shift points, torque converter clutch apply and release, and line pressure. Inputs from sensors and switches provide engine, transmission and vehicle operating information to the TCM. The TCM uses this information to determine the precise moment to upshift or downshift, apply or release the torque converter clutch, and what line pressure is required to apply the clutches or bands. This type of control, based on the operating conditions of the vehicle, results in consistent and precise shift points and shift quality.

NORMAL and SPORT modes

Two operating strategies are available to the driver:

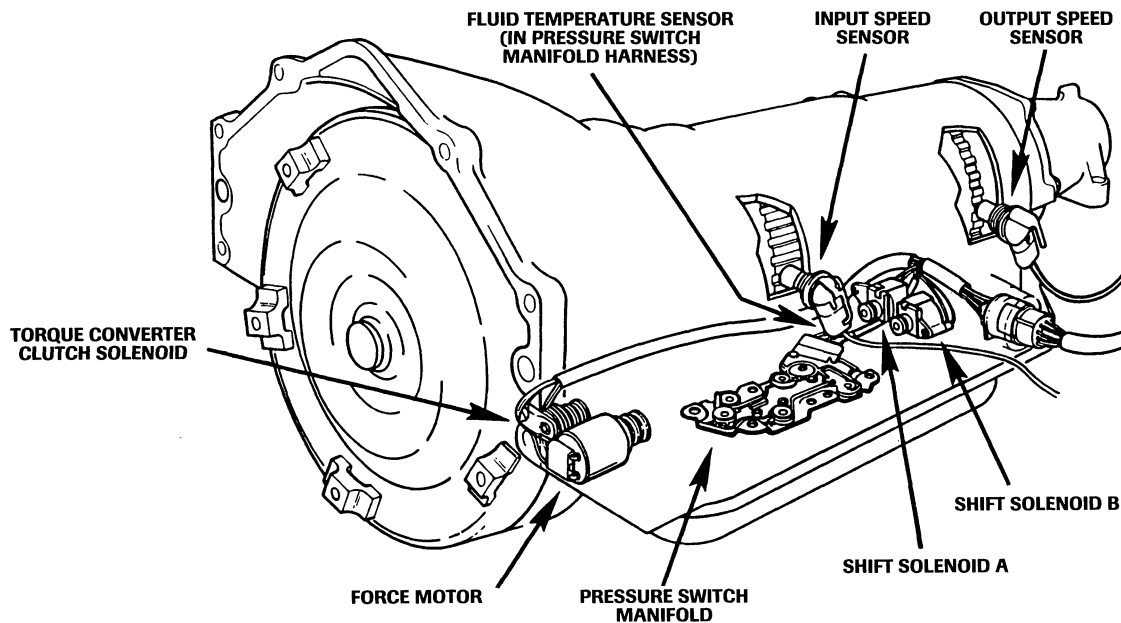
NORMAL Normal mode provides economy operation by causing the transmission to upshift at lower engine speeds and throttle openings. Start-off occurs in second gear unless the accelerator is depressed to the kick down position. High-speed performance is available as required.

SPORT Sport mode allows the engine power to be used to its full potential at all times. Start-off occurs in first gear and upshifts and kick down are tailored to performance.

Torque converter lock-up clutch

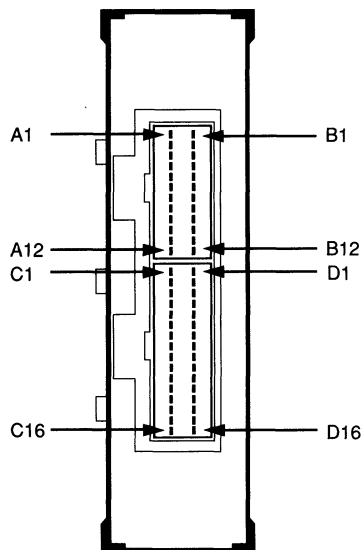
The torque converter assembly employs a lock-up clutch to provide a direct drive coupling between the engine and transmission.

TRANSMISSIONS SENSORS AND SWITCHES



XJS V12 Electronic Four-Speed Automatic Transmission (continued)

TRANSMISSION CONTROL MODULE PIN OUT INFORMATION

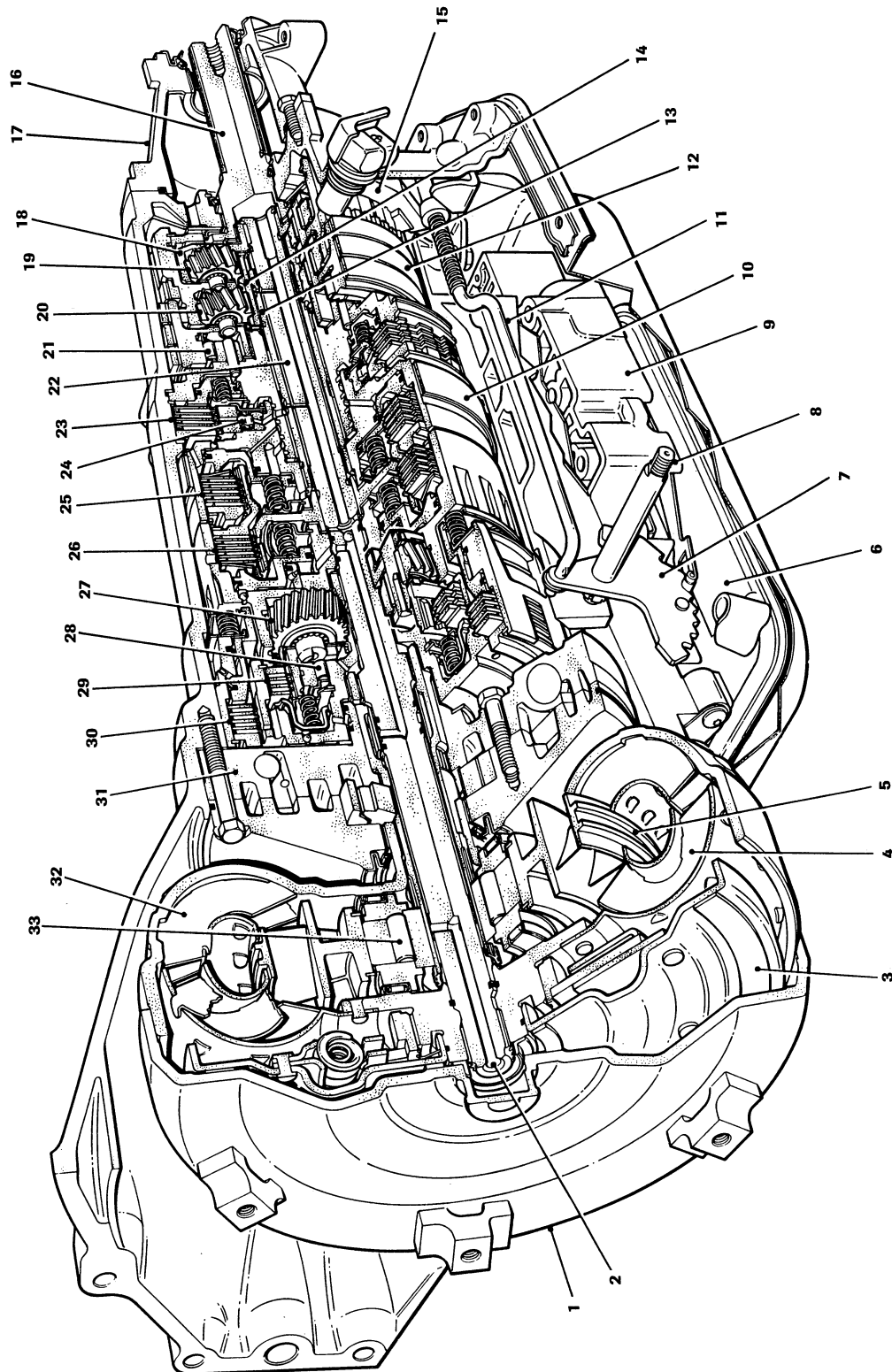


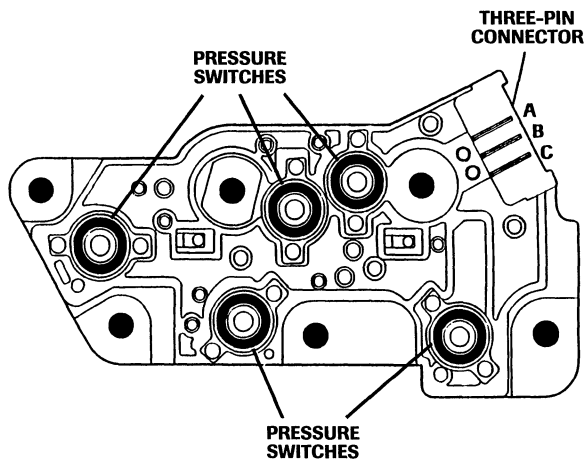
A1	NORMAL INPUT	B12	OUTPUT SPEED
A2	SPORT MODE INPUT	C1	GROUND
A3	GEAR CODE MODE A	C2	GROUND
A4	GEAR CODE MODE B	C3	SENSOR GROUND
A5	GEAR CODE MODE C	C4	SENSOR SUPPLY VOLTAGE
A6	SHIFT SOLENOID B	C6	FUEL OCTANE SELECT
A7	SHIFT SOLENOID A	C7	CATALYST SELECT
A10	IGNITION RETARD REQUEST	C8	KICKDOWN SWITCH
A11	TRANSMISSION FAIL OUTPUT	C9	ENGINE SPEED SHIELD
A12	BATTERY POWER	C15	FORCE MOTOR FEEDBACK
B2	ENGINE FUEL FAIL	C16	IGNITION SWITCHED POWER
B3	A/C COMPRESSOR CLUTCH OPERATION	D3	INPUT SPEED
B4	BRAKE LIGHT OPERATION	D4	INPUT SPEED
B5	TORQUE CONVERTER CLUTCH SOLENOID	D5	ENGINE SPEED INPUT
B6	SPORT MODE INDICATOR OUTPUT	D9	IGNITION RETARD ACKNOWLEDGED
B7	NOT USED	D10	THROTTLE POSITION SENSOR WIPER
B10	DATA LINK SERIAL OUTPUT	D12	DATA LINK SERIAL OUTPUT
B11	OUTPUT SPEED	D13	TRANSMISSION TEMPERATURE SENSOR

Transmission components (key to illustration on opposite page)

- | | |
|---------------------------------------|---|
| 1 Torque converter assembly | 18 Rear internal gear |
| 2 Turbine shaft | 19 Output planetary carrier assembly |
| 3 Pressure plate | 20 Reaction planetary carrier assembly |
| 4 Converter turbine | 21 Lo roller clutch assembly |
| 5 Converter stator | 22 Main shaft |
| 6 Filter | 23 Intermediate clutch assembly |
| 7 Detent lever | 24 Intermediate sprag clutch assembly |
| 8 Manual shaft | 25 Direct clutch assembly |
| 9 Control valve assembly (valve body) | 26 Forward clutch assembly |
| 10 Front band assembly | 27 Overdrive planetary carrier assembly |
| 11 Park lock actuator | 28 Overdrive roller clutch assembly |
| 12 Rear band assembly | 29 Overrun clutch assembly |
| 13 Sun gear shaft | 30 Fourth clutch assembly |
| 14 Sun gear | 31 Pump assembly |
| 15 Park lock pawl | 32 Converter pump assembly |
| 16 Output shaft | 33 Stator roller clutch assembly |
| 17 Case extension | |

TRANSMISSION CUTAWAY

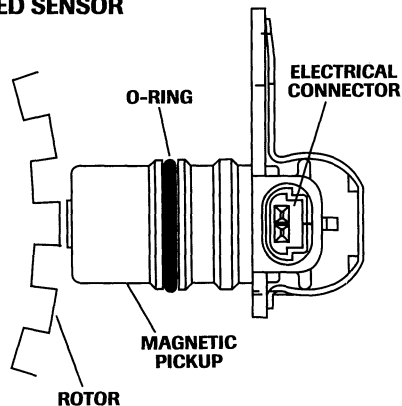


XJS V12 Electronic Four-Speed Automatic Transmission (continued)**PRESSURE SWITCH MANIFOLD****Transmission control components**

The mechanical operation of the transmission follows conventional epicyclic gear transmission operation. The components unique to the electronic control of the transmission are explained here.

Transmission control module (TCM) The TCM is a microprocessor based unit having control over all shift points and the transmission line pressure that determines shift quality. Control inputs are applied to the transmission operating strategy. From the strategy, the TCM controls the shift solenoids, force motor (line pressure), and the torque converter clutch solenoid. A diagnostic facility allows the TCM to diagnose transmission and related component problems. This information is accessed via serial communication.

NOTE: The TCM location varies with vehicle model type. Refer to page 54.

SPEED SENSOR

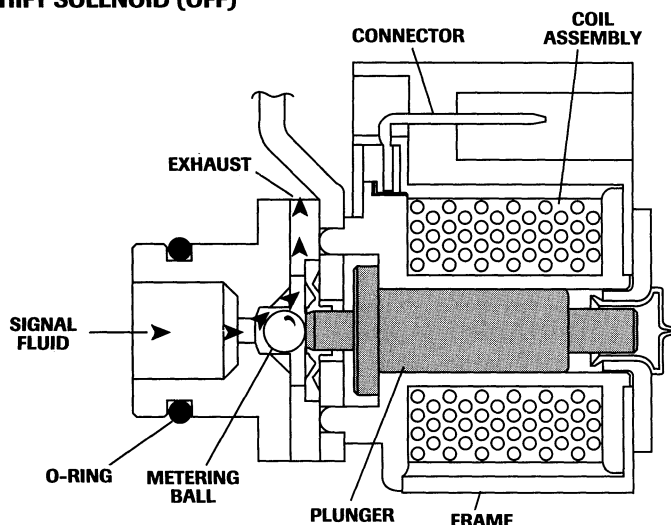
Pressure switch manifold The pressure switch manifold is a multiple switch assembly made up of 5 normally-open pressure switches to provide a logic input to the TCM. Various fluid pressures are fed from the manual valve to the switches depending on gear selector and manual valve positioning. These pressures determine the digital logic at the connector pins A, B and C.

Transmission output speed sensor The output speed sensor is a variable reluctance magnetic pick-up. The sensor is mounted in the case opposite the output speed sensor ring that is pressed on to the output carrier assembly. Whenever the vehicle is moving, the sensor produces an AC voltage input to the TCM proportional to vehicle speed.

Transmission input speed sensor The input speed sensor is identical to the output speed sensor except that it uses the machined teeth on the forward clutch housing as the rotor. The sensor produces an AC voltage input to the TCM proportional to torque converter turbine speed.

Fluid temperature sensor The transmission fluid temperature sensor, located in the pressure switch wiring harness, is a temperature sensitive resistor (thermistor) that provides a fluid temperature input to the TCM.

Shift solenoids Two shift solenoids – A and B – are used to apply upshifts and downshifts in all forward gear ranges. The solenoids work together in a combination of ON and OFF sequences to apply hydraulic pressure to the various shift valves.

SHIFT SOLENOID (OFF)

Torque converter clutch (TCC) solenoid The TCC solenoid is used to control the torque converter lock-up clutch apply and release. The solenoid duty cycle (percent time energized) is varied by TCM control of the ground circuit. The variable duty cycle of the solenoid allows the lock-up rate to be varied to ensure smooth operation.

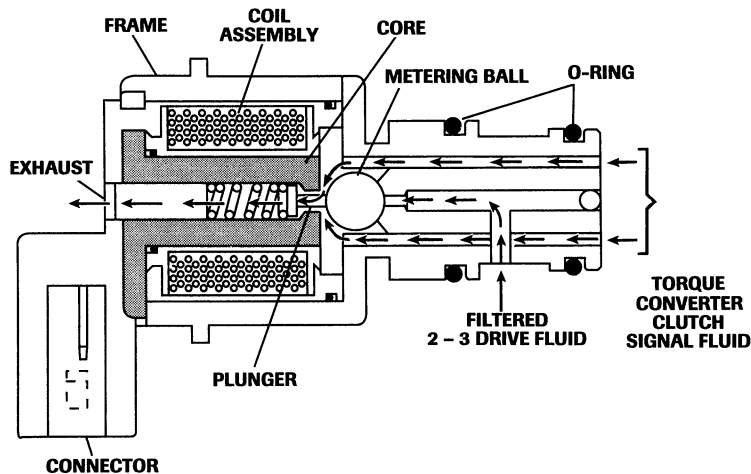
Force motor The force motor is an electronic pressure regulator controlled by the TCM to produce a hydraulic "torque signal pressure" that is primarily an indication of throttle opening. The duty cycle (percent time energized) of the force motor is regulated by TCM control of supply current. No current flow applies maximum torque signal pressure; maximum current flow applies minimum torque

signal pressure. Torque signal pressure controls transmission main line pressure at the pressure regulator valve accordingly.

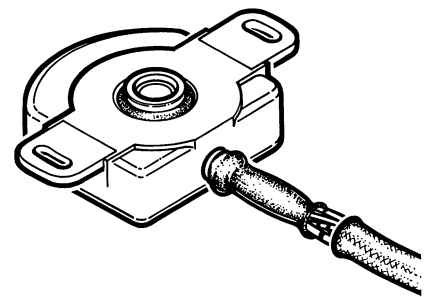
Throttle position sensor The twin track throttle position sensor is mounted under the throttle turntable. The throttle position input to the TCM is an approximation of engine torque.

Barometric pressure sensor A barometric pressure sensor, located under the right front component panel (right front inner fender), provides an air density signal to the TCM.

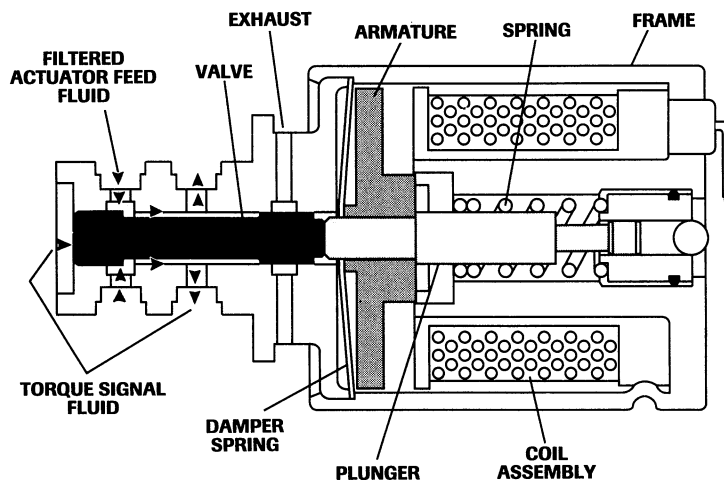
TORQUE CONVERTER CLUTCH SOLENOID (OFF)



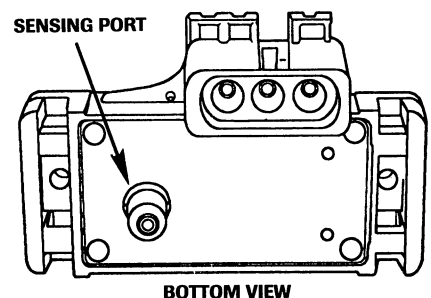
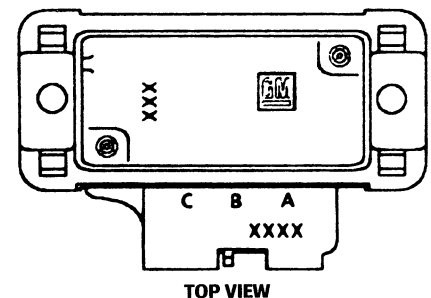
THROTTLE POSITION SENSOR



FORCE MOTOR (OFF)



BAROMETRIC PRESSURE SENSOR



XJS V12 Electronic Four-Speed Automatic Transmission (continued)**Transmission Control Module Inputs and Outputs**

The TCM receives inputs from the transmission, fuel injection and ignition ECMs, external components, and other vehicle systems and applies them to the operating strategy to determine the optimum transmission control outputs.

INPUTS

Mode switch The mode switch position inputs the driver's choice of operating strategy to the TCM.

Input and output speed sensors The TCM uses the transmission input and output speeds to help determine line pressure, shift patterns, and torque converter lock-up clutch apply pressure and timing. The speed inputs are also used to calculate turbine speed, deviation from gear ratio, and lock-up clutch slippage for diagnostic purposes and "adaptive learning" functions.

Transmission fluid temperature The TCM monitors the transmission fluid temperature to help determine torque converter lock-up clutch operation and line pressure. The TCM inhibits lock-up clutch operation until the fluid temperature reaches approximately 68°F (20°C).

If the fluid temperature becomes excessively high (approximately 250°F [122°C]), the TCM will apply the lock-up clutch whenever the transmission is in Second, Third or Fourth gears. Applying the lock-up clutch serves to reduce the fluid temperature, as the torque converter fluid coupling is bypassed.

Above approximately 310°F (154°C), the TCM will flag a fluid temperature diagnostic trouble code (DTC). Once the DTC is flagged, the TCM assumes a fixed temperature input of 266°F (130°C) and applies the lock-up clutch in Second, Third and Fourth gears.

Force motor feedback The TCM senses the force motor duty cycle (percent time energized) to determine the prevailing transmission line pressure.

Pressure switch manifold The pressure switch manifold output logic is used by the TCM to determine what gear range (PRN[D]D32) the transmission is operating in.

Kick down A kick down ground input is supplied to the TCM when the driver activates the switch by depressing the accelerator to the kick down position.

Engine throttle position A variable voltage input allows the TCM to sense throttle position. Throttle position, and other sensor inputs, are used to determine shift patterns and torque converter lock-up clutch apply and release. In general, the greater the throttle opening, the higher the upshift speeds and the greater the transmission line pressure. The TCM releases the lock-up clutch at minimum throttle opening and during open-throttle heavy acceleration.

Barometric pressure sensor The barometric pressure input allows the TCM to adjust the line pressure for changes in air density that affect engine power.

Engine speed An engine speed input is supplied to the TCM from the ignition ECM. Engine speed is one of the sensed inputs used to determine shift patterns and torque converter lock-up clutch apply and release.

Brake operation The TCM receives a brakes applied input via the stop light relay. When the brakes are applied, the TCM releases the torque converter lock-up clutch.

A/C compressor clutch operation The TCM receives a compressor clutch operating input from the climate control module compressor clutch relay activation circuit. When the compressor is operating, the TCM adjusts the line pressure and shift timing to compensate for the added engine load.

EMS fuel fail If a fuel fail input is received from the fuel injection ECM, the TCM defaults to a higher line pressure to compensate for the loss of engine power.

OUTPUTS

Force motor (line pressure) The TCM varies the current to the force motor to control "torque signal" pressure, which in turn, controls line pressure. The lower the "torque signal" pressure, the lower the line pressure; the higher the "torque signal" pressure, the higher the line pressure. At idle (throttle closed), current flow is close to maximum, positioning the force motor so that minimum "torque signal" pressure is applied to the line pressure regulator. At full throttle, current flow is close to minimum, positioning the force motor so that maximum "torque signal" pressure is applied to the line pressure regulator.

If the electrical system becomes disabled, current flow to the force motor will stop and maximum "torque signal" pressure will be applied creating maximum line pressure, thus preventing component slippage until the condition can be corrected.

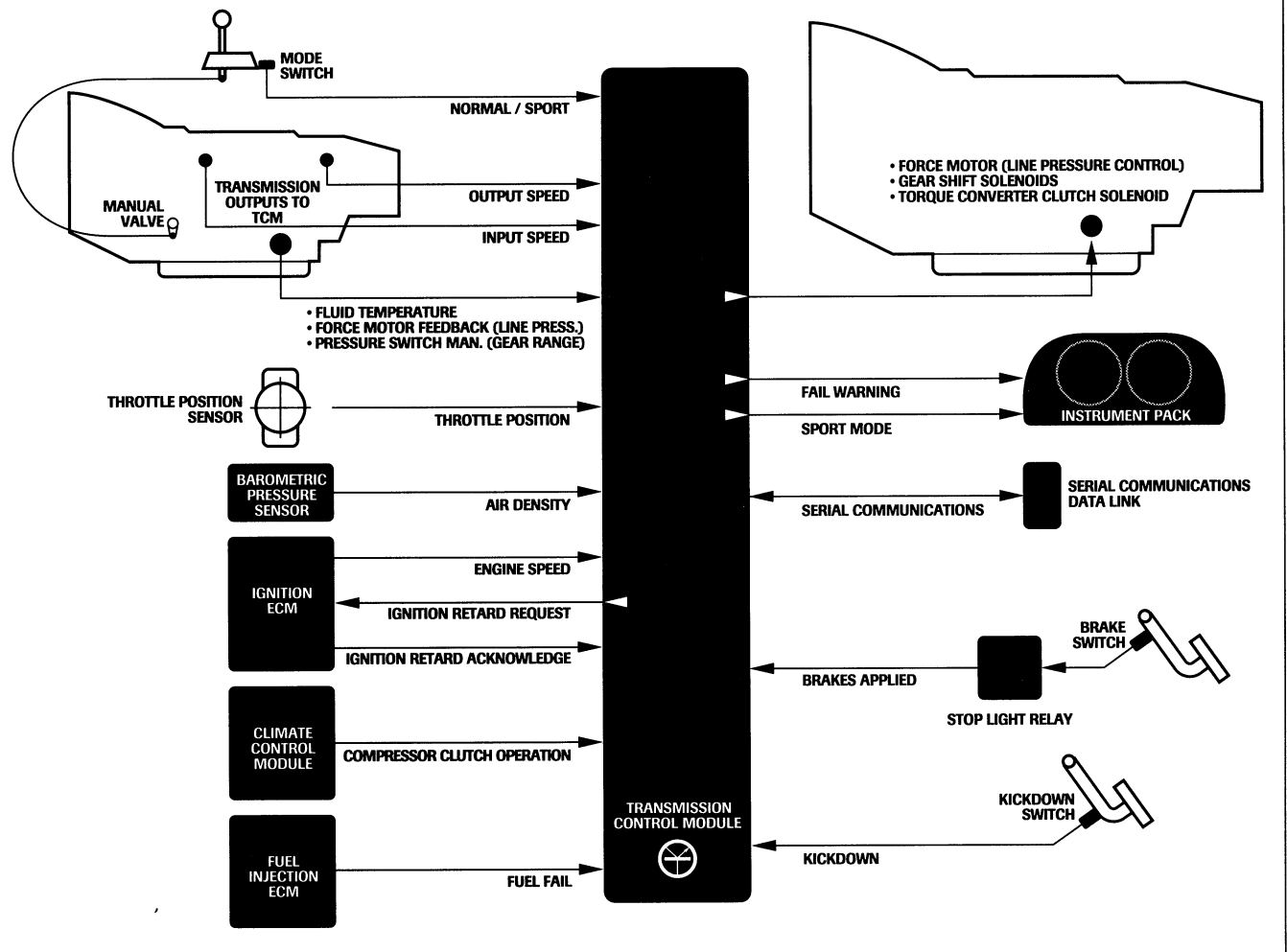
Gear shift solenoids A and B The TCM controls the shift solenoids, based on parameters defined by the operating strategy, by switching the solenoid coil ground circuits. The following table shows the solenoid state combination required for each gear range:

Gear Range	Solenoid A	Solenoid B
P,R,N	ON	OFF
First	ON	OFF
Second	OFF	OFF
Third	OFF	ON
Fourth	ON	ON

Torque converter clutch (TCC) solenoid The rate at which the torque converter lock-up clutch is applied depends on the torque converter clutch signal pressure as controlled by the duty cycle of the TCC solenoid. The TCM varies the duty cycle of the TCC solenoid by controlling the ground circuit. The TCC solenoid, in turn, varies the torque converter clutch signal pressure acting on the lock-up clutch shift valve. By varying the duty cycle of the TCC solenoid, lock-up clutch apply and release occurs smoothly.

Ignition retard request and acknowledge When the TCM senses that a reduction in engine torque is required to allow a "quality shift", a request for ignition retard is output to the ignition ECM. After the ignition has been retarded, the ignition ECM signals the TCM to acknowledge timing retard. When the acknowledgment is received, the TCM initiates the apply or release function.

TRANSMISSION CONTROL MODULE INPUTS AND OUTPUTS



XJS V12 Electronic Four-Speed Automatic Transmission (continued)**Fail safe mode**

If the entire electronic control system becomes disabled, the following occurs:

- both of the shift solenoids will be de-energized, forcing the transmission to operate in Second gear when the gear selector is in a forward drive range,
- the force motor is switched off, increasing line pressure to maximum,
- the pulse width modulated solenoid cannot apply the torque converter lock-up clutch.

Adaptive learning

The TCM programming allows for adjustments in line pressure based on the changing characteristics of the transmission components as sensed from the various TCM inputs. This process is called "Adaptive Learning" and is used to ensure consistent shift patterns and to increase transmission durability. As transmission "apply" components wear and the time required to apply a clutch or band increases, the TCM adjusts line pressure to maintain the originally calibrated shift timing. Line pressure adjustment is accomplished through control of the torque signal fluid pressure, which in turn is controlled by the force motor.

Diagnostics

The TCM continuously monitors the operation of the transmission to detect a fault. When detected, the TCM attempts to rectify a fault with "adaptive learning". If adaptive learning successfully rectifies the fault, the line pressure increase becomes the normal line pressure for that portion of the operating strategy. If the TCM cannot rectify the fault, a diagnostic trouble code (DTC) is flagged and the TCM selects a mode of operation that protects the transmission from damage. DTCs are accessed via serial communication. The following DTCs are available and are listed in the order of priority:

DTC	Input or Component checked	DTC	Input or Component checked
21 ✓	Throttle position high	84	Kick down switch stuck on
22 ✓	Throttle position low	78	Kick down switch stuck off
33	Barometric pressure high	73 ✓	Force motor current
34	Barometric pressure low	69	Torque converter lock-up clutch stuck on
58	Transmission temperature high	39	Torque converter lock-up clutch stuck off
59	Transmission temperature low	83	TCC solenoid circuit fault
79 ✓	Transmission hot	82 ✓	Shift solenoid A circuit fault
53 ✓	System voltage high	81 ✓	Shift solenoid B circuit fault
75 ✓	System voltage low	61	Torque reduction request signal fault
71	Engine speed low	62	Torque reduction acknowledge signal fault
74	Input speed low	89	1 – 2 maximum adapt and long shift
24 ✓	Output speed low	89	2 – 3 maximum adapt and long shift
72 ✓	Loss of output speed	89	3 – 4 maximum adapt and long shift
77	Mode select switch	68 ✓	Overdrive (Fourth) ratio
28 ✓	Pressure switch manifold	85 ✓	Undefined ratio / pressure switch manifold
37	Brake switch stuck on	87 ✓	Shift solenoid B stuck off
38	Brake switch stuck off	86 ✓	Shift solenoid B stuck on

NOTE: ✓ indicates that the DTC will illuminate a transmission warning on the instrument pack.

XJS V12 Propeller Shaft, Differential and Final Drive

The remainder of the drive train is unchanged with two exceptions: the propeller shaft has been shortened slightly due to the increased length of the new transmission, and the axle ratio is changed to 3.54:1 for improved mid-range passing performance.

Suspension tuning

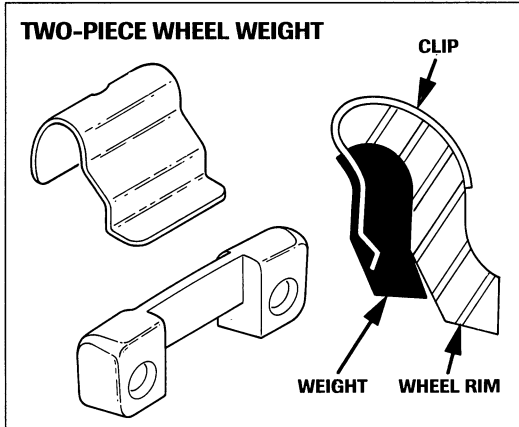
The XJS Range suspension has been re-tuned in conjunction with changes in body work, revised rear suspension and braking, new power train components, and engine power and torque changes. The changes improve comfort and ride refinement while maintaining competitive handling characteristics.

Vehicle ride height

Front and rear suspension revisions have increased ride height on U.S. Market vehicles by 5.0 mm (0.2 in). Canadian vehicles will retain their 1993 ride height.

Wheel balance weights

Two-piece coated wheel balance weights are used with the alloy wheels. 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. The use of a special tool, designed to displace the tire from the rim, will ensure that no damage to the alloy wheel or the tire sidewall occurs. The installed clip must be opened with an appropriate tool while the proper weight is slid under the clip.



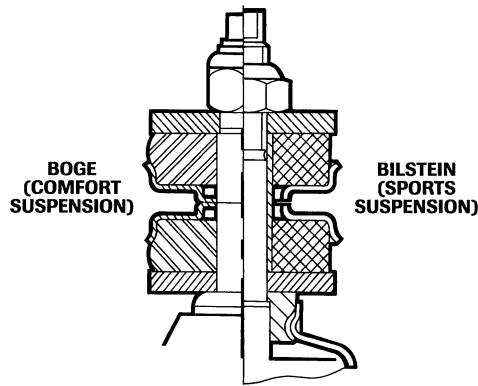
Springs and anti-roll bars

Spring rates and anti-roll bar stiffness have been revised throughout the XJS range. Anti-roll bar diameters have also been reduced.

Front shock absorbers

The sports suspension Bilstein (green) shock absorbers have different upper mountings. The upper washer is located by a sleeve on the shock piston rod.

FRONT SHOCK ABSORBER UPPER MOUNTINGS

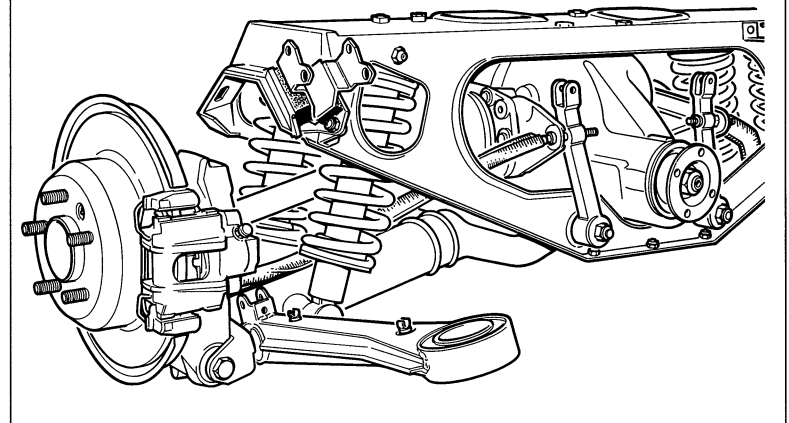


Rear Suspension and Brakes

Outboard rear brakes

The rear suspension has been redesigned to accommodate outboard brakes with new calipers. This arrangement allows for easier servicing and increases the standardization of components with the Sedan Range. The brake assemblies are similar to the Sedan Range type with the discs housing internal shoe type parking brakes.

OUTBOARD REAR BRAKES



Parking brake adjustment

The parking brake shoes are adjusted as on the Sedan Range vehicles utilizing the star wheel adjusters in the parking brake drums. Parking brake cables and linkages are new and will require different setting and adjusting procedures. Refer to the Service Manual for a detailed explanation of the adjustment procedure.

HFC Air Conditioning System

XJS Range vehicles will be equipped with an HFC refrigerant air conditioning system replacing the current CFC refrigerant system. HFC (hydro-fluorocarbon) refrigerants are more friendly to the environment than CFC (chlorofluorocarbon) refrigerants. Although HFC systems function similarly to CFC systems they require unique service procedures and equipment. These new procedures must be strictly followed. New components specifically designed for HFC refrigerant operation cannot be interchanged with CFC components. These include:

- Aluminum refrigerant pipes
- Stainless steel liquid line
- Refrigerant pressure switch
- Clamp type expansion valve
- Receiver drier
- Compressor
- Parallel flow condenser
- R134a couplings
- R134a service ports

NOTE: Initial 1994 model year vehicles will be equipped with CFC air conditioning systems carried over from 1993. Only the HFC system and components are detailed in this publication.

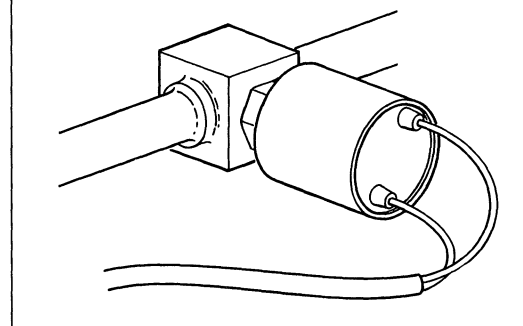
Compressor

Both the AJ6 and V12 engines will be equipped with Sanden R134a compatible compressors as used in the Sedan Range.

Refrigerant dual pressure switch

A refrigerant dual pressure switch located by the right front inner fender in the air conditioning high pressure (liquid) line closes to allow compressor operation at line pressures from 29 to 392 psi (2 to 27 bar).

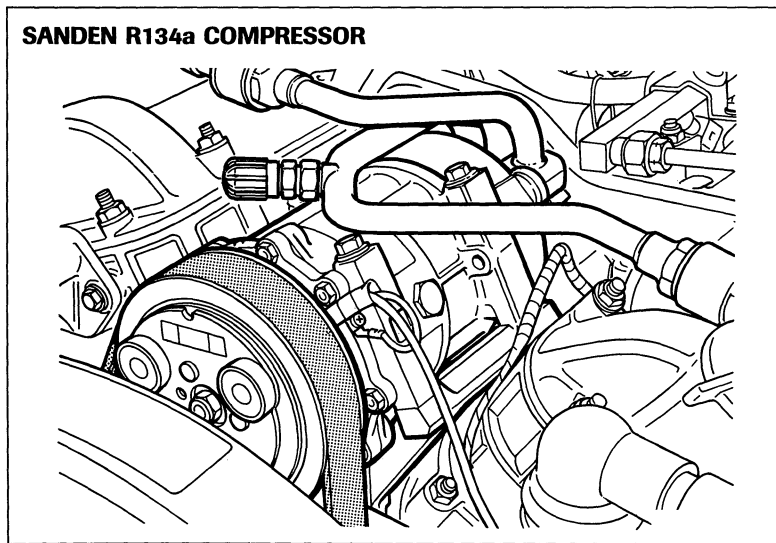
DUAL PRESSURE CUTOUT SWITCH



Condenser and receiver/drier

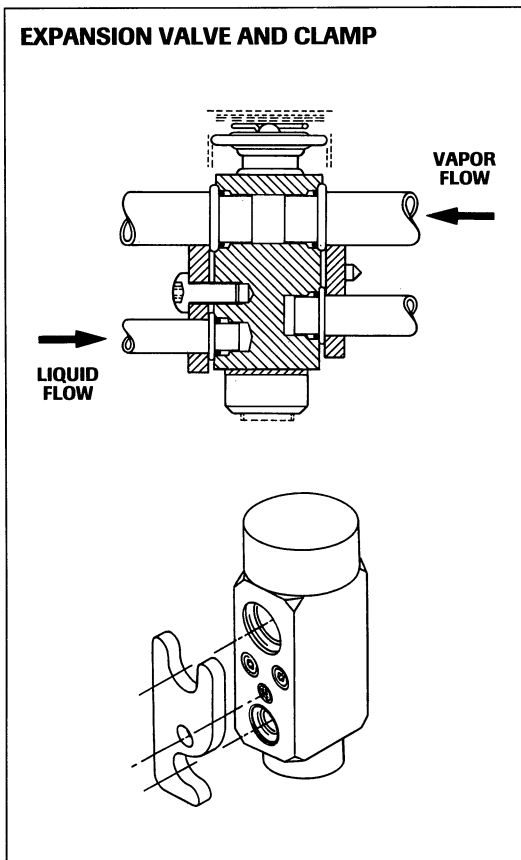
The condenser is constructed of extruded aluminum tubes with corrugated fins. The HFC-compatible receiver/drier is mounted horizontally on the top of the condenser. The receiver/drier sight glass has been eliminated because the combination of HFC refrigerant and PAG lubricating oil gives a milky appearance, making observation an unreliable method of determining state-of-charge.

SANDEN R134a COMPRESSOR



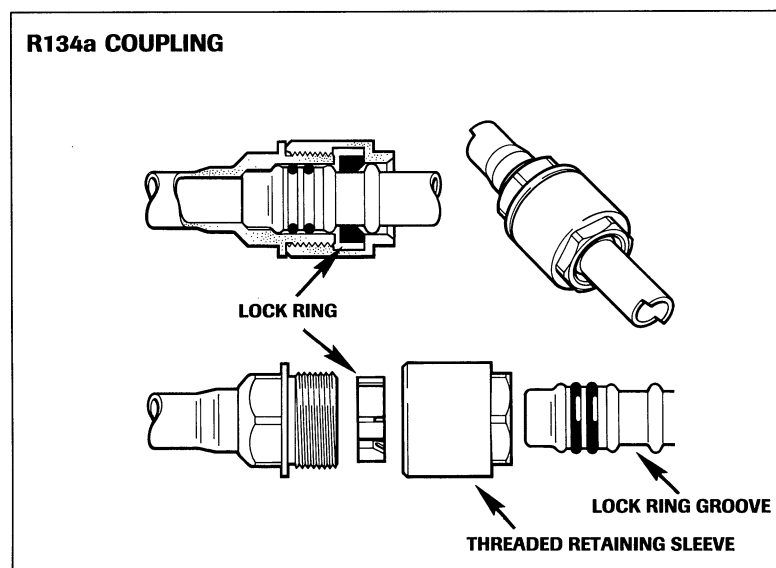
Evaporator and expansion valve

The evaporator is constructed entirely from aluminum. The expansion valve uses clamp plate connections on both sides of the valve. Some of the expansion valve internal parts are made from stainless steel to be compatible with PAG oil.



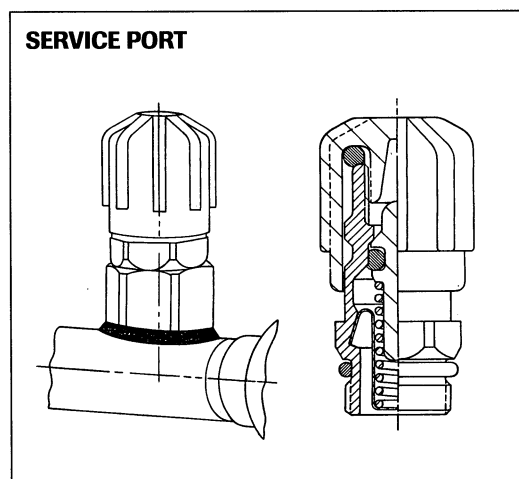
Refrigerant lines and couplings

The refrigerant lines are constructed from aluminum pipes and HFC-compatible flexible hose. Due to the increased operating pressures of R134a systems, couplings at the compressor and at the condenser inlet have been revised to improve sealing. The couplings are disconnected by fully unscrewing the connection (after the system has been de-pressurized). Connection is made by pushing the pipe into the connector after it has been assembled and fully tightened. The threaded retaining sleeve holds the lock ring that snaps around the pipe lock ring groove prior to assembly.



Service ports

The low and high side service ports are designed to accept the SAE standard service port connection, preventing incorrect system charging.

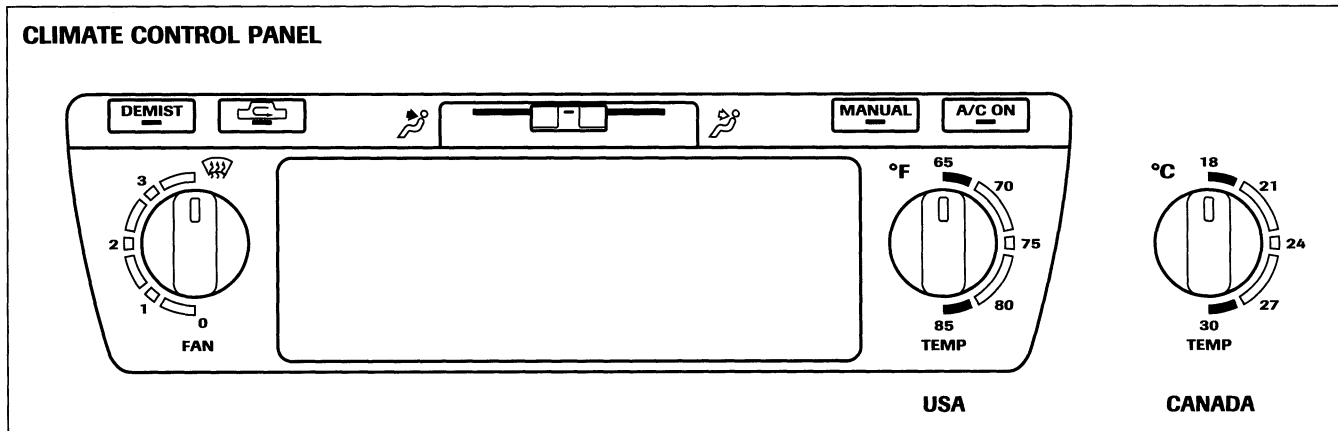


Climate Control System

The climate control system is refined to improve operation and include new functions.

Climate control panel

The climate control panel has revised functions with additional features. Individual buttons have been added to control manual recirculation, defrost (air bleed to windshield), air conditioning on/off, and automatic or manual function. A new temperature differential control is located at the top of the panel. New potentiometers are used for temperature differential and fan speed.

**Climate control module**

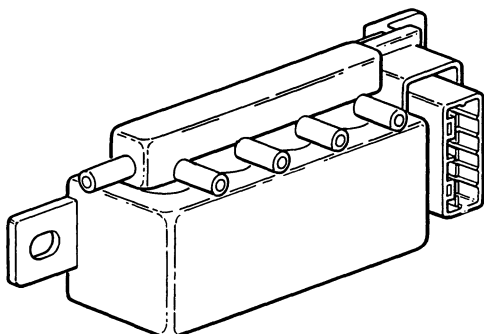
The climate control module has been revised to accommodate new functions and improve temperature stability and consistency of settings. A 45°C engine coolant temperature switch replaces the previous 30°C switch.

Servo motors

Quieter servo motors with reduced backlash react smoother and faster to further aid in stabilizing interior temperature and system reliability.

Vacuum harness and solenoid vacuum valve pack

The vacuum harness and vacuum valves have been revised to simplify assembly and improve reliability. The newly designed harness simplifies assembly and improves reliability. The solenoid vacuum valve pack contains the four vacuum valves for operation of recirculation, defrost, coolant valve and center vent.

SOLENOID VACUUM VALVE PACK

An additional separate main recirculation solenoid vacuum valve is used to bypass the climate control module and provide instantaneous recirculation. This separate main valve is identical to the previous individual valves used in the system.

Ambient temperature sensor

In order to improve response, the climate control ambient temperature sensor has been relocated to the air plenum chamber in front of the windshield.

Blower assemblies

Blower assembly mounting has been revised to accommodate the passenger side air bag and fascia refinements.

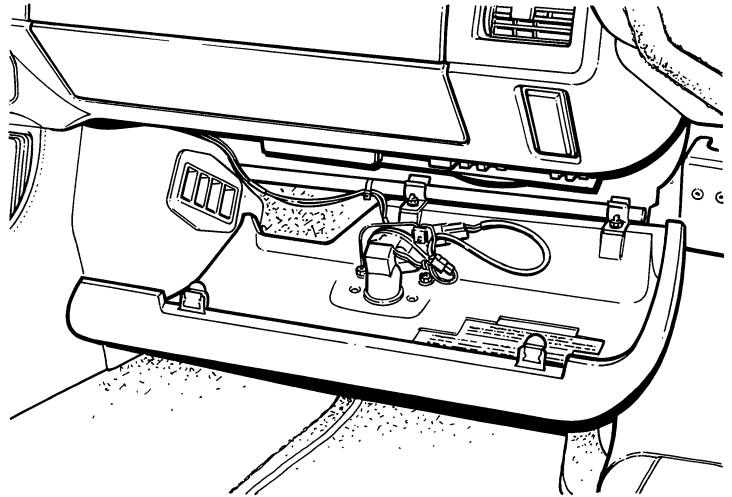
Aspirator

The motorized aspirator is mounted in the lower portion of the passenger knee bolster.

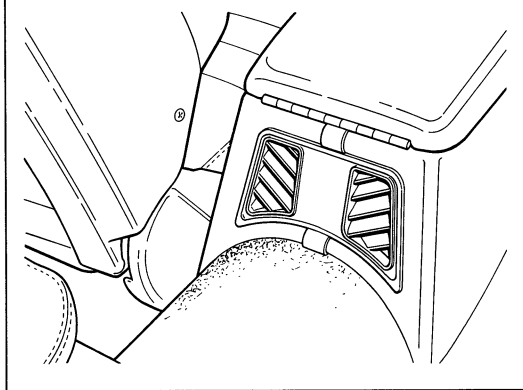
Console ducting and vents

Revisions to the console ducting and air vents, outlined in the interior section of this publication, improve air flow to the rear footwell areas and simplify construction.

ASPIRATOR

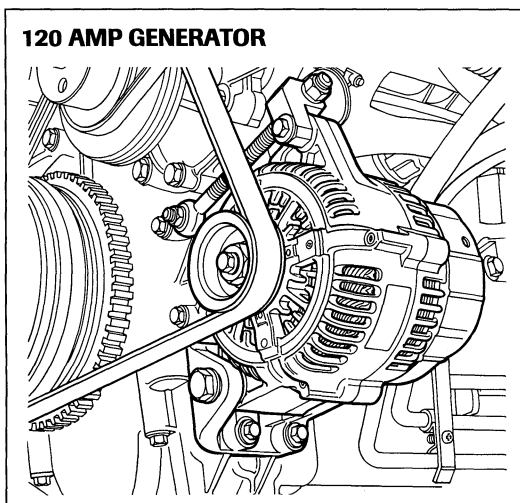


REAR AIR VENTS



Power Supply

The upgraded power supply system introduced in the 1993 model year is retained, with both engines using a 120 amp generator. The 120 amp generator has increased low speed output characteristics to provide an improved battery load balance. A separate load dump module is not required due to the generator's internal overload protection.



Battery tray

The tray for the DIN 66 low maintenance 72 amp hour battery now has a drain tube through the trunk floor.

Wiring Harness and Components

The evolution of the vehicle electrical system continues in an effort to improve reliability and to accommodate new and revised systems and components. The number of components has been reduced and many connectors have been made common with the Sedan Range, resulting in easier servicing.

Harness splices

All harness line splices are ultrasonically welded and covered with heat shrink insulation. Ultrasonic splices provide superior reliability; however, they are permanent and cannot be modified without destroying the splice.

⚠ CAUTION: Do not attempt to repair or modify an ultrasonic splice.

Harness retention

Harness installation along the drive shaft tunnel is greatly improved with the introduction of molded sound deadening material and new floor panels. Harnesses lay in three grooves that run on top of the tunnel and are secured by straps anchored to welded studs.

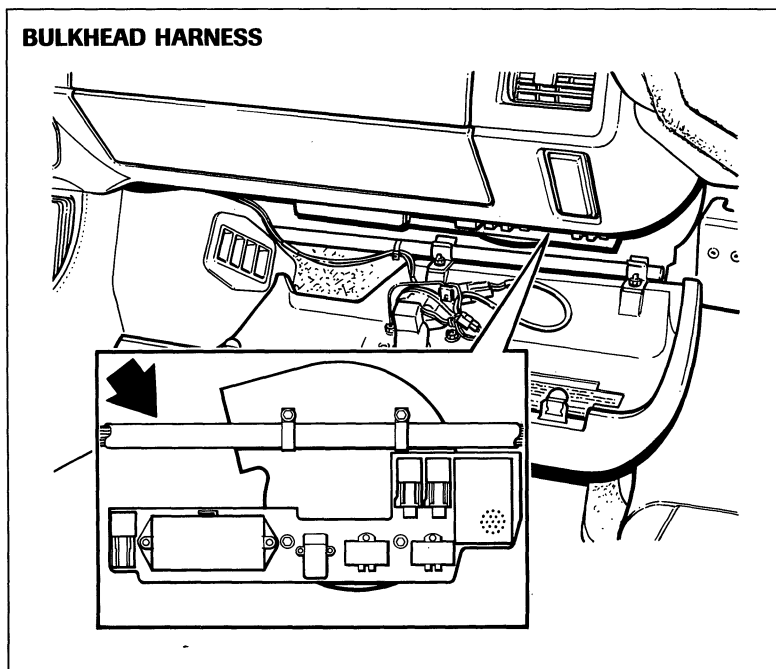
Left Groove: ABS and radio antenna wiring

Center Groove: Main harness

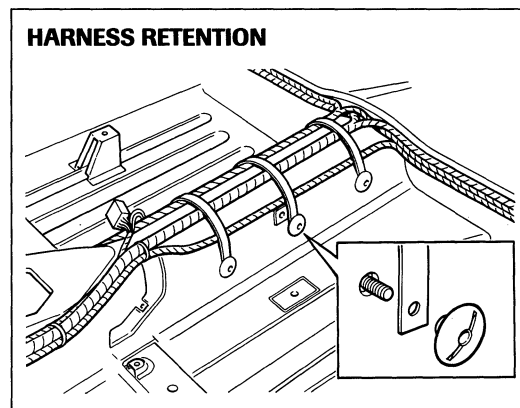
Right Groove: Fuel injection/transmission harness

This arrangement separates the fuel injection/transmission harnesses from the radio antenna cable to reduce the possibility of radio frequency interference.

BULKHEAD HARNESS



HARNESS RETENTION



Bulkhead harness

Beneath the fascia, the bulkhead harness is attached to the blower motor housings.

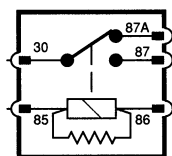
Engine harness

The upper radiator support harness has been deleted due to revisions in fuse placement and harness construction.

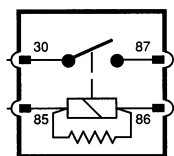
Relays

Individual relays incorporating internal transient protection are used wherever possible.

RELAY CIRCUITS



**NORMALLY OPEN
(LIGHT BLUE CASE)**



**CHANGE-OVER
CONTACT
(VIOLET CASE)**

Switches

Steering column stalk switches Illumination of steering column stalk switch graphics has been deleted.

Seat switch packs The door mounted power seat switch packs have been revised to incorporate a sealed 14-way connector.

Facia switches Revised facia switches are identical in construction and operation as previous switches except they are of momentary touch operation to be compatible with the multi-function unit.

Locate lighting

Dimmer module The dimmer module is revised to incorporate an internally mounted anti-back feed diode.

Gearshift illumination The gearshift illumination switch is upgraded with a Multilock connector replacing the previous bullet connector.

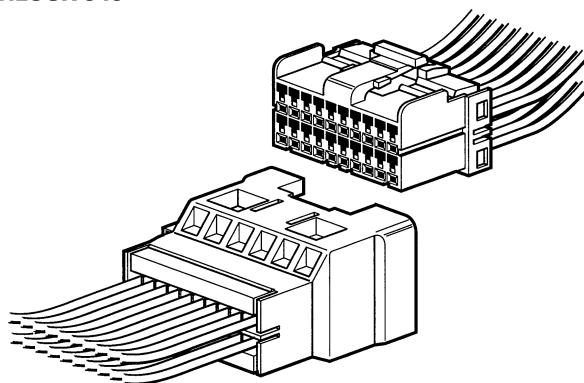
Cigar lighter The new cigar lighter features an SAE socket, an improved connector and a glow-ring surround. The cigar lighter has been standardized for all Jaguar ranges.

Connectors

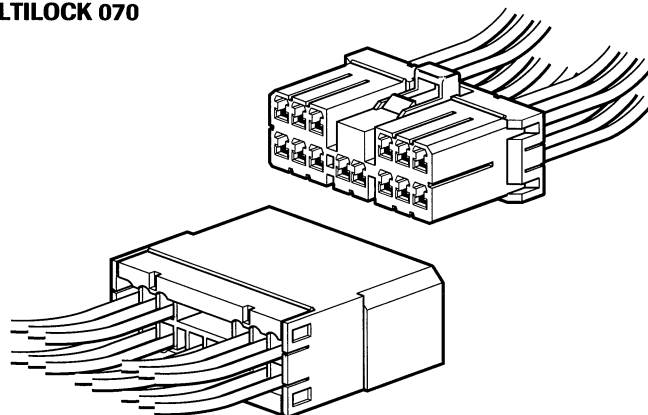
Bullet connectors have been eliminated. The majority of components now use Multilock 040 or 070 connectors. Multilock 040 and 070 connectors are 2- to 20-pin connectors used for both wire-to-wire and wire-to-board connections. Multilock 040 connectors have a current-carrying capacity up to 4.5 amps per contact. Multilock 070 connectors have a current-carrying capacity up to 12 amps per contact. Changed connectors include:

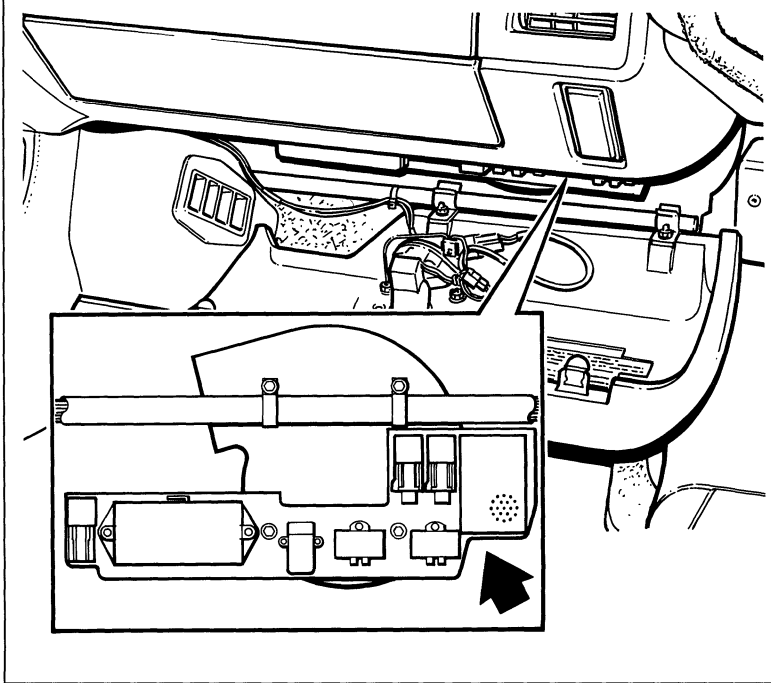
- Speed Interface module
- Speed Sensor
- Door guard light
- Gear selector illumination
- Convertible rear courtesy light

MULTILOCK 040



MULTILOCK 070



MULTI-FUNCTION UNIT**Multi-Function Unit**

A multi-function unit (MFU) has been added to the electrical system to replace individual controls, simplify the system and increase reliability.

Control functions

The MFU simplifies the control of audible and visual warnings and provides outputs for other system interface. It replaces the following individual components:

- Seat belt warning module
- Interior light delay module
- Bulb check unit
- Lights-on audible warning module
- Heated rear window timer

The MFU is mounted on the right component panel under the passenger air bag.

Multi-Function Unit operation summary

Function	Condition	Warning / Output
Seat belt warning	Driver's seat belt unlatched, ignition ON	Single chime plus warning light for 6 seconds
	Driver's seat belt latched, ignition ON	Warning light only for 6 seconds
Key in ignition	Ignition OFF, key in and driver's door open	Double chime
Lights on	Parking or headlights ON, ignition key out of switch and driver's door open.	Double chime
Bulb check	After ignition switched ON	Low wash, park brake, and brake fluid warning lights ON for 2.5 – 3 seconds
Security	Door open	Output to security system ECM
Heated rear window	Ignition ON, heated rear window switched ON	Indicator light on while window heating is activated (approximately 10 minutes)
Interior light delay	Ignition OFF; key out	Interior lights ON when door is opened. Interior lights OFF in approx. 10 sec after last door closed or ignition switched on
Interior light delay	Ignition ON	Interior lights ON when door is opened for approximately 2 minutes
Interior light delay	Key out	Interior lights OFF in approximately 2 minutes if doors are left open. After doors are closed, timer will reset in approximately 10 seconds.

Multi-function unit fault diagnosis

The MFU unit has a diagnostic facility for operator assisted diagnosis of inputs, outputs and MFU functions.

Input diagnostics The input diagnostics procedure determines if the system inputs are at fault, and verifies the input signals. The procedure is carried out as follows:

To determine if the system inputs are at fault, sit in the car with the doors closed and the seat belts unlatched. Be sure the parking and headlights are off. Press and hold the heated rear window switch. Switch on the ignition, then release the heated rear window switch. If the warning chime does not sound, all system inputs are OK and are not at fault.

To verify if the input signals are OK, latch and unlatch the driver's seat belt. The chime should sound while the belt is latched. Open and close the driver's and passenger's doors separately. The chime should sound while each door is open.

NOTE: The ignition key-in switch signal, ignition ON / OFF signals and heated rear window switch inputs are tested by default.

Output diagnostics The output diagnostic mode and procedure inhibits all inputs and tests output functions only. The heated rear window switch is used to cycle the MFU through its output diagnostic sequence. As each output function is selected, the MFU should operate its circuit loads. If the MFU fails to operate the circuit, a chime will sound. The procedure is carried out as follows:

- 1 Switch on the parking lights. Press and hold the heated rear window switch while switching on the ignition, then release the heated rear window switch. All outputs and warnings should be inactive.
- 2 Touch the heated rear window switch to activate the heated rear window circuit. The heated rear window should energize and the indicator should light. Touch the heated rear window switch to cancel the heated rear window circuit.
- 3 Touch the heated rear window switch to activate the interior lights. The interior lights should switch on. Touch the heated rear window switch to cancel the interior light circuit.
- 4 Touch the heated rear window switch to activate the seat belt warning light circuit. The seat belt warning should light. Touch the heated rear window switch to cancel the seat belt warning light circuit.
- 5 Touch the heated rear window switch to activate the low wash fluid, park brake and brake fluid circuits. The low wash, park brake and low brake fluid warnings should light. Touch the heated rear window switch to cancel the low wash, park brake and brake fluid circuits.

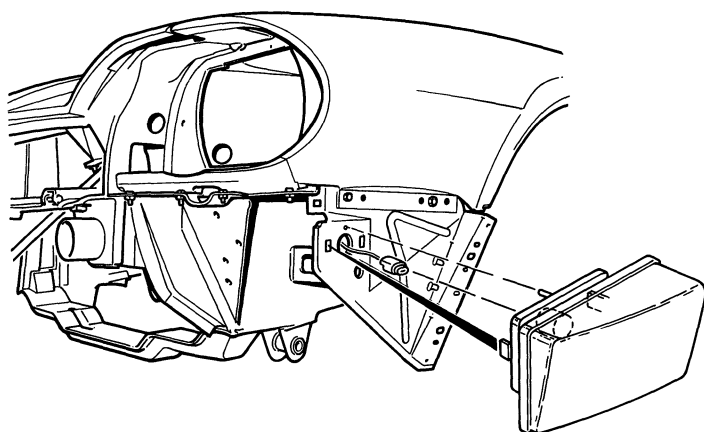
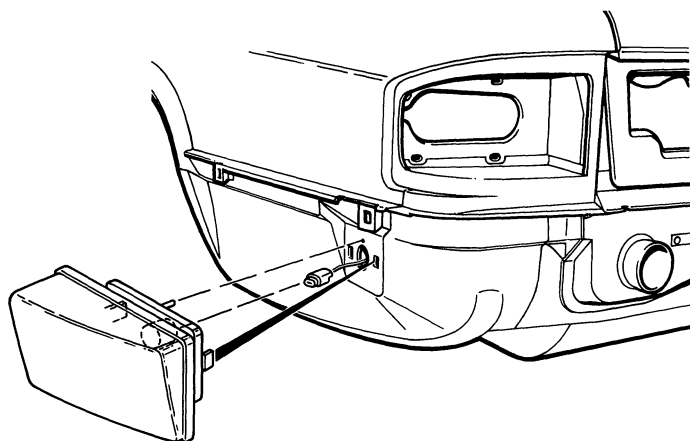
The output diagnostic mode is canceled by switching the parking or headlights lights off.

Exit diagnostics and MFU reset After completing the diagnostic procedure, switch off the ignition to exit diagnostics and reset the MFU.

Lighting**Turn signals / side markers**

New front and rear turn signal and side marker lights are styled to match the design of the revised bumpers. Replacement of the side marker or rear reflector assemblies requires removal of the moulded polyurethane bumper cover. The lights themselves mount to the body with integral clips. Bulb access is through the wheel arch access doors at the front and behind the trunk panels at the rear. The bulb holders twist to remove.

Front turn signal lights are restyled but are serviced as in previous years by removing the two screws on the face of the light then twisting the bulb holder to remove the bulb.

FRONT SIDE MARKER LIGHTS**REAR SIDE MARKER LIGHTS****Bulbs**

Long-life krypton-gas filled bulbs are smaller in size and provide greater illumination combined with extended service life. These bulbs are specified for the following locations:

- Turn signals
- Stop / tail lights
- Reverse lights
- High mount stop lights
- Side marker lights

Six new conventional bulbs are also specified:

- Door guard lights 12V 5W Festoon 239
- Interior light: upper 12V 5W Capless 286
- Map light 12V 5W Halogen 468
- Rear side int. light (Conv) 12V 10W Festoon 265
- Fog light: front 12V 55W Halogen 479 H2
- Sun visor vanity mirror 12V 1.2 Capless 286

Audio System**Speaker system: Convertible 2+0**

The two-place convertible is equipped with six speakers. The two door speakers and rear bass speakers are located the same as in 1993. Two additional speakers are added to the rear, one in each rear quarter. The 2+2 convertible has a four-speaker system.

Antenna assembly

The previous automatic radio antenna is replaced with a new simplified unit. The new antenna features more positive electrical and coaxial connections with the time delay function built into the unit. Installation remains the same, with mounting brackets altered for the new unit.

Instrument Pack

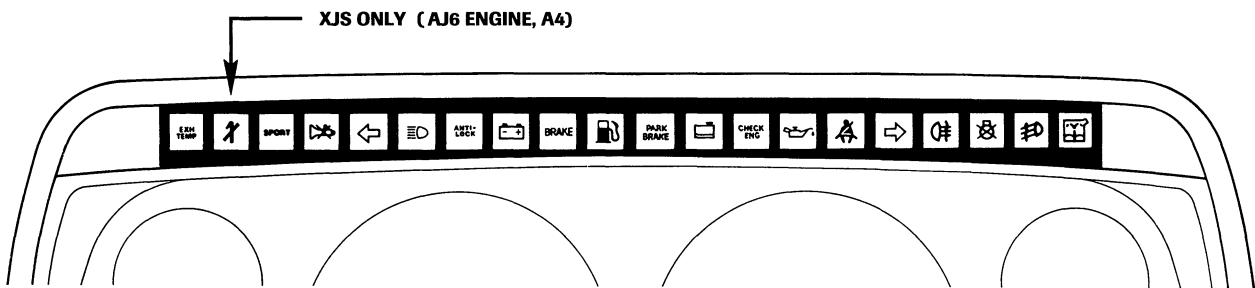
Warning and indicator lights

Instrument pack warning and indicator lights have changed to incorporate the DELETE FIRST function of the three mode ZF 4HP 24E automatic transmission. Other warning lights have been rearranged along with their respective connector pin allocations.

Non-interchangeable

The new instrument pack is not electrically interchangeable with earlier versions. The flexi-circuit is colored green to identify it from the earlier blue units.

INSTRUMENT PACK WARNINGS AND INDICATORS

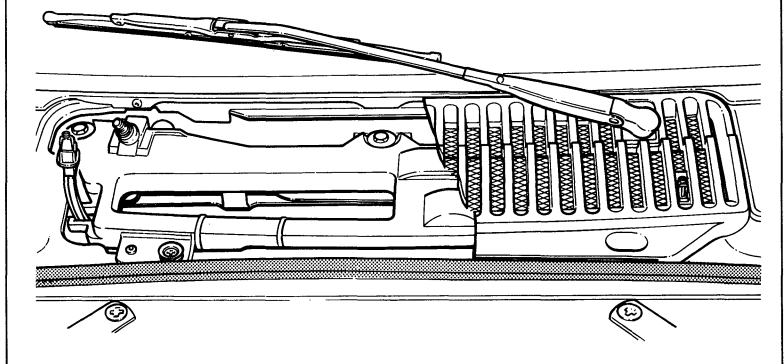


Power wash system

Power wash jets

The power wash system has self regulating, PTC (positive temperature coefficient) heated jets. This system eliminates the previous need for ambient air temperature sensor control of the heated jets. The new jets are fitted to the windshield wash and headlight power wash systems.

WINDSHIELD WASH JETS

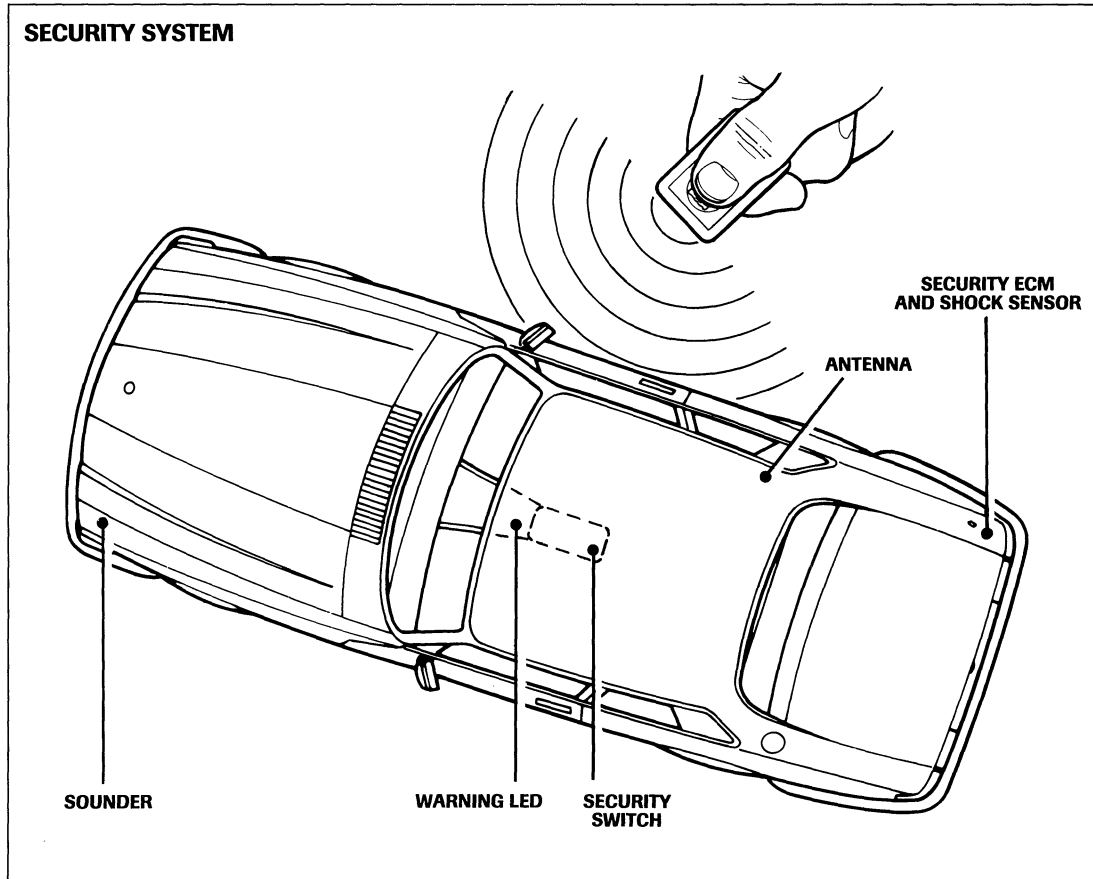


Security System

The factory integrated security system fitted in the 1994 XJS Range is derived from the system introduced in the 1993 Sedan Range.

System layout and features

The new XJS security system provides both audible and visual alarms. In addition to the standard security and convenience features, the system can be equipped with a shock sensor. The system is supplied with two radio frequency (RF) key fob transmitters.



Audible and visual alarms (FULL ALARM) The audible alarm is an intermittent siren and quiet zone lasting 90 seconds, then repeating twice. The visual alarm consists of flashing the headlights (low beams), the side lights and tail lights, the turn signals, and the interior lights. Other alarms and warning tones are explained on page 49.

Standard features Standard system features include: remote lock/unlock, engine starter disable, transmitter signal received indicator (chirp and side lights flash), security OFF reminder tone, quiescent current shutdown, alarm restart (battery removed) and emergency disarm procedure.

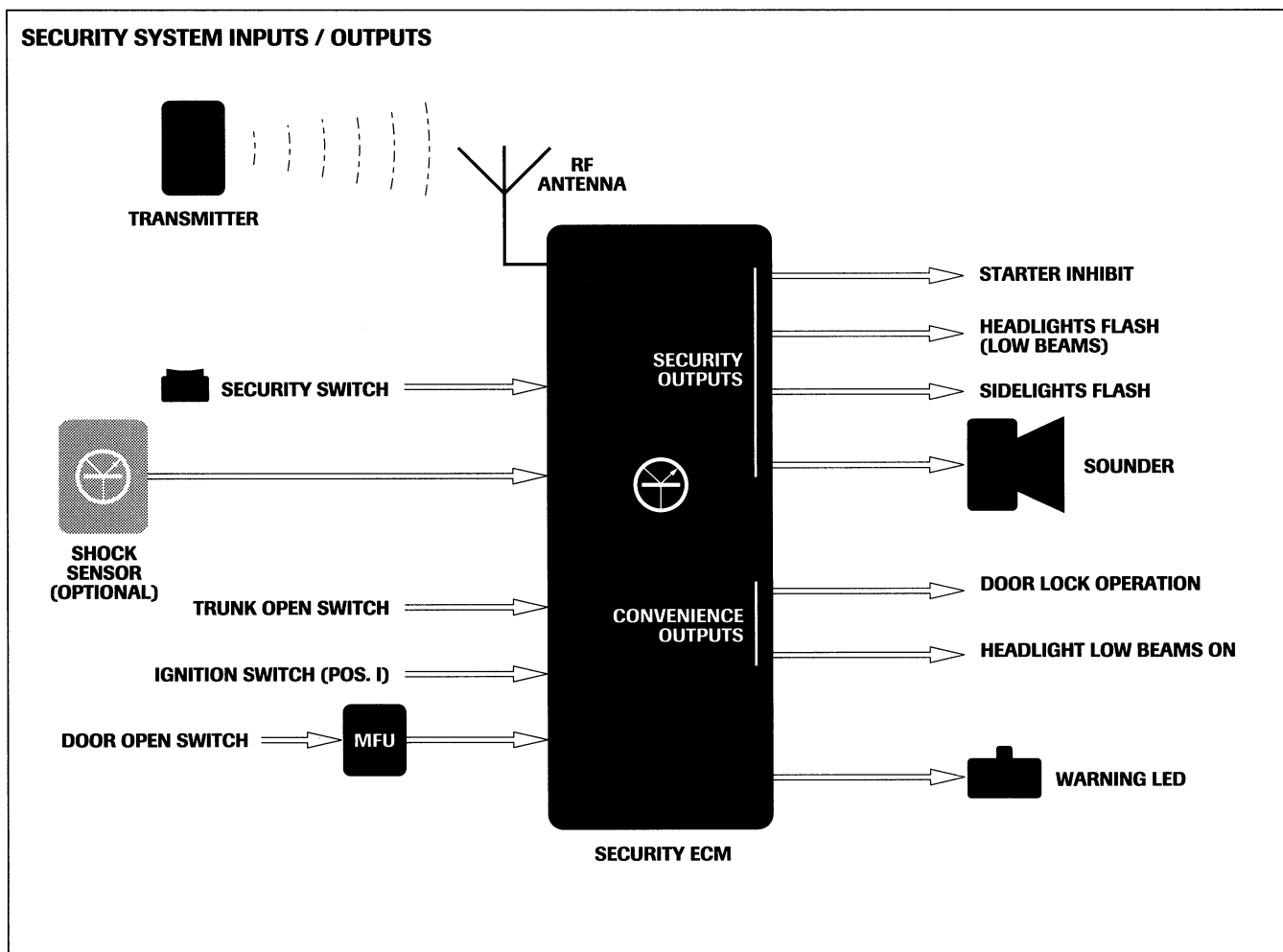
Dealer-programmable standard features The following programmable features are initially enabled:

- Active arming
- Audible confirmation of transmission
- Remote headlight convenience
- Remote panic alarm

At the customer's option, active arming can be changed to passive arming and the remaining features can be disabled, both by the dealer, using JDS.

Dealer-installed accessory security features

Shock sensing is a dealer-installed feature requiring additional parts.



Inputs to the security ECM The ECM receives inputs from the following sources:

- Door open switches (via Multi-Function Unit)
- Trunk open switch
- Ignition switch (position I)
- RF transmitter (via antenna)
- Security switch
- Shock sensor (optional)

Outputs from the security ECM The ECM outputs to the following systems and components:

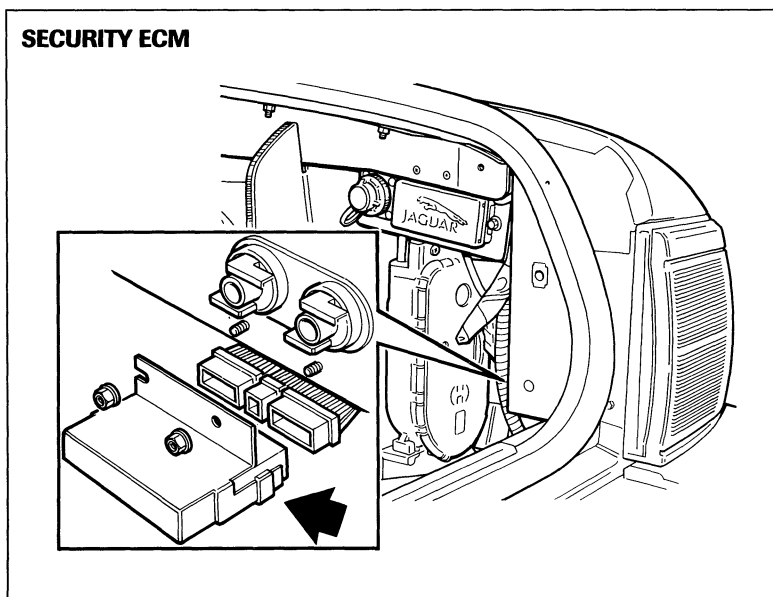
- Headlights flash (low beams)
- Side lights flash
- Horn sounding
- Security system sounder tones
- Warning LED

Vehicle function control The ECM controls the following vehicle functions:

- Starter inhibit
- Central door locking
- Headlights ON (low beams)

Security System (continued)**Security system components**

Security system ECM The system is built around the microprocessor based security ECM, which interfaces with vehicle inputs and outputs, controls vehicle functions and interfaces with the remainder of the security system. All of the interfaces and functions are microprocessor controlled by the security ECM software. Located in the right rear corner of the trunk, the ECM is the RF receiver for the system. The ECM connects to the serial communications data link for diagnosis and programming.



Shock sensor The dealer-installed accessory shock sensor detects impacts or jarring motions and inputs directly to the security system ECM. The shock sensor is located beside the security system ECM.

Key fob RF transmitter The transmitter has a single button to operate all system functions. Since it is an RF transmitter, it does not have to be aimed at the vehicle. The nominal range of the transmitter is approximately 50 feet. This is made possible by an integral coaxial antenna located in the vehicle harness. Note that the transmitter range will vary with environmental conditions and transmitter battery voltage.

Security switch The security switch, located in the center console storage box, operates only when the system is disarmed. In the OFF position, the switch will inhibit the operation of the security system and allow remote lock/unlock and headlight convenience only.

IMPORTANT: Initial production 1994 vehicles will not be equipped with a security switch.

Warning LED The red LED is located on the cigar lighter bezel. The LED flashes once every four seconds when the security system is armed, or when the system locks the doors in the security OFF mode.

Sounder The sounder is a powerful speaker located to the rear of the left headlight.

Operating the security system

The basic operation of the security system requires a single press of the transmitter that will cause the system to lock and arm the vehicle, or to unlock and disarm the vehicle.

Prior to locking and arming, the system emits a short chirp, flashes the side lights once and inhibits the engine starter circuit. The system performs a self-test. When the vehicle is unlocked and disarmed, the system emits two chirps, flashes the side lights twice and clears starter inhibit. If the system detected a fault during the self-test, it will emit a third chirp and visual flash when disarmed.

Remote headlight convenience Pressing the transmitter for a second time within three seconds of locking and arming will activate the headlight low beams for 25 seconds. Remote headlights are a standard feature.

Remote panic alarm A maintained press of the transmitter for six or more seconds (other than within three seconds of locking and arming) will activate the system panic alarm. This alarm is the same as the full alarm and will continue for five times the duration of the full alarm or until the ignition is switched to position I. Panic alarm is a dealer-programmable function that can be disabled at the customer's option.

Security functions

In addition to monitoring the ignition, door and trunk switches, the security system supplies a number of other features.

Starter inhibit When the system is armed, the security ECM inhibits the engine starter by "opening" the circuit to the starter relay. The circuit is completed only when the security system is disarmed.

Passive arming (automatic arming) The security system will automatically arm if the vehicle is left with the ignition off and the doors and trunk closed for more than 30 seconds. The doors will not automatically lock when the system passively arms. To disarm a passively armed vehicle requires that the transmitter be pressed or the ignition switched on. Passive arming is a dealer-programmable function that can be disabled at the customer's option.

Alarms and warning tones The system provides several warnings and alarms:

ERROR TONE The error tone is a high pitched tone emitted when the transmitter is pressed to arm the system while one or more of the following conditions exist:

- a door or doors are open; the trunk is open
- the ignition is on
- a door has not been closed since the ignition was switched off.

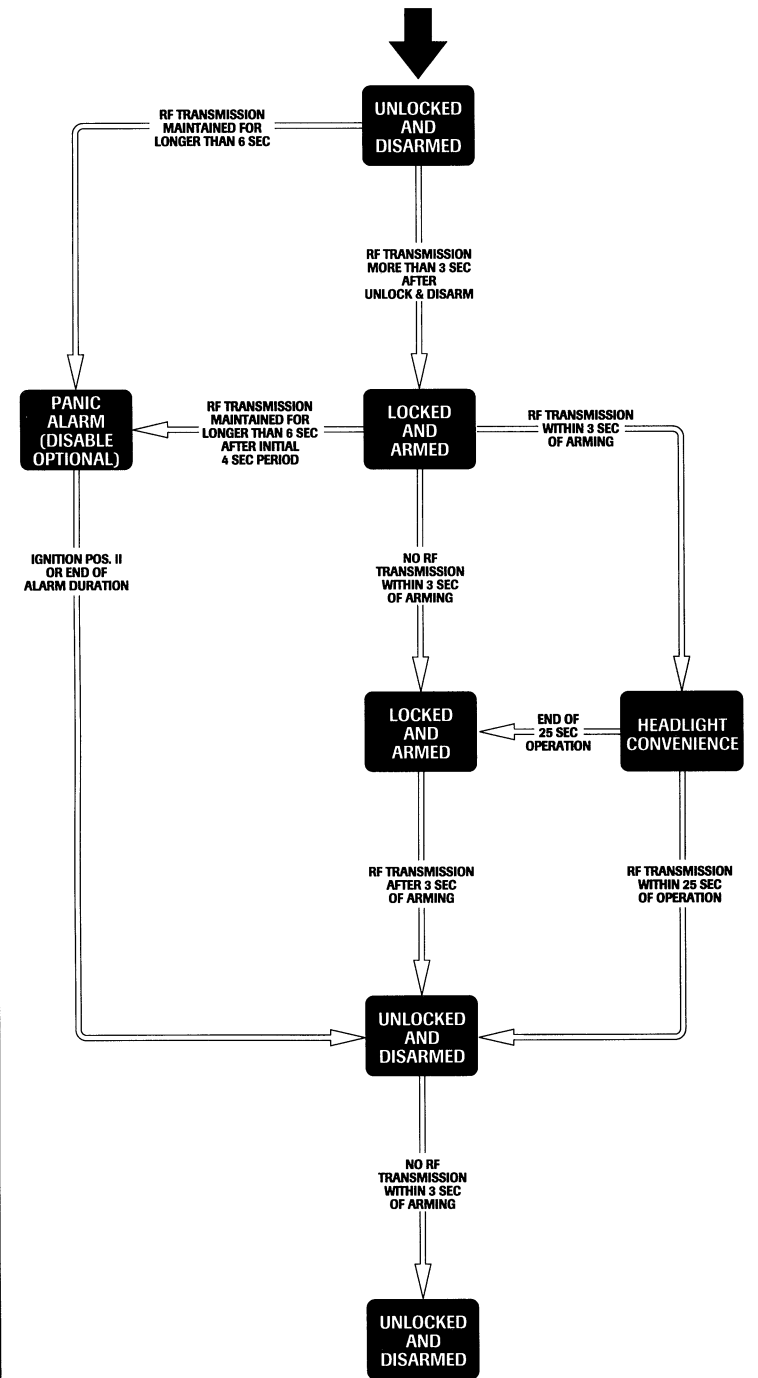
DOOR UNLOCK WARNING The door unlock warning is a repeated chirping tone emitted if a door is unlocked using the key after the system has been actively armed, or if the central locking fails.

ESCALATING RESPONSE An alarm tone that gradually gets louder over its seven-second duration is the second warning that the system is actively armed and a door is opening. If the system is not disarmed during this seven second period, the system will activate the full alarm.

AUDIBLE TICKING A ticking tone that has a 15-second duration audible ticking is equivalent to the escalating response when the system has been passively armed. If the system is not disarmed during this 15 second period, the system will activate the full alarm.

FULL ALARM The full alarm is the combined audible and visual alarm.

SECURITY SYSTEM OPERATION



Security System (continued)**Security functions (continued)**

Emergency disarm If the transmitter is inoperative or is lost, the system can be disarmed by cycling the ignition switch ON/OFF three or more times within 15 seconds of a door being opened.

Alarm restart If, while the system is armed, the battery is disconnected during or after a full alarm, the system will automatically rearm and reinstate the full alarm when the battery is reconnected. Starter inhibit will be maintained. The system then must be disarmed using either the transmitter or the emergency disarm procedure. This feature prevents defeat of the system by disconnection of the battery.

Anti-scan If the system receives more than 10 different RF transmissions within a short period of time (approximately one minute), the security system will not disarm for approximately one hour. This feature prevents defeat of the system by thieves employing frequency scan.

Quiescent current shutdown

If the security system remains armed for an extended period, the system will initiate a phased shutdown to reduce quiescent current (current drain) and extend the life of the battery. After 28 days, the ECM will switch off the RF receiver. The vehicle must then be unlocked manually. When the driver returns to the vehicle, the manual unlocking of the vehicle will cause the RF receiver to be reinstated and allow the system to be disarmed using the transmitter.

Programming the ECM

The ECM is programmed by the dealer using JDS software issue DBC 4065.

Coding for new transmitters

Two transmitters are supplied with each vehicle; however, the system may be coded for use with up to five transmitters. If new or additional transmitters are requested, the system must be recoded with all of the transmitters for the vehicle at hand (from one to five transmitters). Coding for new transmitters is accomplished using the JDS set-up procedure.

Serial Communication

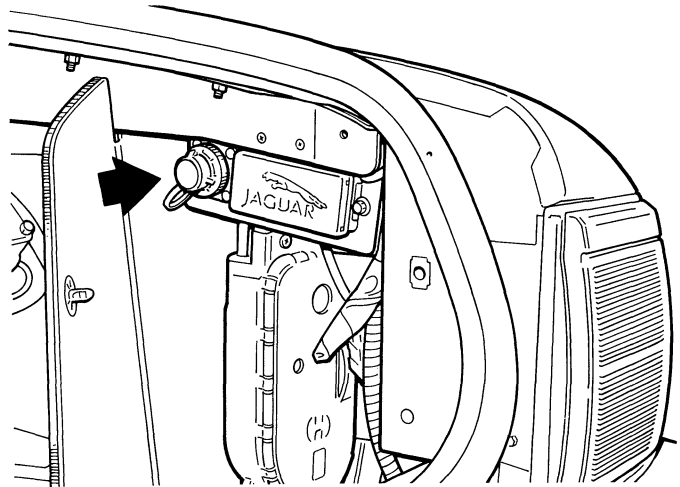
The 1994 XJS Range incorporates a serial communication data link for communication with many of the vehicle control modules. The Data Link Connector (DLC) is located in the trunk behind the right rear side panel. Serial communication is used for Diagnostic Trouble Code (DTC) retrieval, fault diagnosis and programming optional features on the security system.

The vehicle control modules on the serial communication data link are as follows:

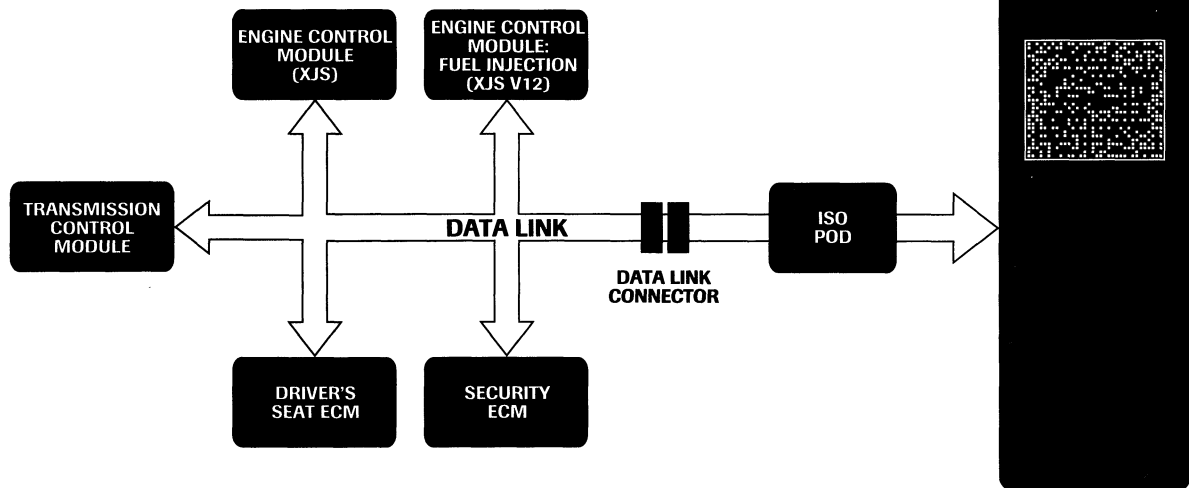
- Engine control module (XJS)
- Engine control module: Fuel Injection (XJS V12)
- Transmission control module
- Driver's seat ECM
- Security system ECM

The ABS and Climate Control systems have individual diagnostic connection.

DATA LINK CONNECTOR



SERIAL COMMUNICATION DATA LINK



Fuse Identification and Location**Left fuse panel**

Number	Color	Value	Circuit
1	Lt. Blue	15A	Driver's seat movement - fore, aft, lumbar
2	Tan	5A	Cruise control
3	Yellow	20A	Left blower
4	Tan	5A	Radio memory
5	Red	10A	Radio power
6	Tan	5A	Interior lights
7	—	—	Not used
8	Red	10A	Windshield washer pump
9	Red	10A	Driver's seat heater
10	—	—	Not used
11	Red	10A	Trunk lighting
12	Yellow	20A	Driver's seat movement - recline
13	Tan	5A	Trip computer memory; gear shift interlock
14	Tan	5A	Power mirrors; door switch packs; seat memory
15	Tan	5A	Heated washer jets
16	Tan	5A	Trip computer speed interface; gear shift interlock
17	Tan	5A	Rear fog lights
18	Orange	7.5A	Locate lighting; instrument pack lighting
19	Red	10A	Hazard warning; seat belt logic
20	—	—	Not used
21	—	—	Not used
22	Lt. Blue	15A	Heated Rear Window

Right fuse panel

Number	Color	Value	Circuit
1	Lt. Blue	15A	Passenger's seat movement - fore, aft, lumbar
2	Red	10A	Central locking
3	Yellow	20A	Right blower
4 *	Tan	5A	Air conditioning compressor relay
4 **	Tan	5A	Air conditioning compressor relay; supplementary air valve
5	Lt. Blue	15A	Horns
6	Brown	7.5A	Turn signals
7 *	Red	10A	Engine management system main relay
7 **	Lt. Blue	15A	Fuel injection main relay; ignition system power
8	Lt. Blue	15A	Windshield wash/wipers (logic module)
9	Red	10A	Passenger's seat heater
10	Tan	5A	Transmission memory
11	Lt. Green	30A	ABS ECM
12	Yellow	20A	Passengers seat movement - recline
13 *	Red	10A	Purge valve; air injection
13 **	Red	10A	Purge valves; air injection; hot start
14 *	Tan	5A	Engine management system memory
14 **	Tan	5A	Fuel injection memory
15	Tan	5A	Climate control (ECM and control circuit)
16	Red	10A	Cigar lighter
17	Lt. Green	30A	Headlight power wash

* XJS (AJ6 engine)

**XJS V12 (V12 engine)

Fuse Identification and Location**Right fuse panel (continued)**

Number	Color	Value	Circuit
18	Lt. Blue	15A	Not used
19	Lt. Blue	15A	Stop lights
20 *	Yellow	20A	Engine management system power
20 **	Tan	5A	Transmission (shift solenoids) power
21 *	Red	10A	Transmission power
21 **	Tan	5A	Transmission control module power
22	Lt. Green	30A	ABS Pump

Left front fuse panel

Number	Color	Value	Circuit
1	Lt. Blue	15A	Not used – USA; daytime running lights – Canada
2	Lt. Blue	15A	Front Fog Lights
3	—	—	Not used
4 *	Red	10A	Auxiliary cooling fan
4 **	Lt. Green	30A	Auxiliary cooling fan
5	Red	10A	Left headlight high beam
6	Red	10A	Right headlight high beam
7	Tan	5A	Left front side lights
8	Tan	5A	Right front side lights
9	Brown	7.5A	Left headlight low beam
10	Brown	7.5A	Right headlight low beam
11	—	—	Not used
12	Tan	5A	Not used

Right rear fuse panel

Number	Color	Value	Circuit
1	Tan	5A	Cellular telephone power
2 *	—	—	Not used
2 **	Yellow	20A	Fuel pump B
3	—	—	Not used
4	Tan	5A	Right tail, right license plate lighting
5 *	—	—	Not used
5 **	Yellow	20A	Fuel injection power
6	Tan	5A	Cellular phone memory
7	Tan	5A	Reverse lights
8	Tan	5A	Serial communications data link
9	Red	10A	Oxygen sensor heater(s)
10	Red	10A	Radio antenna
11	Orange	7.5A	Security system
12 *	Yellow	20A	Fuel pump
12 **	Yellow	20A	Fuel pump A

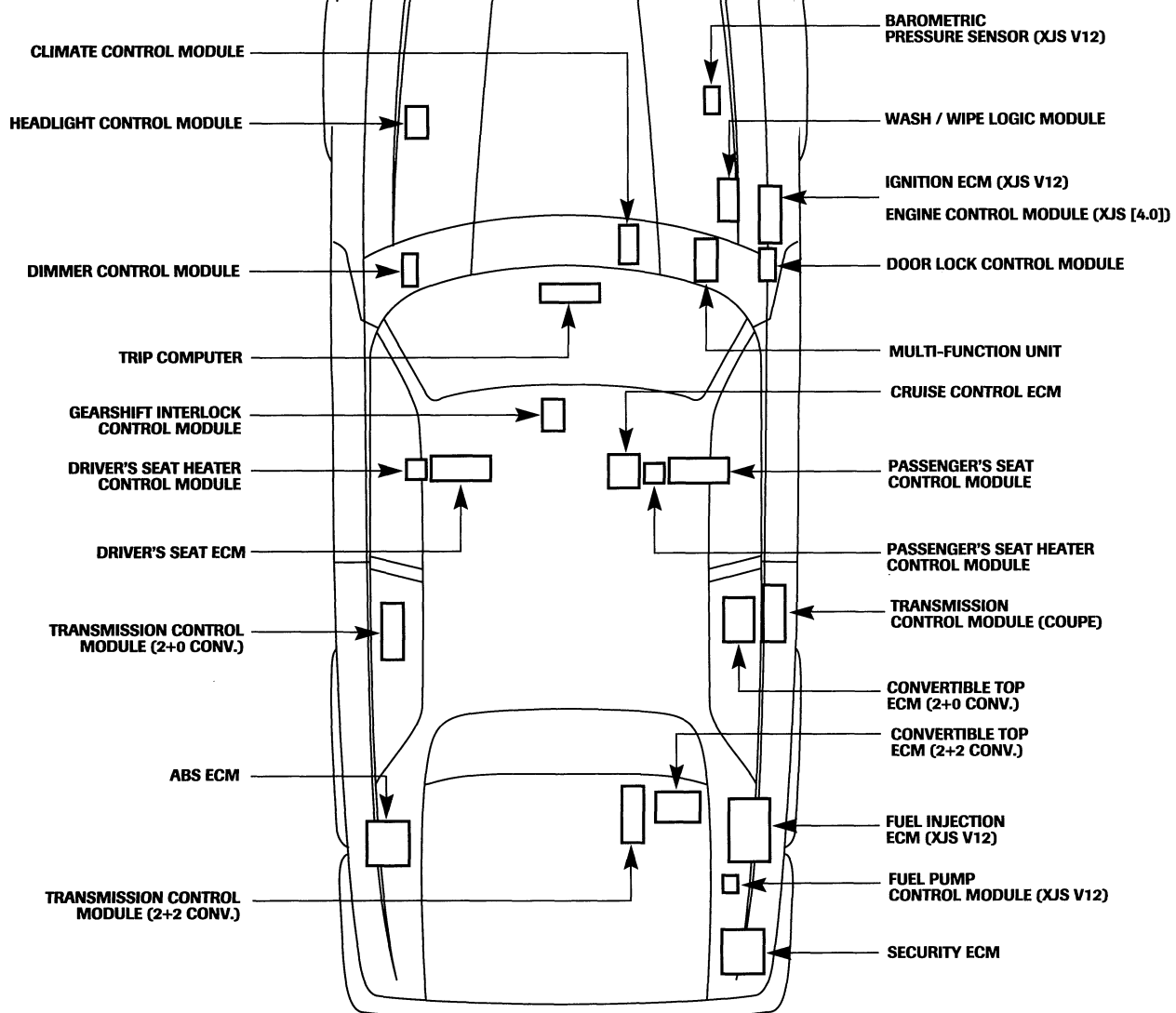
Left rear fuse panel

Number	Color	Value	Circuit
1	Tan	5A	Trailer left tail lighting
2	Tan	5A	Trailer right tail lighting
3	Tan	5A	Right tail, right license plate lighting

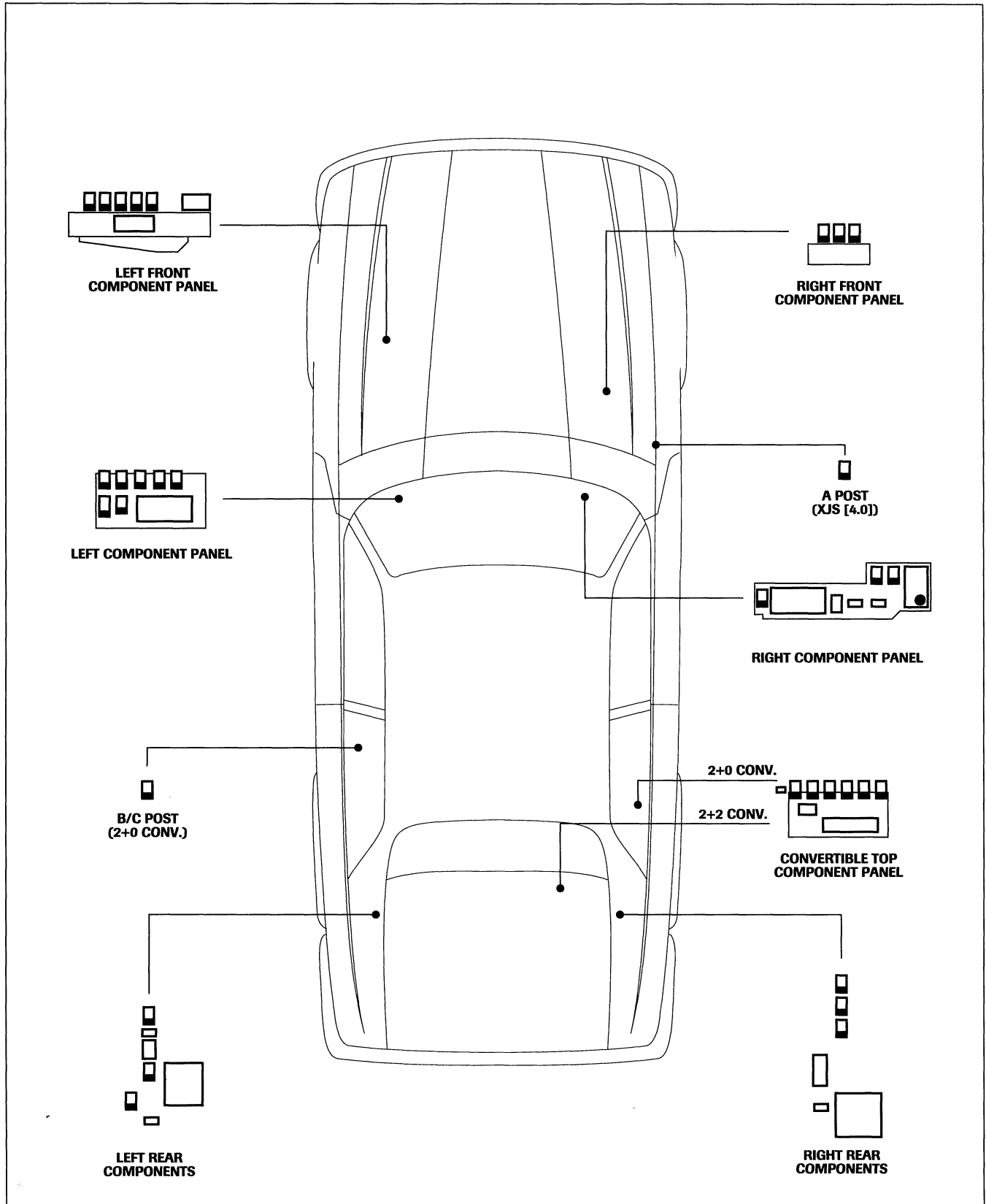
* XJS (AJ6 engine)

**XJS V12 (V12 engine)

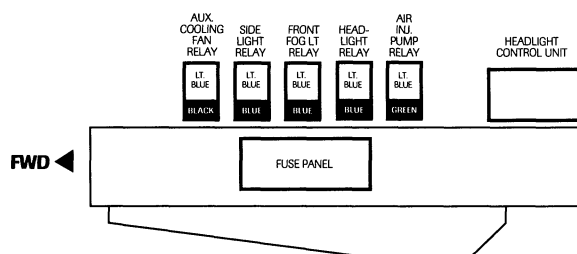
Vehicle Control Module Identification and Location



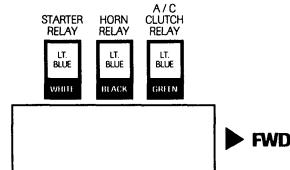
Component Panel Location — see pages 56 - 57 for detailed relay identification



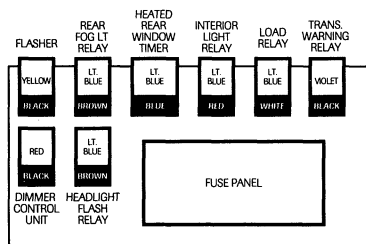
Relay Identification and Location: XJS (4.0)



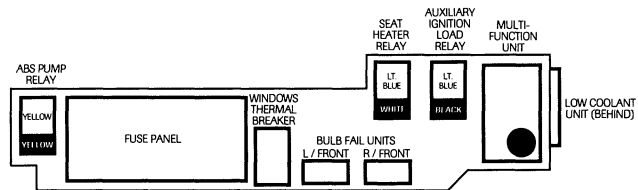
LEFT FRONT COMPONENT PANEL



RIGHT FRONT COMPONENT PANEL



LEFT COMPONENT PANEL



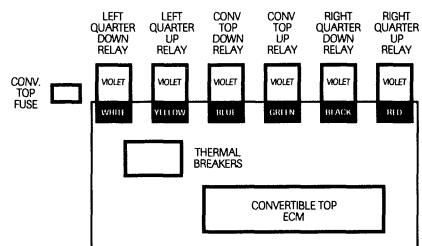
RIGHT COMPONENT PANEL



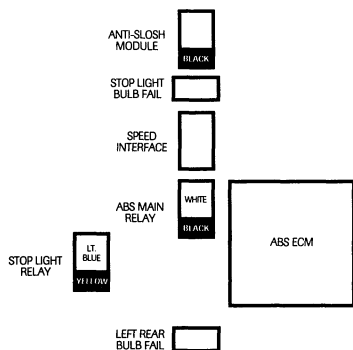
RIGHT A POST



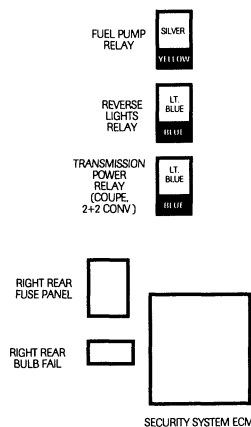
LEFT B/C POST (2+0 CONVERTIBLE)



CONVERTIBLE TOP COMPONENT PANEL

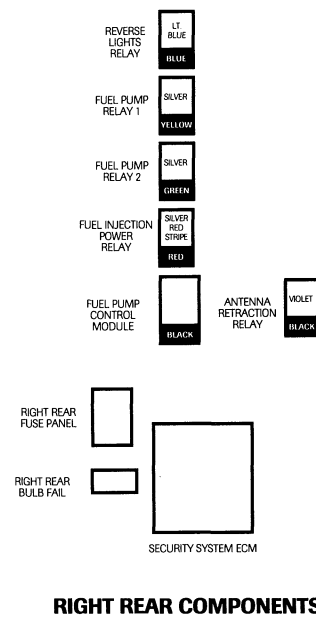
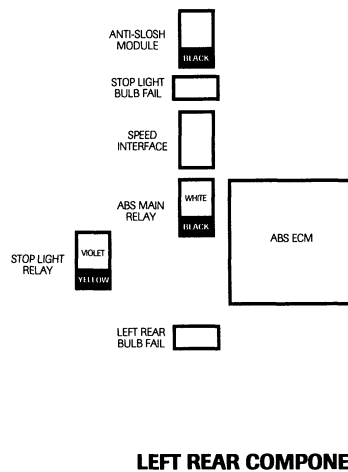
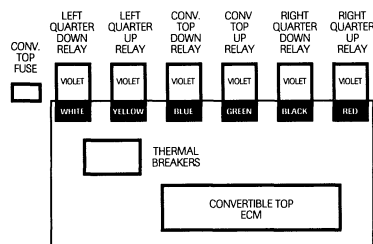
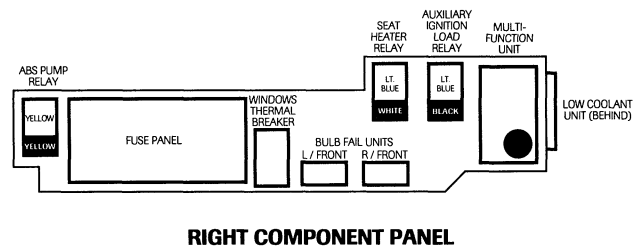
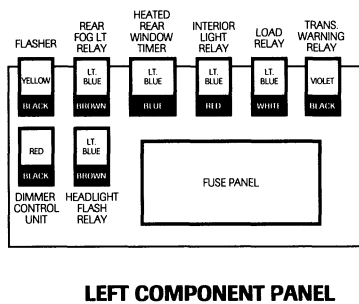
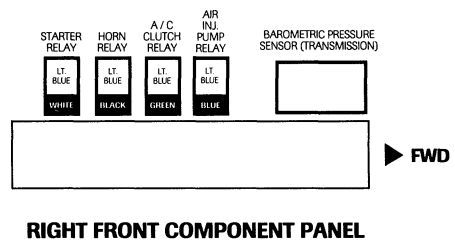
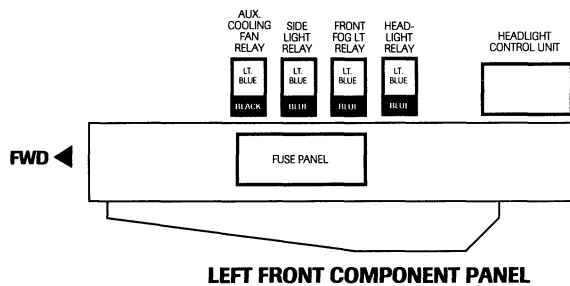


LEFT REAR COMPONENTS



RIGHT REAR COMPONENTS

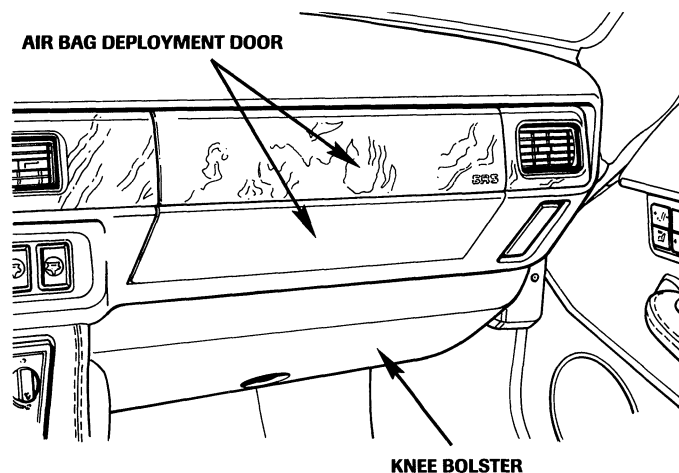
Relay Identification and Location: XJS V12



Passenger Supplementary Restraint System

The air bag supplementary restraint system (SRS) is now standard for both driver and front seat passenger. The driver's system is continued from the 1993 model year. The front seat passenger's supplementary system consists of an additional air bag module, a passenger side under-dash knee bolster and a revised seat belt with a tear loop buckle.

PASSENGER SIDE AIR BAG



Passenger air bag

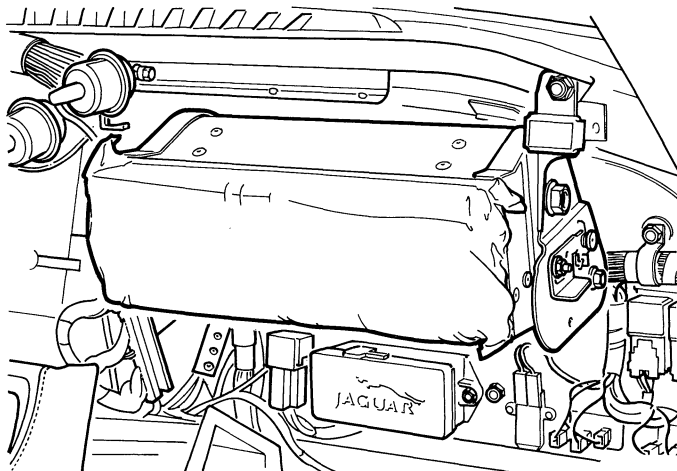
The new front passenger air bag is a separate unit with an integrated inflator/sensor assembly similar to the driver's side air bag module. The passenger's air bag module is larger than that required for the driver. It is installed behind a veneer-faced deployment door in the area previously used for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

⚠ WARNING: Refer to technical bulletins and the XJS repair manual for safety precautions before handling or servicing any Jaguar air bag.

Passenger knee bolster

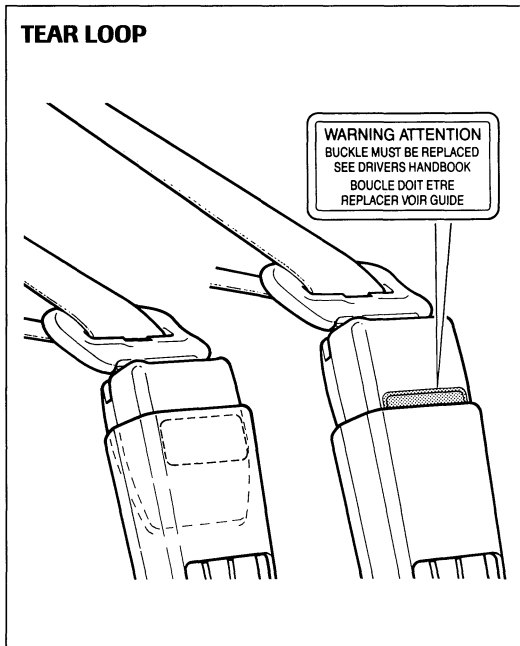
The passenger knee bolster is designed to function with the air bag and tear loop seat belt. The three components are necessary to complete the passenger supplementary restraint system (SRS). In order for the SRS to function properly, it is vital that the knee bolster be clipped in place correctly.

AIR BAG INSTALLATION



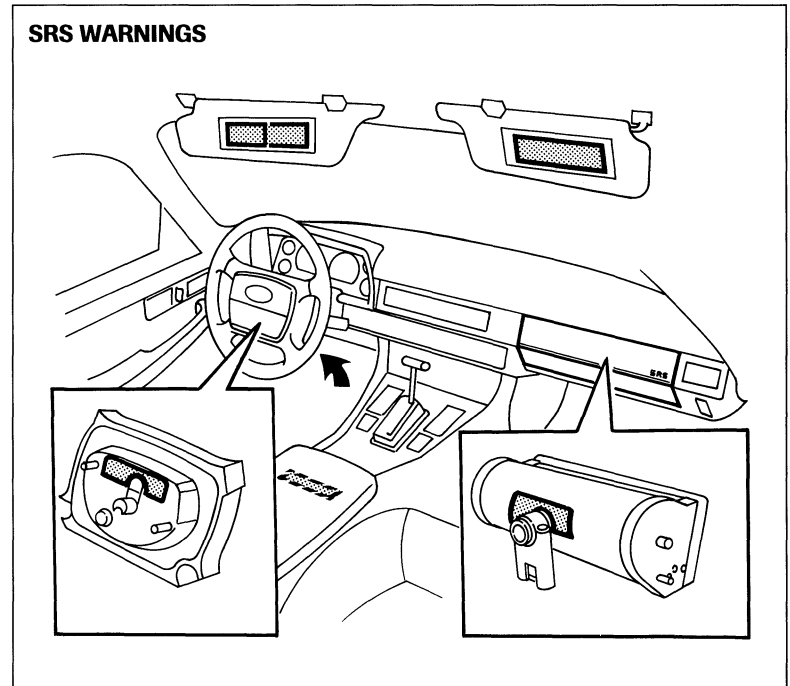
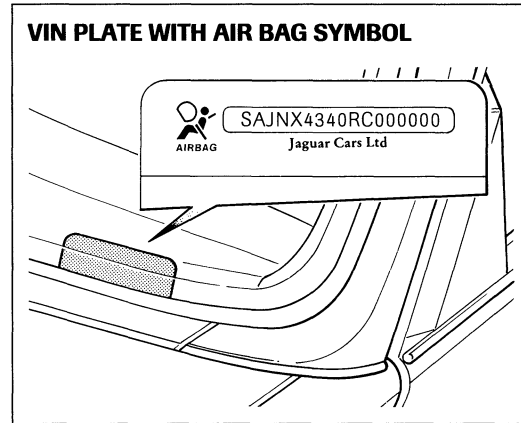
Front passenger seat belt tear loop buckle assembly

The front passenger seat belt incorporates a tear loop seat belt buckle to reduce chest loads in the event of a vehicle collision. Should any part of its warning label become visible, the buckle assembly must be replaced. The tear loop buckle rating for the XJS is unique to the range and is not interchangeable with the Sedan Range tear loop buckle. Therefore, if replacement is required, replace only with the correct XJS tear loop seat belt buckle assembly.



XJS SRS recognition

Warning and service labels have been placed on the vehicle and components so that vehicles with air bags can be readily identified.



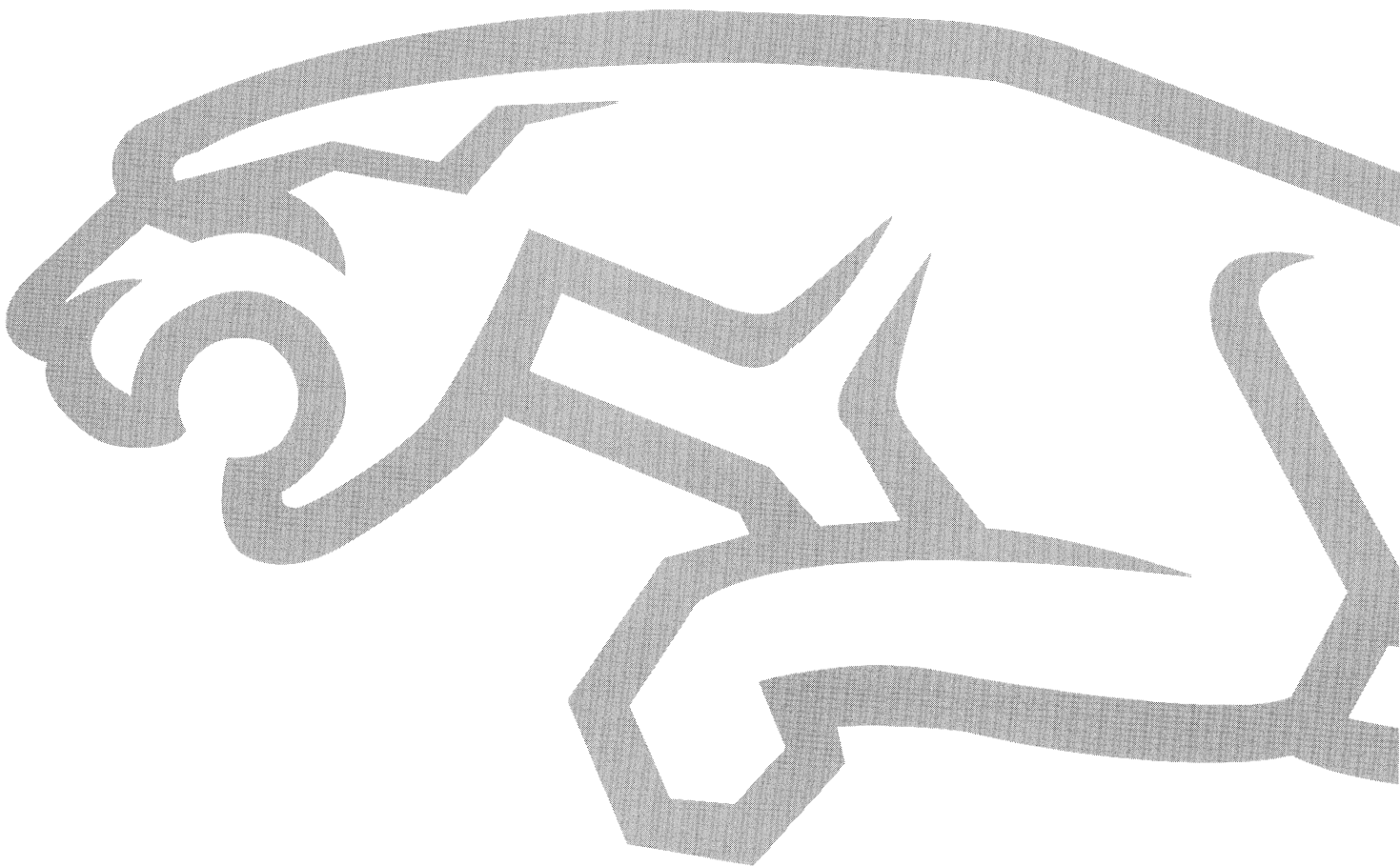


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XJS Range
Model Year Update

1995



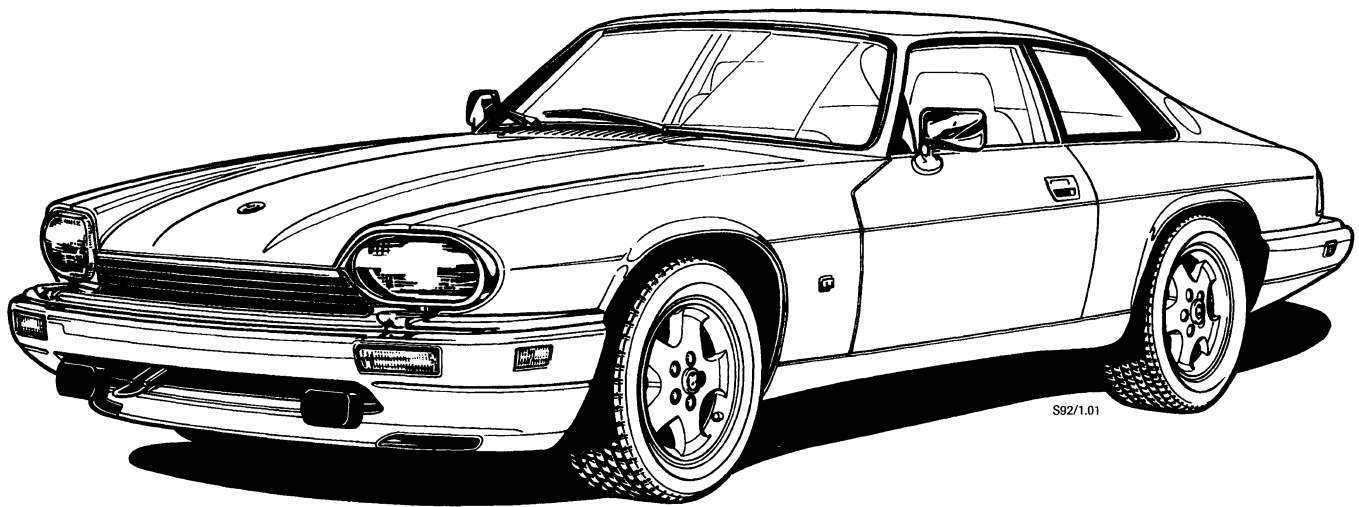
XJS Range
Model Year Update
1995

Publication number S-92

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1995 XJS Range

The 1995 Jaguar XJS Range consists of two model groups: the XJS and the XJS V12. Both the XJS and the XJS V12 are available as Coupe or 2+2 Convertible models. The XJS is powered by the AJ16 4.0L 6 cylinder engine mated to a four-speed automatic transmission. A five-speed manual gearbox is not offered for 1995. The XJS V12 power train remains unchanged from 1994.

Summary of 1995 Model Year Changes

The 4.0 litre six-cylinder engine, now designated AJ16, is an enhanced version of the previous AJ6 4.0 litre engine. In addition to numerous mechanical revisions, the AJ16 has a new engine management system that provides more precise and expanded control of engine functions. Sequential fuel injection, direct spark ignition and knock sensing are performance enhancing features found in the new engine management system.

The automatic transmission mated to the AJ16 engine is a revised version of the familiar four-speed ZF 4HP24E9. Changes have been made to match the performance characteristics of the AJ16 engine.

OBD II (on-board diagnostics, level two) is introduced with the AJ16 engine and transmission package. With OBD II, legislation requires that any power train system or component affecting vehicle emission levels must be operating correctly and be in sound mechanical condition so as not to cause air quality standards from being jeopardized. New and expanded diagnostic procedures and routines are required due to the possibility of diagnostic trouble codes (DTCs) being flagged from a greatly expanded range of parameters monitored by the engine control module and the transmission control module.

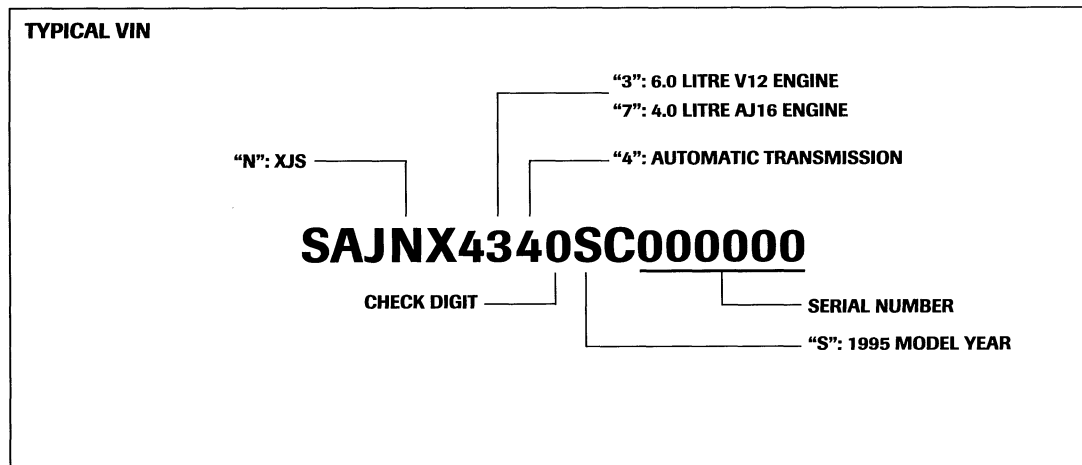
Except for fuel delivery, the V12 engine and transmission package remains unchanged from 1994. OBD level I diagnostics are continued for the V12 models.

Minor improvements and revisions have been made to the electrical system and a new radio is supplied with the in-car entertainment system.

The arrangement of this Model Year Update booklet is changed slightly from previous booklets. A Reference Section has been added to include all lists and charts previously contained in various sections of the booklet.

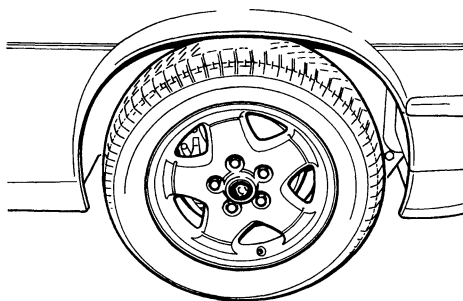
IMPORTANT: The 1995 Model Year technical information contained in this publication should be considered as preliminary information.

Vehicle Identification Number (VIN)

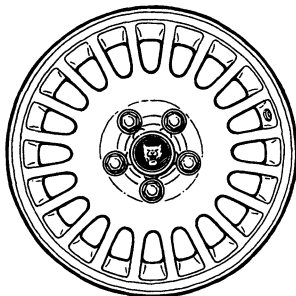


Body Exterior

The exterior styling and trim have been standardized for both XJS and XJS V12 models so that both will have headlight surrounds, rear view mirrors, grille and bumper finishers color keyed to the vehicle finish.

WHEEL STYLES

**XJS (4.0L): FIVE-SPOKE
DIAMOND TURNED WHEEL**



**XJS V12: TWENTY-SPOKE
DIAMOND TURNED WHEEL**

S92/1.02A & B

Tires and wheels

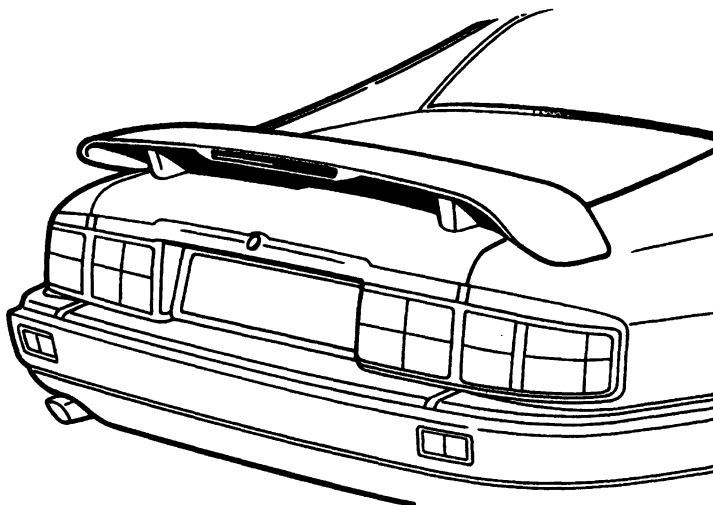
All 1995 XJS models are equipped with 16-inch wheels.

XJS (4.0L)

XJS models have Pirelli P4000 225/60 ZR16 tires mounted on cast alloy J7X16 five-spoke "diamond turned" road wheels.

XJS V12

XJS V12 models have Pirelli P4000 225/55 VR16 tires mounted on new cast alloy J7X16 twenty-spoke "diamond turned" road wheels. An optional five-spoke chromed alloy road wheel is available.

XJS V12 REAR SPOILER

S92/1.03

XJS V12 Rear spoiler

The XJS V12 rear spoiler now incorporates the high mounted stop light assembly. The optional XJS rear spoiler will not incorporate the high mounted stop light.

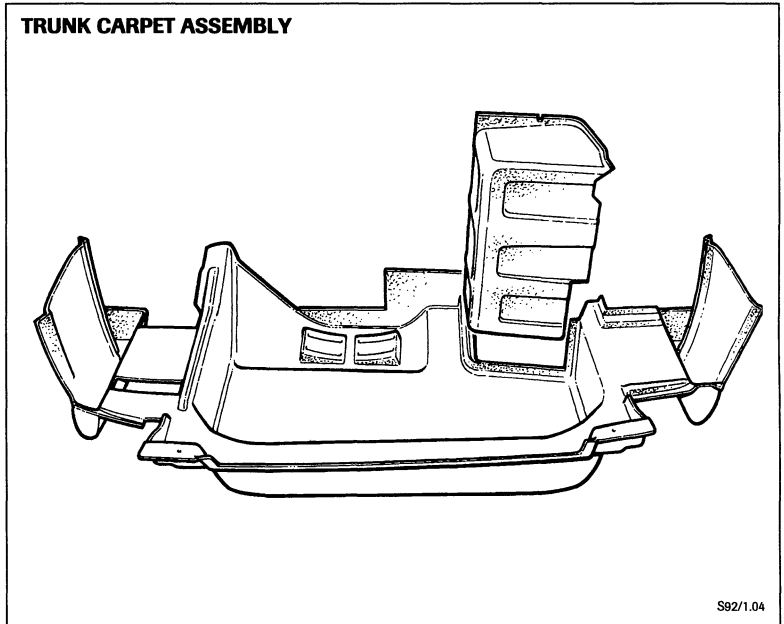
Body Interior

The standard interior leather has been changed to leather with a shallow grain and a softer "feel". The "ambla" trim material has been revised to match the new standard leather. The door sill plates are high gloss aluminum extrusions and do not use a separate finisher.

Trunk

A removable one-piece molded carpet replaces the previous separate carpet and side panel arrangement. Grooves in the molded carpet locate the covers for the spare wheel, battery and rear lights. An additional drain hole has been added adjacent to the existing drain tubes in each wheel well.

TRUNK CARPET ASSEMBLY



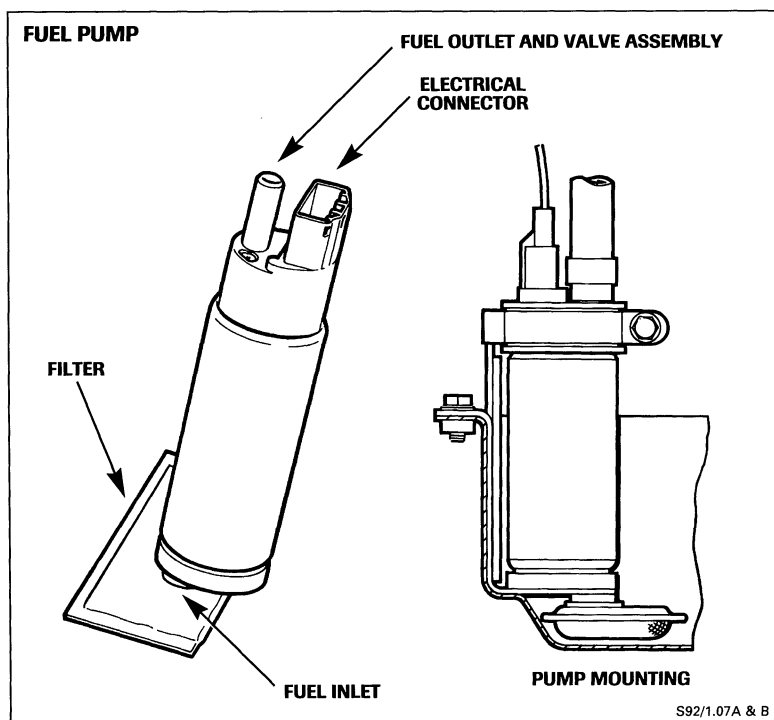
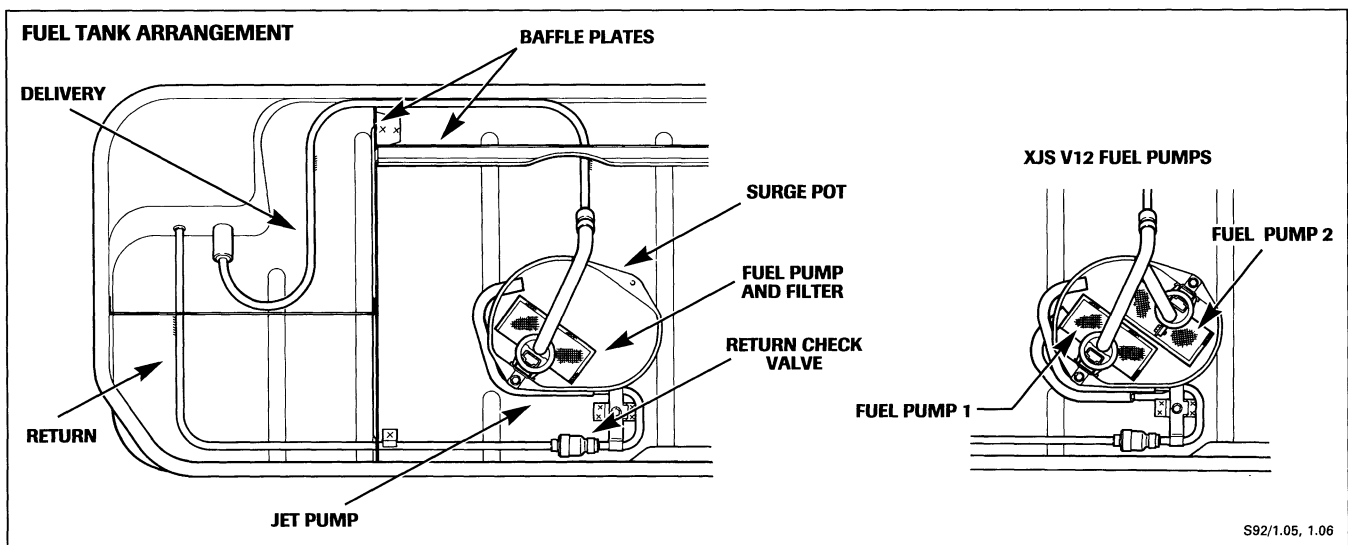
S82/1.04

Fuel System Components

Fuel Tank

The fuel tank has been revised to incorporate a new fuel pump (fuel pumps, V12) and the necessary plumbing for fuel supply and return. A common fuel tank is used for both XJS 4.0L and V12 models. The tank uses baffle plates to reduce fuel surge and a surge pot to ensure that a constant supply of fuel is available for the pump(s). Each pump is located by a rubber mount and clamp attached to the surge pot. The tank interior piping incorporates a jet pump and a check valve in the fuel return line. Returning fuel flows through the jet pump, which draws additional cool fuel from the tank for supply to the surge pot. This supplemented return flow ensures that the surge pot remains full of fuel. The return check valve prevents reverse flow through the fuel return line.

Access to the tank interior is through the evaporative flange at the top of the tank.



Fuel Pump

The new fuel pump assembly is a simplified unit. The pump unit consists of a turbine driven by a DC motor, a check valve and an inlet filter. The fuel output from the turbine pump provides a cooling flow around the motor before being discharged through the outlet check valve. The check valve prevents reverse flow when the engine is switched off and during single pump operation on V12 models.

Nominal pump delivery is 26.45 gallons per hour at 43.5 psi (3 bar) at 13.2 volts and 7 amps current draw.

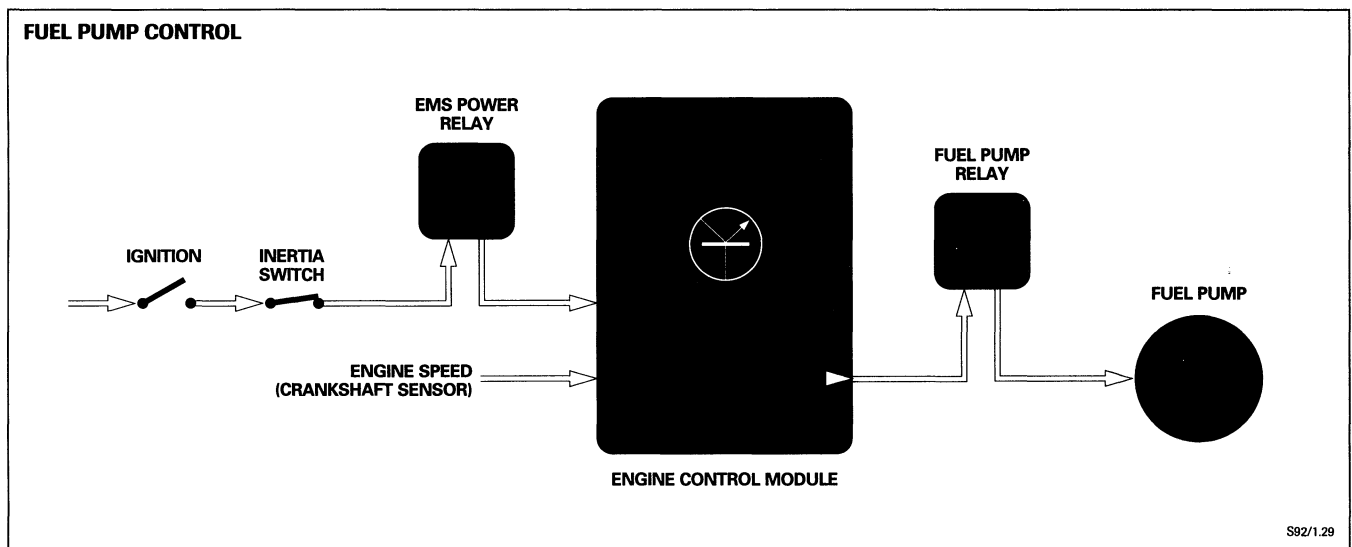
Refer to page 7 for a description of 4.0L fuel pump control. The V12 fuel pump control remains as previous.

AJ16 Fuel Delivery and Evaporative Emission Control

Fuel Pump Control

The electrically powered fuel pump is controlled by the ECM via the fuel pump relay. After the ignition is turned on (position II), the pump runs for about 1 second to build fuel pressure for starting. When the ECM receives an engine speed signal from the crankshaft position sensor, it activates the fuel pump relay, which in turn switches on the fuel pump. The fuel pump will continue to run either until the ignition is turned off or until approximately 1 second after there is no speed signal.

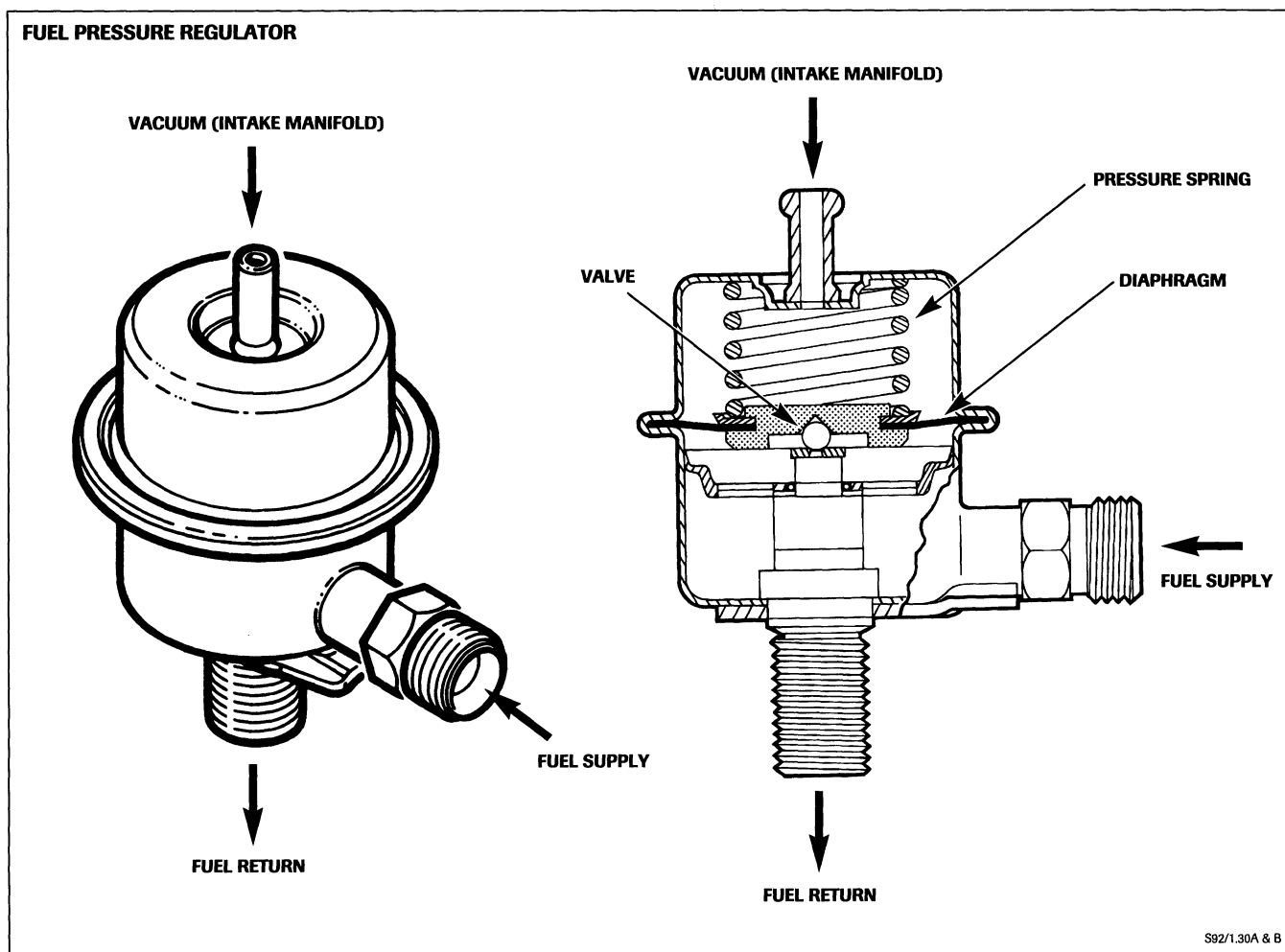
NOTE: In the event of a vehicle collision, the inertia switch will switch off all ignition powered circuits, including the EMS power relay. This action will remove power from the ECM and cause the fuel pump relay to de-energize, switching off the fuel pump.



AJ16 Fuel Delivery and Evaporative Emission Control (continued)**Fuel Rail and Pressure Regulator**

Fuel is pumped to the fuel rail and injectors, where fuel pressure is controlled by the fuel pressure regulator. The pressure regulator is a carry-over component from the AJ6 EMS. Excess fuel, above the engine requirement, is returned to the fuel tank. The pressure regulator spring chamber above the diaphragm is referenced to intake manifold vacuum. The pressure drop across the fuel injector nozzles is therefore maintained constant and the quantity of fuel injected for a given injector pulse duration is also constant. Fuel pressure measured on a test gauge will vary between 32 psi (2.3 bar) at overrun to 44 psi (3.0 bar) at full load.

The fuel pressure regulator is located as close as possible to the fuel rail so that good dynamic control of fuel pressure is achieved. This design provides the same pressure across each injector, and delivers an equal quantity of fuel to each of the six cylinders.



Evaporative Emission Control

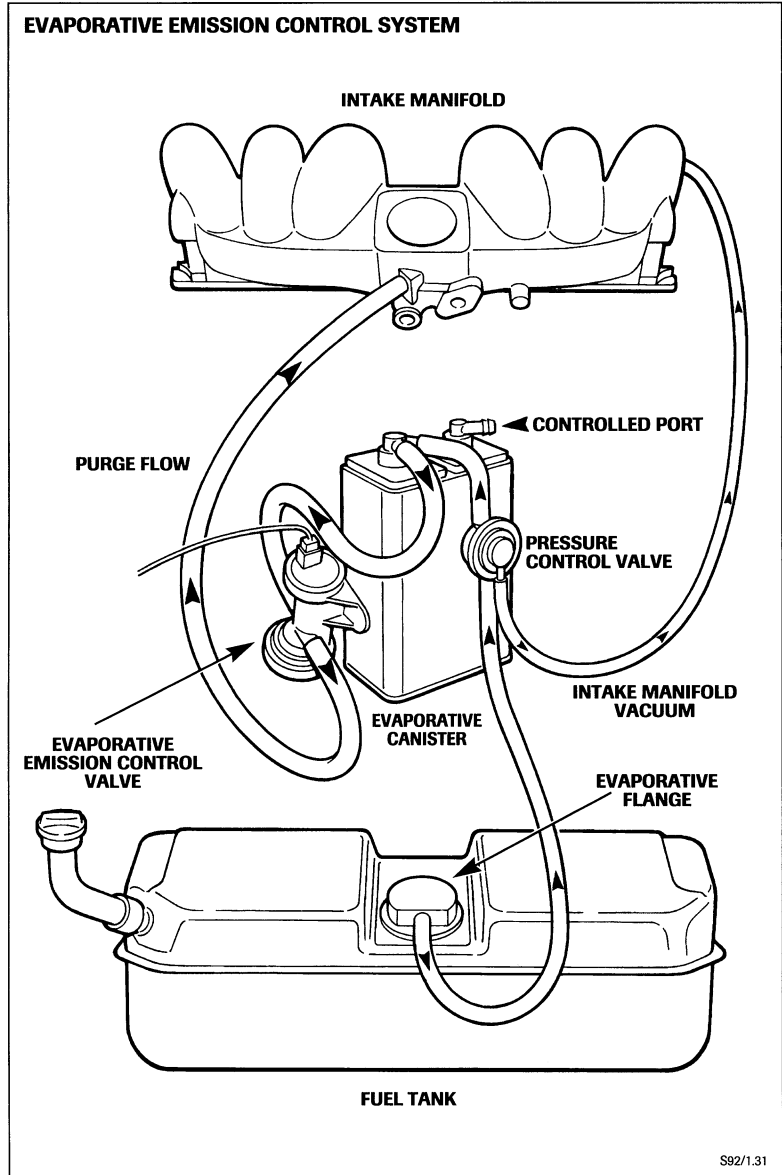
The fuel tank can be filled to approximately 90% of its capacity. The additional 10% of volume allows for expansion of the fuel without escape to the atmosphere.

When the engine is switched off, the fuel tank pressure is maintained at a positive pressure of 1.0 to 1.33 psi by the pressure control valve. Pressure above 1.33 psi is released by the valve to the charcoal canister.

When the engine is running, manifold vacuum acts on the pressure control valve, which opens the vent line from the fuel tank to the charcoal canister. Air enters the charcoal canister and flows to the tank to replace the fuel delivered to the engine and maintain atmospheric pressure in the tank.

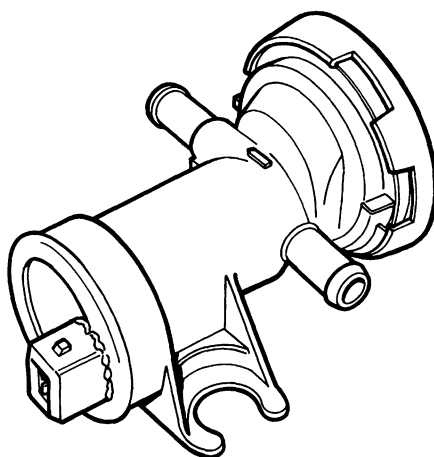
If the pressure control valve fails, the fuel tank cap will vent the fuel tank pressure at 2.0 to 2.5 psi.

When canister purge is enabled, the ECM meters purge flow to the intake manifold through the normally closed evaporative emission control (purge) valve (EVAPP). Canister purge is enabled by the ECM based on engine coolant temperature only when closed loop fuel metering control is operational.



Purge Flow Monitoring for OBD II

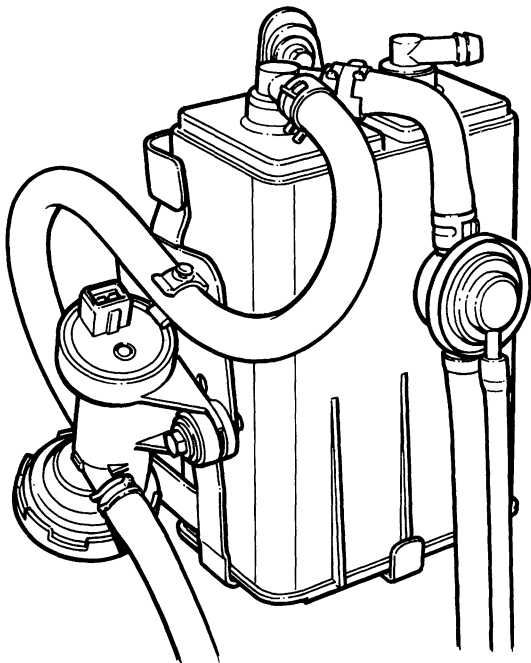
The ECM detects purge flow in two ways: if closed loop fuel metering correction indicates a large movement toward lean when purging is enabled, or if the idle air control valve corrects for increased air flow when purging is enabled, the ECM has confirmation that purging is taking place.

AJ16 Fuel Delivery and Evaporative Emission Control (continued)**EVAPORATIVE EMISSION CONTROL VALVE**

S92/1.32

Evaporative Emission Control (continued)**Evaporative Emission Control Valve (EVAPP)**

The new, redesigned evaporative emission control (purge) valve is a normally closed pulse width modulated valve. The amount of valve opening (and canister purge flow) is determined by the ECM drive signal allowing the ECM to accurately control purge flow for the prevailing engine operating conditions.

AJ16 EVAPORATIVE EMISSION CONTROL VALVE AND EVAPORATIVE CANISTER

S92/1.33

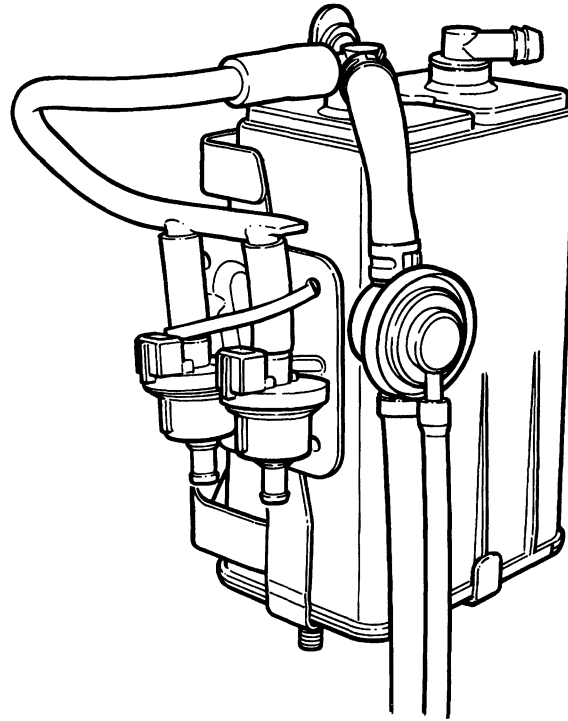
Evaporative Canister

The new, reshaped evaporative (charcoal) canister, situated in the original location in the left front fender, is identical in operation to previous canisters. The new evaporative emission control valve is mounted to the canister on a bracket.

V12 Evaporative Canister

A new, reshaped evaporative (charcoal) canister, situated in the original location in the left front fender, is identical in operation to previous canisters. The evaporative emission control (purge) valves are mounted to the canister on a bracket.

V12 EVAPORATIVE CANISTER

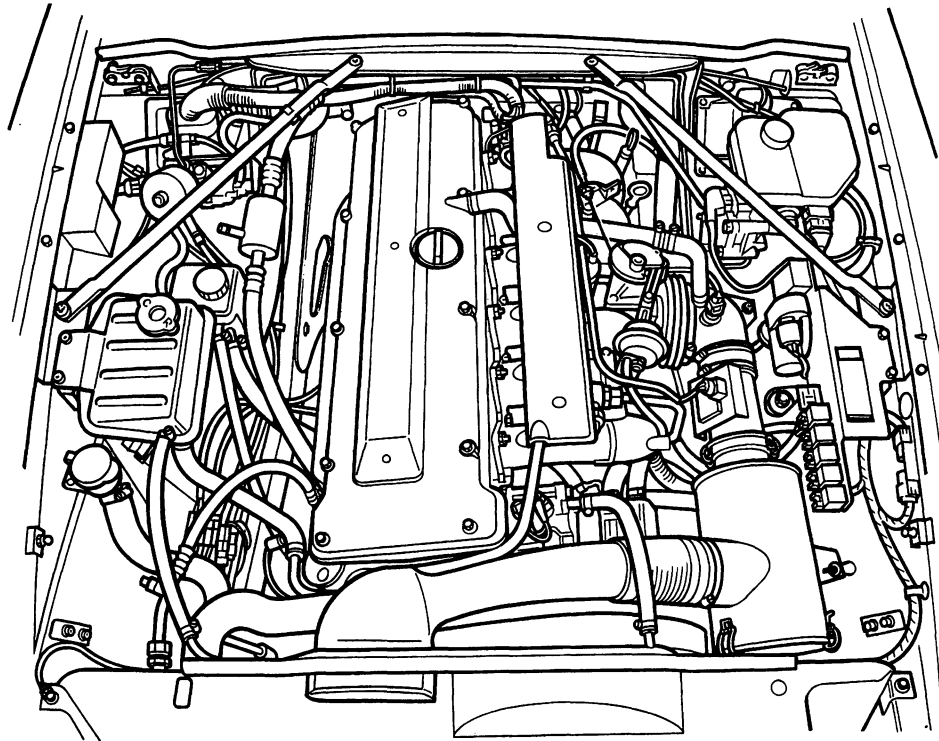


S92/1.09

Engine Design and Construction

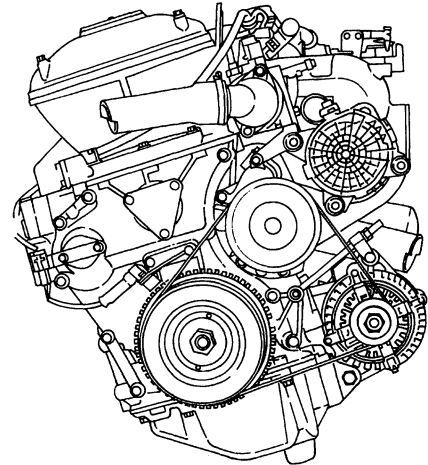
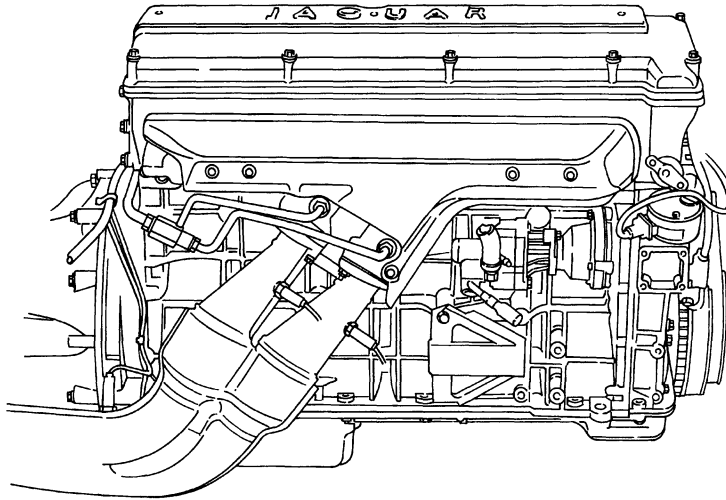
The 4.0 litre six-cylinder engine has been enhanced to improve performance, fuel economy and operational refinement. Now designated AJ16, the revised engine has undergone an improvement program that has resulted in an approximate 10% increase in power and torque, and improved fuel economy.

AJ16 4.0 LITRE ENGINE COMPARTMENT



S92/1.94

AJ16 4.0 LITRE ENGINE



S82/1.10

Engine Specifications

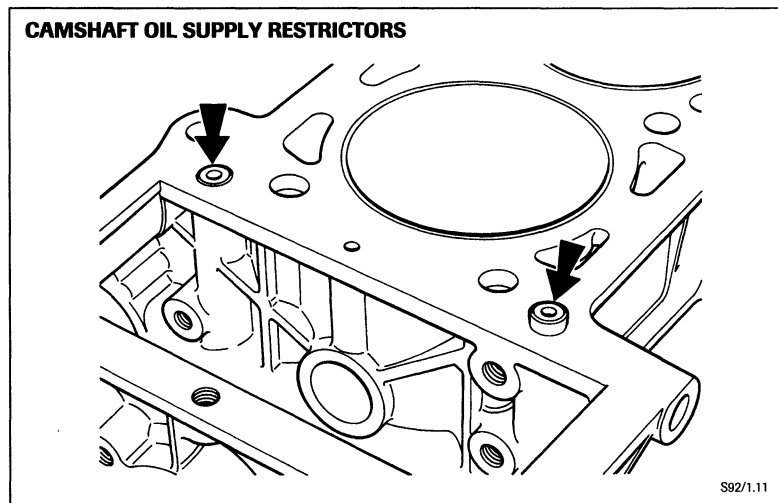
Configuration	Six cylinder, in-line
Valve gear	Two overhead camshafts, four valves per cylinder
Bore and stroke	91 x 102 mm (3.558 x 4.02 in.)
Displacement	3980 cc (234 cu. in.)
Compression ratio	10 : 1
Maximum power (DIN)	237 hp @ 4700 rpm
Maximum torque (DIN)	282 lb ft @ 4000 rpm
Maximum engine speed	5500 rpm

Cylinder Block and Components

The cylinder block has been modified to achieve several objectives and new pistons are used.

Water jacket depth

Water jacket depth has been reduced to improve block stiffness and to decrease engine warm-up time by 15% . In addition, the water jacket modification reduces mechanical noise levels.



Camshaft oil supply restrictors

Each camshaft oil supply passage has a 2.5 mm (0.098 in.) restrictor placed at the upper face of the block. The restrictors decrease oil feed to the camshafts resulting in reduced oil being collected in the camshaft valley before returning to the sump.

Mounting bosses for knock sensor

Two bosses have been added to the cylinder block at the left side for installation of knock sensors.

Pistons

New pistons increase the compression ratio to 10 : 1 (previously 9.5 : 1).

Cylinder Head and Components

The cylinder head has undergone changes to improve performance and fuel efficiency. Additional changes have been made to improve service and operational characteristics.

Reduced distortion

The basic design of the cylinder head load transfer paths has been revised so that the new head has greater resistance to distortion.

Oil drain holes

Additional oil drain holes in the top deck allow faster oil drain-back to the sump.

Intake ports

Revised intake ports help achieve increased performance and fuel efficiency.

Camshaft bearing caps

Changes to the bearing cap design, material and manufacturing process enable higher cylinder head clamp loads to be applied.

Cylinder head gasket

The cylinder head gasket has been revised to improve sealing. The new gasket has wider reinforcement rings around the cylinder bores and a narrower silicone sealant track. The narrower track allows higher clamping loads across the full width of the gasket.

Cylinder head bolts

New cylinder head bolts with higher tensile strength are used on the AJ16 engine. The bolt tightening procedure remains unchanged. The tightening torque has been increased to 50 lb. ft. followed by the 90° SPS torque method.

Camshaft

The cam lobe profiles have been altered to provide higher valve lift and longer valve opening as part of the performance and fuel economy improvement program.

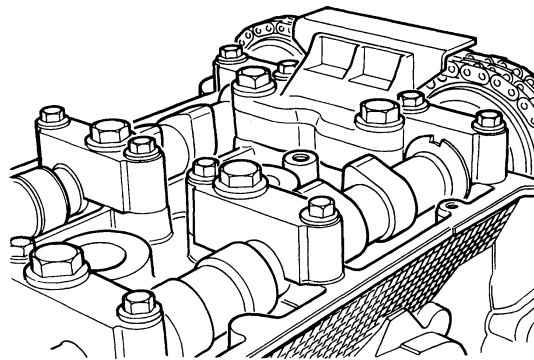
Camshaft cover and gasket

The new style camshaft cover is made from cast magnesium and accommodates individual "on-plug" ignition coils. The new cover provides superior sound absorption qualities. The cover has a locating groove for the one-piece seal. The seal now includes the two "half-moon" seals that were previously supplied separately.

Valve gear

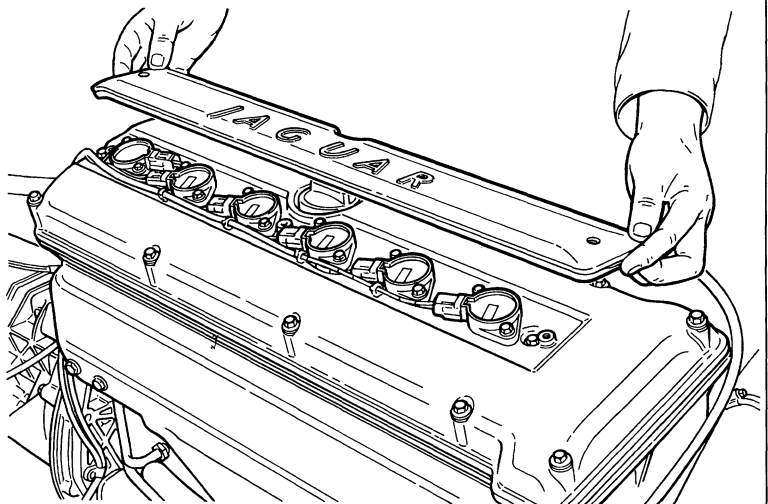
The diameter of the intake and exhaust valve stems has been reduced to 7 mm (previously 8 mm). The lighter valves require less power to operate and produce less noise. The parts associated with the valves have been altered accordingly.

CAMSHAFT BEARING CAPS



S92/1.13

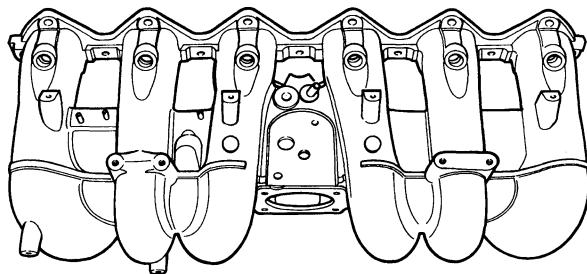
CAMSHAFT COVER



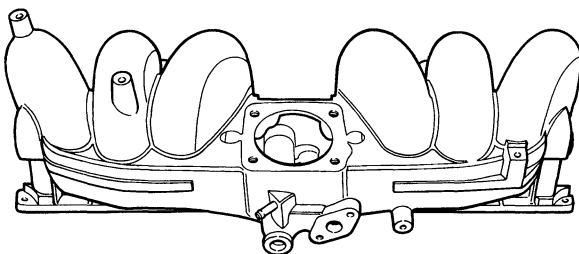
S92/1.14

Intake and Exhaust Manifolds, and Components

INTAKE MANIFOLD



VIEWED FROM ABOVE



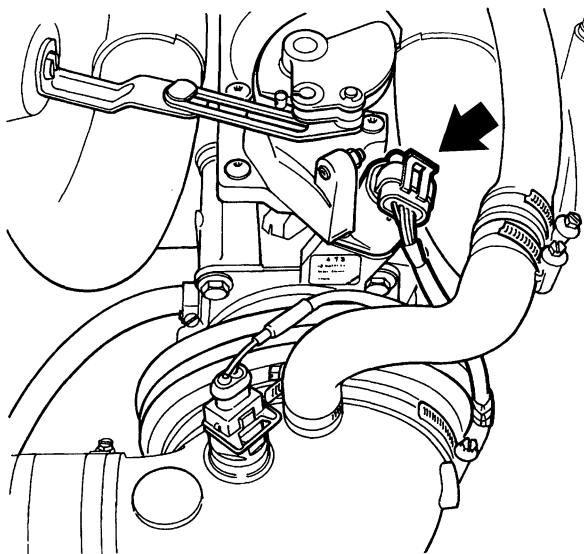
VIEWED FROM BELOW

S92/1.15A & B

The one-piece intake manifold incorporates a number of revisions:

- Integral coolant heated part load breather
- Accommodation for the new electronic EGR valve at the top of the manifold
- Revised EGR pipe connection at the bottom of the manifold
- Deletion of the separate idle air control valve orifice.

THROTTLE BODY AND IDLE AIR CONTROL VALVE



S92/1.16

Throttle body

The new throttle body integrates the idle air control valve (IACV) and the base idle channel. The base idle is set during manufacture and is not field-serviceable. A single track nonadjustable throttle position sensor (TPS) is mounted on the throttle body. Refer to the AJ16 Engine Management Section of this booklet for operating information.

Air cleaner and intake

Minor air cleaner and intake modifications have been made to accommodate the new mass air flow sensor (MAFS) and improve intake tuning.

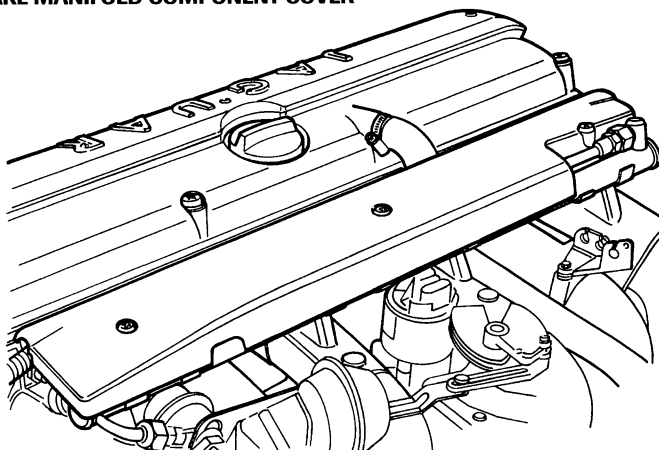
Exhaust manifold

In order to improve sealing, seven bolt exhaust manifolds replace the previous four-bolt arrangement. The previous vacuum-operated EGR valve has been deleted and a new EGR pipe connection is used.

Intake manifold component cover

A streamlined finisher covers the intake manifold components and fuel rail to provide enhanced underhood appearance.

INTAKE MANIFOLD COMPONENT COVER

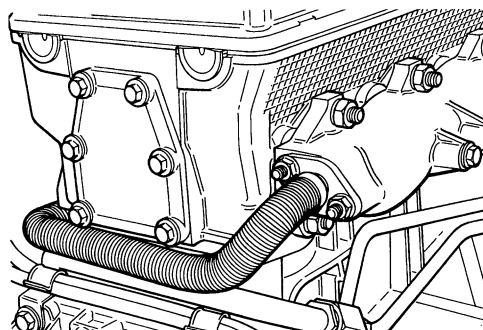


S92/1.17

Exhaust gas recirculation

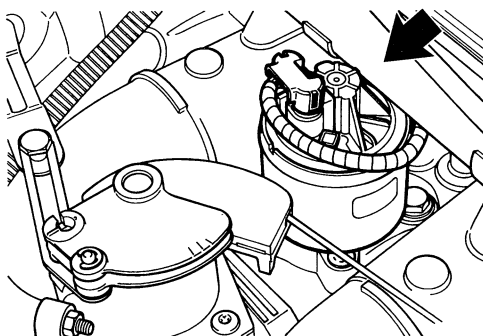
An electronically controlled EGR system has been introduced with improved piping between the exhaust and intake manifolds. The electronic EGR valve (EGRV) replaces the previous vacuum solenoid and vacuum valve arrangement. Refer to the AJ16 Engine Management Section of this booklet for operating information.

REAR EXHAUST MANIFOLD



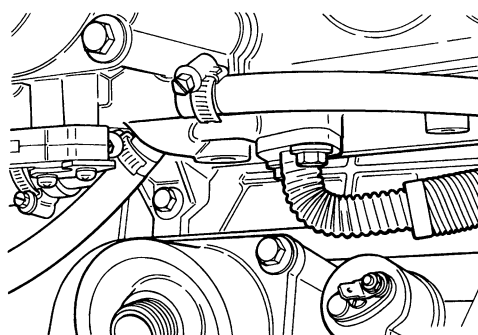
S92/1.18

EGR VALVE

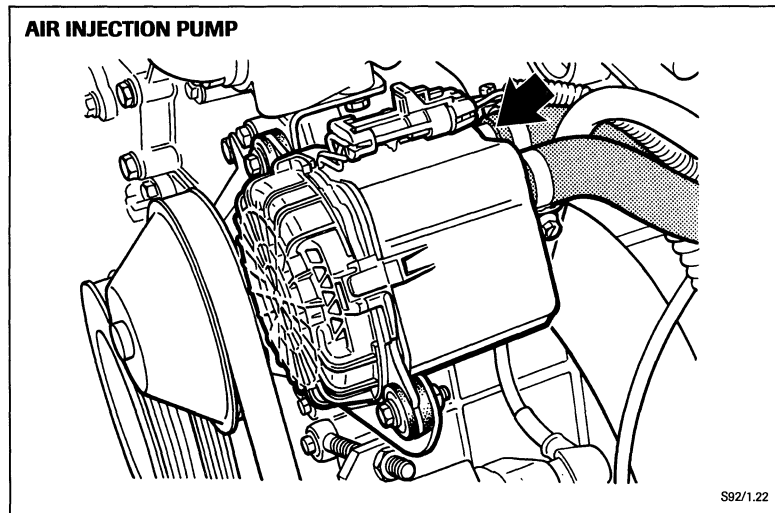


S92/1.20

INTAKE MANIFOLD

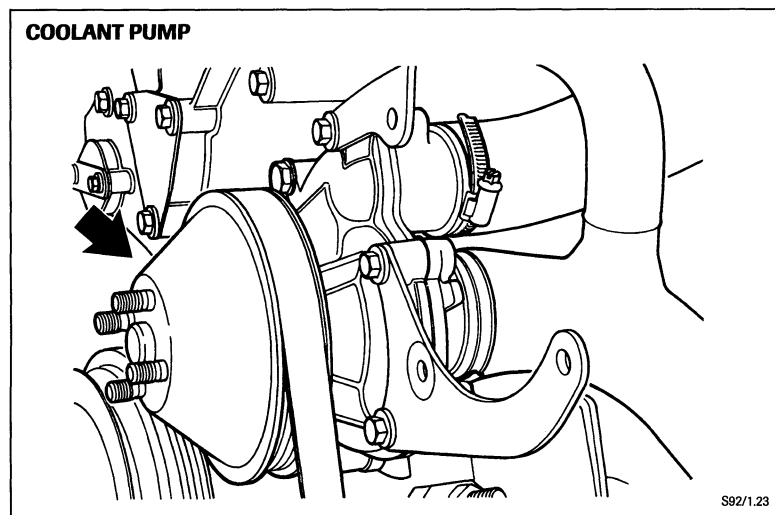


S92/1.19



Secondary Air Injection Pump

The previous belt-driven secondary air injection pump has been replaced with an electrically powered pump. The new pump is located as previous with the bracketry and hoses revised as necessary. Refer to the AJ16 Engine Management section of this booklet for operating information.



Cooling System

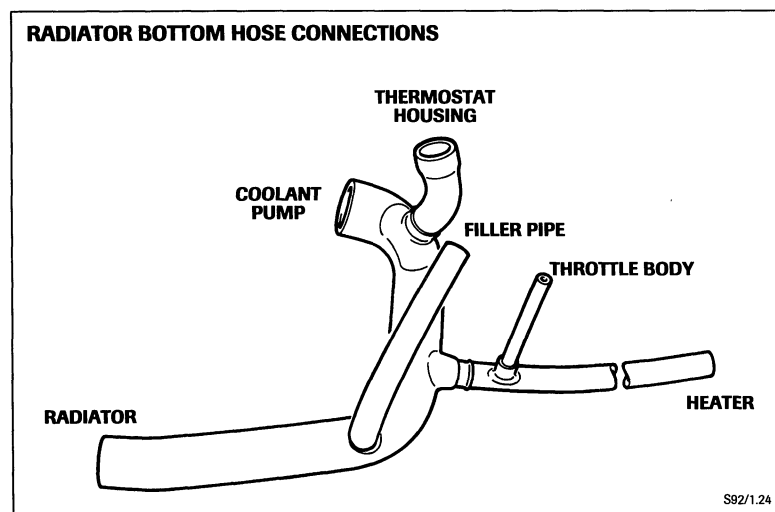
The cooling system has been improved by reducing the number of inlets to the coolant pump and the number of connections.

Coolant pump

A new coolant pump with a single inlet from the radiator bottom hose replaces the previous pump with multiple inlets. The previous pump inlets from the thermostat housing and the fill pipe have been deleted. The design and capacity of the pump remains unchanged.

Fill pipe

The fill pipe now connects to the radiator bottom hose.



Radiator bottom hose

The radiator bottom hose is a molded assembly that incorporates molded hose connections from the fill tube, thermostat housing bypass, heater matrix outlet and the throttle body outlet.

Exhaust System

The exhaust system has revised down pipes and main catalyst.

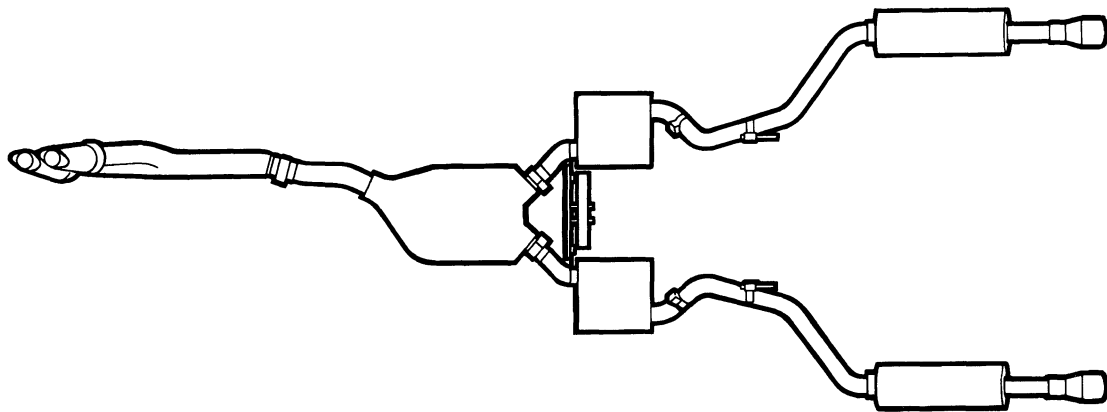
Exhaust down pipes and oxygen sensors

For tuning purposes, the exhaust manifold outlet pipes have been lengthened. This revision resulted in an increase in overall down pipe length. A slip joint replaces the previous clamp joint between the down pipe and the main catalyst. Two additional upstream oxygen sensors are used with the new engine management system. Refer to the AJ16 Engine Management Section of this booklet for operating information.

Main catalyst

The main catalyst front connecting pipe has been shortened to accommodate the lengthened down pipe.

EXHAUST SYSTEM



S92/1.25

Overview

The AJ16 Engine Management System (EMS) is controlled through a digital Electronic Control Module (ECM) containing a microprocessor. The system maintains optimum performance over the engine operating range by precisely controlling all fuel injection, ignition and emission control functions. In addition, the ECM provides various interface outputs and incorporates an on-board diagnostic facility.

The AJ16 EMS complies with OBD II (on-board diagnostics II), the second generation environmental legislative regulations that set the acceptable maximum level of motor vehicle exhaust emission and the required engine control systems self diagnosis capabilities.

The previous EMS used on the AJ6 4.0 litre engine complied with OBD I, which required that the following performance and diagnostic standards be met:

OBD I (AJ6 EMS 1990 – 94 MY)

- Exhaust emission level
- Monitoring and diagnosis of electrical fuel system faults
- Monitoring of both open and closed circuit faults
- Visual warning to driver: MIL (CHECK ENGINE)
- Fault code provided to technician: Diagnostic Trouble Code — DTC (Fuel Fail Code — FF)

OBD II requires lower exhaust emission levels, standardized diagnostics and failure prediction.

OBD II (AJ16 EMS)

- Exhaust emission level reduced
- Industry standardized DTCs
- Generic (after-market) scan tool capable of DTC retrieval
- Expanded self diagnostics to include monitoring and diagnosis of any power train system fault that will likely cause exhaust emission to exceed 1.5 times the standard level.
- Failure prediction of subsystems by performance observation over the life of the power train including: catalyst efficiency, engine misfire, exhaust gas recirculation, and secondary air injection.

Engine Control Module (ECM)

GEMS 6 Engine Control Module

The AJ16 EMS is microprocessor based using a Sagem / Lucas GEMS 6 ECM as the heart of the system. The ECM has a 1.5 megabyte memory with a microprocessor running at a clock speed of 12/24 MHz. The ECM uses discrete components plus analog-to-digital circuits to interface between the microprocessor and the input sensors and output devices. Software is programmed into two EPROMs and one EEPROM. The EPROMs are used for control and data. The EEPROM is used for On-Board Diagnostics and adaptive functions. The ECM has nonvolatile memory so that on-board diagnosis and adaptive information is maintained if the vehicle battery is disconnected. Market specific variants are achieved through PECUS (programmable electronic control units) during manufacturing. The VIN is recorded in the ECM memory.



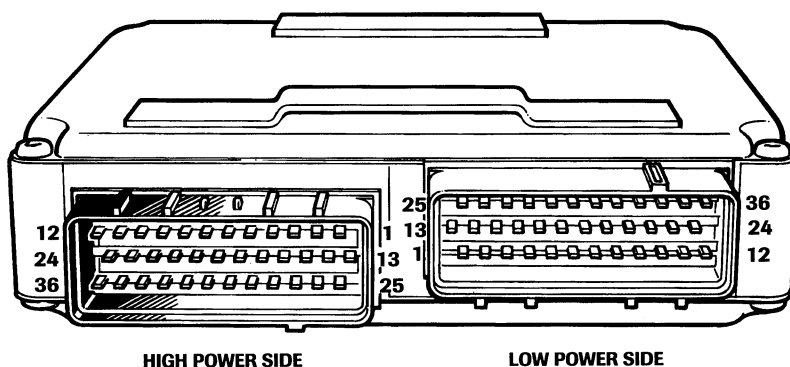
CAUTION: Because fuel metering and idle air adaptations cannot be reprogrammed using PDU, ECMs must not be switched from one vehicle to another.

The ECM contains two double sided printed circuit boards. One is a low power board and the other is a high power board. The red and black 36-way connectors are therefore referred to as the low and high power connectors respectively. Most of the input signals from engine mounted sensors, and interfaces with other systems are located on the low power (red) connector. The high power connector (black), mainly serves outputs such as fuel injector drive, ignition coil drive, and relay activation.

The expanded capacity of the ECM is used for stored emission control strategies, diagnostics, semi-sequential fuel injection, and direct ignition. Sixty percent of the ECM software is used for OBD II diagnostics.

An ECM controlled relay remains energized for approximately 15 seconds after power-down. This enables the ECM to perform idle air control valve positioning and other initializing functions, yet allows for reduced quiescent drain after switch-off.

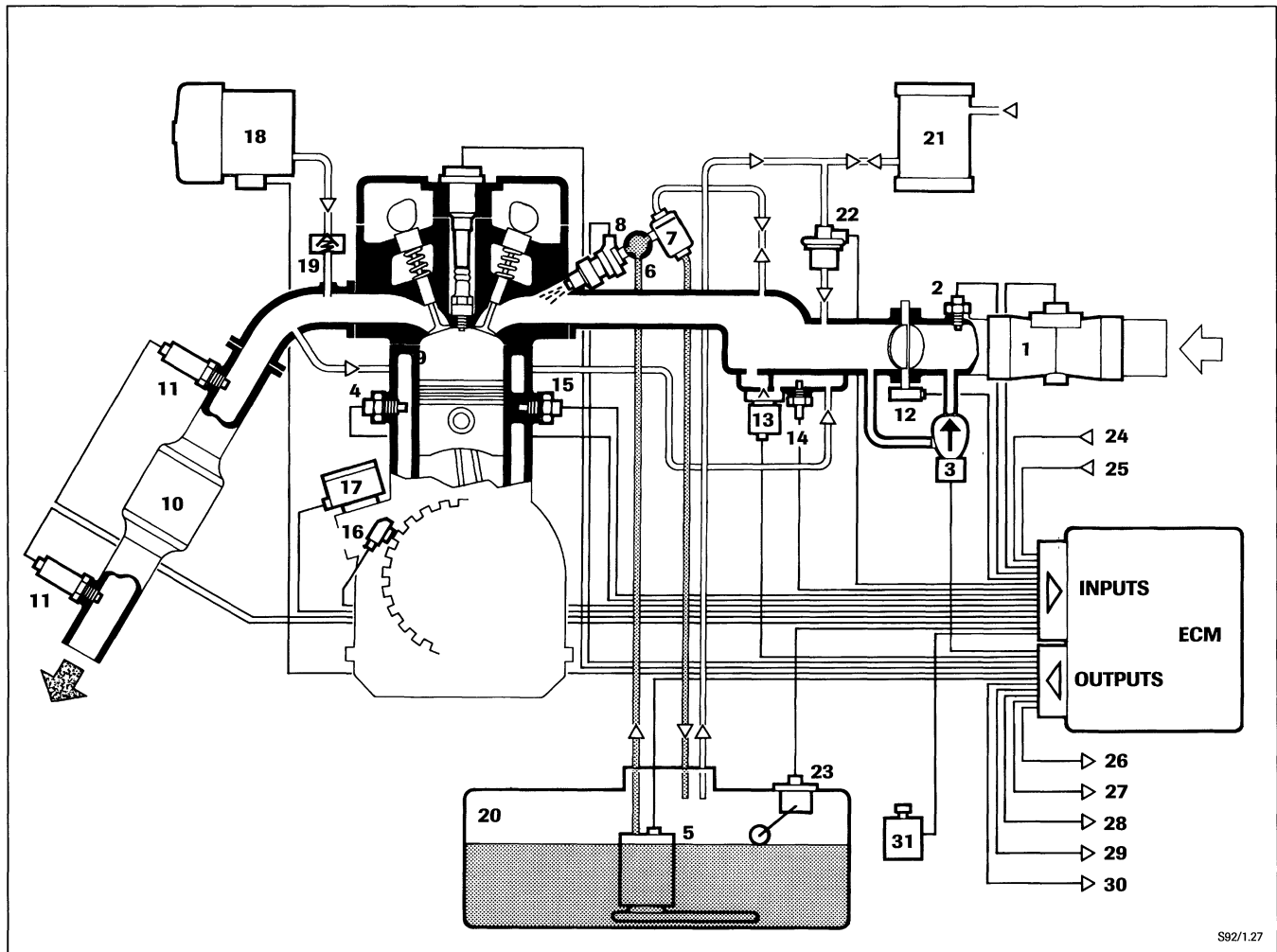
GEMS 6 ENGINE CONTROL MODULE



S92/1.26

Engine Control Module (ECM) (continued)

Engine Management Logic



S92/1.27

Key to Diagram

- | | |
|--|---|
| 1 Mass air flow sensor (MAFS) | 17 Camshaft position sensor (CMPS) |
| 2 Intake air temperature sensor (IATS) | 18 Secondary air injection pump (AIRP) |
| 3 Idle air control valve (IACV) | 19 Secondary air injection check valve (AIRC) |
| 4 Engine coolant temperature sensor (ECTS) | 20 Fuel tank |
| 5 Fuel pump (FP) | 21 Evaporative (charcoal) canister |
| 6 Fuel rail | 22 Evaporative emission control (purge) valve (EVAPP) |
| 7 Fuel pressure regulator | 23 Fuel level sensor |
| 8 Fuel injector (FI) | 24 Park / neutral switch |
| 9 Spark plug with integral coil | 25 Ignition ON |
| 10 Catalyst | 26 Instrument pack (road speed) |
| 11 Heated oxygen sensors (HO2S) | 27 Trip computer |
| 12 Throttle position sensor (TPS) | 28 Malfunction Indicator Lamp (MIL) |
| 13 EGR valve (EGRV) | 29 Serial communication |
| 14 EGR temperature sensor (EGRT Sensor) | 30 Transmission control module (torque control) |
| 15 Knock sensor (KS) | 31 Inertia switch |
| 16 Crankshaft position sensor (CKPS) | |

ECM Inputs, Outputs and Pin Information

ECM Black Connector A (High Power)

Pin LI 189 -

- 1 Power ground - input
- 2 Fuel injector 1 - output
- 3 Idle speed control 1 - output
- 4 Oxygen sensor heaters, downstream - output
- 5 Ignition coil 4 - output
- 6 Ignition coil 3 - output
- 7 Air pump - output
- 8 Ignition coil 2 - output
- 9 Ignition coil 5 - output
- 10 Ignition coil 1 - output
- 11 Ignition coil 6 - output
- 12 Power ground - input
- 13 Fuel injector 4 - output
- 14 Fuel injector 3 - output
- 15 Fuel injector 2 - output
- 16 Idle air control 2 - output
- 17 Fuel used - output
- 18 ECM controlled relay - output
- 19 Fuel pump - output
- 20 MIL - output
- 21 A/C compressor relay - output
- 22 Engine speed - output
- 23 Crankshaft position sensor positive - input
- 24 ECM controlled relay - input
- 25 Fuel injector 6 - output
- 26 Crankshaft position sensor negative - input
- 27 Fuel injector 5 - output
- 28 Idle speed control 3 - input
- 29 Idle speed control 4 - output
- 30 Oxygen sensor heaters, upstream - output
- 31 Not used
- 32 Throttle position (transmission) - output
- 33 Engine torque - output
- 34 Evaporative emission control valve - output
- 35 EGR valve - output
- 36 Power ground - input

ECM Red Connector B (Low Power)

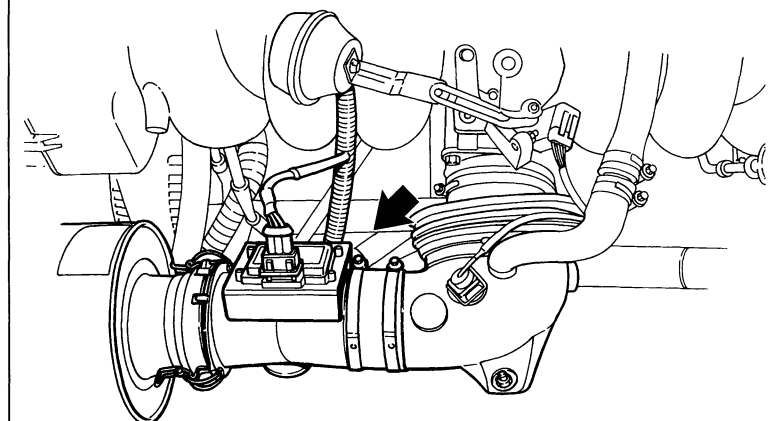
Pin LI 190 -

- 1 Intake air temperature - input
- 2 Not used
- 3 EGR valve function - input
- 4 Mass air flow (load) - input
- 5 Not used
- 6 Oxygen sensor 3 - input
- 7 Sensor 5v ground - input
- 8 Oxygen sensor signal ground - input
- 9 Knock sensor ground - input
- 10 Bidirectional serial communication - input / output
- 11 Sensor 5v supply - output
- 12 Throttle position - input
- 13 Not used
- 14 Engine coolant temperature - input
- 15 EGR valve position - input
- 16 Oxygen sensor 1 - input
- 17 Battery voltage common supply - input
- 18 Oxygen sensor 2 - input
- 19 Oxygen sensor 4 - input
- 20 Fuel tank level - input
- 21 Knock sensor A - input
- 22 Not used
- 23 Not used
- 24 Camshaft position sensor 12v supply - output
- 25 Not used
- 26 Transmission ignition control - input
- 27 Park / neutral position - input
- 28 Road speed - input
- 29 Mass air flow sensor ground - input
- 30 Small signal ground - input
- 31 Engine coolant temperature sensor ground - input
- 32 Knock sensor B - input
- 33 Ignition ON - input
- 34 Camshaft position - input
- 35 Not used
- 36 Air conditioning ON request

EMS Main Sensing Components

The inputs provided by the engine management system main sensing components are used by the ECM to control a variety of subsystems and functions.

MAFS LOCATION



S92/1.34

Engine Load

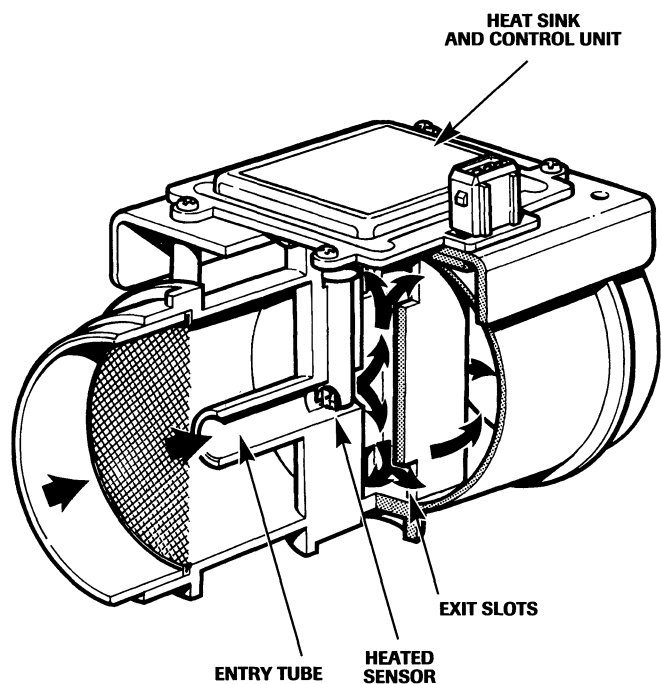
Mass air flow sensor (MAFS)

The new MAFS has an improved and simplified design with revised calibrations for the GEM 6 EMS.

The model 20 AM mass air flow sensor (MAFS) is a hot wire type that measures air flow volume by the cooling effect of air passing over a heated platinum wire, altering the electrical resistance of the wire. The electrical resistance value is converted to an analog output voltage supplied to the ECM as a measure of air flow volume (engine load).

The heated wire sensor is located in the central column that is an integral part of the casting. The column has a central tube entry and four exit slots. A small portion of the intake air flows through the entry tube and passes over the heated wire sensor before returning to the main air flow through the four exit slots. The heated sensor is an integral part of the heat sink and control unit mounted on the main casting. The intake screen stabilizes the air flow through the MAFS and protects the sensor from debris in the air stream.

MAFS CROSS SECTION



S92/1.35

Engine Speed and Crankshaft Position

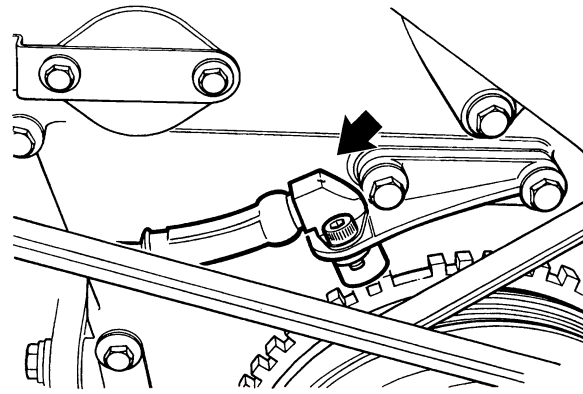
Crankshaft position sensor (CKPS)

The sensor portion of the crankshaft position sensor is identical to the AJ6 sensor with a revised electrical lead and bracket.

The CKPS provides the primary input to the ECM for engine speed and engine position. The sensor is a variable reluctance device, consisting of a bobbin coil with a magnetic core. The steel teeth on the crankshaft timing ring form a rotor. As the rotor teeth pass by the crankshaft position sensor, pulses are generated.

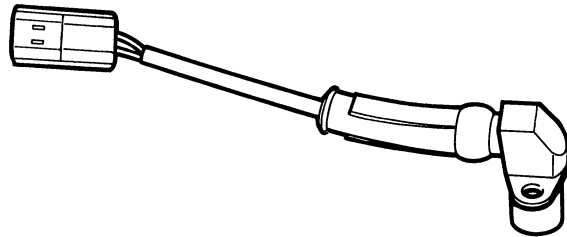
The rotor has 60 tooth positions set at 6° intervals with one tooth missing. The gap identifies the TDC position of cylinders 1 and 6. The rotor thus provides both engine speed and crankshaft position information to the ECM. Each tooth pulse represents 6° of crankshaft rotation. Thus the frequency of the toothed pulses are a measure of engine speed. The sensor is mounted to the timing cover on the front of the engine. The air gap between the sensor and the rotor should be 0.020 – 0.040 in.

CRANKSHAFT POSITION SENSOR LOCATION

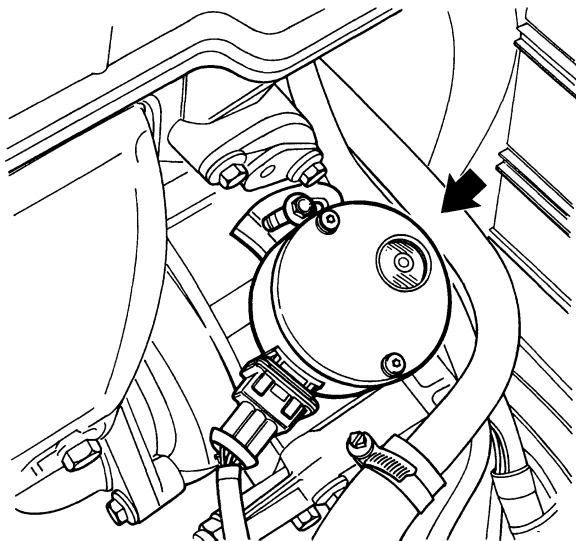


S92/1.36

CRANKSHAFT POSITION SENSOR



S92/1.37

EMS Main Sensing Components (continued)**CAMSHAFT POSITION SENSOR LOCATION**

S92/1.38

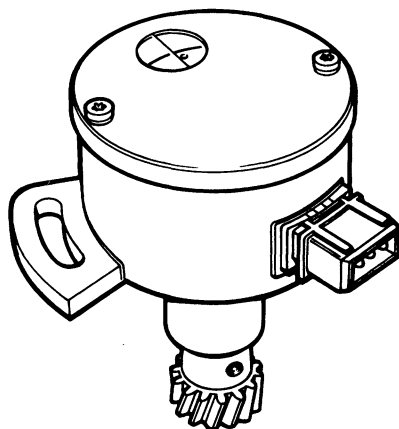
Initial Cylinder Synchronization for Engine Starting**Camshaft position sensor (CMPS)**

The camshaft position sensor is a Hall-effect sensor which provides the ECM with a sequencing input so that correct ignition and fuel injection will begin with two-thirds of an engine revolution at engine start. The CMPS rotor has six "windows" of different width to positively identify each cylinder. As a window passes the sensor, the ECM is able to identify the cylinder (1 through 6).

The CMPS is necessary because the crankshaft position sensor (CKPS) gap identifies TDC position for *both* cylinders 1 and 6. Without the CMPS sequencing input, the ECM would attempt engine start by trial and error, firing each cylinder in sequence; several engine revolutions might be required for successful engine start. CMPS input is not required by the ECM once the engine is started.

CMPS installation procedure

With the engine at cylinder 1 compression TDC, the dot on the CMPS rotor should align with the circle in the inspection window.

CAMSHAFT POSITION SENSOR

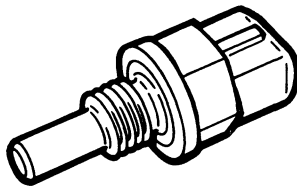
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Engine Coolant Temperature

Engine coolant temperature sensor (ECTS)

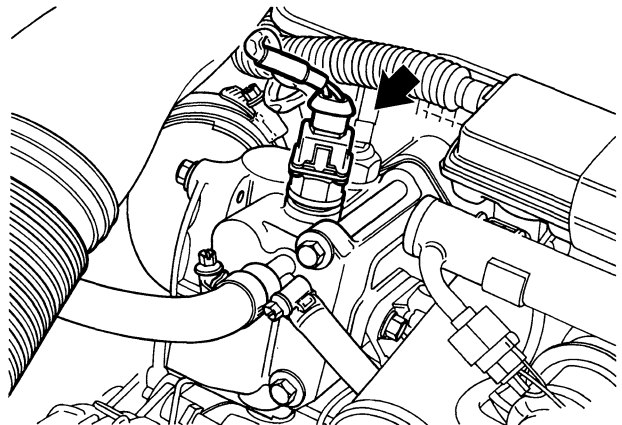
The model 8 TT engine coolant temperature sensor is a negative temperature coefficient (NTC) thermistor. It is identical to the sensor used in AJ6 engine management systems, however, the connector and leads are revised. Engine coolant temperature is determined by the ECM by a change in resistance within the sensor. The ECM applies 5 volts to the sensor and monitors the voltage across the pins to detect the varying resistance.

ENGINE COOLANT TEMPERATURE SENSOR



S92/1.40

ENGINE COOLANT TEMPERATURE SENSOR LOCATION



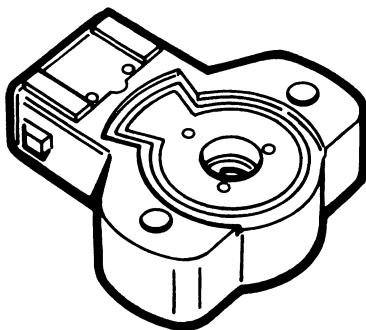
S92/1.41

Throttle Position

Throttle position sensor (TPS)

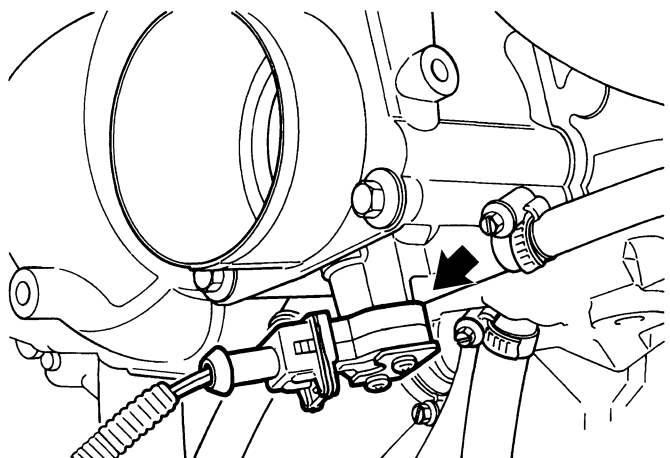
The model CTS 518 throttle position sensor is a nonadjustable single-track potentiometer connected to the spindle on the throttle shaft. The ECM adapts to the TPS idle position to compensate for aging and component wear. The ECM applies 5 volts to the sensor and monitors the voltage across the pins to determine throttle position: low voltage – closed throttle, high voltage – opened throttle.

THROTTLE POSITION SENSOR

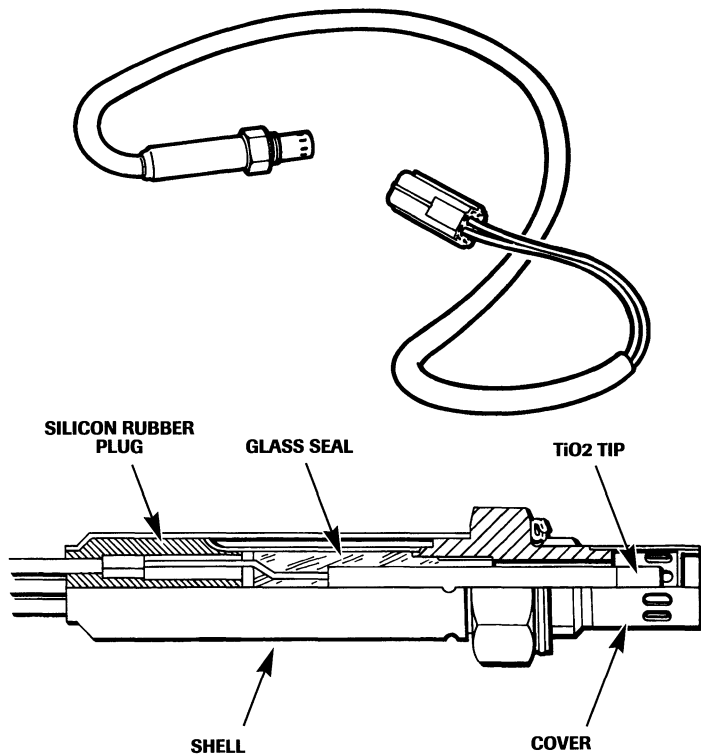


S92/1.42

THROTTLE POSITION SENSOR LOCATION



S92/1.43

EMS Main Sensing Components (continued)**OXYGEN SENSOR AND CROSS SECTION**

S92/1.44A & B

Exhaust Gas Oxygen Content**Heated oxygen sensors (HO2S)**

The AJ16 EMS uses four new redesigned heated oxygen sensors that provide improved heater temperature control and reduced warm-up time.

The model TO 19 heated oxygen sensors are of the Titanium Dioxide type that have a tip composed of an alumina substrate with a thick film titanium dioxide element. This type of sensor does not require reference air to detect the oxygen content of the exhaust so wetting or contamination of the sensor exterior will not affect sensor performance. The resistance of the sensor element varies greatly with the partial presence of oxygen in the exhaust gas. The change in resistance is converted to a voltage output to the ECM via a constant voltage source and reference resistance. Whenever the fuel / air mixture ratio passes 14.7:1 ($\text{Lambda} = 1$), the sensor delivers a voltage swing:

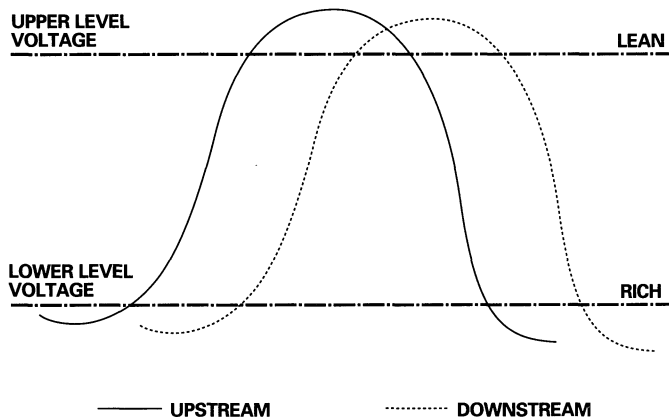
Fuel / air mixture **leaner** than 14.7:1
reference voltage **high** (maximum 4.89 v)

Fuel / air mixture **richer** than 14.7:1 –
reference voltage **low** (minimum 0.015 v)

The heater is used to bring the sensor to the active temperature of approximately 500°C in approximately 20 seconds after engine start.

If the oxygen sensors are to be removed or the exhaust system replaced, the sensors and harness side connectors must be labeled to ensure reinstallation in their original locations.

NOTE: If the sensors and connectors are not reinstalled in their original locations, the ECM can be reprogrammed using PDU to match the sensor locations to the ECM. When new sensors are installed or the wiring harness is changed, the ECM must be reprogrammed using PDU.

OXYGEN SENSOR CHARACTERISTIC

S92/1.45

Fuel Injection

Fuel metering is obtained by controlling the injector pulse duration during each engine cycle (two crankshaft rotations). The pulse duration is varied by the engine control module (ECM) according to several sensor inputs. The sensed control inputs form two groups — primary and secondary. Primary control inputs are intake mass air flow (engine load) and engine speed; secondary control inputs consist of engine coolant temperature, cranking signal, throttle movement and position and exhaust oxygen content. The injector pulse is then corrected for actual battery voltage. The injectors are pulsed semi-sequentially, twice per engine cycle (once per engine revolution) in the engine firing order.

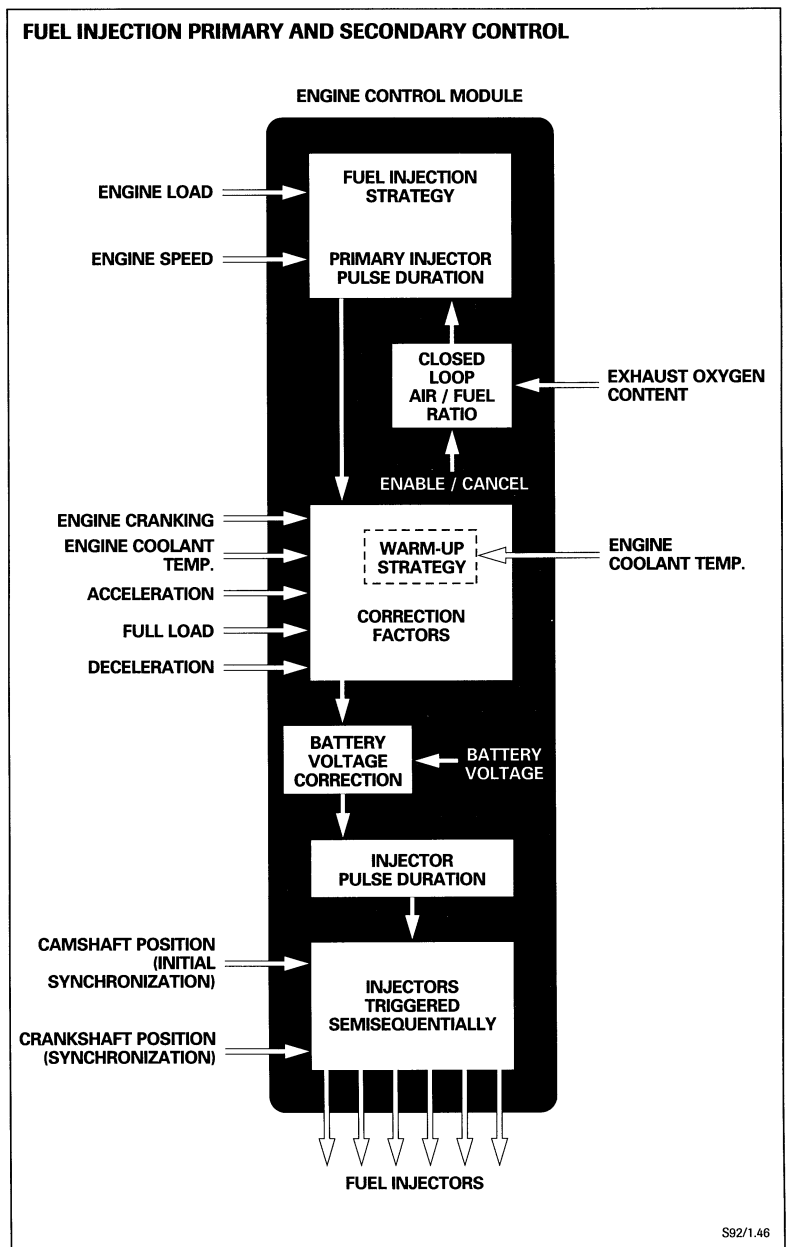
Fuel metering strategies are held in memory (EPROM) in the ECM and form an engine load versus engine speed matrix. The load and speed range of the engine is divided into 16 loads and 16 speeds (256 memory sites). Digital numbers representing injector pulse duration in milliseconds fill each site and cover the entire engine load and speed range. Fuel metering correction is applied for all six cylinders simultaneously — not for individual cylinders.

Fuel injector sequential pulsing in the engine firing order is ECM controlled. The ECM “learns” the compression stroke synchronization at each engine start from the camshaft position sensor (CMPS) and crankshaft position sensor (CKPS) inputs. After the firing synchronization is learned, the ECM uses the CKPS input for engine speed and position. Refer to the CMPS description on page 26 and the CKPS description on page 25.

Additional fuel injection controls are used for overrun fuel cutoff, engine overspeed prevention and fuel cutoff during wide-open-throttle cranking.

Fuel Injection Primary Control

Fuel metering is controlled primarily as a function of engine load and speed. Engine load is sensed by a mass air flow sensor (MAFS) located in the engine air intake before the throttle housing. Engine speed is sensed by a crankshaft position sensor (CKPS) located behind the engine damper. The ECM processes the input from the MAFS and the CKPS to access pulse duration from the fuel metering strategy.

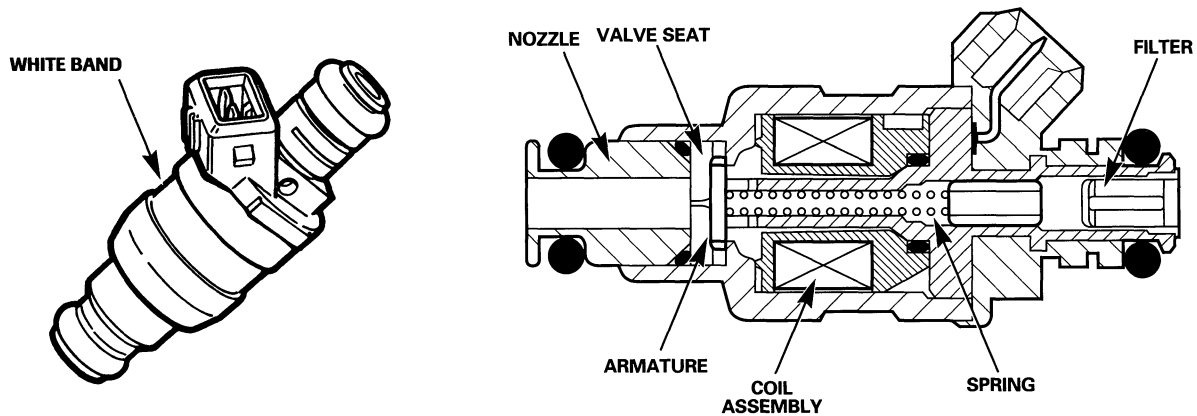


Fuel Injection (continued)

Fuel Injectors

The fuel injectors are plate-type, twin-spray injectors as used on the 1993 / 94 model year AJ6 engine, but with revised flow rates. The plate-type, twin-spray injector design has several benefits: it aims a fuel spray at each intake valve throat, it is quieter in operation, and the tip is less prone to contamination. The injectors are secured to the fuel rail with custom clips that ensure the twin jets of fuel are directed to the intake valve throats. AJ16 injectors are identified by a white band around the injector body.

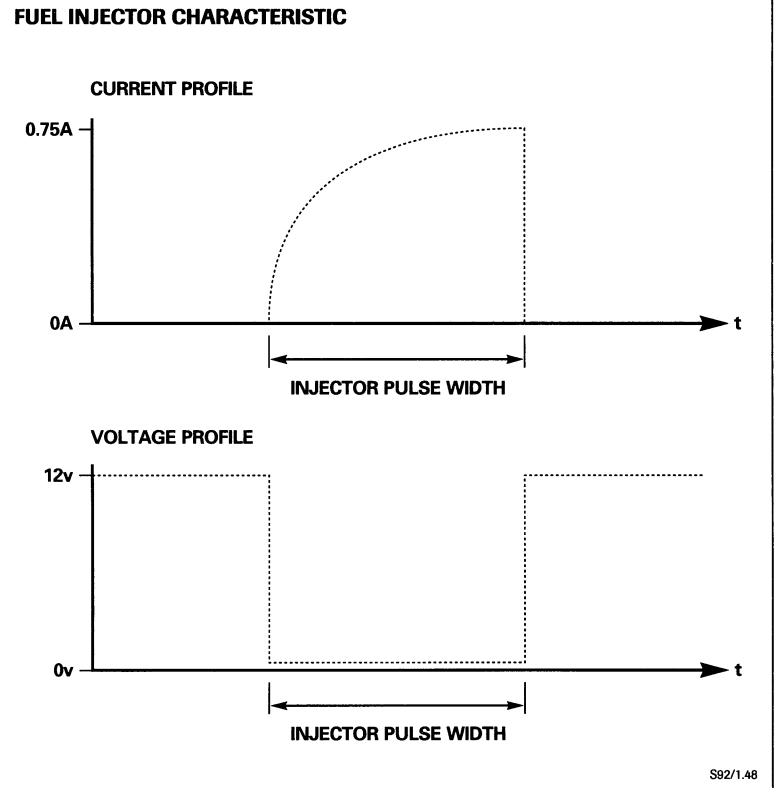
TWIN-SPRAY FUEL INJECTOR AND CROSS SECTION



INJECTOR COIL RESISTANCE: 16 OHMS

S82/1.47A & B

The AJ16 injector drive signal is a single-width modulated pulse. (The AJ6 injector has a large opening pulse followed by a series of hold-on pulses.)



Fuel Injection (continued)

Fuel Injection Secondary Control

Secondary fuel metering control adjusts for engine coolant temperature, cranking signal, throttle movement and position, exhaust oxygen content and battery voltage.

Cranking and after-start enrichment

The ECM provides fuel metering enrichment for cranking and after-start conditions by increasing the injector pulse duration. The injector pulse duration, and the rate at which the enrichment is decreased back to the warm-up phase, are dependent upon engine coolant temperature.

Warm-up

The programmed warm-up enrichment provides extra fuel during engine warm-up based on the engine temperature measured by the coolant temperature sensor.

Acceleration enrichment

When the ECM senses that the throttle is opening (throttle position sensor input), the injector pulse duration is lengthened by an amount dependent upon the rate at which the throttle is opened and on engine coolant temperature.

Full load enrichment

If the ECM senses a full throttle input from the throttle position sensor, full load enrichment is applied and closed loop operation is temporarily canceled.

Deceleration leaning

When the ECM senses that the throttle is closing (throttle position sensor input), the injector pulse duration is shortened dependent on the rate at which the throttle closed. This prevents a momentary rich condition.

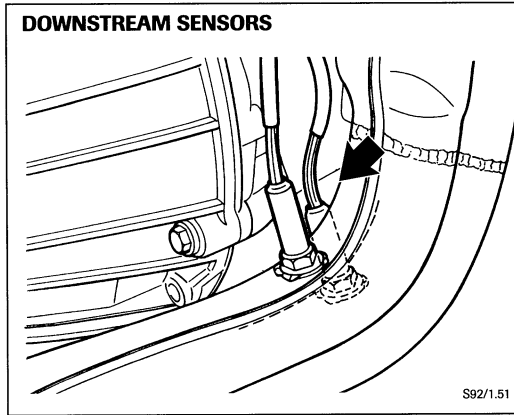
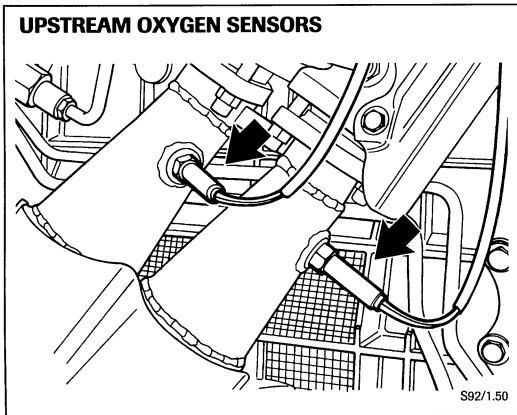
Battery voltage correction

Because the time to achieve full lift of the injector plate decreases as voltage increases, the amount of fuel delivered by the injector for a given pulse duration is dependent upon the injector operating voltage. The ECM is programmed with a voltage correction strategy. The supply voltage is monitored by a software routine and the correction applied to the pulse duration.

Closed loop fuel metering

In order to significantly reduce exhaust emission, the exhaust system incorporates two primary and one secondary 3-way catalytic converters that oxidize CO and HC, and reduce NOx. These converters operate efficiently only if engine combustion is as complete as possible. A closed loop system between fuel injection, ECM control, and exhaust oxygen content feedback is used to maintain an optimum air / fuel ratio as close to 14.7 : 1 as possible. In response to oxygen sensor voltage swings, the ECM continuously drives the air / fuel ratio rich-lean-rich by adding to, or subtracting from the baseline injector pulse duration.

Four oxygen sensors are installed on the exhaust system, two upstream and two downstream of the primary catalysts. The two downstream sensor voltage swings are used by the ECM for closed loop fuel metering correction. The upstream sensors are used for OBD catalyst monitoring. Refer to Catalytic Converters on page 44.



The oxygen sensor voltage swings abruptly at an air / fuel ratio of 14.7 : 1 ($\Lambda = 1$). The new sensors used in the AJ16 EMS have different characteristics than sensors used in previous Jaguar systems. Refer to Heated Oxygen Sensors on page 28 for more information.

Additional Fuel Injection Controls

Overrun fuel cutoff

In order to improve fuel economy and aid in controlling exhaust emission, the ECM cancels fuel injection during engine overrun conditions. The ECM determines overrun conditions from inputs received from the throttle position sensor (TPS), crankshaft position sensor (CKPS) and engine coolant temperature sensor (ECTS).

Engine overspeed control

An engine overspeed control function limits the maximum engine speed by canceling fuel injection.

Wide-open-throttle during cranking

If the ECM senses that the throttle is wide open (throttle position sensor input) during cranking, fuel injection is canceled to help clear a flooded engine.

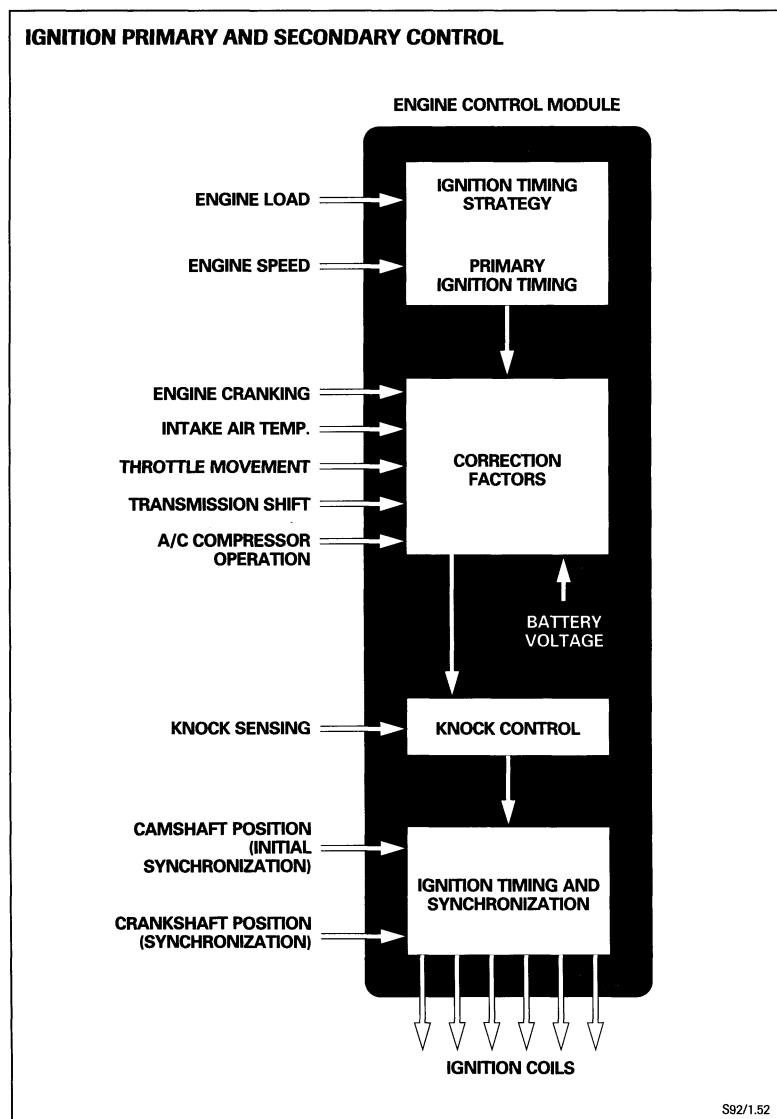
Ignition Control

Ignition Timing and Spark Distribution

Ignition timing and spark distribution are controlled by the engine control module (ECM) according to sensor inputs. As with fuel injection, the sensed control inputs form two groups: primary and secondary. Primary control inputs are intake mass air flow (engine load) and engine speed; secondary control inputs consist of engine coolant temperature, intake air temperature, throttle movement and position, transmission upshift and knock control.

Ignition timing strategies are held in memory (EPROM) in the ECM and form an engine load versus engine speed matrix. The load and speed range of the engine is divided into 16 loads and 16 speeds (256 memory sites). Digital numbers representing ignition timing values fill each site. The resulting 256 ignition timing values cover the entire engine load and speed range. Ignition timing is then calculated from the ignition timing strategy according to secondary input correction factors.

Spark distribution, in the engine firing order, is ECM controlled. The ECM "learns" the compression stroke synchronization at each engine start from the camshaft position sensor (CMPS) input. After starting the ECM uses the crankshaft position sensor (CKPS) input for spark timing. Refer to the CMPS description on page 26 and the CKPS description on page 25.

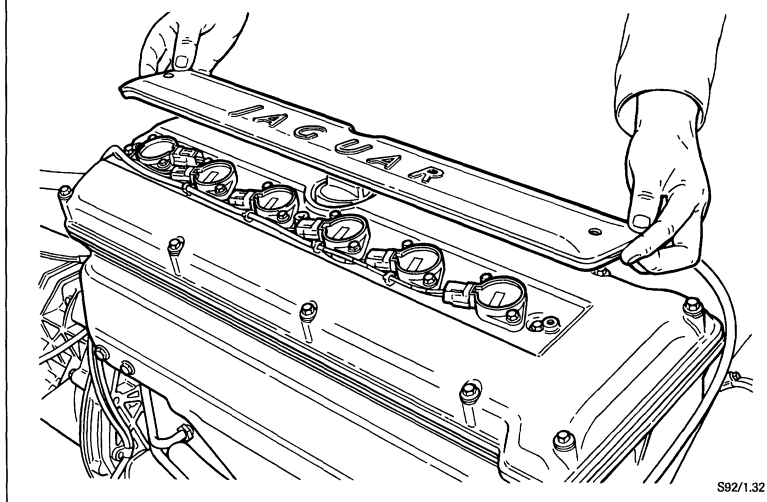


Ignition Primary Control

Ignition timing is controlled primarily as a function of engine load and speed. Engine load is sensed by the mass air flow sensor (MAFS) located in the engine air intake before the throttle housing. Engine speed is sensed by a crankshaft position sensor (CKPS) located behind the engine damper. The ECM processes the inputs from the MAFS and the CKPS and accesses ignition timing from the ignition timing strategy.

Six individual "on-plug" ignition coils are located above each spark plug. The ECM incorporates the primary circuit for each coil and provides switching for each primary circuit. The correct firing sequence and timing of the six individual on-plug ignition coils is determined by the ECM from the cylinder synchronization input provided by the camshaft position sensor (CMPS) (initial learning at engine start) and the crankshaft position sensor (CKPS). Refer to the CMPS description on page 26 and the CKPS description on page 25.

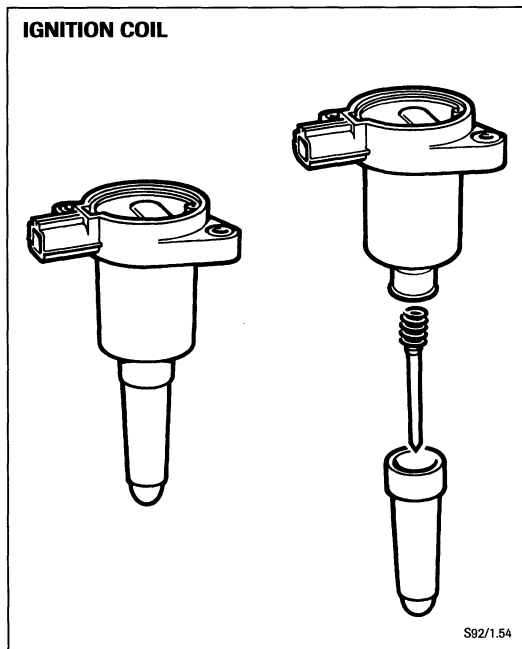
ON-PLUG IGNITION COILS



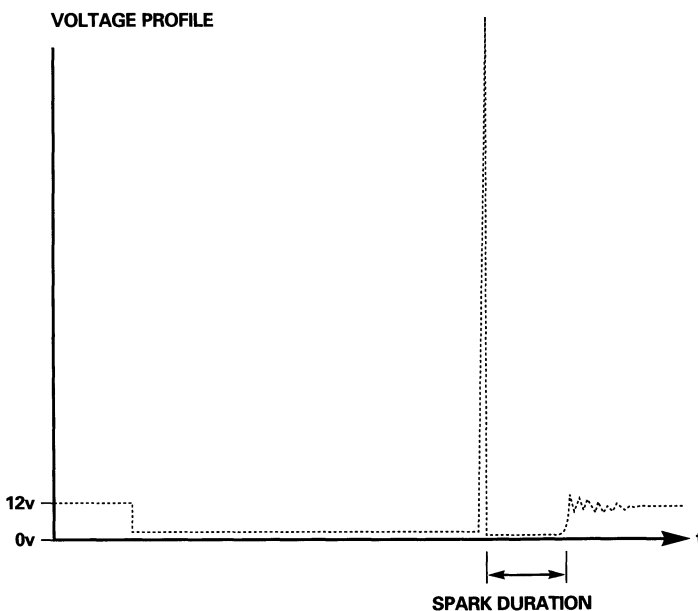
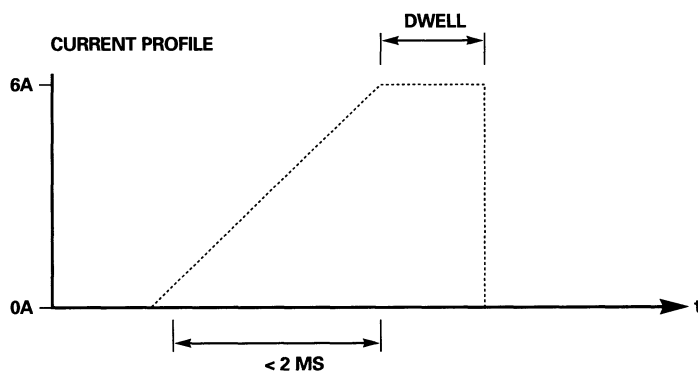
Ignition Coils

Each ignition coil assembly is made up of a coil body with an integral two-pin connector plug (for connection to the ECM), a central electrode and an extension housing.

IGNITION COIL



IGNITION COIL CHARACTERISTIC



S92/1.55

Ignition Control (continued)

Ignition Secondary Control

Secondary ignition timing control inputs consist of battery voltage, engine coolant temperature, intake air temperature, throttle movement and position, transmission upshift, and knock control.

Dwell control

The dwell angle and peak coil current are ECM controlled to maintain the required spark energy required throughout the operating range of the engine while keeping dwell to a minimum to avoid overheating of the ignition coils.

Engine coolant temperature correction

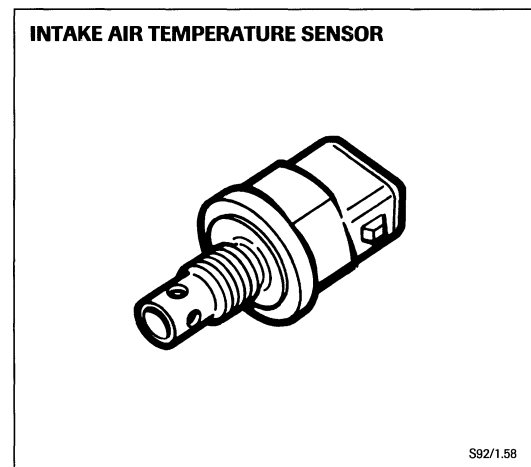
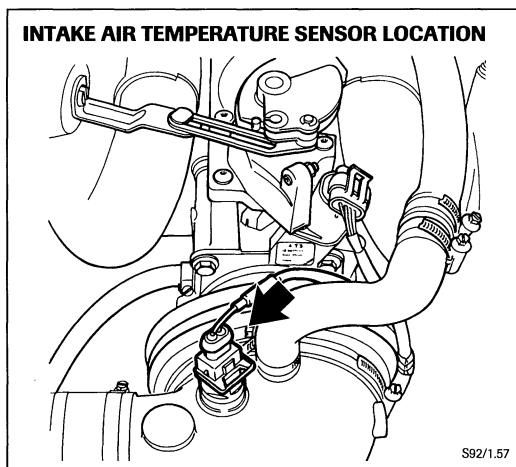
Ignition timing is corrected for engine coolant temperature by the ECM.

Intake air temperature correction

Ignition timing is corrected by the ECM for engine intake air temperature measured by the air temperature sensor mounted in the air inlet elbow.

Intake air temperature sensor (IATS)

The model 10 TT intake air temperature sensor (IATS) is a negative temperature coefficient (NTC) thermistor identical to the sensor used in AJ6 engine management systems, however, the connector and leads are revised. Intake air temperature is determined by the ECM by a change in resistance within the sensor. The ECM applies 5 volts to the sensor and monitors the voltage across the pins to detect the varying resistance.



Closed throttle / idle correction

Separate closed throttle idle ignition strategies for gear positions Neutral and Drive are used. Refer to Idle Control, page 38.

Full load correction

The ECM corrects ignition timing to compensate for full load conditions.

Torque-based transmission shifting

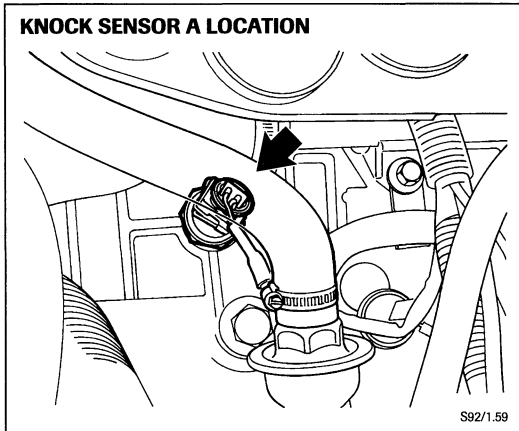
Transmission shift quality is enhanced by "torque-based shifting". The ECM continuously provides the transmission control module (TCM) with a pulse width modulated (PWM) signal that represents the amount of torque the engine is producing. This signal is generated by the ECM based on the injector pulse duration.

When a shift is to occur, the TCM calculates the necessary torque reduction and provides a PWM torque reduction signal to the ECM. The torque reduction signal will vary between 20% and 90%. The actual amount of retard is applied to the ignition advance angle after other corrections are applied.

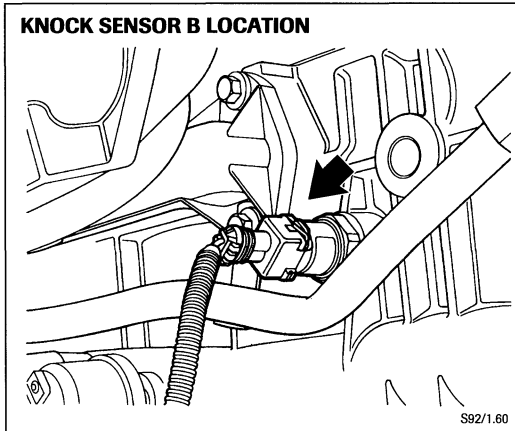
Knock control

Individual, cylinder specific ignition retard to control knock and optimize engine power is provided through ECM control. Two knock sensors (KS) are positioned on the cylinder block at the number 2 and number 5 cylinder locations to sense engine combustion knocks. Each knock sensor has a piezo electric sensing element to detect broad band (2–20 kHz) engine accelerations.

KNOCK SENSOR A LOCATION



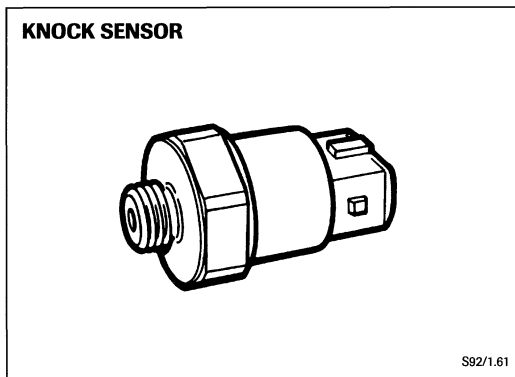
KNOCK SENSOR B LOCATION



If a knock occurs, the ECM determines which cylinder is firing from the camshaft position sensor (CMPS) input, and retards the ignition timing for that cylinder only. If, on the next firing of that cylinder, the knock reoccurs, the ECM will further retard the ignition timing; if the knock does not reoccur on the next firing, the ECM will advance the ignition timing to the normal running ignition timing.

The knock sensing ignition retard / advance process can continue for a particular cylinder up to a maximum retard of 9 degrees. The ECM will advance the ignition timing incrementally after each firing of the cylinder.

KNOCK SENSOR



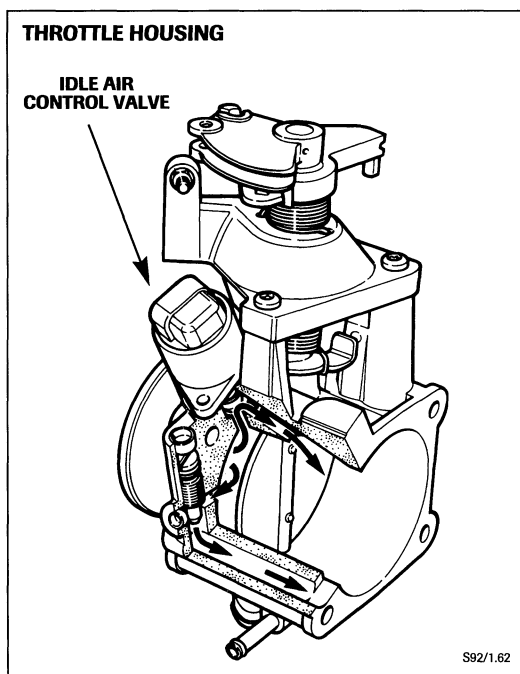
Idle Control

Idle is regulated by idle air control and ignition timing.

The idle air control valve (IACV) is driven by the ECM. The ECM uses inputs received from ignition ON, the crankshaft position sensor (CKPS), engine coolant temperature sensor (ECTS) and throttle position sensor (TPS) as well as inputs for gear position, air conditioning compressor operation and road speed to control idle.

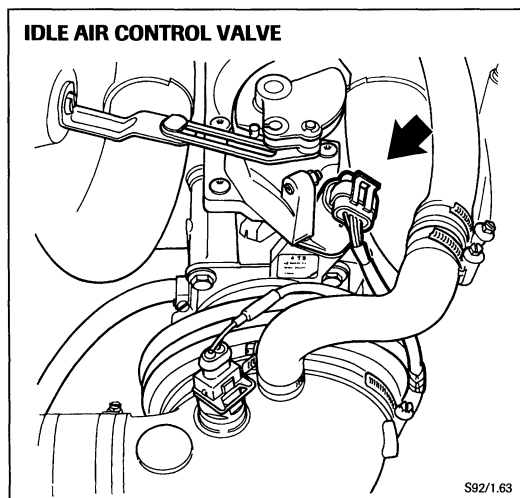
Throttle Body and Idle Air Control Valve (IACV)

The throttle body assembly incorporates the engine throttle, a fixed idle air bypass, an idle air control valve (IACV), and a fixed single track throttle position sensor (TPS). The throttle body is heated by engine coolant to prevent ice formation around the throttle area.



The nonadjustable fixed idle air bypass provides a base idle setting. The ECM-driven IACV provides a variable idle air bypass enabling ECM idle air control. The nonadjustable throttle position sensor provides the ECM with a throttle position input. Refer to page 27. The throttle valve will not require setting during service.

The IACV regulates a variable bypass passage. The flow of bypass air through the variable passage is regulated by a stepper motor connected to a conical valve. The stepper motor has two coils that are pulsed by the ECM. The pulses are phased 90° apart. The order in which the coils are pulsed determines the direction of stepper motor travel. The stepper motor has a total travel from fully opened to fully closed of approximately 230 steps.



ECM Idle Control

ECM idle speed control occurs at closed throttle when road speed is less than 3 mph. The programmed idle speed accounts for engine temperature and the loads placed on the engine by the transmission (gear position N, D, etc.), and air conditioning compressor clutch operation.

Target stable idle speeds:	Park / Neutral – 700 rpm
(normal operating temperature)	Drive / R, D 2, D 3 – 580 rpm

Idle speed \pm 30 rpm when coolant temperature is less than 86°F (30°C)

Idle speed \pm 20 rpm when coolant temperature is 86°F or higher

An ECM adaption function allows for a correction to the idle speed “base line” as the engine base idle changes with age. The adaption values are held in nonvolatile memory (EEPROM) and will be retained or updated even if the battery is disconnected.

NOTE: At road speeds above 3 mph, the idle air control valve (IACV) is opened to limit overrun intake manifold pressure. The amount that the valve is opened is based on engine speed, engine temperature and throttle opening.

Engine start-up

ECM idle speed control begins shortly after the engine is started, provided the throttle is closed (throttle position sensor at idle) and the road speed is less than 3 mph. The stepper motor in the control valve is closed in stages until the target idle speed is reached.

Gear position

When the gear selector is in Park or Neutral, the engine management ECM receives a ground signal from the transmission rotary switch. The ECM then closes the idle air control valve a predetermined number of steps in anticipation the reduced engine load. At idle, the ECM applies ignition timing from separate closed throttle ignition strategies for gear positions Neutral and Drive.

Air conditioning compressor clutch operation

When the air conditioning compressor clutch is energized, a parallel circuit inputs battery voltage to the engine management ECM. The ECM opens the idle air control valve a predetermined number of steps and advances the ignition timing to adjust for the change in engine load.

Ignition switched OFF

When the ignition is switched OFF, the idle air control valve indexes to a known parked position. The reference is from the fully closed position approximately 10 seconds after the ignition is switched OFF.

Adaptive Idle Fuel Metering

Adaptive idle fuel metering is used to allow for minor engine mechanical variability and engine aging.

The ECM contains an adaptive idle fuel metering software function that automatically makes a baseline correction to the idle fuel metering strategy throughout the life of the vehicle. The adaption values are held in nonvolatile memory (EEPROM) and will be retained or updated even if the battery is disconnected.

Secondary Air Injection

Secondary air injection is employed to reduce catalyst "light off" to a minimum. "Light off" is the term used to describe the time taken to bring the catalyst to the ideal operation temperature. After engine start, the fuel / air mixture is initially rich. The exhaust from this rich mixture is still burning when it enters the catalyst. Air is delivered to the exhaust system to prolong the catalyst burning time and therefore raise the catalyst operating temperature to the ideal temperature level as soon as possible.

Secondary air injection operates immediately after start-up for a period mapped against engine coolant temperature and is enabled only when the engine coolant temperature is below 16°C (61°F).

The ECM activates air injection after engine start for 15 seconds, or until the engine coolant temperature reaches 16°C (61°F). Operation occurs for a maximum of 4 minutes.

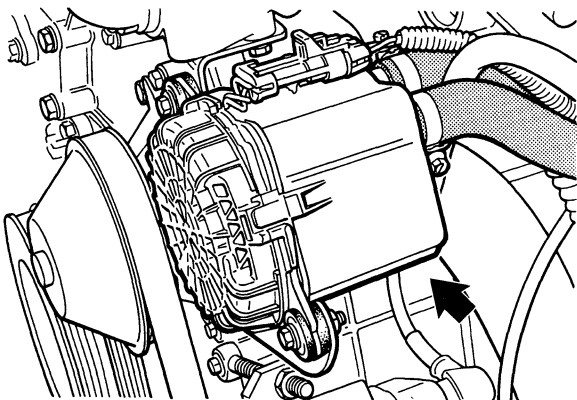
Secondary Air Injection Monitoring for OBD II

Secondary air injection is monitored for decreased flow. The ECM can determine the air injection flow volume by monitoring the drift in oxygen sensor swing levels.

Secondary Air Injection Pump (AIRP)

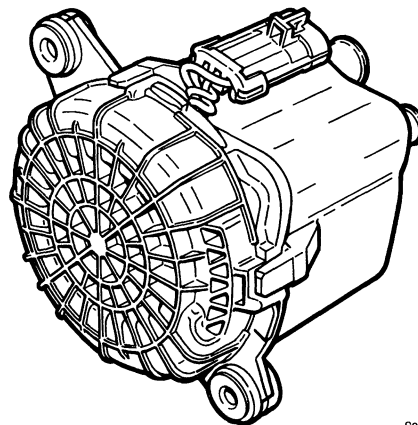
The secondary air injection pump is an electrically powered regenerative turbine-type pump that is permanently lubricated and requires no periodic maintenance. The AIRP incorporates an integral solenoid operated stop valve, which is activated to open when the pump operates to allow air flow to the exhaust manifolds. The stop valve closes when current is switched off to prevent air flow through the pump. The pump and stop valve are controlled by the ECM via the air injection relay.

SECONDARY AIR INJECTION PUMP LOCATION



S92/1.64

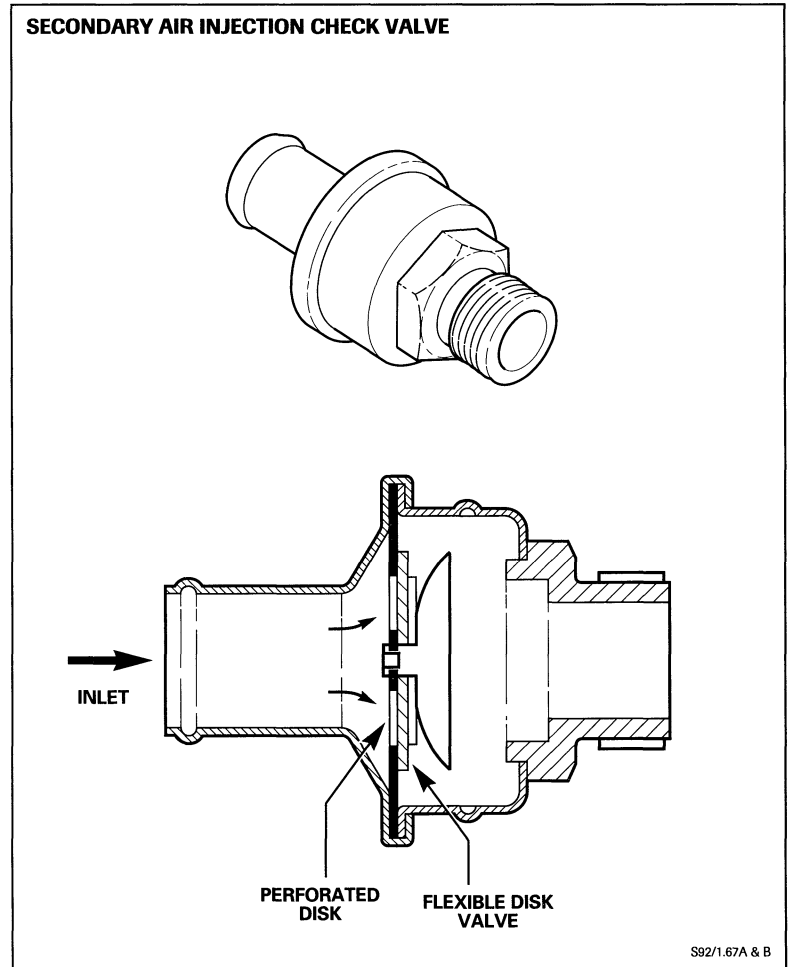
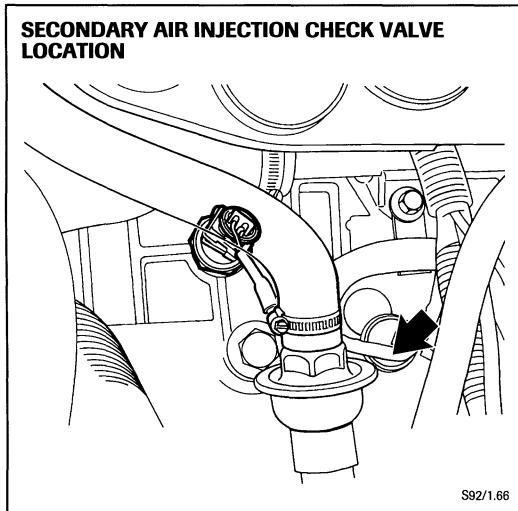
SECONDARY AIR INJECTION PUMP



S92/1.65

Secondary Air Injection Check Valve (AIRC)

The secondary air injection check valve, located in the delivery tube behind the air pump, prevents the back-flow of exhaust gas to the air pump.



Exhaust Gas Recirculation

EGR is employed to lower the combustion temperature, which in turn aids in the reduction of NOx exhaust emission. If the EGR valve is seized closed, the uncontrolled production of NOx will result; if the EGRV is seized open, the combustion temperature will lower resulting in high HC and CO exhaust emission and poor engine performance.

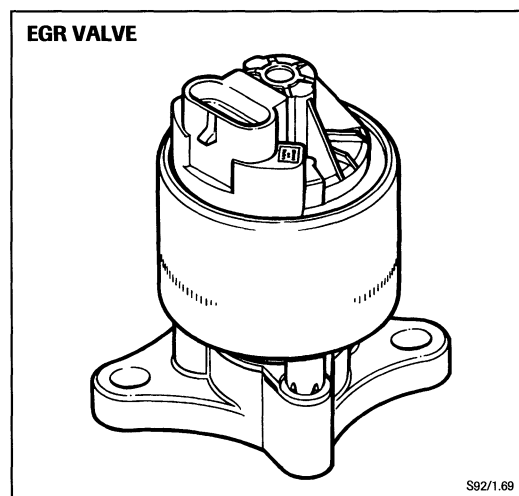
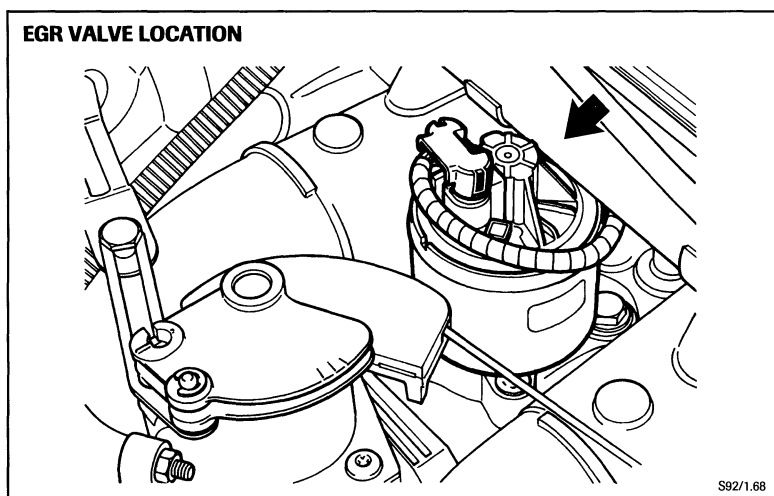
EGR operation is mapped against engine load and speed, throttle position, and coolant temperature.

EGR Monitoring for OBD II

EGR operation is monitored by the ECM via the EGR temperature sensor. When EGR is enabled, the ECM monitors EGR temperature and compares it with the expected temperature for a given EGR valve opening. The valve opening is determined by feedback from the EGR valve.

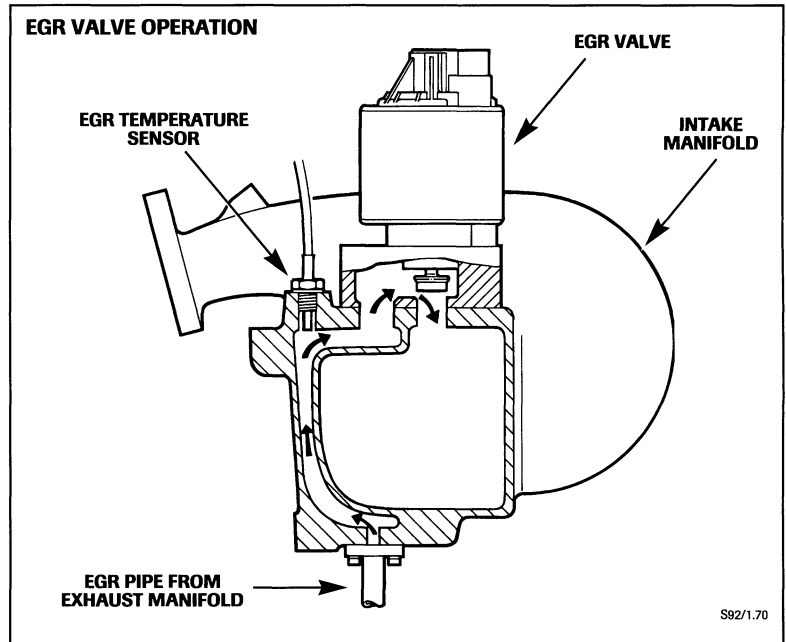
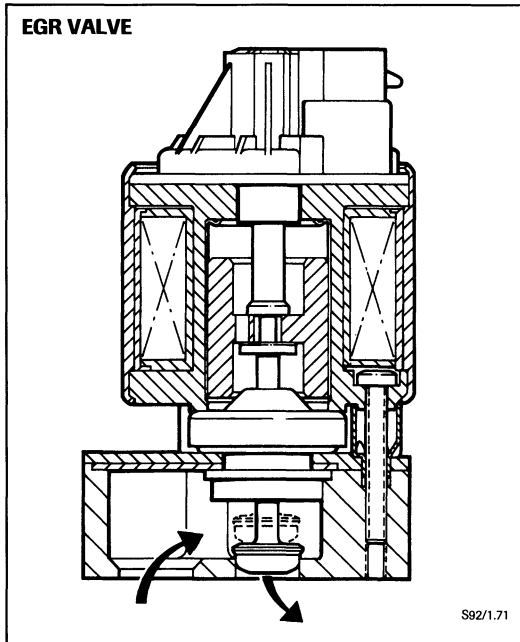
EGR Valve (EGRV)

The electronically operated and controlled independent EGR valve is located on the intake manifold.



The EGRV consists of three main parts: the solenoid, the pintle and seat, and the pintle position sensor. When energized by the ECM, the solenoid pulls the pintle away from the seat to allow exhaust gas flow into the intake manifold. Movement of the armature and pintle is resisted by three forces: the pressure drop across the pintle and seat area, gravity, and the spring load from the pintle position sensor.

The ECM is able to continuously vary the flow of exhaust gas into the intake manifold by the pintle position sensor providing feedback to the ECM for closed loop control. In addition to closed loop EGR control, the ECM uses the pintle position feedback to calculate fuel metering and ignition corrections.

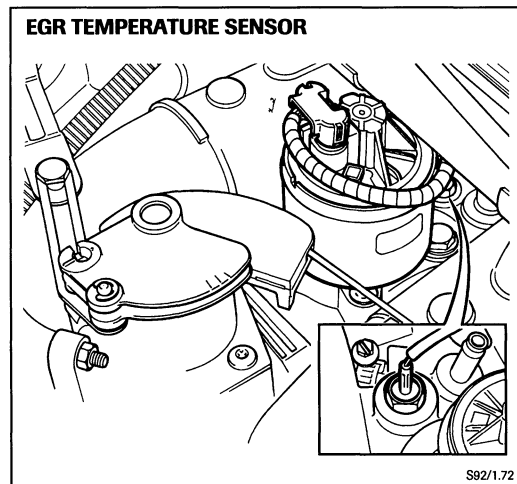


EGR Temperature Sensor (EGRT Sensor)

The EGR temperature sensor is a negative temperature coefficient (NTC) thermistor. It is identical to the EGR temperature sensor used in AJ6 engine management systems, however, the connector and leads are revised. The ECM applies 5 volts to pin 1 of the sensor and monitors the voltage across the sensor pin to ground. The theoretical full voltage range is from 5 to 0 volts representing maximum cold to maximum hot.

EGR temperature sensor – temperature versus resistance

EGR temperature		Resistance
°F	°C	(kilo ohms)
122	50	600
212	100	90
302	150	11
392	200	5
482	250	2
572	300	0.8
662	350	0.3
752	400	0.1

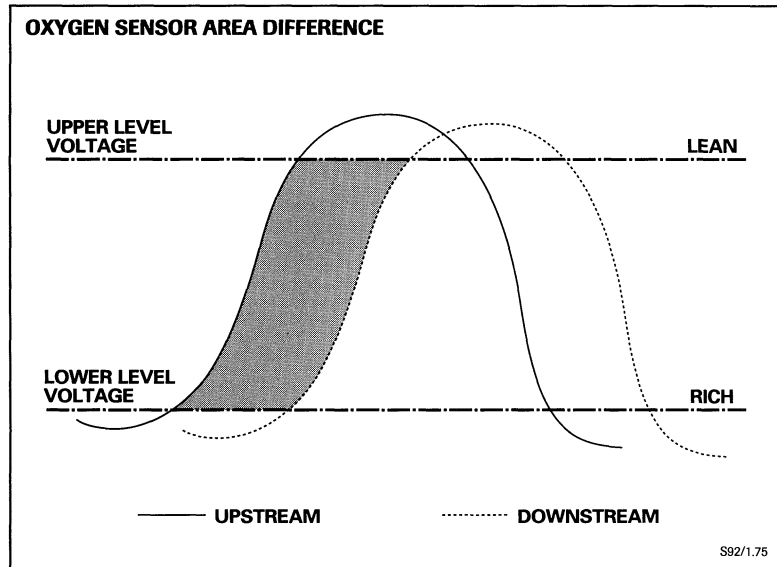
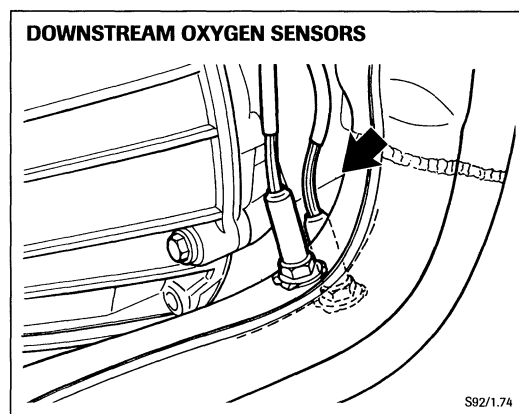
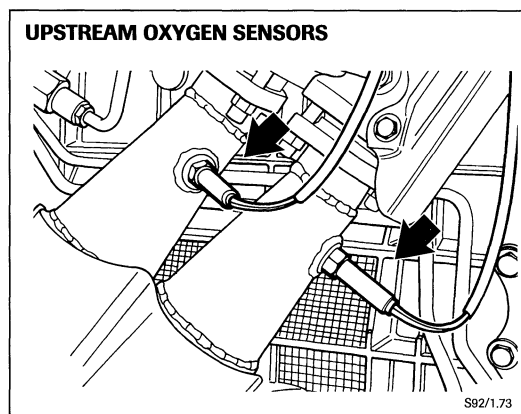


Catalytic Converters

Catalyst Monitoring for OBD II

Deterioration of catalytic conversion efficiency will create higher than acceptable HC, CO and NOx exhaust emission.

The efficiency of the primary catalytic converters is monitored and any deterioration in efficiency is flagged as a fault by the ECM. Monitoring for catalyst efficiency is achieved by sampling both the incoming and outgoing exhaust at the primary catalysts. Two oxygen sensors are positioned in each exhaust down pipe assembly – one upstream of the primary catalyst and one down stream of the primary catalyst.



By comparing the voltage swings of each set of sensors, the ECM can detect when catalyst efficiency drops off. An "area difference" technique is used to compare successive oxygen sensor swing measurements.

NOTE: The CHECK ENGINE MIL will not be activated for catalyst monitoring faults on 1995 model year vehicles.

Engine Misfire

Misfire Monitoring for OBD II

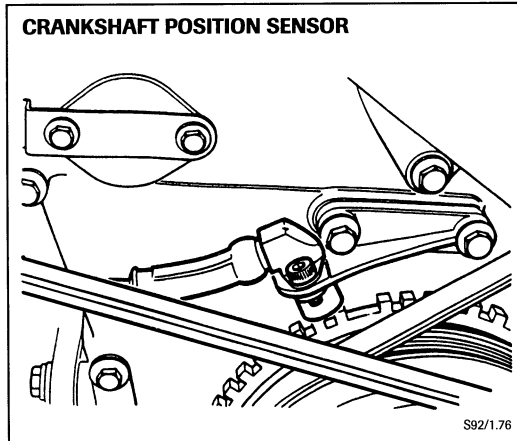
Engine misfire may cause catalytic converter damage and/or cause a vehicle to fail an emission inspection.

The ECM monitors the engine for misfire via the crankshaft position sensor (CKPS). The steel teeth on the crankshaft timing ring are used as a rotor for the sensor. The rotor has 60 tooth positions set at 6 degree intervals with one tooth missing. The gap identifies the TDC position of cylinders 1 and 6 during one complete engine cycle (two crankshaft revolutions). The ECM uses the gap as a position reference.

At each cylinder firing, the crankshaft momentarily accelerates. The ECM records and compares the time intervals between cylinder firings and the rotor gap to detect a misfire.

If a persistent misfire occurs, the ECM will identify the cylinder and switch off the fuel injector.

NOTE: The CHECK ENGINE MIL will not be activated for misfire monitoring faults on 1995 model year vehicles.



Vehicle Systems Interfaces

The engine management system interfaces with the instrument pack, the air conditioning compressor clutch circuit, and the transmission control module to provide data and sensor input, and operational control.

Instrument Pack

Vehicle road speed

The instrument pack outputs a road speed signal (pulsed signal) to the ECM. The ECM uses the signal to determine idle speed control functions.

Low fuel level

The instrument pack outputs a fuel level voltage signal to the ECM. When the voltage drops below a specified value, fuel metering diagnostics (OBD) are canceled. Canceling the fuel metering diagnostics prevents the ECM from flagging DTCs caused by the vehicle running out of fuel.

Engine speed

The ECM provides an engine speed signal (pulsed signal) to the instrument pack for operation of the tachometer.

CHECK ENGINE MIL

If the OBD system detects a fault, the ECM outputs a warning signal (ground) to the instrument pack for operation of the CHECK ENGINE MIL. Refer to On-Board Diagnostic Facility, page 47.

Climate Control / Air Conditioning

The ECM controls air conditioning compressor clutch operation from a request made by the climate control module. When an air conditioning compressor ON request (12 volt signal) is received from the climate control module, the ECM switches ON the compressor (via the air conditioning compressor relay). The ECM cancels (or does not switch ON) air conditioning during a full throttle demand, and when high engine coolant temperatures occur.

Automatic Transmission

Throttle position

The ECM processes the throttle position input signal from the single track throttle position sensor (TPS) and supplies the TCM with a pulse width modulated signal to indicate throttle position.

Gear selector position

The transmission control module (TCM) outputs gear position signals to the ECM. When the gear selector is in R, D, 2 or 3, the signal is 5 volts; when the gear selector is in P or N, the signal is ground or 0 volts. The ECM uses the gear position inputs to control idle speed. Refer to Ignition Control, page 34 – 37, and Idle Control, page 38 – 39, for a detailed explanation.

Engine speed and torque

The ECM supplies the TCM with engine speed and torque signals. Speed is supplied as a pulsed voltage signal that decreases as rpm increases; torque (derived from injector pulse duration) is supplied as a pulse width modulated (PWM) signal that.

Serial Communication

Serial communication between the engine management system and PDU takes place via the serial communication data link. Only one bidirectional serial line connects to the ECM. Serial communication is used for engine setup, accessing stored DTCs, fault diagnosis and erasing DTCs.

On-Board Diagnostic Facility

The OBD facility has greatly expanded diagnostic capability, as described previously in this section. The OBD facility continuously monitors the operation of the engine management sensors and components. In addition the OBD facility predicts failure of subsystems by performance observation. If a fault is detected by OBD monitoring or testing, a fault is registered and reported to the Diagnostic Status Manager (DSM) (ECM internal software). The DSM decides whether to flag a DTC and activate the CHECK ENGINE MIL. Except in cases where EMS system operation would be impaired, a fault must be detected on two consecutive trips (ignition ON cycles) before being flagged by the DSM.

If, after the MIL is activated, three sequential trips are made with no recurrence of the fault(s) and no occurrence of additional fault(s), the MIL will extinguish on the next trip. The fault(s) will remain stored in memory. The DSM will erase any fault code that has not recurred in 40 consecutive engine warm-up cycles.

Faults stored in the ECM memory can only be retrieved through serial communication via the data link. Refer to page 55. DTCs are held in nonvolatile memory (EEPROM) so that disconnecting the battery does not erase stored codes.

Limp Home Default

In order to allow vehicle operation if a malfunction occurs, "limp home" default values are incorporated as an ECM facility. If a sensor fault is detected by OBD, the ECM will substitute a nominal value for the missing input(s).

Diagnostic Trouble Codes

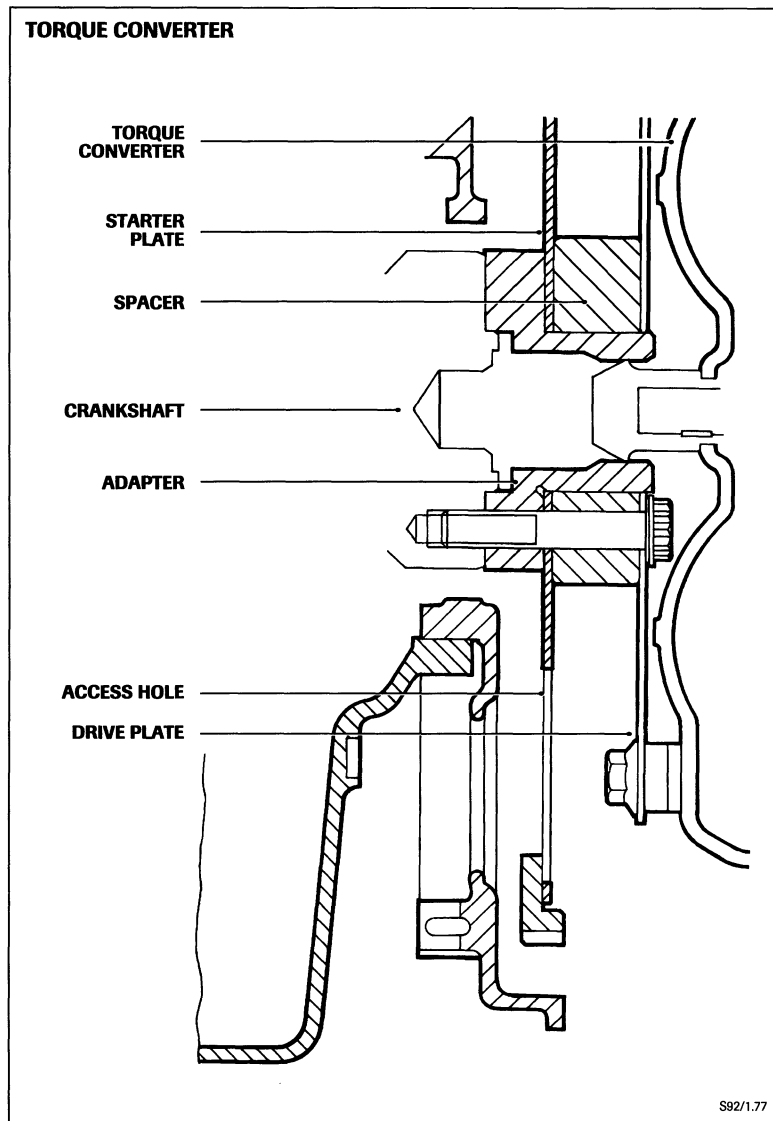
The number of possible diagnostic trouble codes (DTCs) has been greatly increased. Each DTC is a five place standard SAE (Society of Automotive Engineers) code that describes a subsystem and the specific fault. Refer to the Service Manual for a complete DTC listing.

DTCs are arranged in seven major groups as follows.

PX1XX	Fuel and air metering
PX2XX	Fuel and air metering
PX3XX	Ignition system or misfire
PX4XX	Auxiliary emission controls
PX5XX	Vehicle speed; idles control; auxiliary inputs
PX6XX	Computer and auxiliary inputs
PX7XX	Transmission control

Fault diagnostics

The Service Manual contains a Diagnostics section for OBD II specific fault finding and repair.

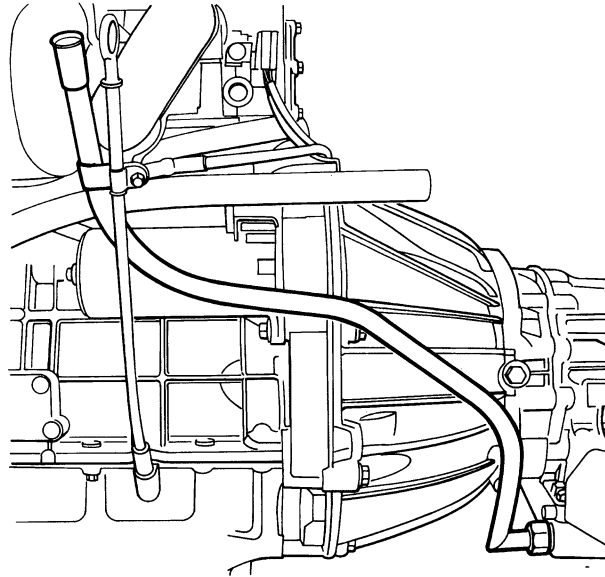
Automatic Transmission Mechanical**Torque Converter**

A new torque converter with reduced mass improves engine response. The depth of the converter has been reduced by 1.18 in. (30 mm). In order to allow the use of the existing torque converter housing (bell housing), a spacer and drive plate have been added between the crankshaft and the torque converter. The torque converter attaches to the drive plate. Six holes in the starter plate allow access to the drive plate-to-torque converter attaching hardware.

Fill Tube and Dipstick

With the introduction of the new torque converter, the expansion tank on the fill tube is no longer required. To improve fluid level reading accuracy, the new simplified fill tube positions the end of the dipstick adjacent to the transmission sump.

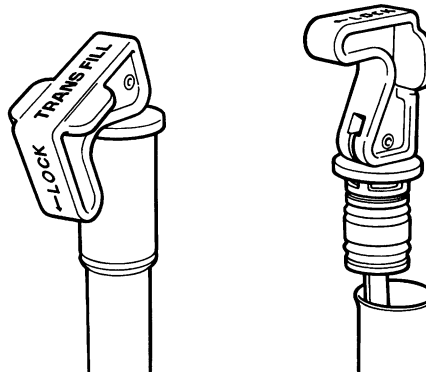
FILL TUBE



S92/1.78

The dipstick has a "flip-top" handle that compresses the fill tube seal when moved to the lock position. The dipstick handle is color keyed silver to indicate the XJS (AJ16) fill level specification.

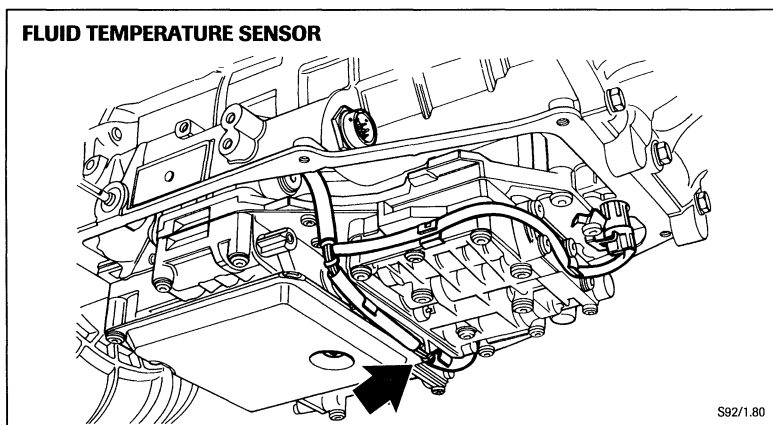
"FLIP-TOP" DIPSTICK HANDLE



S92/1.79

Automatic Transmission Control

The transmission control system and the transmission control module (TCM) have been revised to suit the characteristics of the AJ16 engine and conform to OBD II. In addition, a fluid temperature sensor has been added to the system.



Fluid Temperature Sensor

The positive temperature coefficient (PTC) fluid temperature sensor, located in the transmission internal electrical harness, provides the TCM with a sump fluid temperature signal. The TCM uses the signal input to calculate and adjust line pressure. This adjustment refines gear shift quality at low fluid temperature.

Transmission Control Module

The revised TCM incorporates control revisions for the AJ16 engine operating characteristics and the introduction of the fluid temperature sensor. The TCM also has revised

sensor and interface inputs from the engine management system, expanded and enhanced shift quality control and OBD fault monitoring.

Throttle position input

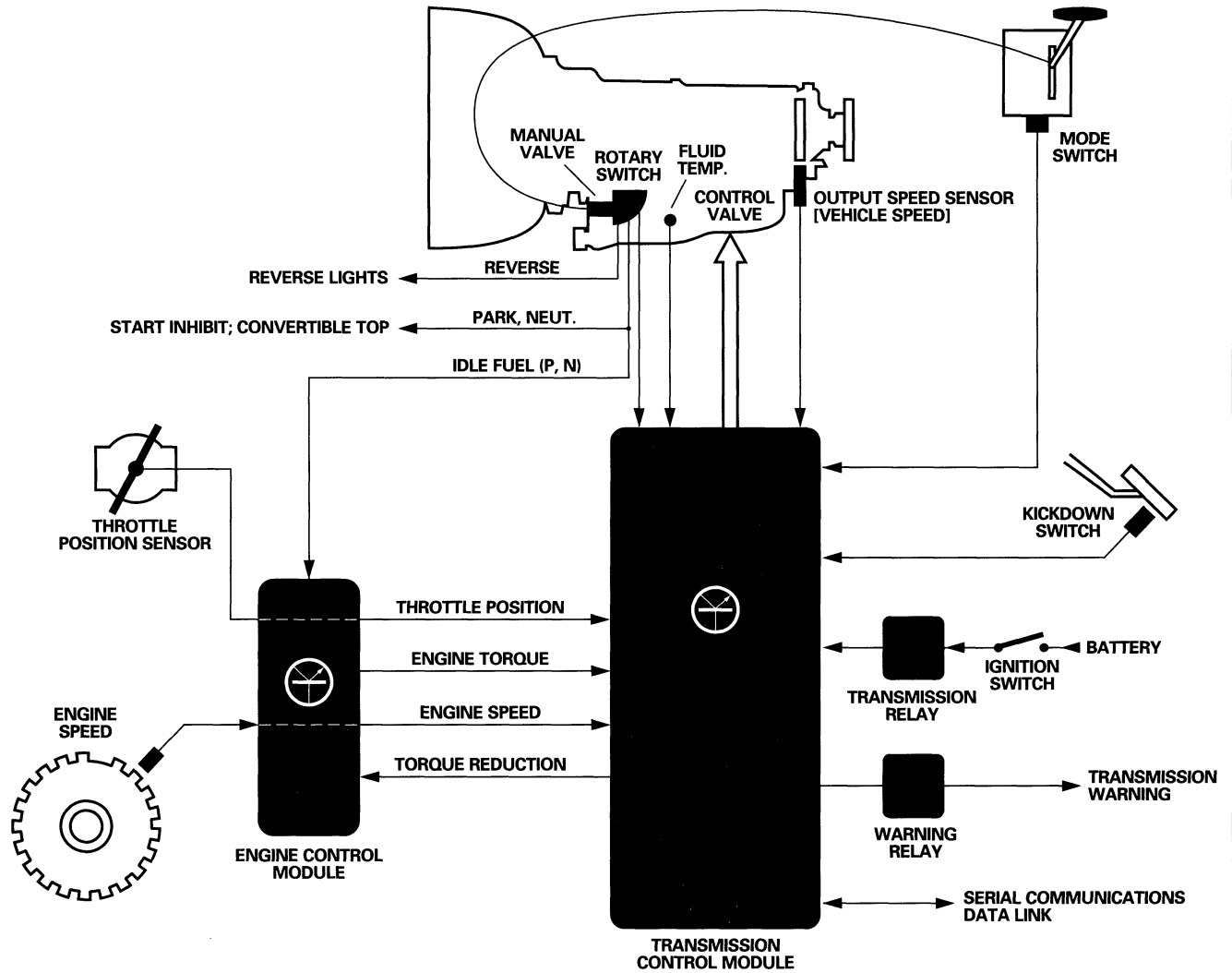
The TCM receives a throttle position signal from the engine management ECM. The ECM processes the single track throttle position sensor (TPS) input and supplies the TCM with a pulse width modulated (PWM) signal to indicate throttle position.

Torque-based shifting

Transmission shift quality is enhanced by "torque-based shifting". The ECM continuously provides the transmission control module (TCM) with a pulse width modulated (PWM) signal that represents the amount of torque the engine is producing. This signal is generated by the ECM based on the injector pulse duration.

When a shift is to occur, the TCM calculates the necessary torque reduction and provides a PWM torque reduction signal to the ECM. The torque reduction signal will vary between 20% and 90%. The actual amount of retard is applied to the ignition advance angle after other corrections are applied.

AJ16 AUTOMATIC TRANSMISSION CONTROL



S92/1.81

Automatic Transmission Control (continued)

On-Board Diagnostic Facility

The transmission control OBD facility has expanded diagnostic capability for fluid temperature and to conform to OBD II. The OBD facility continuously monitors the operation of the transmission sensors and components.

Before a fault is flagged by the TCM, the fault must be detected on two consecutive trips (ignition ON cycles). If a fault is detected on two consecutive trips, the OBD system will activate the Malfunction Indicator Lamp (MIL) (TRANSMISSION FAULT) warning in the instrument pack and flag a diagnostic trouble code (DTC) in the TCM memory. DTCs are held in nonvolatile memory so that disconnecting the battery does not erase stored codes. The TCM can be interrogated only through serial communication via the data link. Refer to page 55.

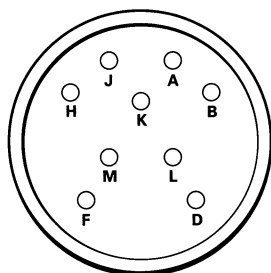
Fault Diagnostics

The Service Manual contains a Diagnostics section for OBD II specific fault finding and repair.

Serial Communication

Serial communication between the transmission control system and PDU takes place via the serial communication data link. Both serial lines (input and output) connect to the ECM. Serial communication is used for accessing stored DTCs, fault diagnosis and erasing DTCs.

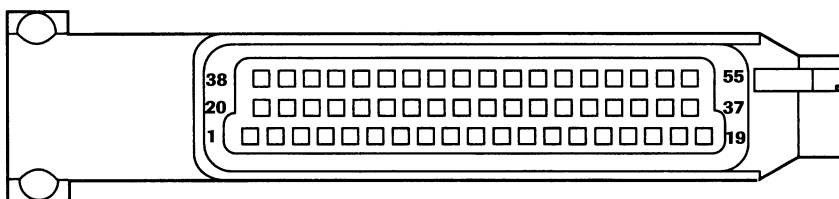
TRANSMISSION HARNESS CONNECTOR PINS



- A Road Speed (-)
- B Fluid pressure regulator control
- D Fluid temperature sensor
- F Road speed (+)
- H Solenoid valve 1 control
- J Fluid temperature ground
- K Solenoid valve 2 control
- L Solenoid valve 3 control
- M Solenoids supply

S92/1.82

TRANSMISSION CONTROL MODULE PIN-OUT INFORMATION

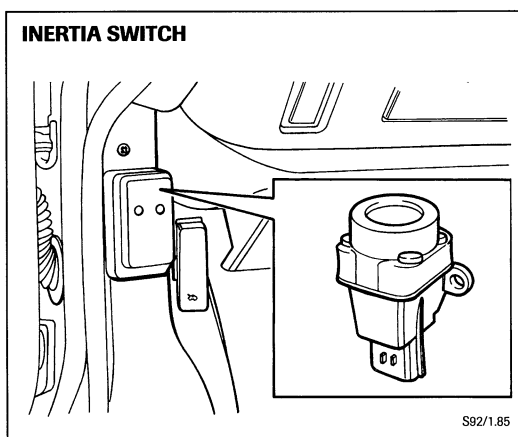


- | | | |
|--------------------------------------|----------------------------------|----------------------------------|
| 1 Power supply | 19 Solenoids supply | 38 Road speed (-) |
| 2 Road speed (+) | 20 Not used | 39 Not used |
| 3 Engine speed | 21 Engine torque signal | 40 Not used |
| 4 Mode selector input B | 22 Not used | 41 Kickdown switch |
| 5 Solenoid valve 1 control | 23 Not used | 42 Solenoid valve 3 control |
| 6 Fluid pressure regulator control | 24 Solenoid valve 2 control | 43 Not used |
| 7 Digital ground | 25 Not used | 44 Fluid temperature ground |
| 8 Not used | 26 Power ground | 45 Not used |
| 9 Not used | 27 Not used | 46 Fluid temperature sensor |
| 10 Not used | 28 Not used | 47 Throttle position |
| 11 Not used | 29 Mode selector input A | 48 Not used |
| 12 Not used | 30 Not used | 49 Sport mode indicator |
| 13 First gear inhibit mode indicator | 31 Not used | 50 Gear selector position code X |
| 14 Gear selector position code Y | 32 Engine torque reduction | 51 Serial output |
| 15 Serial input | 33 Gear selector position code Z | 52 Not used |
| 16 Gearbox fault warning | 34 Not used | 53 Not used |
| 17 Not used | 35 Not used | 54 Not used |
| 18 Not used | 36 Not used | 55 Not used |
| | 37 Not used | |

S92/1.83

Wiring Harness and Components

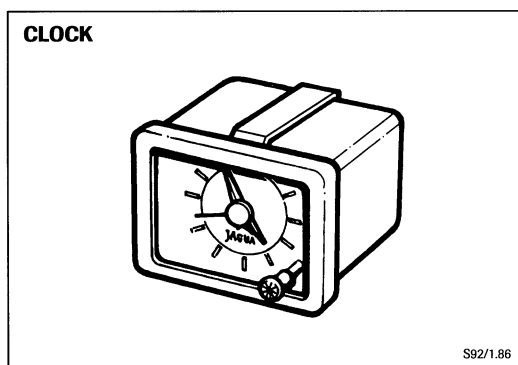
Minor harness and component revisions have been made for incorporation of the AJ16 engine management system and improvements to systems and circuits. The tables and charts, included in the Reference Section, include all current component locations and service specifications.

**Inertia Switch**

A new type inertia switch is installed in the same location as previous models.

Window Lift Circuit

The window lift thermal breaker has been deleted and replaced by a 30-amp fuse.

**Clock: XJS (4.0L)**

A new analog clock replaces the previous trip computer / LCD display on XJS (4.0L) models. The trip computer has been deleted and is no longer available.

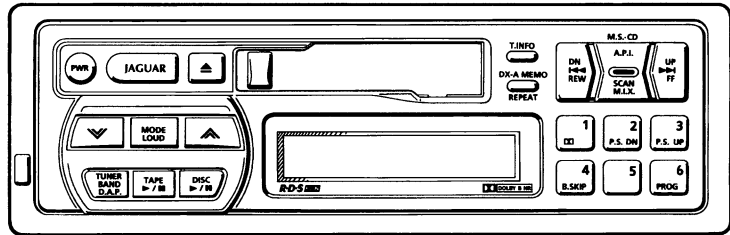
In-Car Entertainment

A new radio cassette unit allows custom operation to suit individual taste. The optional trunk-mounted CD player remains unchanged.

Theft deterrent control panel

The theft deterrent control panel can be removed simply by pressing the release button and hinging the panel out from the left. All programmable functions are stored in nonvolatile memory so that reprogramming is not required after reinstallation. "Coding" has been deleted.

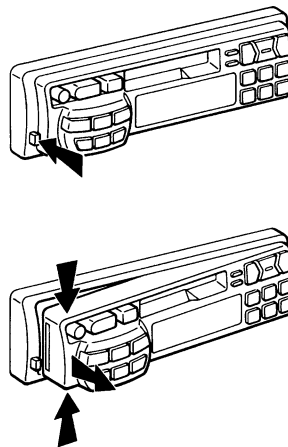
RADIO CASSETTE CONTROL PANEL



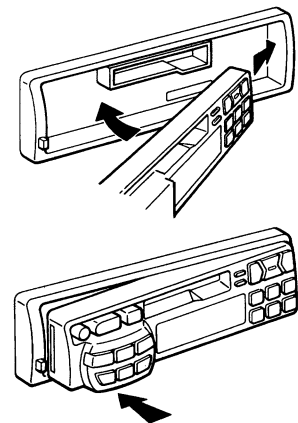
S92/1.87

CONTROL PANEL REMOVAL AND REPLACEMENT

TO REMOVE:



TO REPLACE:

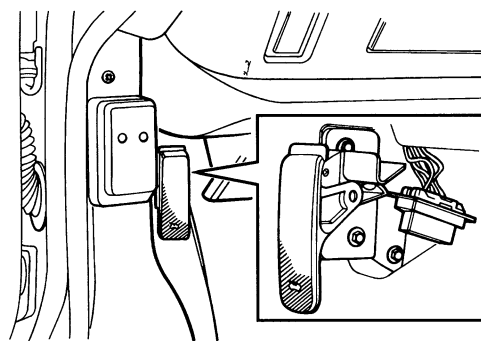


S92/1.88A - D

Serial Communication

A new serial communication Data Link Connector that conforms to OBD II is located behind the hood release lever. The control modules on the data link remain unchanged from previous models.

DATA LINK CONNECTOR



S92/1.89

Fuse Identification and Location**Left fuse panel**

Number	Color	Value	Circuit
1	Lt. Blue	15A	Driver's seat movement - fore, aft, lumbar
2	Tan	5A	Cruise control
3	Yellow	20A	Left blower
4	Red	10A	Radio memory
5	Red	10A	Radio power
6	Tan	5A	Interior lights; serial communications data link
7 *	Tan	5A	Climate control (ECM and control circuit)
7 **	—	—	Not used
8	Red	10A	Windshield washer pump
9	Red	10A	Driver's seat heater
10	—	—	Not used
11	Red	10A	Trunk lighting
12	Yellow	20A	Driver's seat movement - recline
13 *	Tan	5A	Clock; gear shift interlock; climate control panel
13 **	Tan	5A	Trip computer memory; gear shift interlock; climate control panel
14	Tan	5A	Power mirrors; door switch packs; seat memory
15	Tan	5A	Heated washer jets
16	Tan	5A	Speed interface; gear shift interlock; serial communications data link
17	Lt. Green	30A	Power windows
18	Orange	7.5A	Locate lighting; instrument pack lighting
19	Red	10A	Hazard warning; seat belt logic
20	—	—	Not used
21	—	—	Not used
22	Lt. Blue	15A	Heated rear window

Right fuse panel

Number	Color	Value	Circuit
1	Lt. Blue	15A	Passenger's seat movement - fore, aft, lumbar
2	Red	10A	Central locking; multi-function unit
3	Yellow	20A	Right blower
4 *	Tan	5A	Air conditioning compressor relay
4 **	Red	10A	Air conditioning compressor relay; supplementary air valve
5	Lt. Blue	15A	Horns
6	Brown	7.5A	Turn signals
7 *	Red	10A	EMS power relay; transmission relay
7 **	Lt. Blue	15A	Fuel injection main relay; ignition system power
8	Lt. Blue	15A	Windshield wash/wipers (logic module)
9	Red	10A	Passenger's seat heater
10 *	Tan	5A	ECM controlled power
10 **	Tan	5A	Transmission memory
11	Lt. Green	30A	Brake (ABS) control module
12	Yellow	20A	Passenger's seat movement - recline
13 *	—	—	Not used
13 **	Red	10A	EVAPP valves; secondary air injection; hot start
14 *	Tan	5A	ECM controlled relay
14 **	Tan	5A	Fuel injection memory

* XJS 4.0L

** XJS V12

Fuse Identification and Location

Right fuse panel (continued)

Number	Color	Value	Circuit
15 *	—	—	Not used
15 **	Tan	5A	Climate control (ECM and control circuit)
16 *	Red	20A	Cigar lighter
16 **	Yellow	20A	Cigar lighter
17	Lt. Green	30A	Headlight power wash
18	Lt. Blue	15A	Accessory connector
19	Lt. Blue	15A	Stop lights
20 *	Yellow	20A	Engine management system power
20 **	Tan	5A	Transmission (shift solenoids) power
21 *	Red	10A	Transmission power
21 **	Tan	5A	Transmission control module power
22	Lt. Green	30A	ABS Pump

Front fuse panel

Number	Color	Value	Circuit
1	Lt. Blue	15A	Not used – USA; daytime running lights – Canada
2	Lt. Blue	15A	Front fog lights
3	—	—	Not used
4 *	Lt. Blue	15A	Auxiliary cooling fan
4 **	Lt. Green	30A	Auxiliary cooling fan
5	Red	10A	Left headlight high beam
6	Red	10A	Right headlight high beam
7	Tan	5A	Left front side lights
8	Tan	5A	Right front side lights
9	Brown	7.5A	Left headlight low beam
10	Brown	7.5A	Right headlight low beam
11	—	—	Not used
12	Tan	5A	Not used

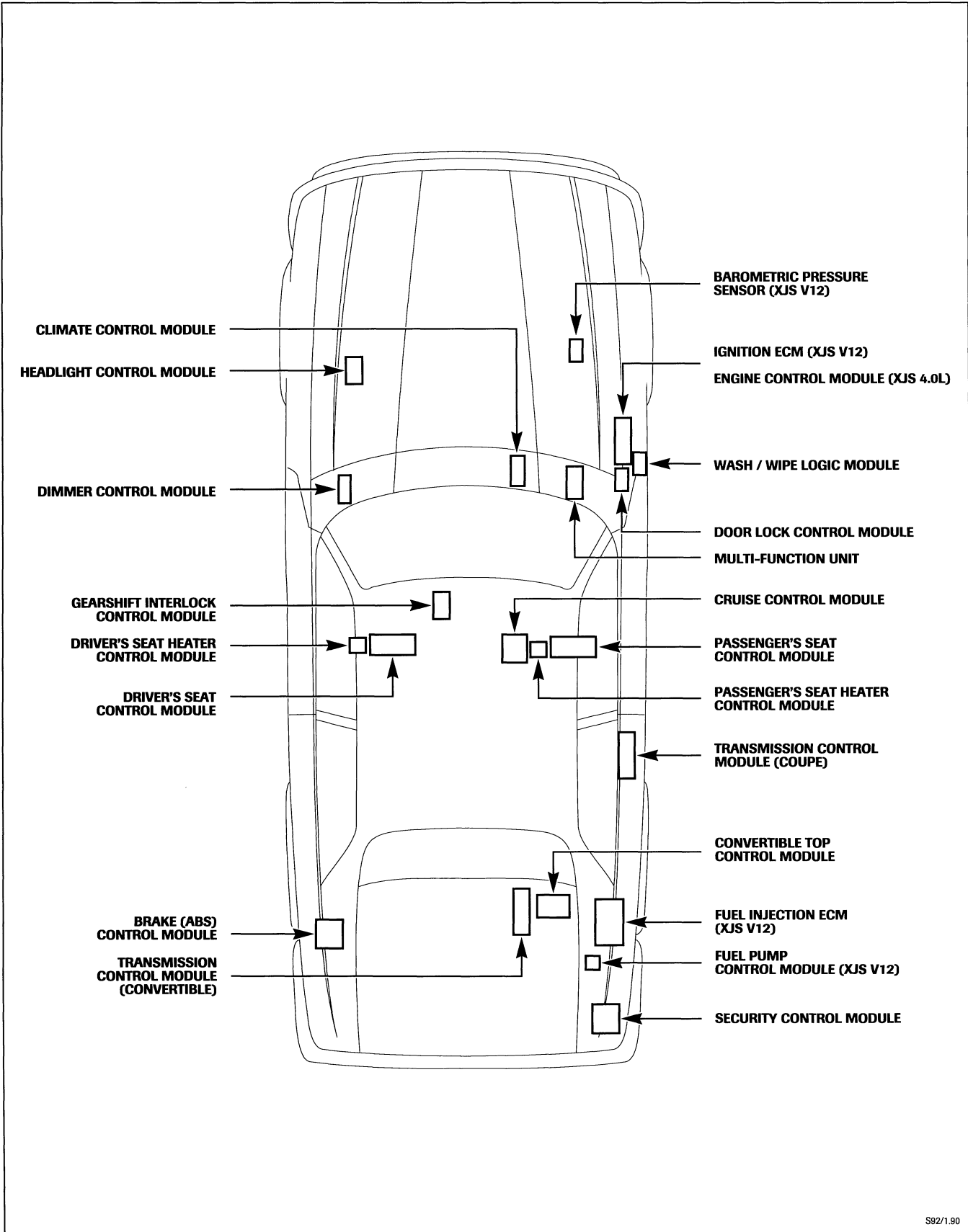
Rear fuse panel

Number	Color	Value	Circuit
1	Tan	5A	Cellular telephone power
2 *	Yellow	20A	Not used
2 **	Yellow	20A	Fuel pump 2
3 *	—	—	Not used
3 **	Yellow	20A	Fuel injection power
4	Tan	5A	Right tail, right license plate lighting
5	Red	10A	Rear fog lights; antenna
6	Tan	5A	Cellular phone memory
7	Tan	5A	Reverse lights
8	Tan	5A	Left tail; left license plate lighting
9	Tan	5A	Trailer right tail lighting
10	Tan	5A	Trailer left tail lighting
11	Orange	7.5A	Security system
12 *	Yellow	20A	Fuel pump
12 **	Yellow	20A	Fuel pump 1

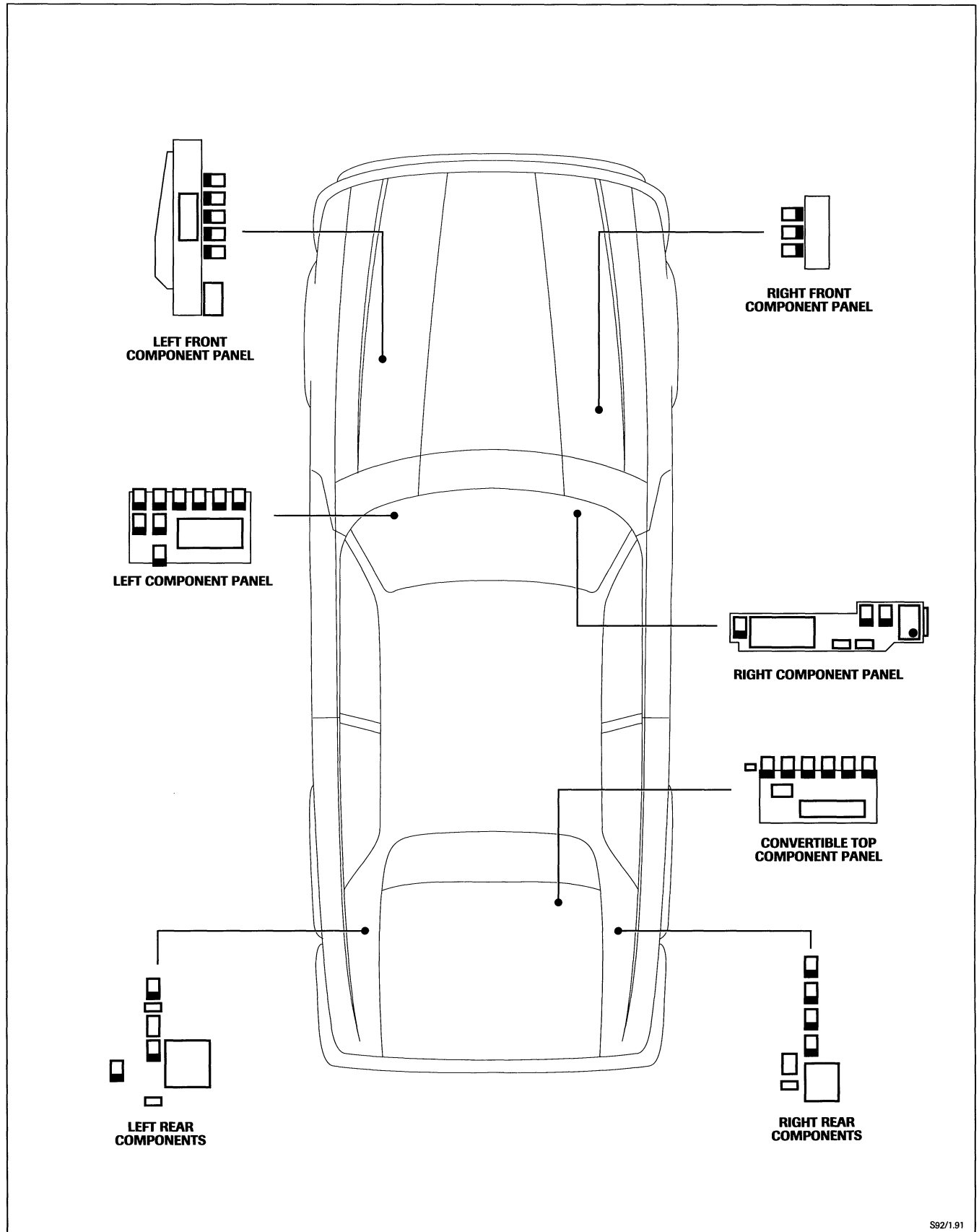
* XJS 4.0L

** XJS V12

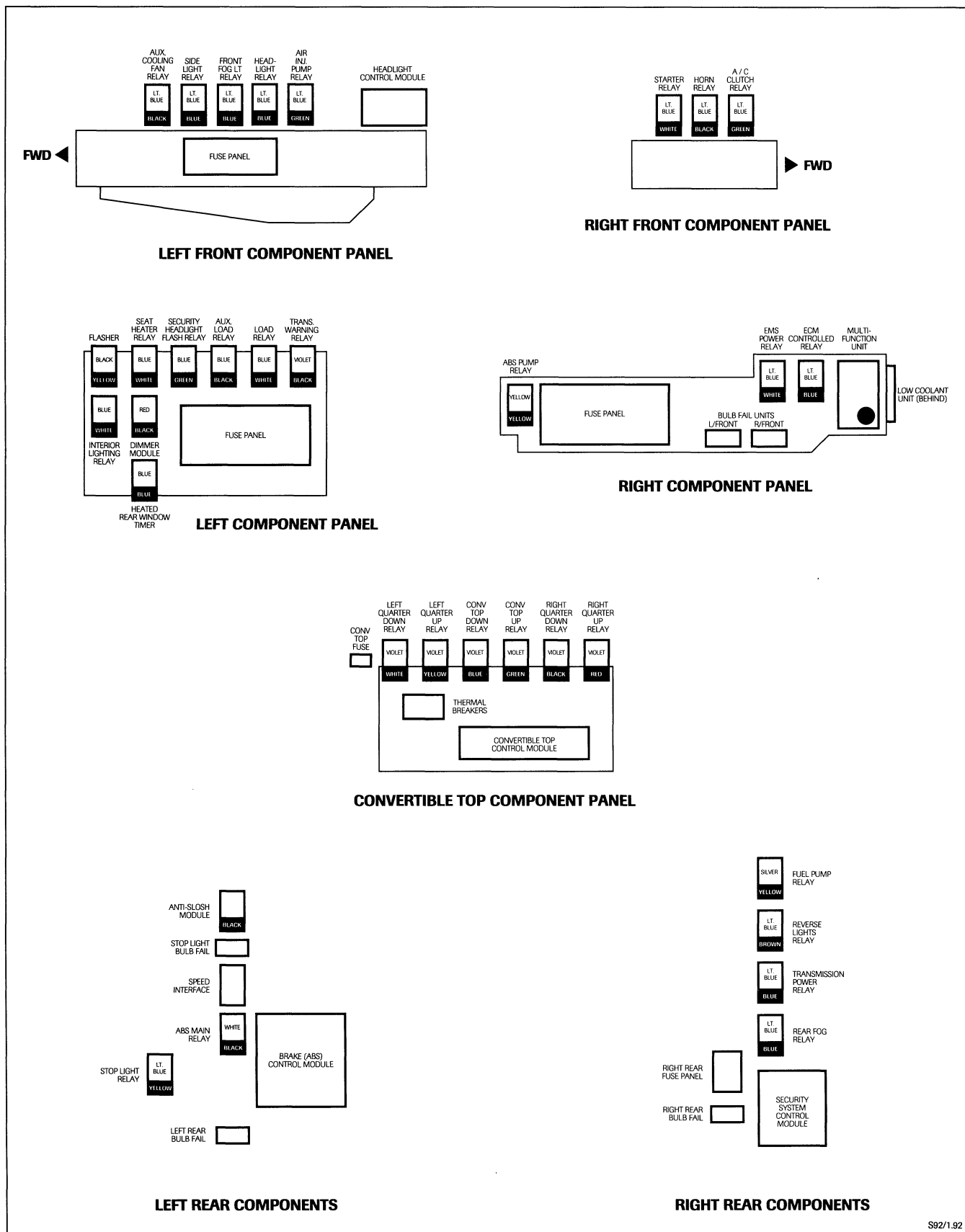
Vehicle Control Module Identification and Location



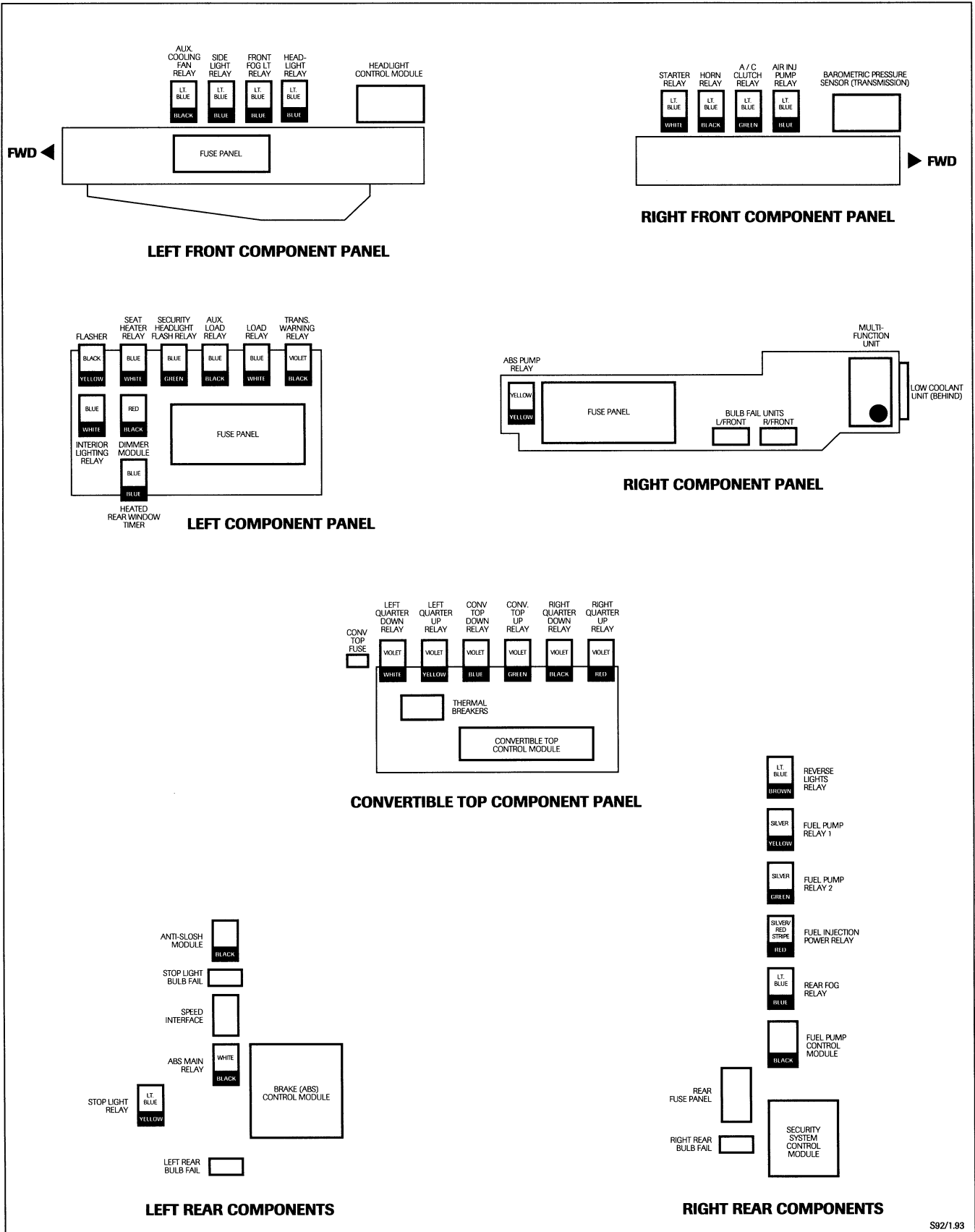
Component Panel Location — see pages 62 - 63 for detailed relay identification



Relay Identification and Location: XJS 4.0L



Relay Identification and Location: XJS V12





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JAGUAR

Technical Guide

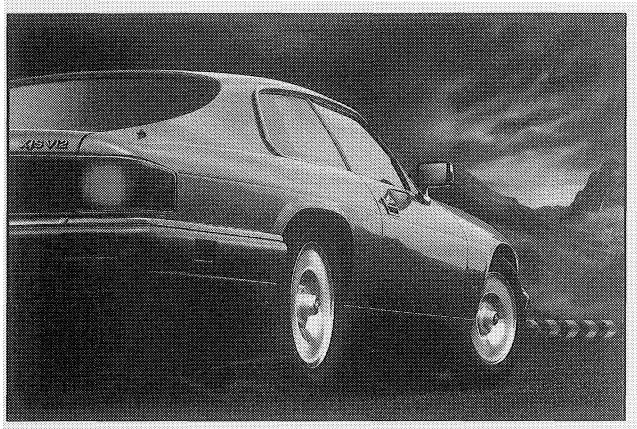
MODEL YEAR UPDATE

XJS-1995.25

MODEL YEAR UPDATE

XJS-1995.25

MODEL YEAR UPDATE



XJS-1995.25

MODEL YEAR UPDATE

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MODEL YEAR UPDATE

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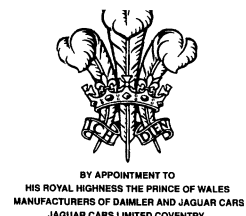
MODEL YEAR UPDATE

XJS-1995.25

MODEL YEAR UPDATE

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MODEL YEAR UPDATE



Technical Guide

XJS-1995.25 MODEL YEAR UPDATE

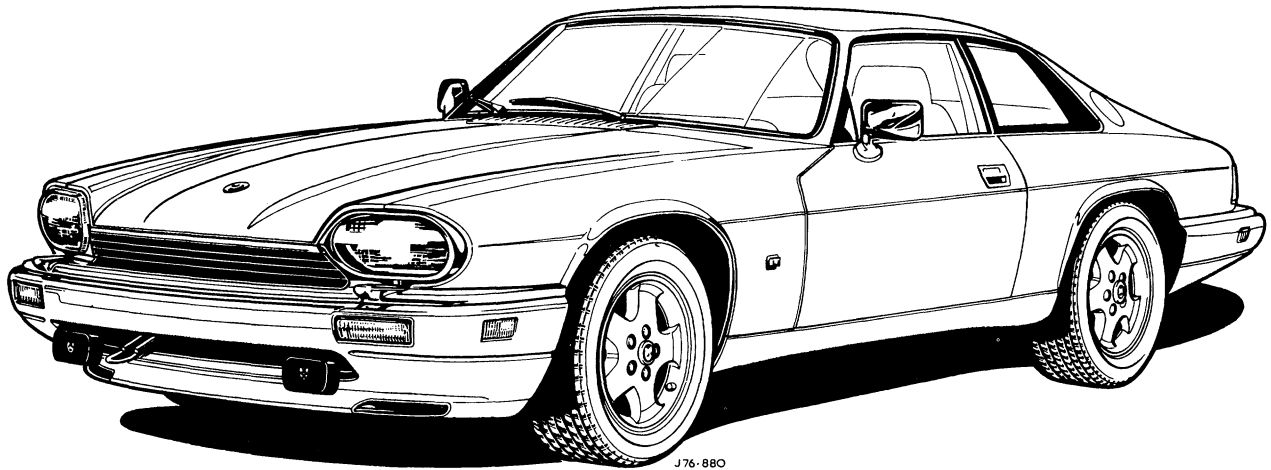
This Technical Guide is produced as an outline description of the changes introduced to the XJS range, since the last Model Year programme, for Jaguar Dealer workshop personnel.

It is intended to complement updates to the Service Manual. By providing the information as a cohesive package, developments can be seen in isolation, in contrast with their dispersed nature in the Service Manual. Where a feature is restricted to certain countries, it is identified as such in the text. Major changes are described, but no attempt is made to cover every technical detail.

The information contained in this publication should be considered as preliminary information and is accurate at the time of printing. The right is reserved to make changes at any time without notice.

The information given in this Technical Guide will not be updated. Until the release of the next Technical Guide, information on changes to the XJS range can be obtained from Service Bulletins and revisions to the Service Manual.

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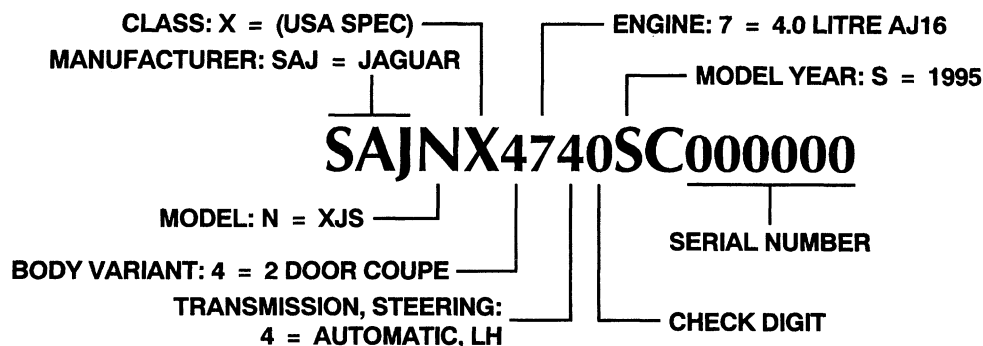
The most significant change introduced at this update is to the brake system, which on all models is changed to the Teves Mark IV system, similar to that on the 1995 Model Year Sedan range.

All models also have a different fluid in the transmission and the power-assisted steering system. 4.0 liter models have a new driveshaft and a revised engine part-load breather. North American 4.0 liter models also have a revised installation for the exhaust gas recirculation valve. On 6.0 liter models, the engine crankcase ventilation and the secondary air injection systems are revised.

All models incorporate new windshield wash jets and revised seat heater systems. Models for some markets incorporate revisions to the security and engine immobiliser systems. Other changes to the electrical systems include the re-positioning of control modules and the deletion of relays. In addition, the fuse boxes incorporate revisions to the fuse values and to the location of some circuit connections.

Vehicle Identification Number (VIN)

TYPICAL VIN



J76-1093

Vehicle Features

The features of the XJS range include those items detailed below. All of the features listed are standard for all models in all markets unless designated as **NA** (Not Available) or **O** (Optional).

Feature	Applicability
16 inch, five spoke alloy wheels	NA on 6.0 L
16 inch, chromed, five spoke alloy wheels	O in all markets
16 inch, 20 spoke alloy wheels	NA on 4.0 L
Space saver spare wheel	O in Belgium and on 4.0 L in South Africa
Full size spare wheel	O in all markets except Belgium, and on 4.0 L in South Africa
Sports suspension	NA on 4.0 L Convertible in Canada, or on 6.0 L in USA and Canada O on 4.0 L in Brazil, Taiwan and USA, 6.0 L Convertible in Austria, all 6.0 L models in Netherlands, Switzerland and ROW, 4.0 L Convertible in all other markets
Touring suspension	NA on 4.0 L Coupe in Canada O on 6.0 L Coupe in Austria, all 6.0 L models in Europe (except Netherlands and Switzerland), 4.0 L Coupe in Europe (except Switzerland) and ROW (except Taiwan)
Limited slip differential	
Electronic four-speed automatic transmission	O on 4.0 L in Belarus, Belgium, Canaries, Czech Republic, Eire, France, Germany, Greece, Hungary, Italy, Kazakhstan, Netherlands, Poland, Portugal, Slovakia, Spain, UK, Ukraine and Uzbekistan
Manual five-speed transmission	NA on 6.0 L, or on 4.0 L in Canada, Denmark, Estonia, Finland, Latvia, Lithuania, Norway, ROW, Russia, Sweden, Switzerland and USA
Catalyst exhaust system	NA in China, Indonesia, Panama, Paraguay and South Africa O in Abu Dhabi, Belarus, Dubai, Kazakhstan, Lebanon, Qatar, Turkey, Ukraine and Uzbekistan
Cruise control	O on 4.0 L except in Brazil, Canada, France, Japan, Luxembourg, Switzerland, Taiwan and USA
Trip computer	NA on 4.0 L in USA and Taiwan O on 4.0 L in all other markets except Belgium, Canaries, Japan, Luxembourg, Portugal, Spain and Switzerland, and on 6.0 L in all markets except Belgium, Canada, Canaries, France, Japan, Luxembourg, Portugal, Spain, Switzerland and USA
Driver and front passenger air bag	
Front fog lamps	O on 4.0 L in all markets except China, Hong Kong and Switzerland, and on 6.0 L in all markets except Brazil, China, Hong Kong, Japan and Switzerland

Feature

Applicability

Headlamp levelling	NA except in Czech Republic, Finland, Germany, Luxembourg and Slovakia
Headlamp power washers	O on 4.0 L in all markets except Austria, Czech Republic, Estonia, Finland, Japan, Latvia, Lithuania, Norway, Russia, Slovakia, Sweden and Switzerland
Air conditioning	
Electric front seat adjustment	
Heated seats	NA on 4.0 L, or on 6.0 L in Canada and USA O on 6.0 L in all other markets except Austria, Estonia, Finland, Japan, Latvia, Lithuania, Luxembourg, Norway, Russia, Sweden and Switzerland
Heated seats with electric lumbar support adjustment	NA on 6.0 L, or on 4.0 L in Canada, ROW, Switzerland and USA O on 4.0 L in all other markets except Estonia, Finland, Latvia, Lithuania, Norway, Russia and Sweden
Heated seats with electric lumbar support adjustment and driver seat memory	NA on 6.0 L except in Canada and USA O on 4.0 L in all markets except Canada and Switzerland
Electric lumbar support adjustment with driver seat memory	NA on 4.0 L in Canada, Estonia, Finland, Latvia, Lithuania, Norway, Russia, Sweden and Switzerland, or on 6.0 L in USA O on 4.0 L in all other European markets
CD autochanger	O in all markets except on 4.0 L in Brazil and on 6.0 L in Brazil, Canada, Switzerland and USA
Telephone harness	O in all markets except Canada, Germany, Greece, Taiwan and USA
Vehicle immobiliser	NA in Canada and USA O (Dealer fit) in all other markets except Germany
Security system	NA in Belgium, China, Cyprus, Finland, France, Germany, Hong Kong, Hungary, Italy, Netherlands, New Zealand, Norway, Russia, South Africa and Sweden O in all other markets except Austria, Canada, Czech Republic, Denmark, Eire, Greece, Luxembourg, Poland, Slovakia, Switzerland, Taiwan, UK and USA

Exterior Trim

Convertible Top

The convertible top is now manufactured from an acrylic material, instead of polyester, to give improved strength and ageing properties.

Interior Trim

Door Casings

The trim on Rest of World V12 models is enhanced to the same level as already fitted on North American V12 models. Enhancements include the installation of Autolux leather and revised color keying and piping.

Engine – Mechanical

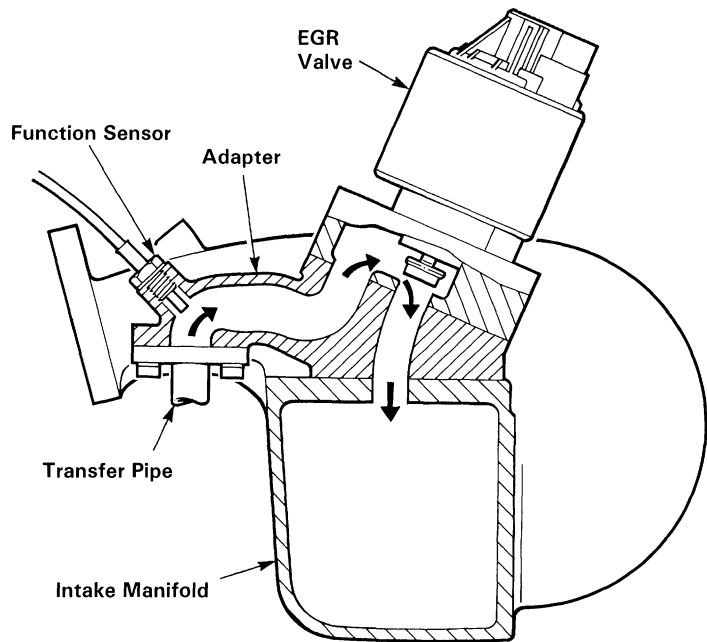
On North American vehicles, the exhaust gas recirculation (EGR) system and engine part-load breather are revised to reduce the possibility of oil vapor deposits adversely affecting the operation of the EGR valve. For reasons of commonality, the changes to the part-load breather are carried over to vehicles in all other markets.

EGR System

An adapter, with connection points for the transfer pipe and the EGR valve function sensor, is introduced between the EGR valve and the intake manifold. Since the exhaust gases no longer pass through the internal passage in the intake manifold, they remain at a higher temperature, reducing the possibility of contaminants in the gases being deposited on the valve.

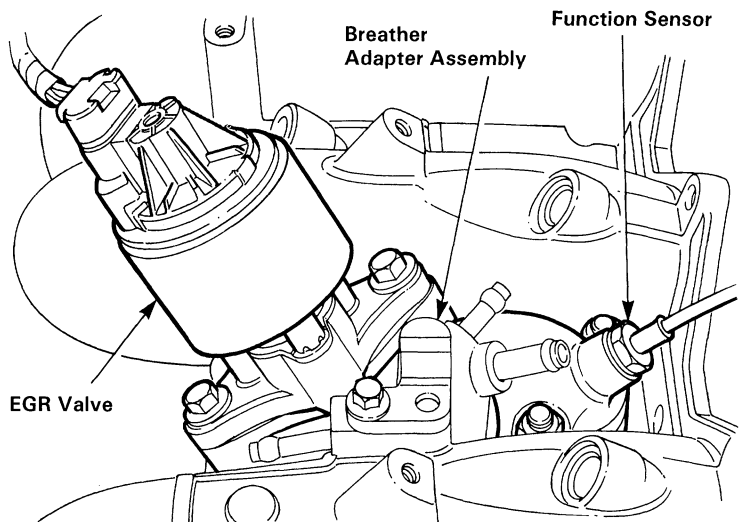
The previous connection points on the intake manifold, for the transfer pipe and the valve function sensor, are deleted.

EGR VALVE INSTALLATION

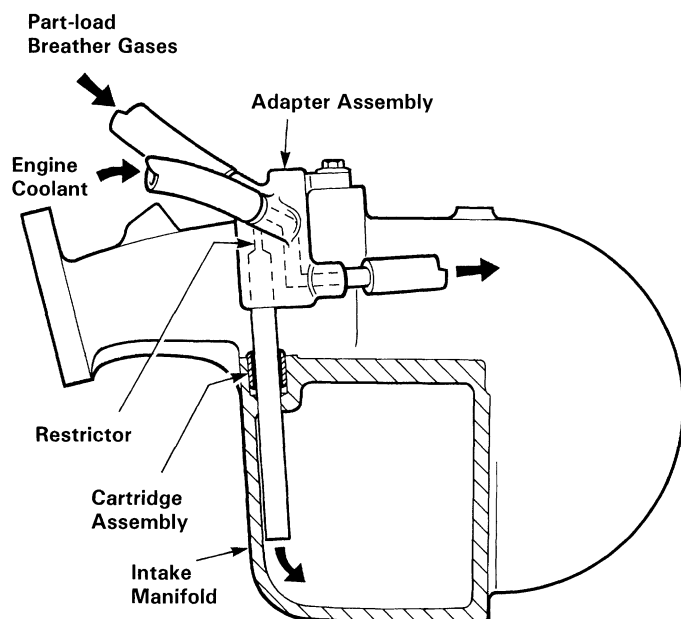


J18-339

INSTALLED VIEW OF EGR VALVE



J18-340

BREATHER ADAPTER ASSEMBLY INSTALLATION

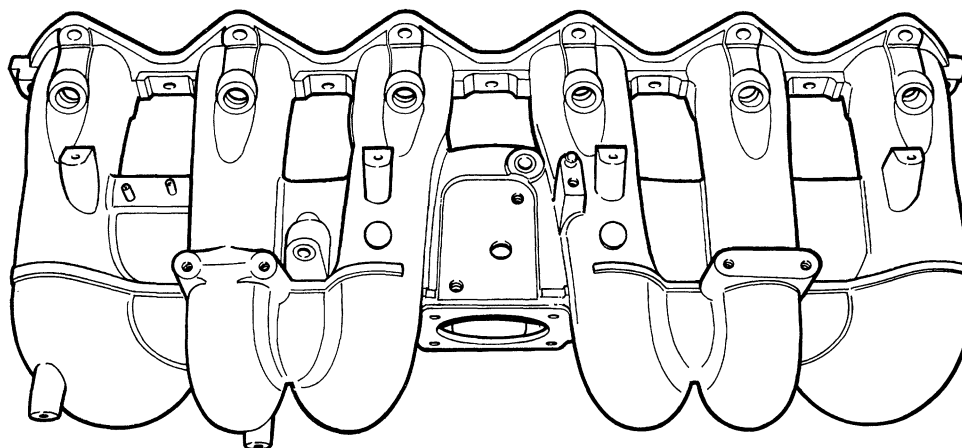
J12-862

Part-load Breather

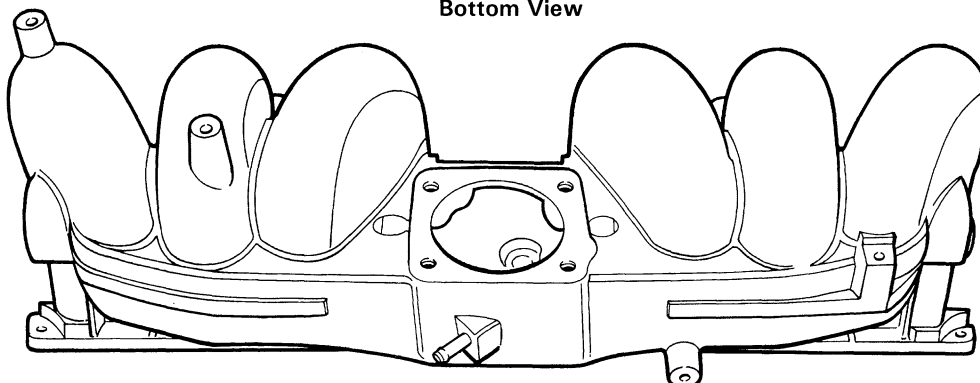
A breather adapter assembly is introduced to the part-load breather, replacing the stub pipe, restrictor and engine coolant passages previously integrated into the intake manifold.

The adapter assembly, attached to the intake manifold with a dowel and bolt, consists of a casting with four stub pipes. Pairs of the stub pipes, for the part-load breather and for the engine coolant, are connected by separate passages in the casting. The part-load breather passage contains a 2,5 mm nominal diameter restrictor, to prevent reverse flow. The flow of engine coolant through the adapter assembly prevents the formation of ice in the restrictor at low ambient temperatures.

The outlet stub pipe for the part-load breather directs breather gases to the lower part of the intake manifold interior, away from the exhaust gas recirculation valve. A press fit, rubber lined cartridge assembly provides the seal between the outlet stub pipe and the manifold.

INTAKE MANIFOLD**Top View**

J19-493

Bottom View

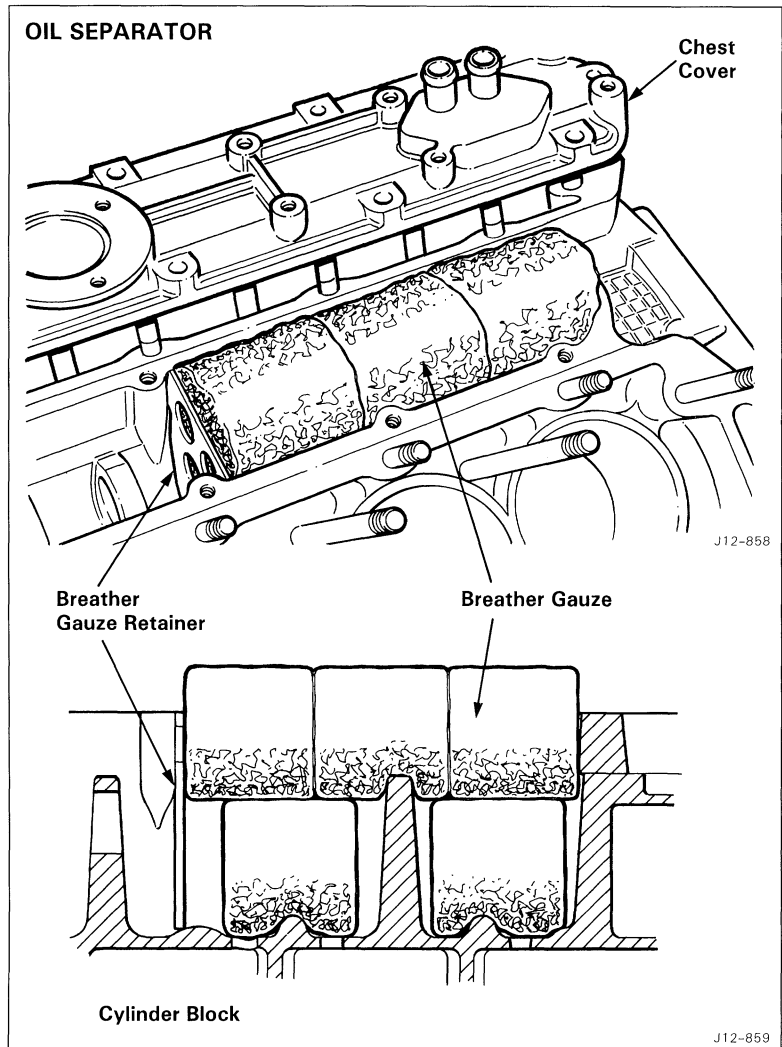
J19-494

Engine - Mechanical

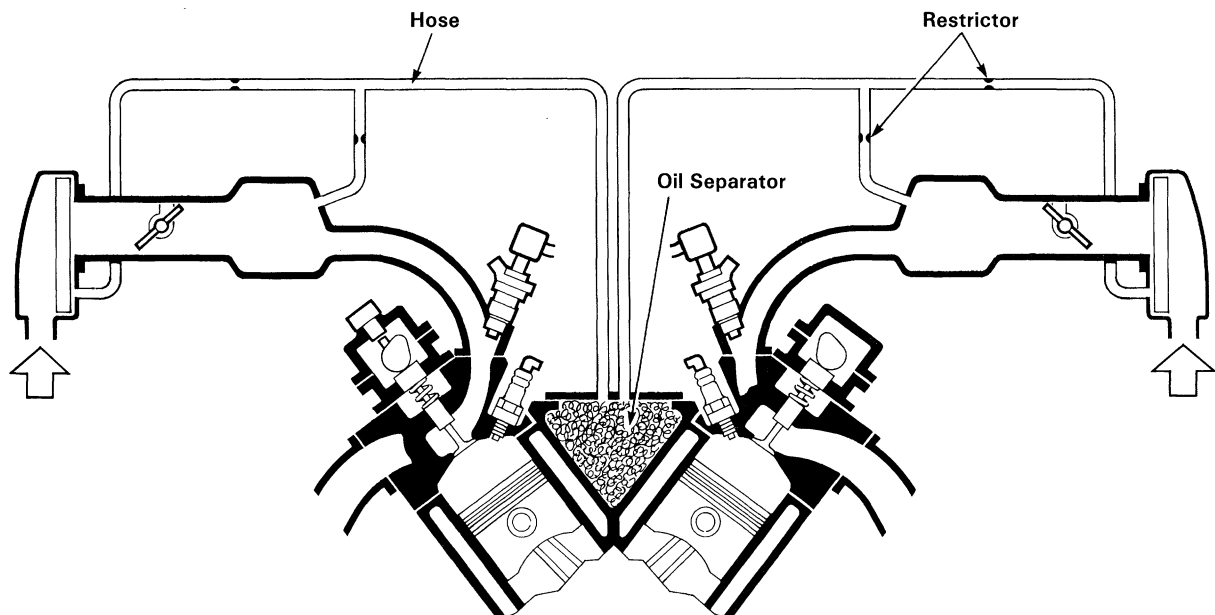
Crankcase Ventilation

A new crankcase ventilation system, similar to that introduced on the new XJ Series Sedan V12 engine, is incorporated on the XJS V12 engine. Instead of separate part load and full load oil separators, the system now has a single oil separator installed below the rear half of the breather chest cover. The new oil separator consists of five cylinders of breather gauze, held in place by a sliding-fit, breather gauze retainer. Hoses connect outlets on the breather chest cover to the intake manifold and air cleaner of each cylinder bank. The mounting boss for the previous full load oil separator, on the front face of 'B' bank cylinder head, is deleted.

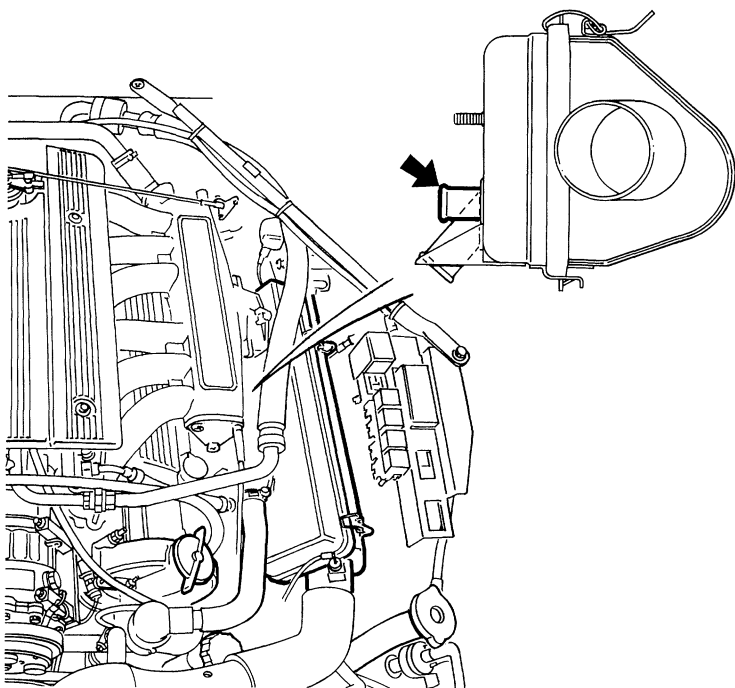
With the engine running at part load, gases are drawn from the breather chest by the depression in the intake manifolds. At full load, the gases are drawn from the breather chest by the depression in the air cleaners. Restrictors in the breather hoses ensure the gases flow in the correct direction at all engine running conditions. As the gases pass through the oil separator, any oil vapor that it contains condenses out on the breather gauze, then drains back into the sump.



CRANKCASE VENTILATION SCHEMATIC

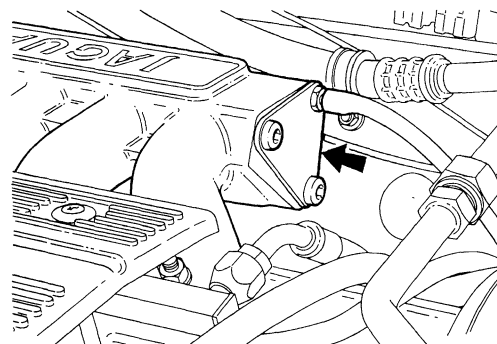


AIR CLEANER



J12-860

INTAKE MANIFOLD FRONT END PLATE



J12-861

Air Cleaners

Each air cleaner has a new stub pipe on the back plate assembly, for the connection of the breather hoses of the crankcase ventilation system. On the LH air cleaner, the stub pipe replaces the previous connection point of the full load breather.

Intake Manifold Front End Plates

The manifold front end plates are now made from steel plate instead of die-cast aluminum alloy.

Transit Spark Plugs

The final delivery standard of spark plugs, instead of transit standard, are now installed during the initial engine build. Consequently, it is no longer necessary to replace the spark plugs on the Pre-Delivery Inspection, and vehicles are delivered without the spare set of spark plugs in the trunk.

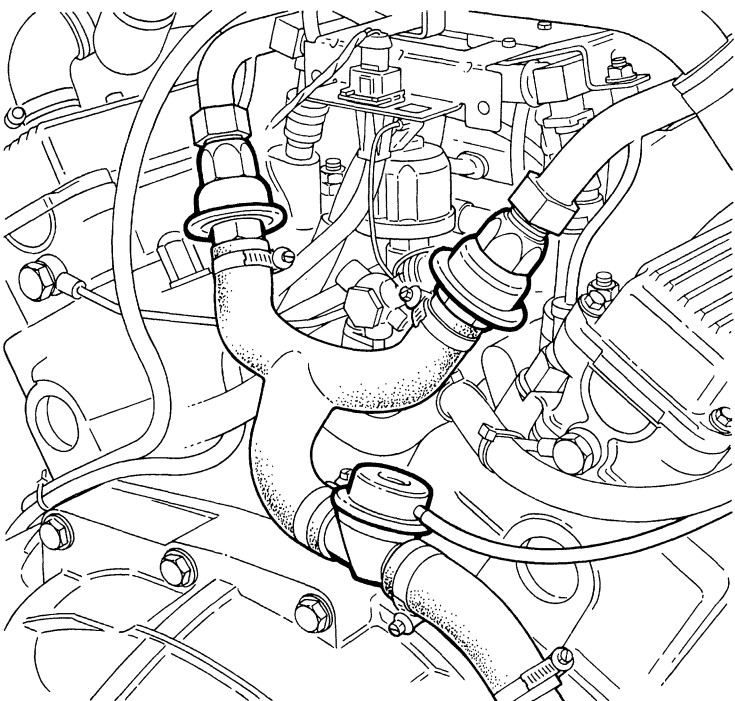
Engine Ancillaries

Secondary Air Injection System

For commonality with the Sedan V12 engine, the AC Delco check valves and the air injection switching valve are replaced with Nippondenso components. The operation of the valves remains the same.

The hoses from the air injection pump and from the air injection rails are revised to accommodate the new valves.

AIR INJECTION VALVES



J17-199

Transmission

Transmission Fluid

Both automatic and manual transmissions are now filled with Dexron III. Transmissions may be replenished with Dexron IID or IIE if Dexron III is not available.

Driveshaft

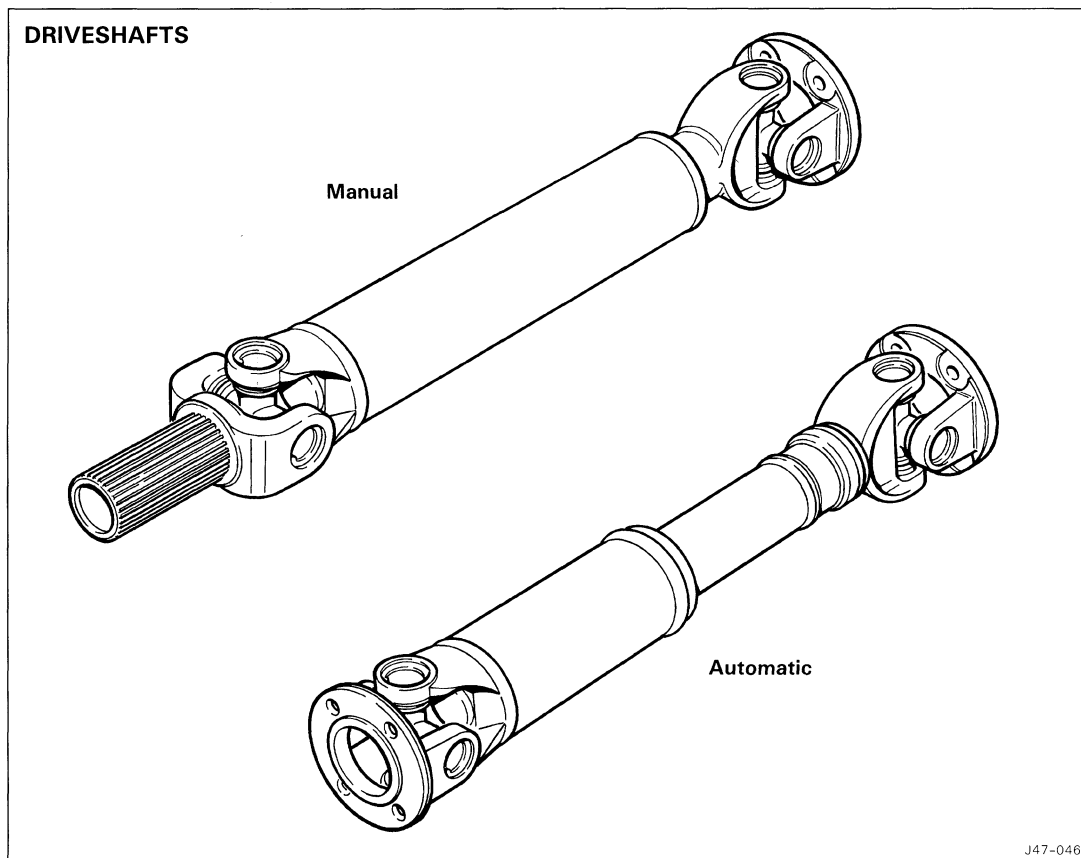
4.0 L Models Only

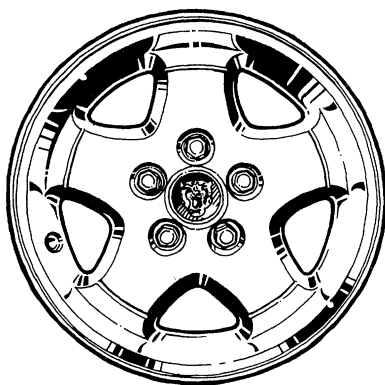
To reduce noise, vibration and harshness levels, a new driveshaft is introduced on both automatic and manual models. The new driveshaft on automatic models is the same as that currently used on V12 models, except for the length, which is increased to compensate for the shorter engine installation.

The new driveshaft on manual models is made from a single length of tubing with a yoke welded to each end. Universal joints connect the welded yokes to a reverse sleeve yoke and a flange yoke, to connect the driveshaft with the transmission and final drive unit respectively.

All Automatic Models

The installation of the driveshaft is reversed. The end next to the splined slip-joint is now connected to the transmission.



**FULLY CHROMED,
FIVE-SPOKE ALLOY WHEEL**

JLS-063

Wheels and Tires

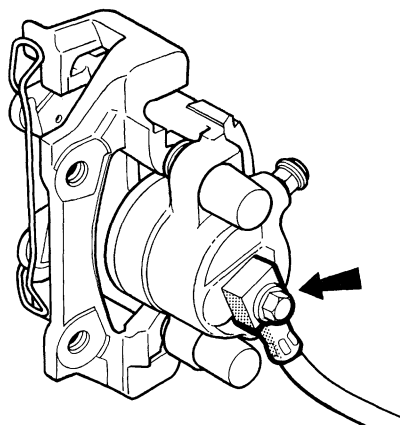
Wheels

Fully chromed, five-spoke alloy wheels are to be introduced as an option in all markets.

Power-Assisted Steering

System Fluid

The power-assisted steering system is now filled with Dexron III. The system reservoir may be replenished with Dexron IID or IIE if Dexron III is not available.

CALIPER HOSE CONNECTION

J70-310

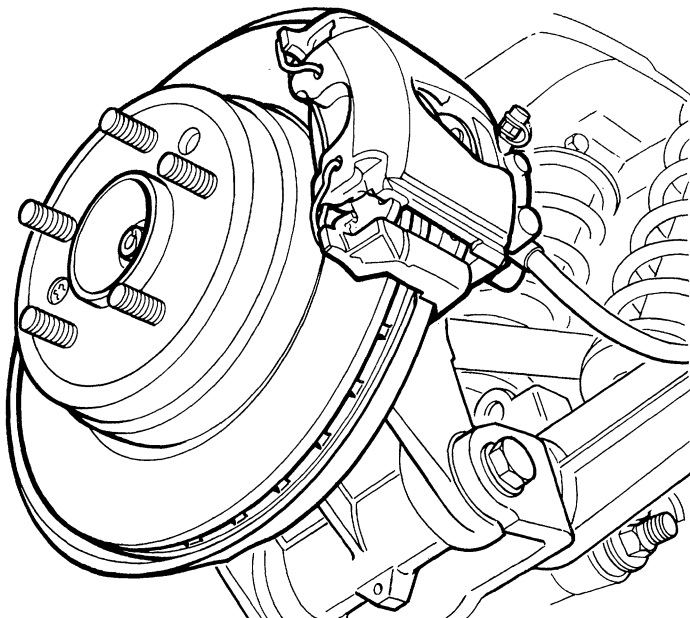
Foundation Brakes

Rear Calipers and Discs

The rear brake discs are changed to ventilated type discs providing additional cooling performance. The disc thickness increases from 10 to 20 mm. In addition, the caliper pistons are increased in diameter from 36 to 48 mm.

The disc back plate cover is larger to accommodate the larger caliper and is profiled so as not to cover the disc vents. The pad material is changed to Jurid 101.

Hose connection to the caliper is made by a 'banjo' fitting. Brake system pipe routing is changed to accommodate the new rear braking system installation.

VENTILATED REAR DISC

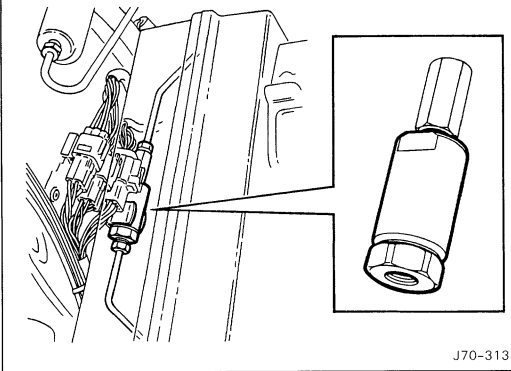
J70-311

Hydraulic Force

A conventional master cylinder/reservoir/servo booster arrangement is used to provide the hydraulic force for the foundation brakes. The vacuum for the servo boost is obtained from the intake manifold. The vacuum line from the servo booster to the intake manifold includes a one-way check valve.

The new fluid reservoir incorporates a level sensor. The sensor's electrical connector is moulded to the side of the reservoir.

PRESSURE CONSCIOUS REDUCTION VALVE



J70-313

Hydraulic Circuits

The hydraulic circuits are split front/rear as on previous model year vehicles. They are modified to suit the Teves Mk IV-GI ABS and are illustrated in the ABS section. During normal braking operation, the ABS modulator has no effect other than to act as a manifold in the system.

To prevent over-braking to the rear brakes, a pressure conscious reduction valve is fitted to the rear brake line. The valve throttles off to the rear brakes at pressures over a certain threshold, to provide a closer balance between front and rear brakes.

Anti-lock Braking System

The anti-lock braking system (ABS) is changed to the Teves Mk IV-GI. The ABS control module activates the ABS when a wheel(s) rotates slower than the comparative norm (approaching wheel lock).

Components

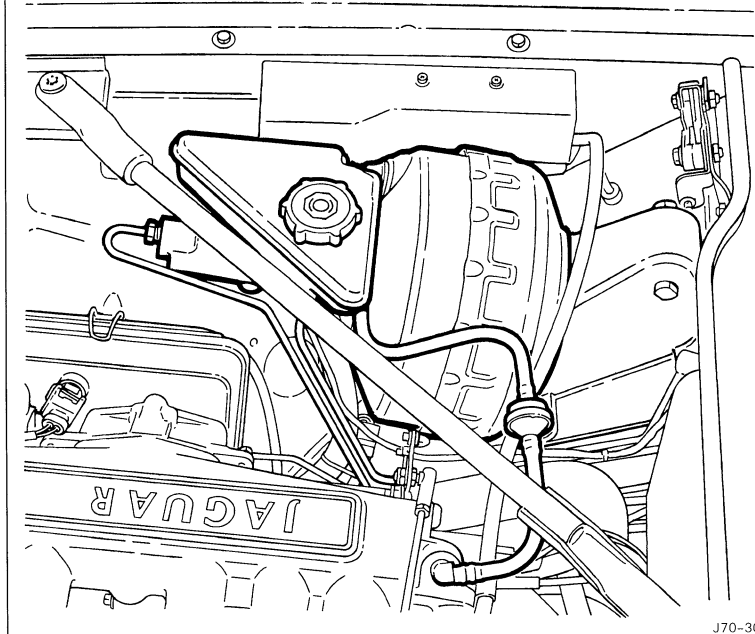
Hydraulic Modulator

This incorporates a pump, motor, low pressure accumulator, valve block and control module. Contained within the hydraulic modulator are the electro-hydraulic inlet and outlet valves which regulate brake system pressure during ABS. The modulator has three ports (two front, one rear).

Wheel Speed Sensors

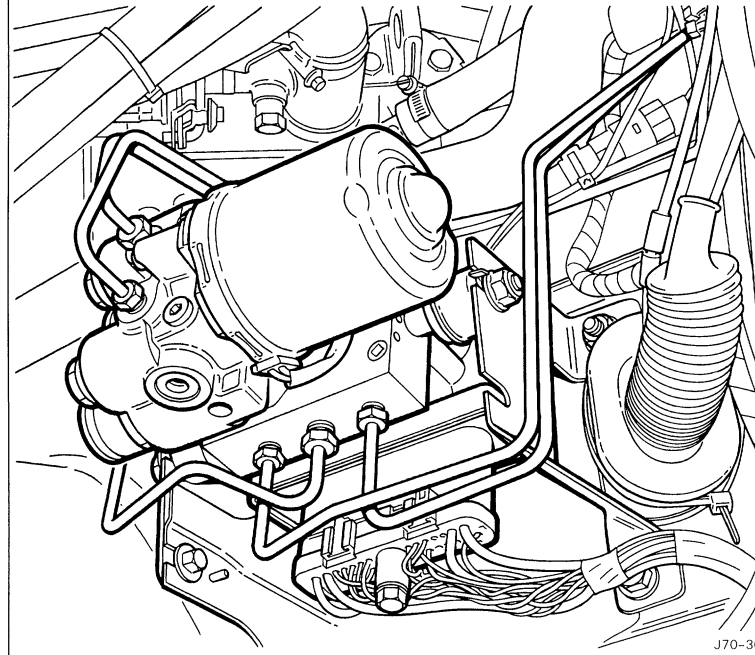
The four hub end mounted wheel speed sensors are similar in appearance to the previous model year installation. A modified flying lead and connector however, causes the sensors to be not interchangeable with former versions.

MASTER CYLINDER/BOOSTER ASSEMBLY



J70-306

ABS HYDRAULIC MODULATOR



J70-305

Warning Indicators

The two warning indicators are unchanged: an indicator with the words ANTI-LOCK for failure of the anti-lock function; an indicator with a brake symbol or the word BRAKE (USA only) for low fluid level in the brake system reservoir.

Various Auxiliary Inputs

These provide information to the ABS CM.

Diagnostic Communication Input/Output Link

The ABS CM is linked to communicate with the portable diagnostic unit (PDU).

System Description

ABS Control

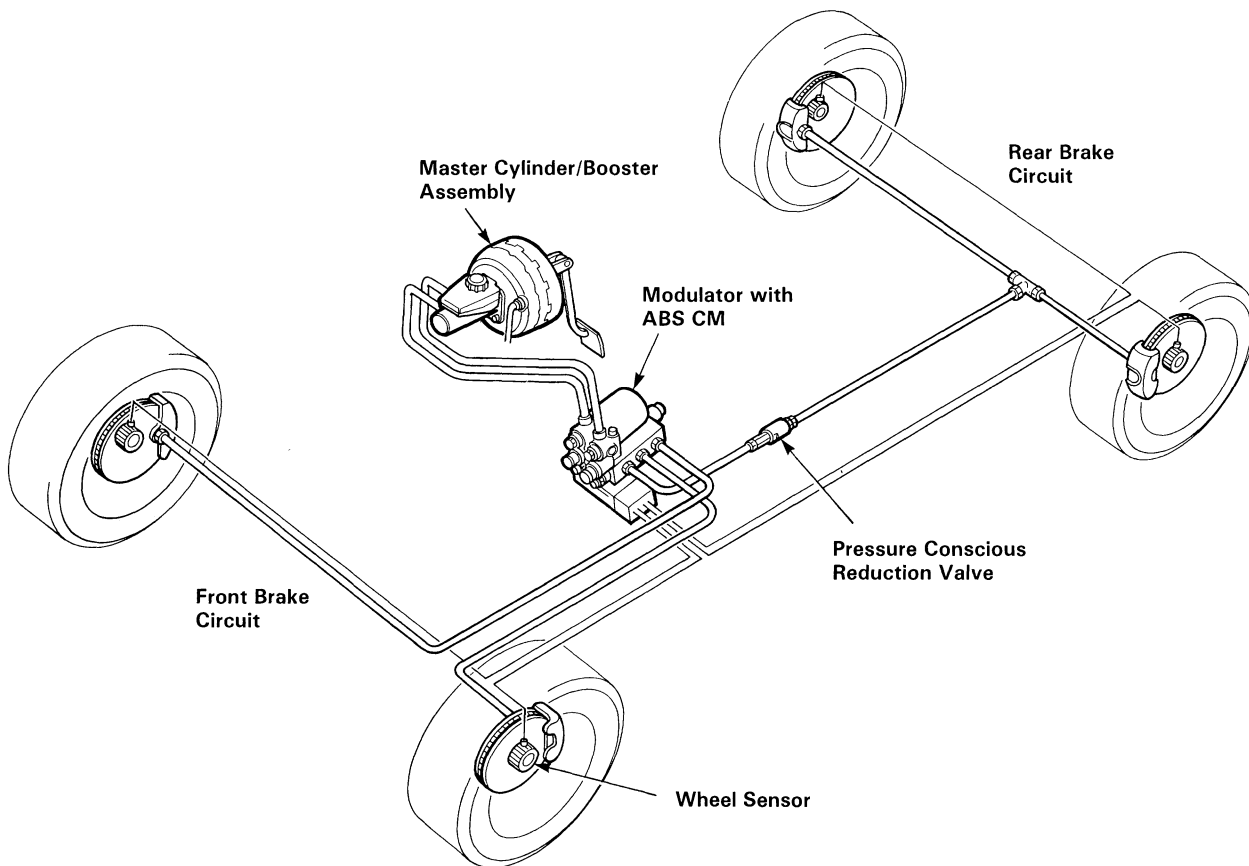
The solenoid operated hydraulic valves are activated by signals from the ABS CM, which are generated using signals received from the wheel speed sensors. Hydraulic pressure is applied by the modulator's motor/pump unit.

The valves operate on three circuits, two front and one rear, as necessary to prevent wheel locking during braking.

Brake pressure is modulated individually at the front wheels and collectively at the rear. Rear wheel control operates a 'select low' principle such that if locking in either wheel is sensed, brake pressure is controlled and will be reduced to both wheels simultaneously.

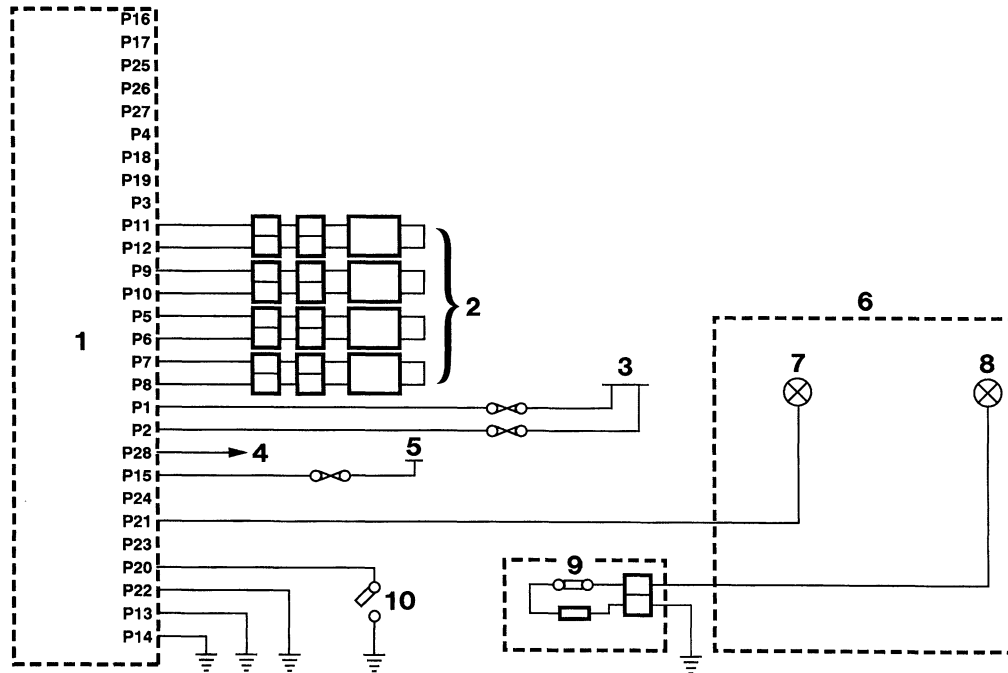
The ABS system as a whole is monitored constantly by the ABS CM and is disabled (switched off until fault is rectified) automatically when certain failures are identified. In the event of a failure being detected, the ABS malfunction indicator lamp (MIL), located on the instrument pack, will illuminate. Full boosted brake operation is available when ABS is disabled.

ABS SCHEMATIC LAYOUT



J70-307

ABS PIN OUT IDENTITY



1. ABS Control Module
2. Wheel Speed Sensors
3. Battery Voltage Input
4. Diagnostic Communication Bus
5. Ignition Voltage Input

6. Instrument Pack
7. ABS MIL
8. Braking Warning Indicator
9. Fluid Level Switch
10. Stop Lamp Switch

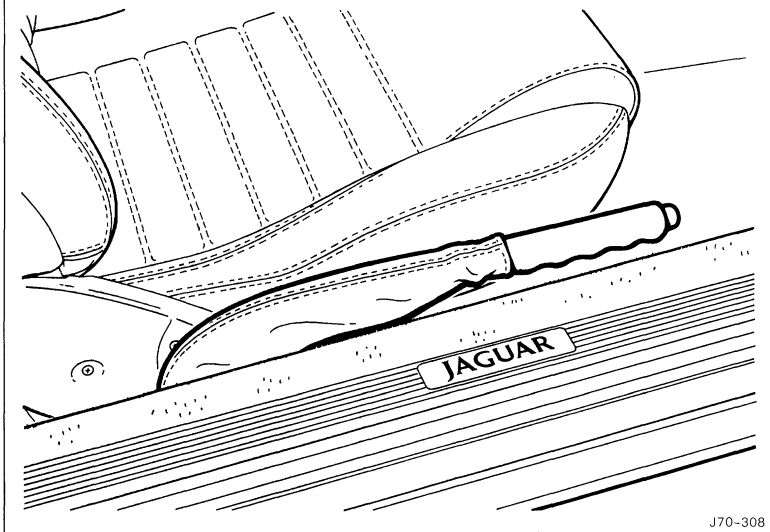
J86-1964

Parking Brake

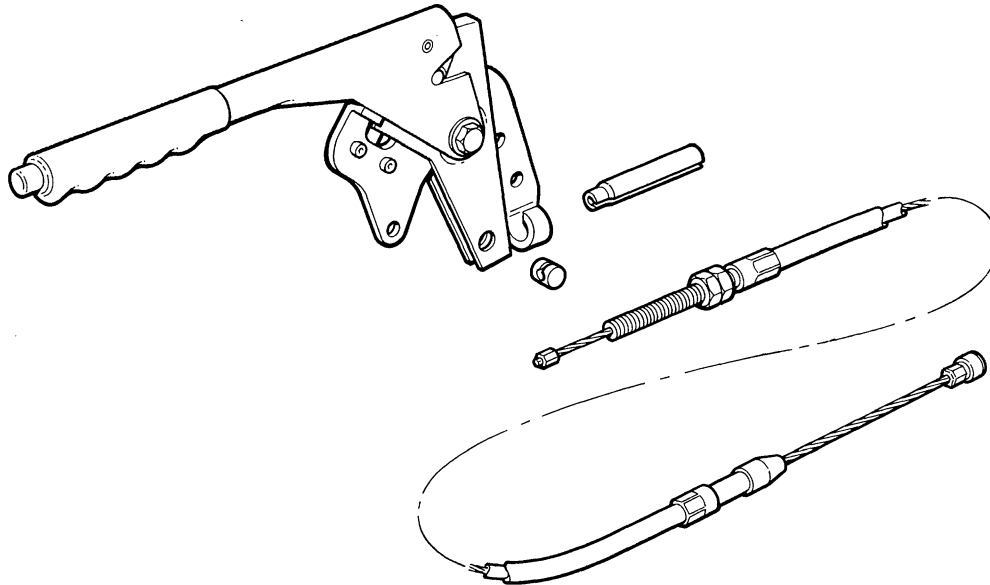
A new parking brake is introduced, the lever of which is shorter and covered by a color-keyed gaiter. The gaiter is made from Ambra on 4.0 liter and from Autolux on V12 models. The hand grip has a soft feel finish with finger contact curved contours. Improvements are made which give a more positive feel when moving the lever to the off position and give a high quality ratchet operation sound.

The main cable is changed in the way that it attaches to the parking brake lever and now incorporates a slot-in trunnion.

PARKING BRAKE



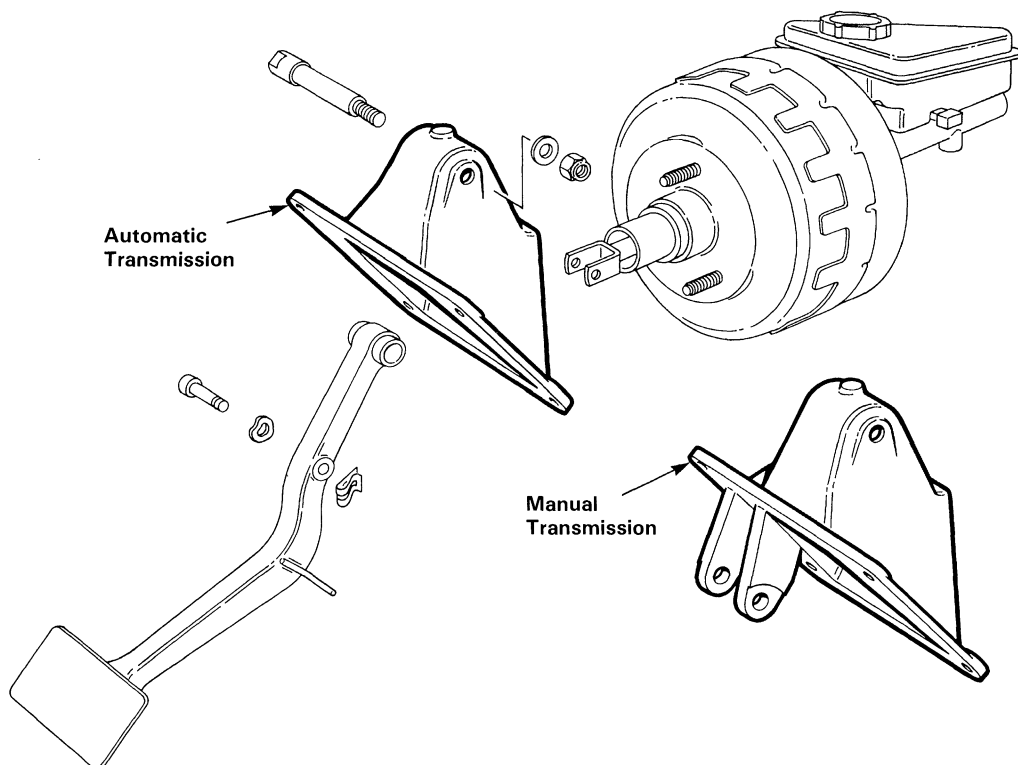
J70-308

PARKING BRAKE CABLE

J70-312

Brake Pedal Assemblies

The new brake pedal housing assemblies are designed to accommodate the installation changes needed for the new master cylinder/booster assembly. The brake pedal housing for automatic transmission vehicles is now made from plastic; manual transmission vehicles remain in aluminum.

BRAKE PEDAL ASSEMBLY

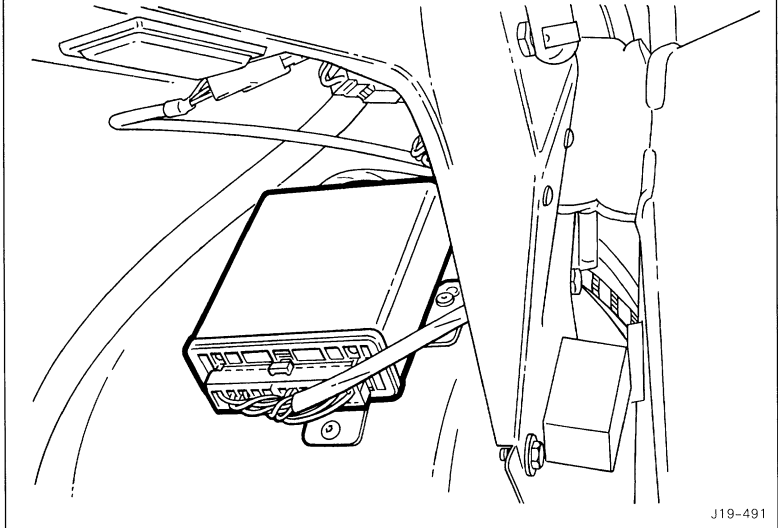
J70-309

Speed Control System

Control Module

The control module is located on the left wheel arch in the trunk, instead of the scuttle. It occupies the position previously occupied by the anti-lock braking system control module (which is integrated into the hydraulic modulator of the new brake system).

SPEED-CONTROL CONTROL MODULE

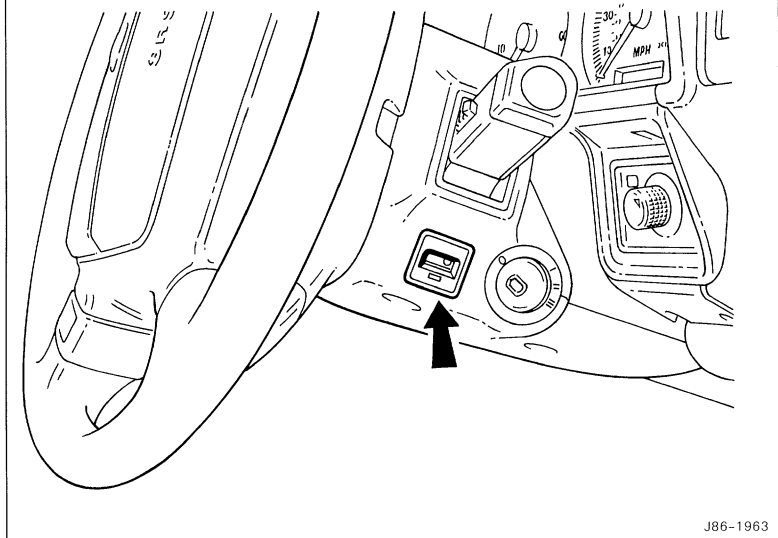


Engine Immobiliser System

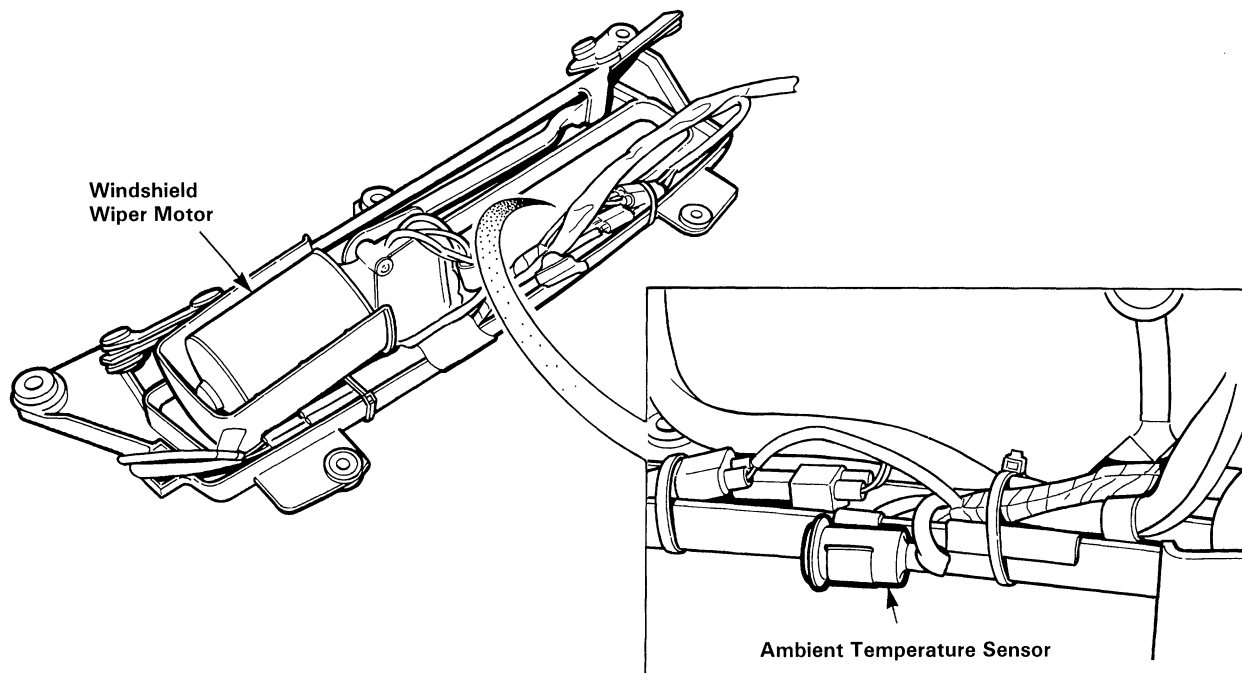
Engine Immobiliser Socket

On vehicles for the German market, the socket for the engine immobiliser key is moved to the opposite side of the ignition switch. The wiring for the socket is re-routed for increased security, and now has a dedicated connector on the bulkhead harness.

ENGINE IMMOBILISER SOCKET

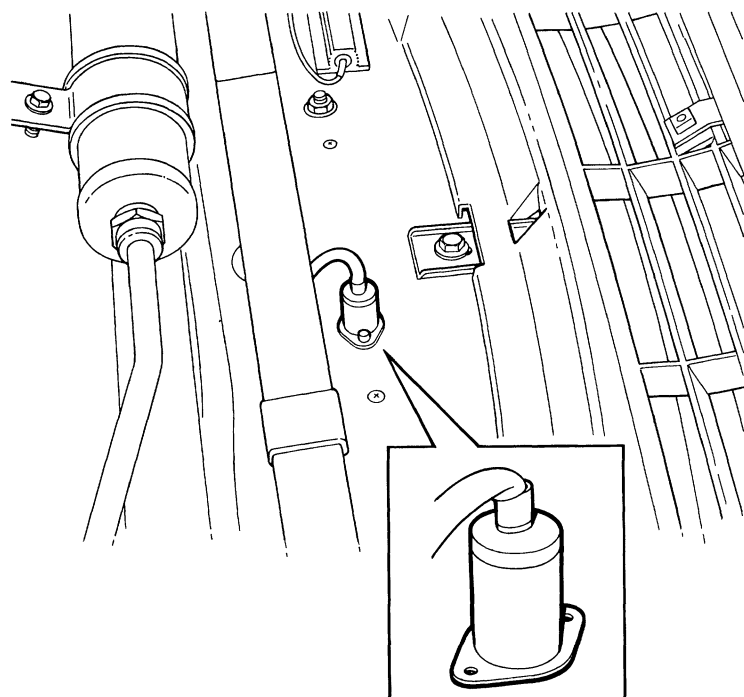


WASH JETS LINK LEAD AND TEMPERATURE SENSOR



J84-102

WASH JETS TEMPERATURE SENSOR - RADIATOR INSTALLATION



J84-103

Windshield Wash System

Wash Jets

Heated wash jets with a separate ambient temperature sensor are re-introduced for the windshield wash system. Initially the sensor is integrated into the wash jets link lead and attached to the support frame of the windshield wiper motor. On later vehicles the sensor is installed at the right front of the radiator, in the Pre-1994 Model Year position.

Security System

The electronic security system, with remote operation, is introduced as a standard fit on vehicles for Austria, Czech Republic, Denmark, Eire, Poland, Slovakia and Switzerland.

Seat Heater System

Each front seat heater system incorporates a new control module and new heater elements. The relay in the supply to the two systems is deleted. System operation is now similar to that on the Sedan models. External control of each system, by the switch on the related door trim panel, is unchanged.

Heater Elements

The new heater elements have thermostats instead of thermistors to control temperature.

Control Module

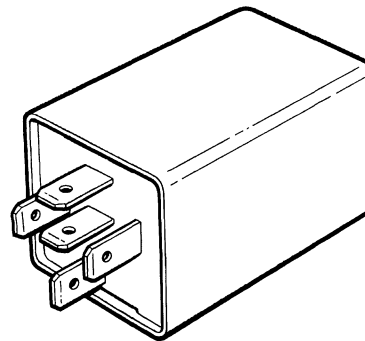
The new control modules are 10 to 12 minute timer relays. They are installed on the left and right rear of the engine bulkhead, instead of below the seats as on the previous system. On vehicles without seat heaters, black protective covers are installed on the control module connectors of the bulkhead harness.

Operation

When a seat heater is selected on, the related control module energizes and connects a 12V dc supply to the heater elements. The thermostats then regulate the supply to maintain the heater elements at a temperature of 32 to 35°C.

After 10 to 12 minutes the control module automatically de-energizes and disconnects the supply to the heater elements. The system then remains off until the seat heater is selected on again. The control module also de-energizes if the seat heater is manually selected off before the 10 to 12 minutes time delay has elapsed.

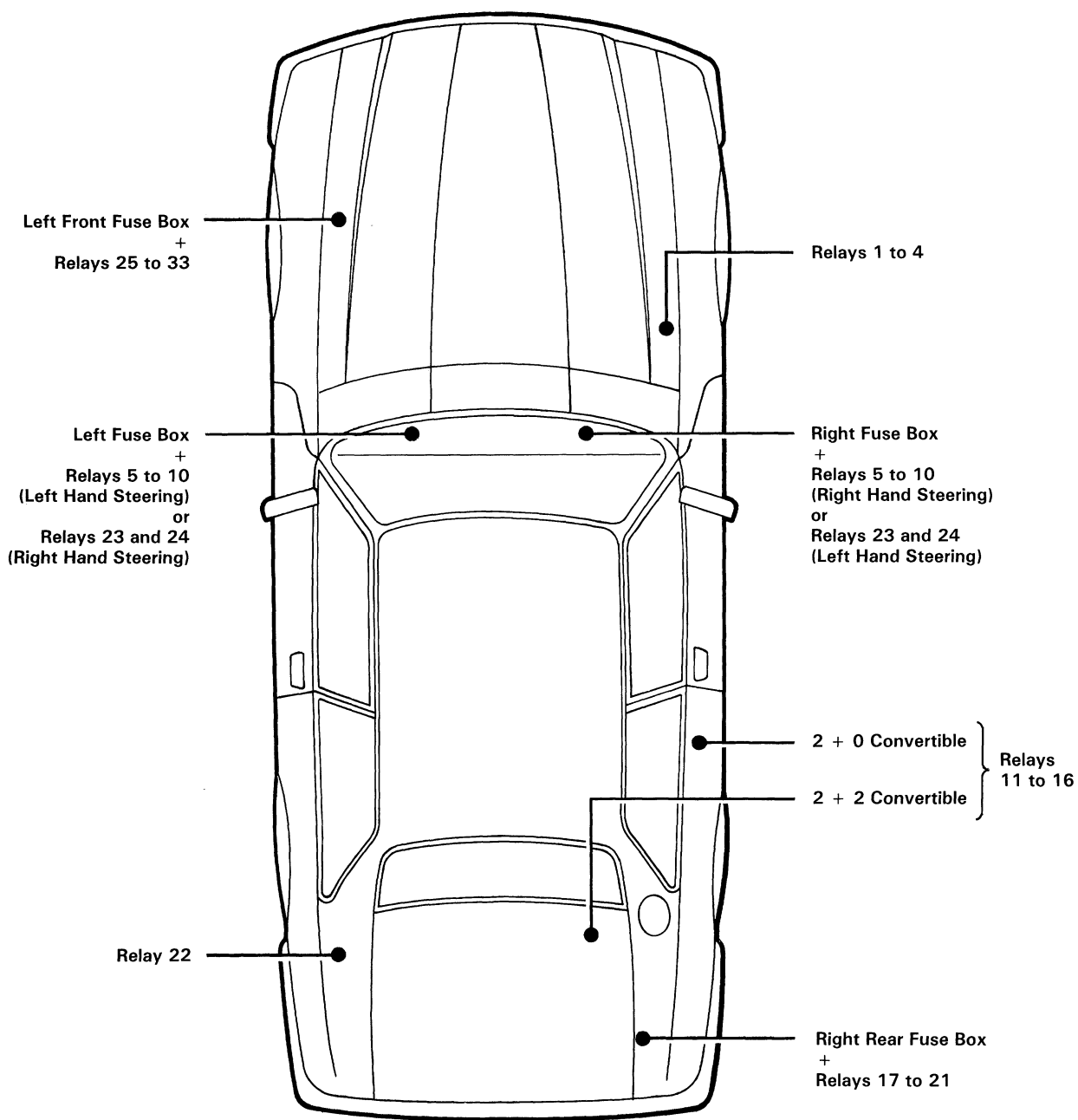
SEAT HEATER CONTROL MODULE



J86-1968

Relays and Fuses

RELAY AND FUSE BOX LOCATIONS



For details see Relay and Fuse Identification Tables

Relay Identification Table

No.	Relay	Color		Location	Applicability
		Case	Base		
1	Air injection hot start	Light blue	Blue	Engine compartment, RH	6.0 L Catalyst
2	Air conditioning clutch	Light blue	Green	Engine compartment, RH	All
3	Horn	Light blue	Black	Engine compartment, RH	All
4	Starter solenoid	Light blue	White	Engine compartment, RH	All
5	Transmission warning	Violet	Black	Driver's side scuttle	Automatic
6	Auxiliary controlled load	Light blue	Black	Driver's side scuttle	All
7	Ignition controlled load	Light blue	Yellow	Driver's side scuttle	All
8	Heated rear window	Light blue	Blue	Driver's side scuttle	All
9	Interior lights	Light blue	Red	Driver's side scuttle	All
10	Headlamp flash	Light blue	Blue	Driver's side scuttle	Australia, Canada, Middle East, UK and USA
11	Convertible top up	Violet	Green	Rear seat Trunk	2 + 0 Convertible 2 + 2 Convertible
12	Convertible top down	Violet	Blue	Rear seat Trunk	2 + 0 Convertible 2 + 2 Convertible
13	Rear quarter window up, RH	Violet	Red	Rear seat Trunk	2 + 0 Convertible 2 + 2 Convertible
14	Rear quarter window down, RH	Violet	Black	Rear seat Trunk	2 + 0 Convertible 2 + 2 Convertible
15	Rear quarter window up, LH	Violet	Yellow	Rear seat Trunk	2 + 0 Convertible 2 + 2 Convertible
16	Rear quarter window down, LH	Violet	White	Rear seat Trunk	2 + 0 Convertible 2 + 2 Convertible
17	Reverse lights	Light blue	Silver	Trunk	All
18	Fuel pump 1	Silver	Yellow	Trunk	All
19	Rear fog lamp	Light blue	Blue	Trunk	All
20	Main fuel injection	Silver/Red	Red	Trunk	6.0 L
21	Fuel pump 2	Silver	Green	Trunk	6.0 L
22	Stop lamp	Violet	Yellow	Trunk	All
23	Engine management system power	Silver/Red	Red	Passenger's side scuttle	4.0 L
24	Engine control module controlled	Light blue	Blue	Passenger's side scuttle	4.0 L
25	Air pump	Light blue	Green	Engine compartment, LH	4.0 L catalyst
26	Daylight running 1	Light blue	Blue	Engine compartment, LH	Canada, Denmark and Sweden
27	Daylight running 2	Violet	Blue	Engine compartment, LH	Canada, Denmark and Sweden
28	Daylight running 3	Violet	Blue	Engine compartment, LH	Canada, Denmark and Sweden
29	Dim/Dip control	Light blue	Blue	Engine compartment, LH	UK
30	Front fog lamp	Light blue	Blue	Engine compartment, LH	All – optional
31	Side lights	Light blue	Blue	Engine compartment, LH	All
32	Headlamp control	Light blue	Blue	Engine compartment, LH	All
33	Radiator fan	Light blue	Blue	Engine compartment, LH	All

Note: The following relays have been deleted since the previous Model Year:

- Anti-lock braking system main, from the trunk
- Anti-lock braking system pump, from the passenger's scuttle
- Seat heater, from the driver's scuttle
- Transmission power, from the passenger's scuttle (4.0 L automatic Convertible) or the trunk (4.0 L automatic Coupe).

Fuse Identification Tables

Left (Passenger's Side Scuttle) Fuse Box – 4.0 Liter, Right-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Passenger seat control power
2	Red	10	Central door locking/Multifunction module
3	Yellow	20	LH air conditioning fan
4	Red	10	Radio memory
5	Red	10	Radio ignition
* 6	Tan	5	Direction indicators
* 7	Red	10	Inertia switch
8	Blue	15	Windshield wiper system
9	Red	10	Passenger seat heater
10	Yellow	20	Engine control module relay
* 11	Green	30	Anti-lock braking system valves
12	Yellow	20	Passenger seat control power
* 13	Tan	5	Transmission memory
14	Tan	5	Engine control module relay (coil)
* 15	Tan	5	Accessory connector
16	Yellow	20	Cigar lighter
17	Green	30	Headlamp power wash
* 18	Red	10	Sunroof/Accessory supply
19	Blue	15	Stop lights
* 20	Yellow	20	Engine management system power relay
21	–	–	Not used
22	Green	30	Anti-lock braking system pump

Right (Driver's Side Scuttle) Fuse Box – 4.0 Liter, Right-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Driver seat control power
2	Tan	5	Cruise control
3	Yellow	20	RH air conditioning fan
4	Tan	5	Air conditioning clutch relay
5	Blue	15	Horns
6	Tan	5	Interior lights
7	Tan	5	Air conditioning control
8	Red	10	Screen wash pump
9	Red	10	Driver seat heater
* 10	Tan	5	Anti-lock braking system control module
11	Red	10	Trunk lamps/(Caravan power)
12	Yellow	20	Driver seat control power
* 13	Tan	5	Trip computer memory
14	Tan	5	Electric mirrors/Door switch packs/Seat memory
* 15	Red	10	Heated screen wash jets
* 16	Tan	5	Trip computer ignition/Gear shift interlock ignition/Speed interface unit ignition
17	Green	30	Front window lifts
18	Red	10	Locate illumination
19	Red	10	Hazard warning
* 20	Tan	5	Radio telephone ignition
* 21	Tan	5	Radio telephone memory
22	Blue	15	Heated rear screen/Heated door mirrors

* = Change from previous Technical Guide

Left (Driver's Side Scuttle) Fuse Box – 4.0 Liter, Left-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Driver seat control power
2	Tan	5	Cruise control
3	Yellow	20	LH air conditioning fan
* 4	Red	10	Radio memory
5	Red	10	Radio ignition
6	Tan	5	Interior lights
7	Tan	5	Air conditioning control
8	Red	10	Screen wash pump
9	Red	10	Driver seat heater
* 10	Tan	5	Anti-lock braking system control module
11	Red	10	Trunk lamps/(Caravan power)
12	Yellow	20	Driver seat control power
* 13	Tan	5	Trip computer memory
14	Tan	5	Electric mirrors/Door switch packs/Seat memory
* 15	Red	10	Heated screen wash jets
* 16	Tan	5	Trip computer ignition/Gear shift interlock ignition/Speed interface unit ignition
17	Green	30	Front window lifts
* 18	Red	10	Locate illumination
* 19	Red	10	Hazard warning
* 20	Tan	5	Radio telephone ignition
* 21	Tan	5	Radio telephone memory
22	Blue	15	Heated rear screen/Heated door mirrors

Right (Passenger's Side Scuttle) Fuse Box – 4.0 Liter, Left-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Passenger seat control power
2	Red	10	Central door locking/Multifunction module
3	Yellow	20	RH air conditioning fan
4	Tan	5	Air conditioning clutch relay
5	Blue	15	Horns
* 6	Red	10	Direction indicators
* 7	Red	10	Inertia switch
8	Blue	15	Windshield wiper system
9	Red	10	Passenger seat heater
10	Yellow	20	Engine control module relay
* 11	Green	30	Anti-lock braking system valves
12	Yellow	20	Passenger seat control power
* 13	Tan	5	Transmission memory
14	Tan	5	Engine control module relay (coil)
* 15	Tan	5	Accessory connector
16	Yellow	20	Cigar lighter
17	Green	30	Headlamp power wash
* 18	Red	10	Accessory connector
19	Blue	15	Stop lights
* 20	Yellow	20	Engine management system power relay
21	–	–	Not used
22	Green	30	Anti-lock braking system pump

* = Change from previous Technical Guide

Left (Passenger's Side Scuttle) Fuse Box – 6.0 Liter, Right-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Passenger seat control power
2	Red	10	Central door locking/Multifunction module
3	Yellow	20	LH air conditioning fan
* 4	Red	10	Radio memory
5	Red	10	Radio ignition
* 6	Red	10	Direction indicators
* 7	Tan	5	Accessory connector
8	Blue	15	Windshield wiper system
9	Red	10	Passenger seat heater
10	Tan	5	Transmission memory
* 11	Green	30	Anti-lock braking system valves
12	Yellow	20	Passenger seat control power
13	Tan	5	Air injection solenoid/Hot start solenoid/Purge valves
14	Tan	5	Fuel injection control module memory
* 15	Tan	5	Air conditioning control
16	Yellow	20	Cigar lighter
17	Green	30	Headlamp power wash
* 18	Red	10	Accessory connector
19	Blue	15	Stop lights
20	Tan	5	Transmission shift solenoids
21	Tan	5	Transmission power
22	Green	30	Anti-lock braking system pump

Right (Driver's Side Scuttle) Fuse Box – 6.0 Liter, Right-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Driver seat control power
2	Tan	5	Cruise control
3	Yellow	20	RH air conditioning fan
* 4	Red	10	Air conditioning clutch relay
5	Blue	15	Horns
6	Tan	5	Interior lights
7	Blue	15	Engine management system ignition
8	Red	10	Screen wash pump
9	Red	10	Driver seat heater
* 10	Tan	5	Anti-lock braking system control module
11	Red	10	Trunk lamps/(Caravan power)
12	Yellow	20	Driver seat control power
13	Tan	5	Trip computer memory
14	Tan	5	Electric mirrors/Door switch packs/Seat memory
* 15	Red	10	Heated screen wash jets
* 16	Tan	5	Trip computer ignition/Gear shift interlock ignition/Speed interface unit ignition
17	Green	30	Front window lifts
* 18	Red	10	Locate illumination
19	Red	10	Hazard warning
* 20	Tan	5	Radio telephone ignition
* 21	Tan	5	Radio telephone memory
22	Blue	15	Heated rear screen/Heated door mirrors

* = Change from previous Technical Guide

Left (Driver's Side Scuttle) Fuse Box – 6.0 Liter, Left-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Driver seat control power
2	Tan	5	Cruise control
3	Yellow	20	LH air conditioning fan
* 4	Red	10	Radio memory
5	Red	10	Radio ignition
6	Tan	5	Interior lights
* 7	Red	10	Accessory connector
8	Red	10	Screen wash pump
9	Red	10	Driver seat heater
* 10	Tan	5	Anti-lock braking system control module
11	Red	10	Trunk lamps/(Caravan power)
12	Yellow	20	Driver seat control power
* 13	Tan	5	Trip computer memory
14	Tan	5	Electric mirrors/Door switch packs/Seat memory
* 15	Red	10	Heated screen wash jets
* 16	Tan	5	Trip computer ignition/Gear shift interlock ignition/Speed interface unit ignition
17	Green	30	Front window lifts
* 18	Red	10	Locate illumination
19	Red	10	Hazard warning
* 20	Tan	5	Radio telephone ignition
* 21	Tan	5	Radio telephone memory
22	Blue	15	Heated rear screen/Heated door mirrors

Right (Passenger's Side Scuttle) Fuse Box – 6.0 Liter, Left-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Passenger seat control power
2	Red	10	Central door locking/Multifunction module
3	Yellow	20	RH air conditioning fan
* 4	Red	10	Air conditioning clutch relay/Supplementary air valve
5	Blue	15	Horns
* 6	Red	10	Direction indicators
7	Blue	15	Engine management system ignition
8	Blue	15	Windshield wiper system
9	Red	10	Passenger seat heater
10	Tan	5	Transmission memory
* 11	Green	30	Anti-lock braking system valves
12	Yellow	20	Passenger seat control power
13	Tan	5	Air injection solenoid/Hot start solenoid/Purge valves
14	Tan	5	Fuel injection control module memory
15	Tan	5	Air conditioning control
16	Yellow	20	Cigar lighter
17	Green	30	Headlamp power wash
18	Blue	15	Sunroof/Accessory connector
19	Blue	15	Stop lights
20	Tan	5	Transmission shift solenoids
21	Tan	5	Transmission power
22	Green	30	Anti-lock braking system pump

* = Change from previous Technical Guide

Left Front (Engine Compartment) Fuse Box – 4.0 and 6.0 Liter, Left and Right-hand Steering

Number	Color	Rating (Amperes)	Circuit
1	Blue	15	Dim dip/Daytime running lamps
2	Blue	15	Front fog lamps
3	–	–	Not used
* 4	Blue	15	Radiator fan (4.0 liter)
	Green	30	Radiator fan (6.0 liter)
5	Red	10	LH main beam
6	Red	10	RH main beam
7	Tan	5	LH side lamps
8	Tan	5	RH side lamps
* 9	Red	10	LH dipped beam
* 10	Red	10	RH dipped beam
* 11	Natural (White)	25	Air pump (4.0 liter)
	–	–	Not used (6.0 liter)
12	Tan	5	Headlamp leveling

Right Rear (Trunk) Fuse Box – 4.0 and 6.0 Liter, Left and Right-hand Steering

Number	Color	Rating (Amperes)	Circuit
* 1	Red	10	Accessory connector
2	–	–	Not used (4.0 liter)
	Yellow	20	Fuel pump 2 (6.0 liter)
3	–	–	Not used (4.0 liter)
	Yellow	20	Main fuel injection relay (6.0 liter)
4	Tan	5	RH tail and licence plate RH lamps
5	Red	10	Rear fog lamps/Antenna motor
* 6	–	–	Not used
7	Tan	5	Reverse lamps
8	Tan	5	LH tail and licence plate LH lamps
9	Tan	5	Caravan RH tail
10	Tan	5	Caravan LH tail
* 11	Red	10	Fused feed
12	Yellow	20	Fuel pump 1

