Jaguar XJ6
Service and Repair Manual

Mike Stubblefield

Models covered *(3261-248-11AA1)*

Jaguar XJ6 models with 3.2 litre (3239 cc), 3.6 litre (3590 cc) & 4.0 litre (3980 cc) six-cylinder in-line dohc petrol engines and automatic transmission

Covers most features of Daimler 3.6 and 4.0 litre models
Does not cover 2.9 litre (2919 cc) sohc engine or manual transmission
Does not cover XJR models or revised Jaguar/Daimler model ranges introduced September 1994

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Engine oil level

Before you start

✔ Make sure that your car is on level ground.
✔ Check the oil level before the car is driven, or at least 5 minutes after the engine has been switched off.

> **HAYNES HiNT** ***If the oil level is checked immediately after driving the vehicle, some of the oil will remain in the upper engine components, resulting in an inaccurate reading on the dipstick!***

The correct oil

Modern engines place great demands on their oil. It is very important that the correct oil for your car is used (See "Lubricants, fluids and tyre pressures").

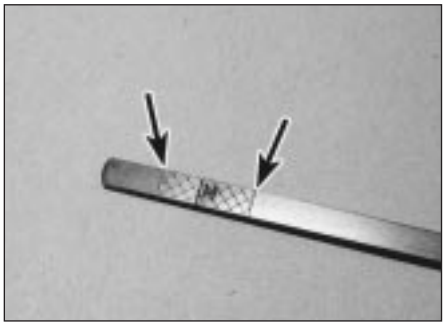
Car care

● If you have to add oil frequently, you should check whether you have any oil leaks. Place some clean paper under the car overnight, and check for stains in the morning. If there are no leaks, the engine may be burning oil *(see "Fault finding").*

● Always maintain the level between the upper and lower dipstick marks (see photo 3). If the level is too low severe engine damage may occur. Oil seal failure may result if the engine is overfilled by adding too much oil.

1 The dipstick is located at the rear of the engine on the left-hand side (see "Under-bonnet check points" on page 0•10 for exact location). Withdraw the dipstick.

2 Using a clean rag or paper towel remove all oil from the dipstick. Insert the clean dipstick into the tube as far as it will go, then withdraw it again.



3 Note the oil level on the end of the dipstick which should be between the upper and lower marks. The "M" mark is for use when checking the oil level after the vehicle has been standing overnight; in this case the oil level should be between the "M" and upper level markings.

4 Oil is added through the filler cap. Unscrew the cap and top-up the level; a funnel may help to reduce spillage. Add the oil slowly, checking the level on the dipstick often. Don't overfill (see "*Car care" left*).

Coolant level

> ***Warning: DO NOT attempt to remove the expansion tank pressure cap when the engine is hot, as there is a very great risk of scalding. Do not leave open containers of coolant about, as it is poisonous.***

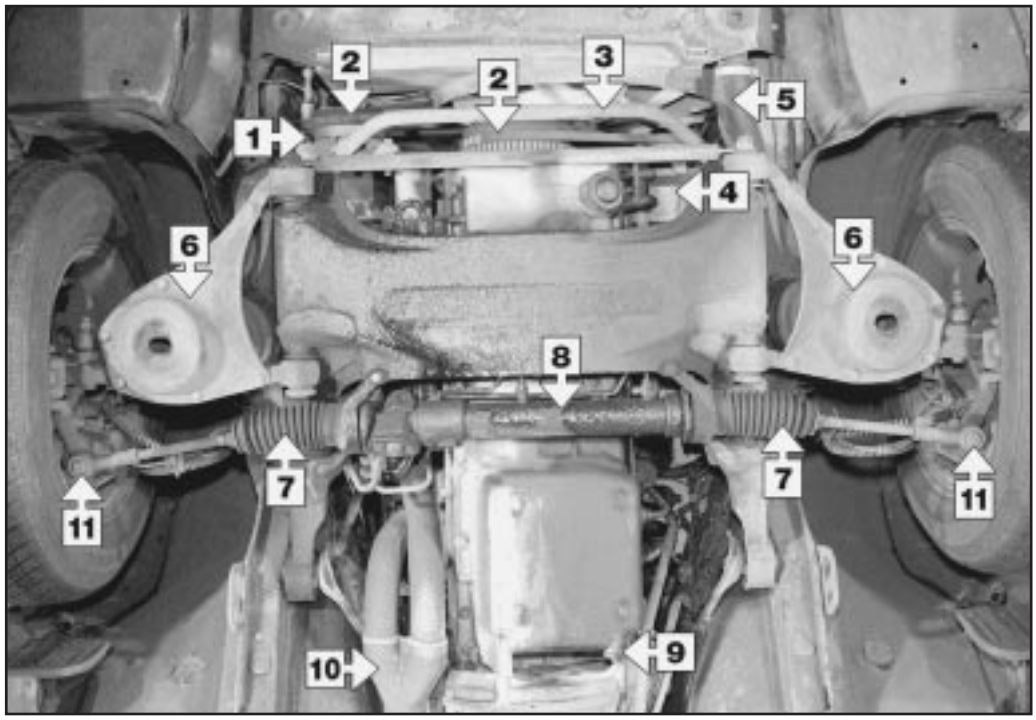
Car care

● Adding coolant should not be necessary on a regular basis. If frequent topping-up is required, it is likely there is a leak. Check the radiator, all hoses and joint faces for signs of staining or wetness, and rectify as necessary.
● It is important that antifreeze is used in the cooling system all year round, not just during the winter months. Don't top-up with water alone, as the antifreeze will become too diluted.

1 The coolant level should be checked only with the engine cold. The level is checked in the expansion tank on the left-hand side of the engine compartment. Remove the expansion tank pressure cap and check that the coolant level is upto the base of filler neck.

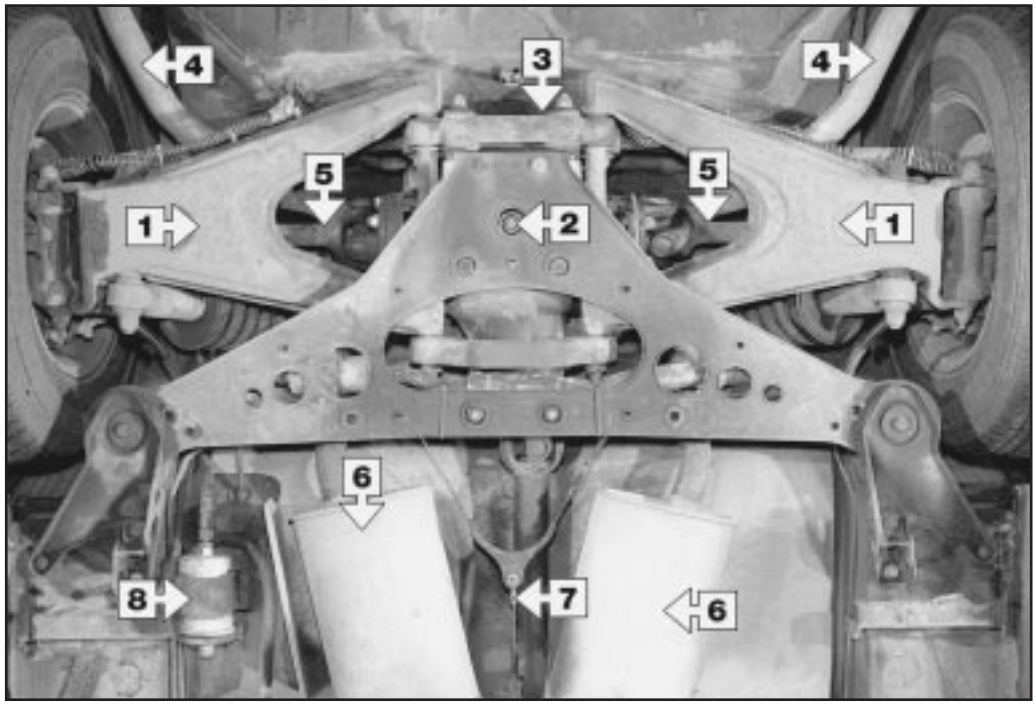
2 If topping up is necessary, add a mixture of water and antifreeze to the expansion tank until the coolant level is upto the base of the filler neck. Once the level is correct, securely refit the pressure cap.

Front underbody view

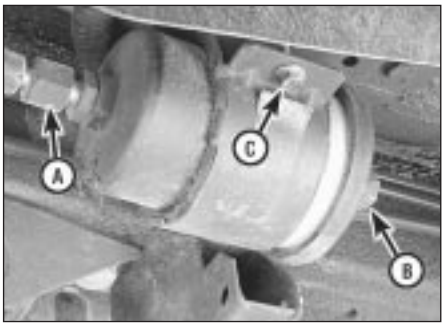


1 Air conditioning compressor
2 Drivebelts
3 Anti-roll bar
4 Alternator
5 Lower radiator hose
6 Lower control arm
7 Steering gear boot
8 Steering gear
9 Engine sump drain plug
10 Exhaust system
11 Outer tie-rod end

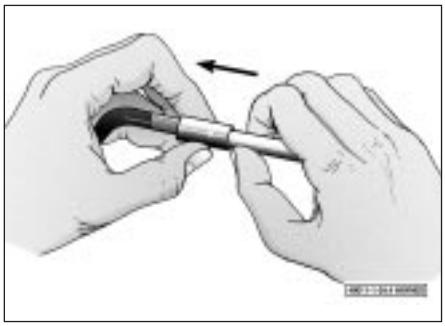
Rear underbody view (typical)



1 Rear suspension control arms
2 Differential drain plug
3 Differential filler plug (not visible)
4 Exhaust pipe
5 Driveshaft
6 Silencers
7 Handbrake cable
8 Fuel filter



18.3 Remove the banjo bolt from the outlet side (B), detach the fitting from the inlet side (A) and unscrew the filter mounting bolt (C)



18.4 On 1991 to 1994 models, slide back the locking collars and remove the inlet and outlet fuel lines

19.11a Unsnap the distributor cap retaining clips - pull the cap up and away to access the rotor

hand tools to remove. Simply slide back the locking collars and remove the inlet and outlet fuel lines **(see illustration)**. Detach the filter mounting bracket and discard the old filter in a proper container.

5 Note the direction of the arrow on the outside of the filter; it should be pointed towards the front of the car. Make sure the new filter is installed so that it's facing the proper direction. **Note:** *Always refit new copper washers where equipped.*

6 Refit the inlet and outlet fittings then tighten the filter mounting bracket. Reconnect the battery cable, start the engine and check for leaks.

19 Ignition system check

1 The spark plug leads should be checked whenever new spark plugs are installed.

2 Begin this procedure by making a visual check of the spark plug leads while the engine is running. In a darkened garage (make sure there is adequate ventilation) start the engine and observe each plug lead. Be careful not to come into contact with any moving engine parts. If there is a break in the lead, you will see arcing or a small spark at the damaged area. If arcing is noticed, make a note to obtain new leads, then allow the engine to cool and check the distributor cap and rotor.

3 The spark plug leads should be inspected one at a time to prevent mixing up the order, which is essential for proper engine operation. Each original plug lead should be numbered to help identify its location. If the number is illegible, a piece of tape can be marked with the correct number and wrapped around the plug lead.

4 Disconnect the plug lead from the spark plug. A removal tool can be used for this purpose or you can grasp the rubber boot, twist the boot half a turn and pull the boot free. Do not pull on the lead itself.

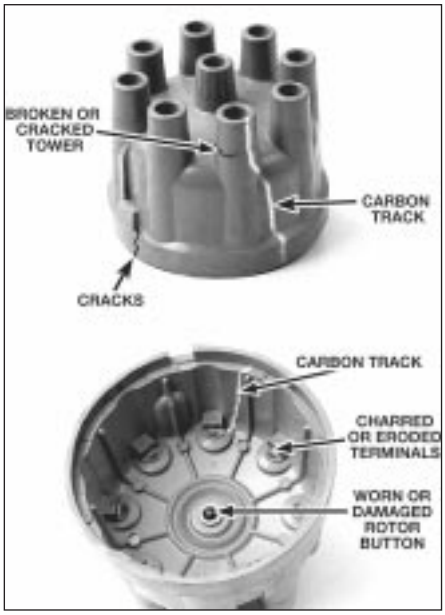
5 Check inside the boot for corrosion, which will look like a white crusty powder.

6 Push the lead and boot back onto the end of the spark plug. It should fit tightly onto the end of the plug. If it doesn't, remove the lead and use pliers to carefully crimp the metal connector inside the lead boot until the fit is snug.

7 Using a clean rag, wipe the entire length of the lead to remove built-up dirt and grease. Once the lead is clean, check for burns, cracks and other damage. Do not bend the lead sharply, because the conductor might break.

8 Disconnect the spark plug lead from the distributor cap. Again, pull only on the rubber boot. Check for corrosion and a tight fit. Reinsert the lead in the distributor cap.

9 Inspect the remaining spark plug leads, making sure that each one is securely fastened at the distributor and spark plug when the check is complete.



19.11b Shown here are some of the common defects to look for when inspecting the distributor cap (typical cap shown). If in doubt about its condition, fit a new one

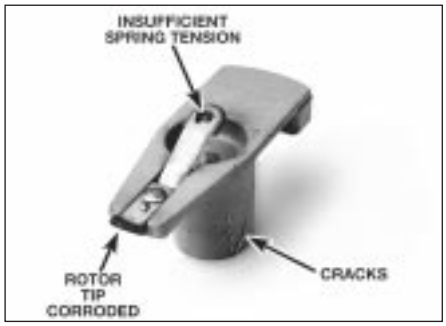
10 If new spark plug leads are required, purchase a set for your specific engine model. Remove and replace the leads one at a time to avoid mix-ups in the firing order.

11 Detach the distributor cap by unsnapping the cap retaining clips. Look inside it for cracks, carbon tracks and worn, burned or loose contacts **(see illustrations)**.

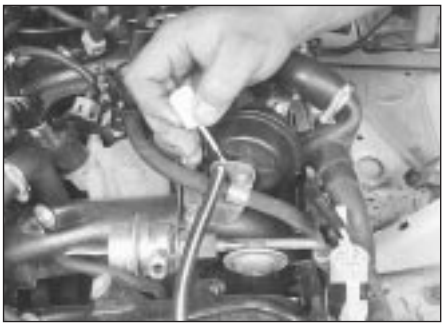
12 Pull the rotor off the distributor shaft and examine it for cracks and carbon tracks **(see illustrations)**. Replace the cap and rotor if any damage or defects are noted.

13 It is common practice to refit a new cap and rotor whenever new spark plug leads are installed. When refitting a new cap, remove the leads from the old cap one at a time and attach them to the new cap in the exact same location **Note:** *If an accidental mix-up occurs, refer to the firing order Specifications at the beginning of this Chapter.*

19.12a Pull off the rotor (arrowed) and inspect it thoroughly



19.12b Check the ignition rotor for wear and corrosion as indicated here (if in doubt about its condition, buy a new one)



5.3 The various hoses should be marked to ensure correct refitting

5.6a Remove the oil filler tube bracket nuts (arrowed) . . .

5.6b . . . pull the tube up to dislodge it from the housing - it won't come out, but can be removed with the intake manifold

5.7a Remove the ground strap from the front stud (arrowed), and the engine wiring harness clips from the other studs

5.7b Remove the intake manifold bolts/ nuts and remove the intake manifold - the upper fasteners are studs/nuts, while the lower row are bolts (two arrowed)

5.9 Refit the new intake manifold gasket over the studs (arrowed) refit the manifold

8 Tighten the screws to the torque listed in this Chapter's Specifications in three or four equal steps.
9 Refit the remaining components, start the engine and check for oil leaks.

5 Intake manifold - removal and refitting

Removal

1 Disconnect the negative cable from the battery.
Caution: If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.
2 Refer to Chapter 4 to remove the accelerator and cruise-control linkage, safely relieve the fuel system pressure, and disconnect the fuel supply lines.
3 Label or mark and detach the PCV and vacuum hoses connected to the intake manifold, **(see illustration)**.
4 The intake manifold can be removed with the injectors and fuel rail still in place. Disconnect the electrical connectors at each injector (label them first for reassembly). If the injectors are to be removed from the intake manifold, refer to Chapter 4.
5 Refer to Chapter 4 and remove the throttle body.
6 Remove the three nuts retaining the oil filler tube bracket, then pull the tube up as far as possible **(see illustrations)**.
7 Remove the ground strap and intake manifold mounting nuts/bolts, then detach the intake manifold from the engine **(see illustrations)**.

Refitting

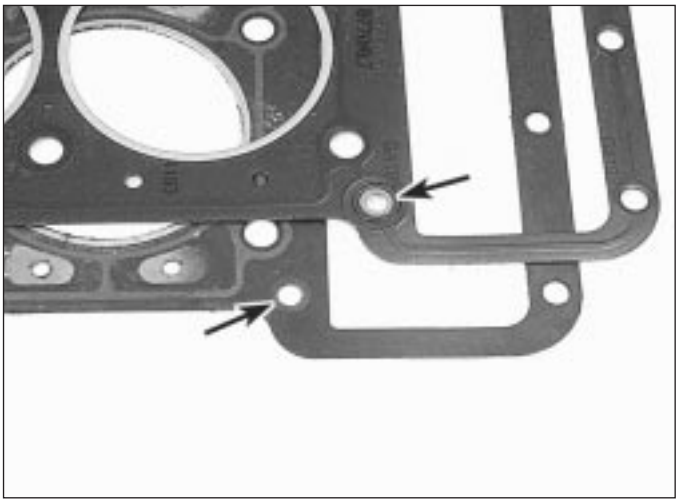
8 Clean the mating surfaces of the intake manifold and the cylinder head mounting surface with lacquer thinner or acetone. If the gasket shows signs of leaking, have the manifold checked for warpage at an automotive machine workshop and resurfaced if necessary.
9 Refit a new gasket, then position the intake manifold on the cylinder head and refit the nuts/bolts **(see illustration)**.
10 Tighten the nuts/bolts in three or four equal steps to the torque listed in this Chapter's Specifications. Work from the centre out towards the ends to avoid warping the manifold.
11 Refit the remaining parts in the reverse order of removal.
12 Before starting the engine, check the throttle linkage for smooth operation.
13 Run the engine and check for coolant and vacuum leaks.
14 Road test the car and check for proper operation of all accessories, including the cruise control system.

6 Exhaust manifolds - removal and refitting

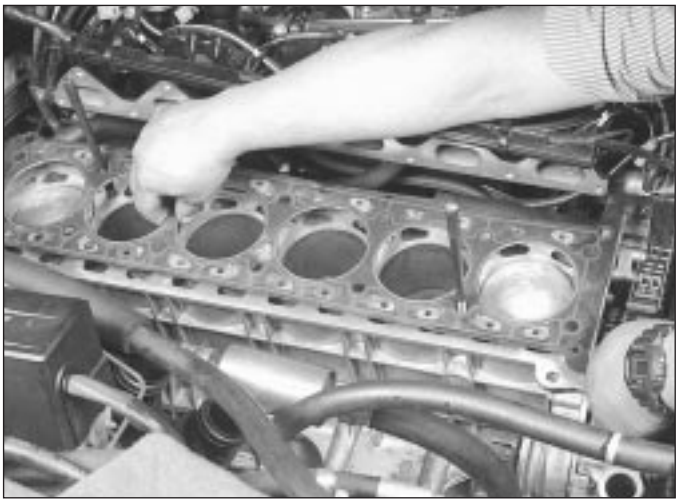
Warning: The engine must be completely cool before beginning this procedure.

Removal

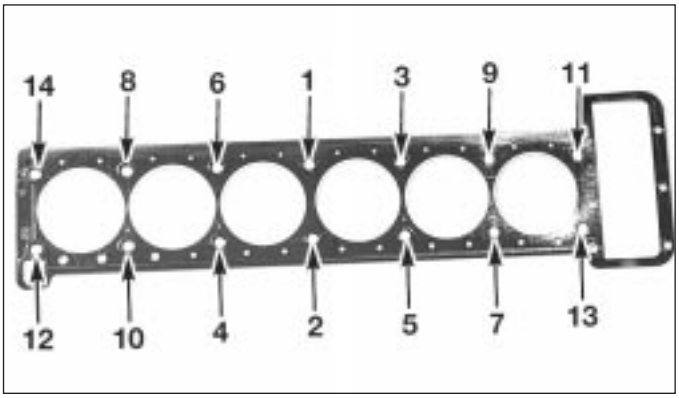
1 Disconnect the negative cable from the battery.
Caution: If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.
2 On 1990 and later models, disconnect the EGR pipe and remove the EGR valve from the top of the exhaust manifold (see Chapter 6).
3 Apply penetrating oil to the exhaust manifold mounting nuts/bolts, and the nuts retaining the exhaust pipes to the manifolds. After the nuts have soaked, remove the nuts retaining the exhaust pipes to the manifolds and the lower bolt from the heat shield **(see illustration)**.
4 Remove the heat shield from the exhaust manifolds **(see illustration)**.
5 Disconnect the electrical connector to the oxygen sensor. Unless the oxygen sensor is being renewed, leave the sensor in place.
6 Remove the nuts/bolts and detach the manifolds and gaskets **(see illustration)**.



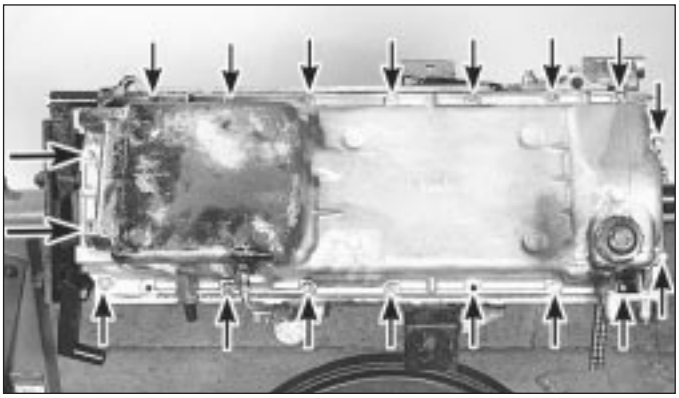
11.21a Only use a head gasket with the improved oil transfer seal (right arrow) - the older style (left arrow) is prone to oil leaks



11.21b Place the new head gasket over the dowels in the engine block - note the markings for UP or TOP printed on the gasket



11.23 Cylinder head bolt TIGHTENING sequence



12.3 Remove the sump bolts (arrowed)

21 There are variations in cooling holes in some models. Before refitting the cylinder head gasket, carefully check all of the passages and bolt holes in the new cylinder head gasket to be sure it matches your engine block. Also make sure the new cylinder head gasket you're using is equipped with the improved oil transfer hole seal **(see illustration)**. Position the cylinder head gasket over the dowel pins in the engine block, make sure TOP is facing up **(see illustration)**.

22 Carefully place the cylinder head on the engine block without disturbing the gasket.

23 Refit NEW cylinder head bolts and following the recommended sequence, tighten the bolts in two steps to the torque listed in this Chapter's Specifications **(see illustration)**. Step 2 of the tightening sequence requires the bolts to be tightened and additional 90°. An angle-torque attachment for your torque wrench is available at car accessory outlets. This tool provides precision when the angle-torque method is required and its use is highly recommended. If the tool is not available, paint a mark on the edge of each cylinder head bolt and tighten the bolt until the mark is 90¡ from the starting point. After the cylinder head bolts are tightened, tighten the cylinder head-to-timing-cover bolts.

24 The remaining refitting steps are the reverse of removal. Refer to Section 10 for replacing the camshaft sprockets and adjusting the timing chain and tensioner. Refill the cooling system (see Chapter 1).

25 Run the engine and check for oil or coolant leaks. Adjust the ignition timing (see Chapter 5) and road test the car.

12 Sump - removal and refitting

Removal

1 Note: *The sump cannot be removed with the engine in the chassis without lowering the front suspension and crossmember. This is a difficult procedure for the home mechanic without a vehicle hoist and some other specialised tools. The other alternative requires the engine be removed from the car and mounted on a stand, as we have illustrated here. Refer to Part B of this Chapter for engine removal procedures.*

2 Drain the engine oil and remove the oil filter (see Chapter 1).

3 Remove the bolts and detach the sump **(see illustration).**

4 If it's stuck, pry it loose very carefully with a small screwdriver or putty knife **(see illustration)**. Don't damage the mating surfaces of the pan and engine block or oil leaks could develop.

12.4 Pry at the recess in the front of the sump to break the gasket seal - insert a putty knife, if necessary, between the sump and engine block

incorporated throughout. The refitting of manifolds and external parts is all that's necessary. Engines in this rebuilt form are available from Jaguar dealers, and some independent rebuilders.

Give careful thought to which alternative is best for you and discuss the situation with local automotive machine shops, auto parts dealers and experienced rebuilders before ordering or purchasing replacement parts.

8 Engine overhaul - dismantling sequence

1 It's much easier to dismantle and work on the engine if it's mounted on a portable engine stand. A stand can often be rented quite cheaply from an equipment rental yard. Before the engine is mounted on a stand, the driveplate and rear oil seal retainer should be removed from the engine.

2 If a stand isn't available, it's possible to dismantle the engine with it blocked up on the floor. Be extra careful not to tip or drop the engine when working without a stand.

3 If you're going to obtain a rebuilt engine, all external components must come off first, to be transferred to the replacement engine, just as they will if you're doing a complete engine overhaul yourself. These include:

Alternator and brackets
Emissions control components
Distributor, spark plug leads and spark plugs
Thermostat and housing cover
Water pump
EFI components
Intake/exhaust manifolds
Oil filter
Engine mounts
Driveplate
Transmission adapter plate

Note: *When removing the external components from the engine, pay close attention to details that may be helpful or important during refitting. Note the installed position of gaskets, seals, spacers, pins, brackets, washers, bolts and other small items.*

4 If you're obtaining a short block, which consists of the engine block, crankshaft, pistons and connecting rods all assembled, then the cylinder head, sump and oil pump will have to be removed as well from your engine so that your short-block can be turned in to the rebuilder as a core. See *Engine rebuilding alternatives* for additional information regarding the different possibilities to be considered.

5 If you're planning a complete overhaul, the engine must be dismantled and the internal components removed in the following order:

Intake and exhaust manifolds
Valve cover
Upper timing chain and camshaft sprockets
Camshafts
Timing chain cover
Cylinder head
Sump
Oil pump
Piston/connecting rod assemblies
Crankshaft rear oil seal retainer
Crankshaft and main bearings

6 Before beginning the dismantling and overhaul procedures, make sure the following items are available. Also, refer to Section 21 for a list of tools and materials needed for engine reassembly.

Common hand tools
Small cardboard boxes or plastic bags for storing parts
Gasket scraper
Ridge reamer
Micrometers
Telescoping gauges
Dial indicator set
Valve spring compressor
Cylinder surfacing hone
Piston ring groove-cleaning tool
Electric drill motor
Tap and die set
Wire brushes
Oil gallery brushes
Cleaning solvent

Special Jaguar tools

Engine lifting brackets (18G 1465)
Timing damper simulator (18E 1436)
Camshaft TDC tool (18G 1433)

9 Cylinder head - dismantling

Note: *New and rebuilt cylinder heads are available from Jaguar and some independent rebuilders. Due to the fact that some specialised tools are necessary for the dismantling and inspection procedures, and replacement parts may not be readily available, it may be more practical and economical for the home mechanic to purchase a replacement cylinder head rather than taking the time to dismantle, inspect and recondition the original.*

1 Cylinder head dismantling involves removal of the intake and exhaust valves and related components. It's assumed that the lifters and camshafts have already been removed (see Part A as needed).

2 Before the valves are removed, arrange to label and store them, along with their related components, so they can be kept separate and reinstalled in the same valve guides they are removed from **(see illustration)**.

3 Compress the springs on the first valve with a spring compressor and remove the keepers **(see illustration)**. Carefully release the valve spring compressor and remove the retainer, the spring and the spring seat (if used). **Note:** *If your spring compressor does not have an end (such as the one shown) with cut-outs on the side, an adapter is available to use with a standard spring compressor.*

Caution: Be very careful not to nick or otherwise damage the lifter bores when compressing the valve springs.

4 Pull the valve out of the cylinder head, then remove the oil seal from the guide. If the valve binds in the guide (won't pull through), push it back into the cylinder head and deburr the area around the keeper groove with a fine file or whetstone.

5 Repeat the procedure for the remaining valves. Remember to keep all the parts for each valve together so they can be reinstalled in the same locations.

6 Once the valves and related components have been removed and stored in an organised manner, the cylinder head should be thoroughly cleaned and inspected. If a complete engine overhaul is being done, finish the engine dismantling procedures before beginning the cylinder head cleaning and inspection process.

10 Cylinder head - cleaning and inspection

1 Thorough cleaning of the cylinder head(s) and related valve train components, followed by a detailed inspection, will enable you to decide how much valve service work must be

9.2 A small plastic bag, with an appropriate label, can be used to store the valve train components so they can be kept together and reinstalled in the correct guide

9.3 Compress the spring until the keepers can be removed with a small magnetic screwdriver or needle-nose pliers - use a valve spring compressor with an adapter (arrowed) to remove the keepers

22.12 Refit the compression rings with a ring expander - the mark must face up

23.10 Lay the Plastigauge strips on the main bearing journals, parallel to the crankshaft centreline

the upper and lower side rails can be turned smoothly in the ring groove.

11 The number two (middle) ring is installed next. It's usually stamped with a mark which must face up, toward the top of the piston. **Note:** *Always follow the instructions on the ring package or box - different manufacturers may require different approaches. Do not mix up the top and middle rings, as they have different cross sections.*

12 Use a piston ring refitting tool and make sure the ring's identification mark is facing the top of the piston, then slip the ring into the middle groove on the piston **(see illustration)**. Don't expand the ring any more than necessary to slide it over the piston.

13 Refit the number one (top) ring in the same manner. Make sure the mark is facing up. Be careful not to confuse the number one and number two rings.

14 Repeat the procedure for the remaining pistons and rings.

23 Crankshaft - refitting and main bearing oil clearance check

1 Crankshaft refitting is the first major step in engine reassembly. It's assumed at this point that the engine block and crankshaft have been cleaned, inspected and repaired or reconditioned.

2 Position the engine with the bottom facing up.

3 Remove the main bearing cap bolts and lift out the caps. Lay the caps out in the proper order.

4 If they're still in place, remove the old bearing inserts from the engine block and the main bearing caps. Wipe the main bearing surfaces of the engine block and caps with a clean, lint free cloth. They must be kept spotlessly clean!

Main bearing oil clearance check

5 Clean the back sides of the new main bearing inserts and lay the bearing half with the oil groove in each main bearing saddle in the engine block. Lay the other bearing half from each bearing set in the corresponding main bearing cap. Make sure the tab on each bearing insert fits into the recess in the engine block or cap. Also, the oil holes in the block must line up with the oil holes in the bearing insert.

Caution: Do not hammer the bearings into place and don't nick or gouge the bearing faces. No lubrication should be used at this time.

6 The thrust bearings (washers) must be installed in the number four main bearing cap and saddle.

7 Clean the faces of the bearings in the engine block and the crankshaft main bearing journals with a clean, lint free cloth. Check or clean the oil holes in the crankshaft, as any dirt here can go only one way - straight through the new bearings.

8 Once you're certain the crankshaft is clean, carefully lay it in position in the main bearings.

9 Before the crankshaft can be permanently installed, the main bearing oil clearance must be checked.

10 Trim several pieces of the appropriate size Plastigauge (they must be slightly shorter than the width of the main bearings) and place one piece on each crankshaft main bearing journal, parallel with the journal axis **(see illustration)**.

11 Clean the faces of the bearings in the caps and refit the caps in their respective positions (don't mix them up) with the arrows pointing toward the front of the engine. Don't disturb the Plastigauge. Apply a light coat of oil to the bolt threads and the undersides of the bolt heads, then refit them. **Note:** *Use the old bolts for this step (save the new bolts for final refitting).*

12 Tighten the main bearing cap bolts, in three steps, to the torque listed in this Chapter's Specifications. Don't rotate the crankshaft at any time during this operation!

13 Remove the bolts and carefully lift off the main bearing caps or cap assembly. Keep them in order. Don't disturb the Plastigauge or rotate the crankshaft. If any of the main bearing caps are difficult to remove, tap them gently from side-to-side with a soft-face hammer to loosen them.

14 Compare the width of the crushed Plastigauge on each journal to the scale printed on the Plastigauge envelope to obtain the main bearing oil clearance **(see illustration)**. Check the Specifications to make sure it's correct.

15 If the clearance is not as specified, the bearing inserts may be the wrong size (which means different ones will be required - see Section 20). Before deciding that different inserts are needed, make sure that no dirt or oil was between the bearing inserts and the caps or engine block when the clearance was measured. If the Plastigauge is noticeably wider at one end than the other, the journal may be tapered (see Section 19).

16 Carefully scrape all traces of the Plastigauge material off the main bearing journals and/or the bearing faces. Don't nick or scratch the bearing faces.

Final crankshaft refitting

17 Carefully lift the crankshaft out of the engine. Clean the bearing faces in the engine block, then apply a thin, uniform layer of clean moly-base grease or engine assembly lube to each of the bearing surfaces. Coat the thrust washers as well.

18 Lubricate the crankshaft surfaces that contact the oil seals with moly-base grease, engine assembly lube or clean engine oil.

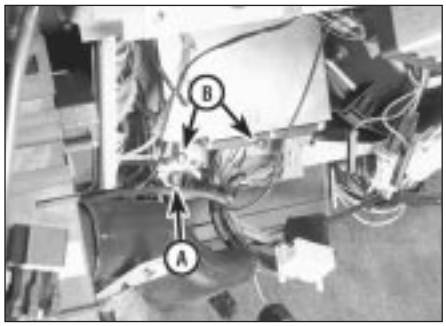
19 Make sure the crankshaft journals are clean, then lay the crankshaft back in place in the engine block. Clean the faces of the bearings in the main bearing caps, then apply lubricant to them. Refit the main bearing caps in their respective positions with the arrows pointing toward the front of the engine. **Note:** *Be sure to refit the thrust washers (lubricated) with the number 4 main journal.* The upper (block side) thrust washers can be rotated into position around the crankshaft with the crankshaft installed in the engine block, with the thrust washer grooves facing OUT. The lower thrust washers should be placed on the main bearing caps with their grooves OUT.

20 For the final assembly, use only **new** bolts, for both the main bearings and the

23.14 Compare the width of the crushed Plastigauge to the scale on the envelope to determine the main bearing oil clearance (always take the measurement at the widest point of the Plastigauge). Be sure to use the correct scale - imperial and metric scales are included

10.2a The right blower housing (arrowed) is located behind the glove box area of the dash

10.2b Apply heavy duct tape to the sharp edge of this brace (dotted line) when working behind the glove box area of the dash - the metal is very sharp



10.3a Remove the screw (A) holding the wiring harness in place, then remove the two lower cruise-control ECU screws (B) . . .

10.3b . . . then remove the upper ECU screw (arrowed) and pull down the ECU, then remove the ECU mounting plate

10.5 Two bolts (arrow indicates the left bolt) hold the top of the blower housing to the cowl

10.6 Pull down and out on the housing until it clears the sheet metal brace below it

10.7 Remove this brace rod (small arrow) for clearance to remove the left blower motor housing (large arrow)

10.10 Remove the five clips (two shown here with arrows) and one screw holding the halves of the housing together

3 Remove the screws holding the cruise-control ECU in place **(see illustrations)**, then remove the four screws holding the ECU mounting plate in place.

4 Disconnect the vacuum lines and electrical connectors at the blower housing, identifying each connection with marked masking tape for reassembly, or write down the colour codes of the vacuum tubing. Remove the duct tape connecting the blower housing to the duct from the heater/air conditioning unit.

5 Remove the two bolts holding the top of the blower housing to the cowl **(see illustration).**

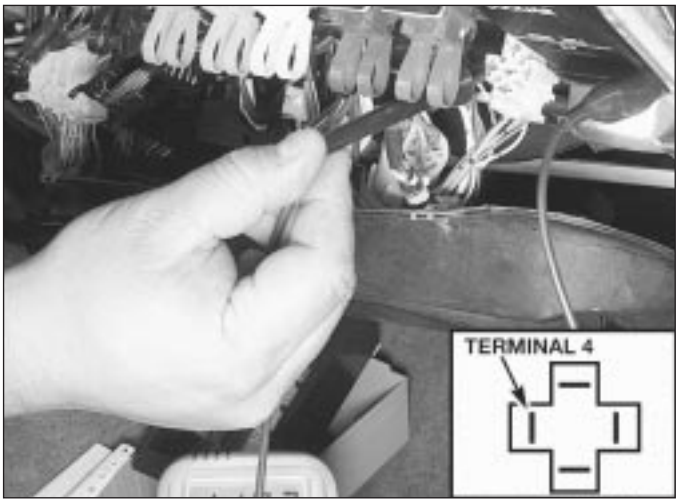
6 Pull down and back on the housing until it squeezes past the metal brace below it **(see illustration).** It will take some force at first.

7 To access the left blower motor, remove the left-hand brace rod from the steering column forward to the body **(see illustration**), then repeat Steps 4 and 5 on the left blower housing. The blower housing should now drop straight down and out.

8 If the blower motor does not operate, disconnect the electrical connectors at the blower motor and connect the black wire terminal to chassis ground, and the purple wire terminal to a fused source of battery voltage. If the blower doesn't operate, it should be renewed. If it does operate, there is a problem in the feed or earth circuit.

9 If the motor is good, but doesn't operate at any speed, the problem could be in the heater/air conditioning control assembly or the heating/air conditioning computer. Diagnosis either of these electronic components is beyond the scope of the home mechanic, and should be referred to your Jaguar dealer or other qualified repair facility.

10 If either blower motor must be renewed, remove the five clips and one screw holding the blower housing halves together **(see illustration)**.



3.3a Checking for battery voltage at the fuel pump relay connector (1989 model)

3.3b Checking for battery voltage to the main relay (1989 model)

circuit. If all circuits are intact and not damaged, check the inertia switch. **Note:** *The inertia switch is a special device that shuts down power to the ignition and the fuel pump in the event of an accident. See Chapter 12 for checking and resetting procedures for the inertia switch.*

3 Remove the relay and check for battery voltage to the fuel pump relay connector **(see illustration)**. If there is battery voltage present, check the relay for proper operation. Refer to the relay checking procedure in Chapter 12. **Note:** *If battery voltage is not available, check for battery voltage to the main relay* **(see illustration)***. Refer to the relay location diagrams in Chapter 12. The main relay, which is located next to the fuel pump relay, supplies voltage to the fuel pump and ignition system.*

4 If battery voltage is present, check for battery voltage directly at the fuel pump electrical connector **(see illustrations)**, within two seconds of the ignition key being turned On. If there is no voltage, check the fuel pump circuit. If there is voltage present, renew the pump (see Section 4). **Note:** *It will be necessary to raise the vehicle and support it securely on axle stands to gain access to the fuel pump electrical connectors. Have an assistant operate the ignition key and be sure to block the front wheels to avoid any movement of the vehicle.*

Operating pressure check

5 Relieve the fuel system pressure (see Section 2). Detach the cable from the negative battery terminal.

Caution: If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.

6 Detach the fuel line from the fuel rail and connect a fuel pressure gauge **(see illustrations)** between the fuel pulsation damper and the fuel rail. Tighten the hose clamps securely.

7 Attach the cable to the negative battery terminal. Start the engine.

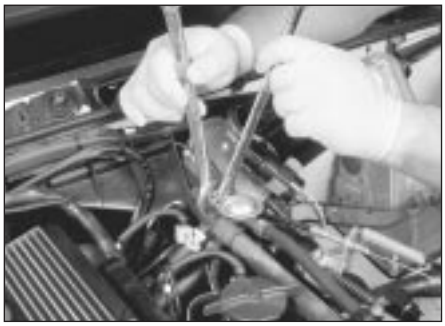
8 Note the fuel pressure and compare it with the pressure listed in this Chapter's Specifications.

9 Disconnect the vacuum hose from the fuel pressure regulator and hook up a hand-held vacuum pump **(see illustration)** to the port on the fuel pressure regulator.

10 Read the fuel pressure gauge with vacuum applied to the pressure regulator and also with no vacuum applied. The fuel pressure should decrease as vacuum increases (and increase as vacuum decreases).

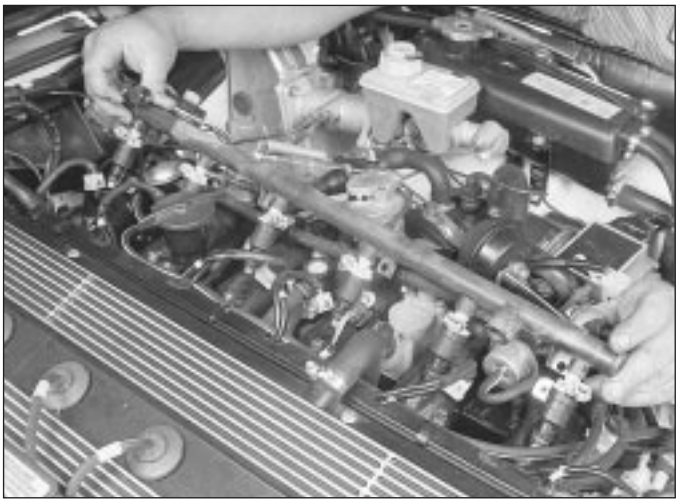
3.4a Remove the rubber boot from the fuel pump electrical connector and check for voltage while an assistant turns the ignition key (1989 model shown)

3.4b Check for battery voltage to the fuel pump on the harness connector near the fuel tank on models with in-tank fuel pumps

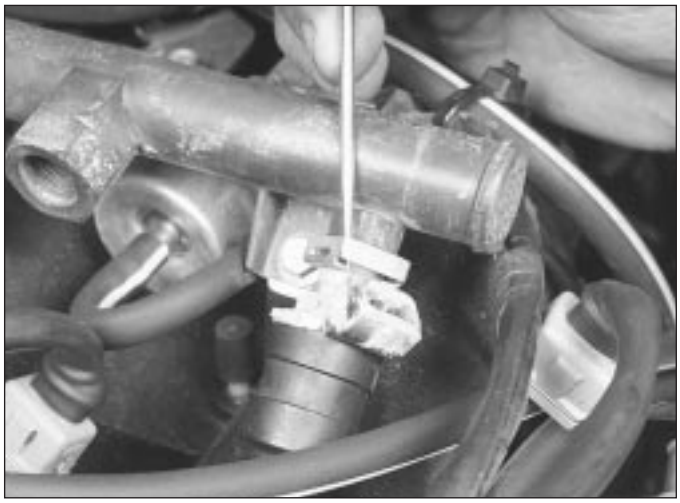


3.6a Remove the fuel line from the fuel pulsation damper . . .

3.6b . . . then refit the fuel pressure gauge between the fuel rail and the fuel pressure damper using a T-fitting



13.36 . . . and remove the fuel rail with the fuel injectors attached



13.37 Remove the fuel injector retaining clips from the fuel rail using a small screwdriver

36 Remove the fuel rail with the fuel injectors attached **(see illustration)**.
37 Prise off the clips and remove the fuel injector(s) from the fuel rail **(see illustration)**.
38 If you are replacing the injector(s), discard the old injector. If you intend to re-use the same injectors, renew the grommets and O-rings **(see illustrations)**.
39 Refitting of the fuel injectors is the reverse of removal. Apply a light film of clean engine oil to the O-rings before refitting them.
40 Tighten the fuel rail mounting bolts to the torque listed in this Chapter's Specifications.

Fuel pressure regulator

Check

41 Refer to the fuel pump/fuel pressure check procedure (see Section 3).

Renewal

42 Relieve the fuel pressure (see Section 2) and detach the cable from the negative terminal of the battery *(see the* **Caution** *at the beginning of this Section)*.
43 Detach the vacuum hose from the regulator.
44 Remove the fuel rail and the injectors as an assembly (see Steps 30 to 39).
45 Remove the fuel line from the fuel pressure regulator **(see illustration)**.
46 Remove the fuel pressure regulator mounting bolts and detach the pressure regulator from the engine.
47 The remainder of refitting is the reverse of removal. Make sure the fuel lines are secure and there are no leaks before using the car.

Supplementary air valve

Check

48 The supplementary air valve provides additional throttle valve bypass air during cold starting and cold running conditions below 15° F. This output actuator is controlled by the computer (ECU) in response to information received from the coolant temperature sensor, intake air temperature sensor and other information sensors working with the fuel injection system.
49 Check for battery voltage to the supplementary air valve. With the engine cold, backprobe the electrical connector using a long pin and check for battery voltage **(see illustration)**. Voltage should exist.
50 Because of the special tools required to test the supplementary air valve, have it tested by a dealer service department or other qualified repair facility.

Renewal

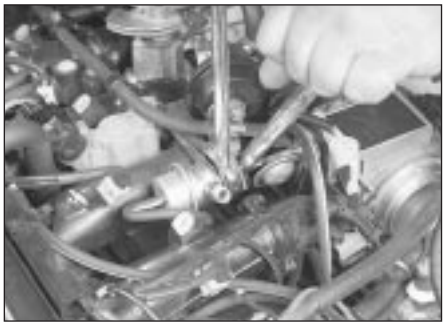
51 Remove the intake hoses, the mounting screws and detach the supplementary air valve from the engine.
52 Refitting is the reverse of removal.
53 Be sure to use a new gasket when refitting the idle-up valve.

Air intake plenum

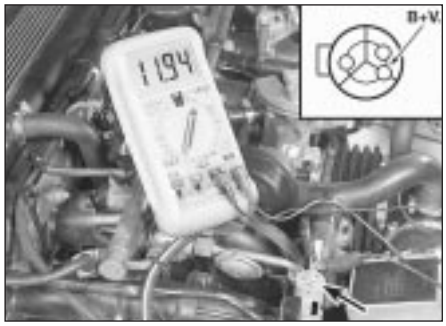
Note: *The air intake plenum is removed and installed as a complete unit with the intake manifold. In the event of damage or leaks, remove the air intake plenum and intake*

13.38a If you plan to refit the original injectors, remove and discard the O-rings and grommets and fit new ones

13.38b Pick out the old injector seal but make sure the injector body is not damaged in the process



13.45 Disconnect the fuel pressure regulator from the fuel return line



13.49 Check for battery voltage to the supplementary air valve

Chapter 6
Emissions and engine control systems

Contents

Degrees of difficulty

Easy, suitable for novice with little experience

Fairly easy, suitable for beginner with some experience

Fairly difficult, suitable for competent DIY mechanic

Difficult, suitable for experienced DIY mechanic

Very difficult, suitable for expert DIY or professional

Specifications

EGR gas temperature sensor resistance

Temperature:	
212° F	60 to 100 k-ohms
400° F	3 to 8 k-ohms
662° F	250 to 350 ohms

Torque wrench setting	Nm	lbf ft
Crankshaft sensor bolt	27	20

1 General information

To minimise pollution of the atmosphere from incompletely burned and evaporating gases and to maintain good driveability and fuel economy, a number of emission control systems are used on these vehicles. They include the:

Air Injection Reactor (AIR) system
Crankcase Ventilation system
Exhaust Gas Recirculation (EGR) system
Electronic Fuel Injection (EFI) system
Evaporative Emission Control (EVAP) system
Three-way catalytic converter (TWC) system

The sections in this chapter include general descriptions, checking procedures within the scope of the home mechanic and component renewal procedures (when possible) for each of the systems listed above.

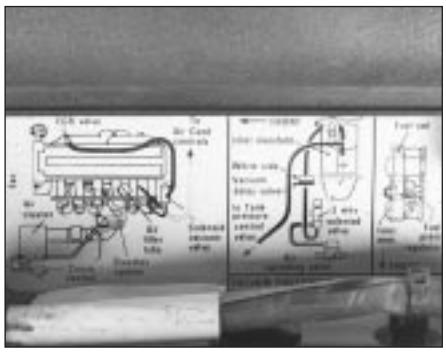
Before assuming an emissions control system is malfunctioning, check the fuel and ignition systems carefully (Chapters 4 and 5). The diagnosis of some emission control devices requires specialised tools, equipment and training. If checking and servicing become too difficult or if a procedure is beyond the scope of your skills, consult your dealer service department or other repair workshop.

This doesn't mean, however, that emission control systems are particularly difficult to maintain and repair. You can quickly and easily perform many checks and do most of the regular maintenance at home with common tune-up and hand tools. **Note:** *The most frequent cause of emission problems is simply a loose or broken electrical connector or vacuum hose, so always check the electrical connectors and vacuum hoses first.*

Pay close attention to any special precautions outlined in this chapter. It should be noted that the illustrations of the various systems may not exactly match the system installed on your vehicle because of changes made by the manufacturer during production or from year-to-year.

The Vehicle Emissions Control Information (VECI) label and a vacuum hose diagram are located under the bonnet **(see illustrations)**. These contain important emissions specifications and setting procedures, and a vacuum hose schematic with emissions

1.6a The Vehicle Emissions Control Information (VECI) label shows the types of emission control systems installed, engine information, etc (1992 model shown)



1.6b Typical vacuum hose routing label (1992 model shown)

7.11a Check for vacuum to the thermal vacuum valve (TVV)

7.11b Check for vacuum from the TVV before and after the engine has reached normal operating temperature

7.12 Remove the front spoiler to gain access to the purge control valve (see Chapter 11). Apply vacuum to the valve and make sure the valve holds vacuum

7.14 Remove the bolts (arrowed) and lower the charcoal canister from the wing

canister. If fuel is leaking, renew the canister and check the hoses and hose routing.

9 Inspect the canister. If it's cracked or damaged, renew it.

10 Check for a clogged filter or a damaged pressure relief valve. Using low pressure compressed air (such as from a tyre pump), blow into the canister tank pipe. Air should flow freely from the other pipes. If a problem is found, renew the canister.

11 Check the operation of the thermal vacuum valve (TVV). With the engine cold and idling, check for ported vacuum to the temperature vacuum switch. Vacuum should be present **(see illustration)**. Now warm the engine to operating temperature (above 115°F/43°C) and confirm that ported vacuum passes through the TVV **(see illustration)**. Renew the valve if the test results are incorrect.

12 Check the operation of the purge control valve. Apply vacuum to the purge control valve using a hand-held vacuum pump and observe that the valve holds vacuum steadily **(see illustration)**. If the valve holds vacuum and the valve is opening, it is working properly.

Charcoal canister renewal

13 Clearly label, then detach the vacuum hoses from the canister.

14 Remove the mounting clamp bolts **(see illustration)**, lower the canister with the bracket, disconnect the hoses from the check valve and remove it from the vehicle.

15 Refitting is the reverse of removal.

8 Crankcase ventilation system

General information

1 The crankcase ventilation system reduces hydrocarbon emissions by scavenging crankcase vapours. It does this by circulating fresh air from the air cleaner through the crankcase, where it mixes with blow-by gases and is then re-routed through a heating element to the intake manifold **(see illustration).**

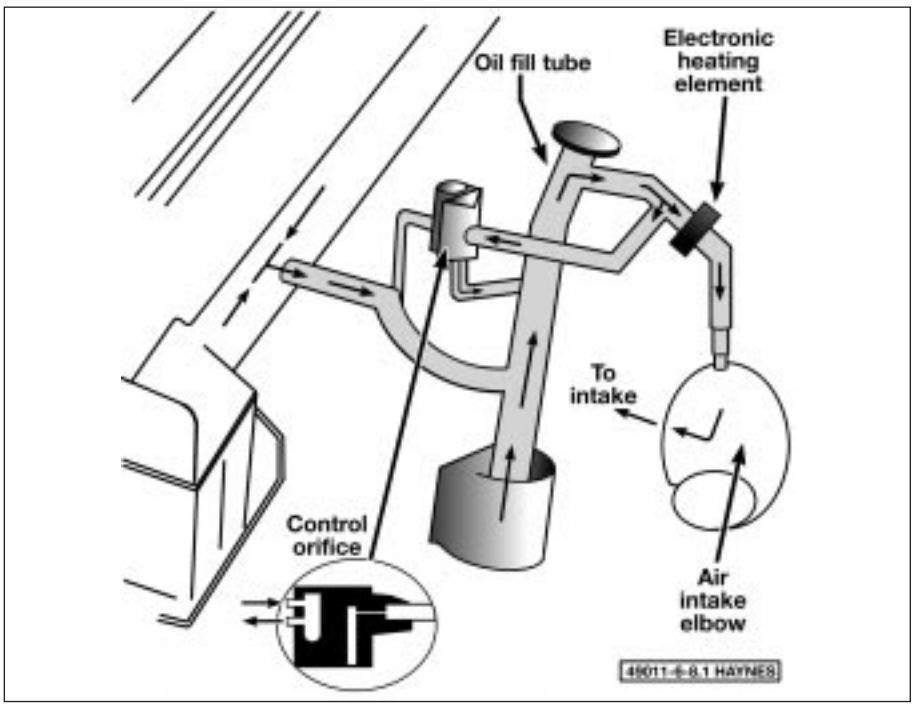
2 The main components of the crankcase ventilation system are the control orifice, a heating element and the vacuum hoses connecting these components with the engine.

3 Piston blow-by gasses are collected from the crankcase and the camshaft housing via the oil filler tube. These gasses are fed into the intake manifold at part throttle through the part throttle orifice and when the engine is at full throttle, the gasses are fed through the air intake elbow.

4 To prevent possible icing-up during cold weather operation, the control orifice and the hose to the intake system is electronically heated. The heater element is energised by a relay signal from the windscreen washer jet temperature sensor.

Check

5 Remove the tubes and elbows that connect the crankcase ventilation system and inspect them for obstructions, oil deposits or clogging. Make sure the ventilation system is free of all



8.1 Schematic of the crankcase ventilation system

7.5 Use a flare-nut spanner to loosen the fittings, then pull the lines back from the brake servo and plug them to prevent contamination

7.6 Pry off the two rubber caps from the pedal box

7.7 To detach the brake servo from the pedal box, remove these four nuts (arrowed) (lower right nut not visible in this photo)

being drawn back into the master cylinder. Wait several seconds for brake fluid to be drawn from the reservoir into the piston bore, then depress the piston again, removing your finger as brake fluid is expelled. Be sure to put your finger back over the hole each time before releasing the piston, and when the bleeding procedure is complete for that outlet, renew the plug and snug it up before going on to the other port.

Refitting

16 Refit the master cylinder over the studs on the brake servo and tighten the mounting nuts only finger tight at this time.

17 Thread the brake line fittings into the master cylinder. Since the master cylinder is still a bit loose, it can be moved slightly to allow the fitting threads to start easily. Do not strip the threads as the fittings are tightened.

18 Tighten the brake fittings securely and the mounting nuts to the torque listed in this Chapter's Specifications.

19 Fill the master cylinder reservoir with fluid, then bleed the master cylinder and the brake system (see Section 9).

20 To bleed the master cylinder on the vehicle, have an assistant pump the brake pedal several times and then hold the pedal to the floor. Loosen the fitting nut to allow air and fluid to escape, then tighten the nut. Repeat this procedure on both fittings until the fluid is clear of air bubbles. Test the operation of the brake system carefully before placing the vehicle into service.

7 Brake servo - general information, removal and refitting

General information

1 A hydraulic brake servo system assists braking when the brake pedal is depressed. The booster unit, located between the brake pedal box and the master cylinder, is operated by hydraulic pressure generated by an engine-driven pump (on early models) or by an electric pump (on later models). When the engine is running, the pump supplies hydraulic pressure to an accumulator. The accumulator stores and regulates the pressure to the hydraulic brake servo. When you depress the brake pedal, the pressure in the booster helps actuate the master cylinder, reducing pedal effort.

2 The hydraulic brake servo isn't rebuildable; if it fails, it must be replaced. Basic operation can be checked (see Chapter 1, Section 15), but in-depth testing of the system requires special tools, so diagnosis is beyond the scope of the home mechanic. If the system fails, take it to a dealer service department or other qualified repair workshop for repairs. However, if the unit must be replaced, you can do it yourself as follows.

Removal and refitting

3 With the engine off, discharge the hydraulic accumulator by depressing the brake pedal several times until it feels hard to depress.

4 Remove the master cylinder (see Section 6).

5 Clean the area around the return and supply tube nuts, then disconnect them with a flare-nut spanner **(see illustration)**. Plug the lines to prevent dirt from entering the system.

Caution: Even a particle of dirt can damage the servo system, so be extremely careful to prevent dirt from entering the system while the lines are disconnected.

6 To disconnect the brake servo pushrod from the brake pedal, remove the access plugs from both sides of the pedal box **(see illustration)**, remove the clevis pin retaining clip and drive out the clevis pin.

7 Remove the four mounting nuts and remove the brake servo **(see illustration)**.

8 Refitting is the reverse of removal. Tighten the hydraulic line fittings securely.

9 When you're done, adjust the brake light switch (see Section 13).

8 Brake hoses and lines - inspection and renewal

Inspection

1 About every six months, with the vehicle raised and placed securely on axle stands, the flexible hoses which connect the steel brake lines with the front and rear brake assemblies should be inspected for cracks, chafing of the outer cover, leaks, blisters and other damage. These are important and vulnerable parts of the brake system and inspection should be complete. A light and mirror will prove helpful for a thorough check. If a hose exhibits any of the above conditions, renew it with a new one.

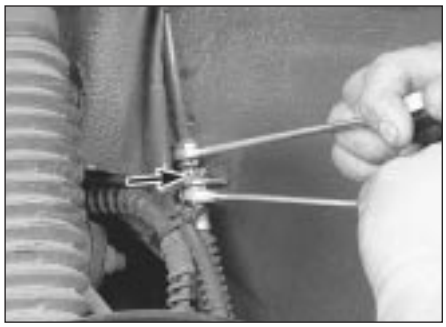
Flexible hose renewal

2 Clean all dirt away from the ends of the hose.

3 To disconnect the hose at the frame end, use a second spanner on the hex-shaped fitting on the end of the flexible hose and loosen the nut on the metal brake line **(see illustrations)**. If the nut is stuck, soak it with penetrating oil. After the hose is disconnected from the metal line, remove the nut right above the bracket and detach the hose from the bracket.

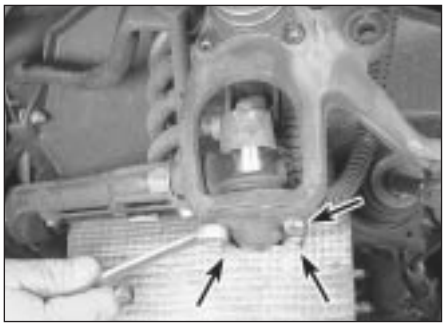
4 To detach the flexible hose from the caliper, simply unscrew it.

5 Refitting is the reverse of the removal procedure. Make sure the brackets are in good condition and the locknuts are tightened securely.

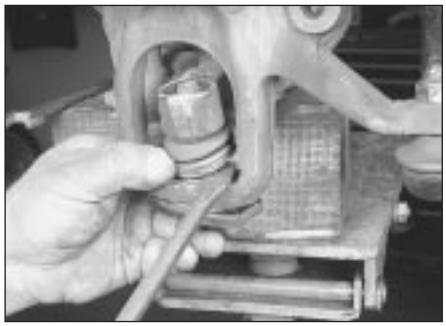


8.3a To remove a front flexible brake hose from a metal brake line, use one spanner to hold the hose fitting just below the bracket (lower spanner), then break loose the nut on the metal line (upper spanner); to disconnect the flex hose from the bracket, remove the centre nut (arrowed) just above the bracket

5.11 Strike the steering knuckle in this area to pop the lower ball stud loose from the steering knuckle



5.12 To detach the lower balljoint from the lower control arm, remove these four bolts (arrowed)



5.13 To detach the dust boot from the steering knuckle, pry the lower lip of the boot out of its groove in the knuckle

12 Remove the four balljoint retaining bolts **(see illustration)**.
13 If the dust boot is damaged, pry it out **(see illustration)**.
14 Remove the balljoint.
15 Refitting is the reverse of removal. Tighten the balljoint bolts and the ball stud nut to the torque listed in this Chapter's Specifications.
16 Remove the jack from under the control arm, refit the front wheel. Lower the vehicle and tighten the wheel nuts to the torque listed in the Chapter 1 Specifications.

6 Steering knuckle - removal and refitting

1 Loosen the wheel nuts, raise the front of the vehicle and place it securely on axle stands. Remove the wheel.
2 Remove the front brake caliper and mounting bracket (see Chapter 9). Do not disconnect the brake hose. Hang the caliper out of the way with a piece of wire.
3 Remove the brake disc (see Chapter 9).
4 Remove the ABS sensor **(see illustration)**.
5 Remove the brake shield **(see illustration)**.
6 Disconnect the tie-rod end from the steering knuckle (see Section 15).
7 Disconnect the upper and lower balljoints from the steering knuckle (see Section 5).
8 Remove the steering knuckle.
9 Refitting is the reverse of removal. Tighten the balljoint nuts and the tie-rod end nuts to the specified torque. Tighten the brake fasteners to the torque values listed in the Chapter 9 Specifications.

7 Upper control arm - removal and refitting

1 Loosen the wheel nuts, raise the vehicle and support it securely on axle stands. Remove the wheel.
2 Support the lower control arm with a trolley jack **(see illustration 4.2)**.
3 Disconnect the upper balljoint from the steering knuckle (see Section 5).
4 If you're removing the right upper control arm on a vehicle equipped with the power hydraulic system, remove the three Torx screws which attach the accumulator **(see illustration)** and push the assembly aside just far enough to clear the pivot bolt.
5 Remove the upper control arm pivot bolt and nut **(see illustration)**. When removing the nut, note the number of washers used and the order in which they're installed. Put these parts in a plastic bag.
6 Remove the upper control arm. Inspect the bushings at either end of the arm and renew them if they're damaged or worn.
7 Refitting is the reverse of removal. Be sure to refit the washers in the same order in which they were removed. Raise the suspension with the trolley jack to simulate normal ride height, then tighten the upper control arm pivot bolt and nut to the torque listed in this Chapter's Specifications.

8 Coil spring (front) - removal and refitting

Warning: The coil springs cannot be removed without a special spring compressor tool (Jaguar tool JD115). Do not try to remove a coil spring without this special tool. If you do, you could be seriously injured.
1 Loosen the wheel nuts, raise the vehicle

6.4 To detach the ABS sensor from the steering knuckle, remove this bolt

6.5 To detach the brake shield from the steering knuckle, remove these three screws (arrowed)

7.4 Remove these three Torx screws (arrowed) and move the accumulator assembly to the side a little to provide clearance for pulling out the pivot bolt

7.5 To detach the upper control arm from the crossmember, remove the nut (at the rear) and pull the bolt out from the front; note the fitted order of the spacer washers

9.2a Use a small screwdriver to prise the clip out of its locking groove, then detach the end of the strut from the mounting stud

9.2b The boot lid support strut requires prising out a locking pin to detach it from the locating stud

spray painting technique is mastered. Cover the repair area with a thick coat of primer. The thickness should be built up using several thin layers of primer rather than one thick one. Using 600-grit wet-or-dry sandpaper, rub down the surface of the primer until it is very smooth. While doing this, the work area should be thoroughly rinsed with water and the wet-or-dry sandpaper periodically rinsed as well. Allow the primer to dry before spraying additional coats.

21 Spray on the top coat, again building up the thickness by using several thin layers of paint. Begin spraying at the top of the repair area and then, using a side-to-side motion, work down until the whole repair area and about two inches of the surrounding original paint is covered. Remove all masking material 10 to 15 minutes after spraying on the final coat of paint. Allow the new paint at least two weeks to harden, then use a very fine rubbing compound to blend the edges of the new paint into the existing paint. Finally, apply a coat of wax.

6 Body repair - major damage

1 Major damage must be repaired by an auto body workshop specifically equipped to perform unibody repairs. These workshops have the specialised equipment required to do the job properly.

2 If the damage is extensive, the body must be checked for proper alignment or the vehicle's handling characteristics may be adversely affected and other components may wear at an accelerated rate.

3 Due to the fact that most of the major body components (bonnet, front wings, etc.) are separate and replaceable units, any seriously damaged components should be replaced rather than repaired. Sometimes the components can be found in a scrapyard that specialises in used vehicle components, often at considerable savings over the cost of new parts.

7 Hinges and locks - maintenance

Once every 3000 miles, or every three months, the hinges and latch assemblies on the doors, bonnet and boot should be given a few drops of light oil or lock lubricant. The door latch strikers should also be lubricated with a thin coat of grease to reduce wear and ensure free movement. Lubricate the door and boot locks with spray-on graphite lubricant.

8 Windscreen and fixed glass - replacement

Replacement of the windscreen and fixed glass requires the use of special fast-setting adhesive/caulk materials and some specialised tools. It is recommended that these operations be left to a dealer or a workshop specialising in glass work.

9 Bonnet and boot lid support struts - removal and refitting

1 Open the bonnet or boot lid and support it securely.

2 Using a small screwdriver, detach the retaining clips at both ends of the support strut. Then pry or pull sharply to detach it from the vehicle **(see illustrations).**

3 Refitting is the reverse of removal.

10 Bonnet - removal, refitting and adjustment

Note: *The bonnet is heavy and somewhat awkward to remove and refit - at least two people should perform this procedure.*

Removal and refitting

1 Use blankets or pads to cover the wings and the area in front of the bonnet. This will protect the body and paint as the bonnet is lifted off.

2 Make marks or scribe a line around the bonnet hinge to ensure proper alignment during refitting.

3 Disconnect any cables or wires that will interfere with removal.

4 Have an assistant support the bonnet. Remove the hinge-to-bonnet screws or bolts **(see illustration)**.

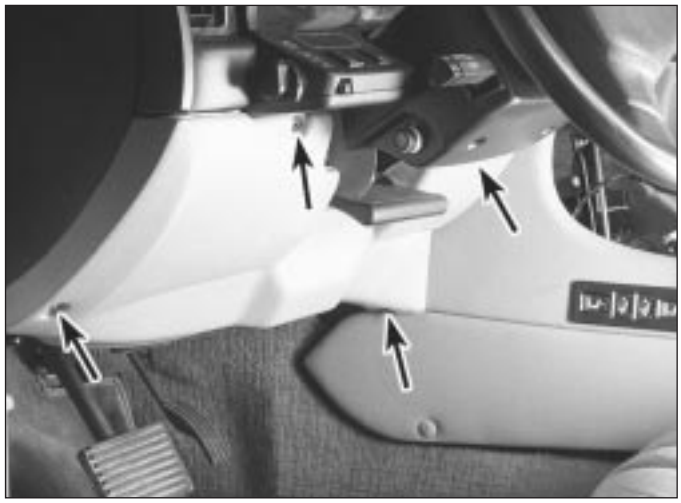
5 Lift off the bonnet.

6 Refitting is the reverse of removal.

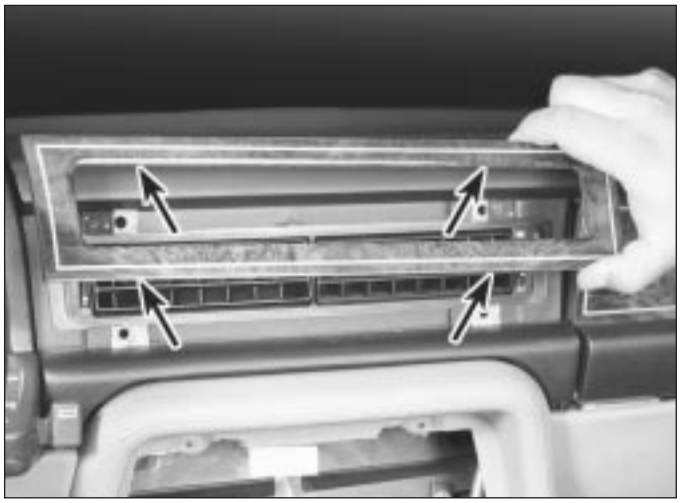
Adjustment

7 Before the bonnet can be adjusted properly, both bonnet striker assemblies

10.4 With the help of an assistant to hold the bonnet, remove the retaining bolts (arrowed) from each hinge plate, then lift off the bonnet



26.2 Remove the retaining screws along the outer edge of the knee bolster, then remove it from the vehicle



26.5 Grasp the centre trim panel with both hands, then unsnap the retaining clips (arrowed) from the dashboard assembly

26 Dashboard trim panels - removal and refitting

Warning: Later models are equipped with airbags. To prevent the accidental deployment of the airbag, which could cause personal injury or damage to the airbag system, DO NOT work in the vicinity of the steering column or instrument panel. The manufacturer recommends that, on airbag equipped models, the following procedure should be left to a dealer service department or other repair workshop because of the special tools and techniques required to disable the airbag system.
Caution: If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery

Knee bolster

1 Knee bolsters are located on the lower half of the instrument panel on the driver and passenger sides of the vehicle. The removal of these covers will allow access to a variety of electrical, heating and air conditioning components.
2 Detach the retaining screws along the edges of the knee bolster **(see illustration)**.
3 Pull outward on the lower edge of the knee bolster and detach it from the vehicle.
4 Refitting is the reverse of removal.

Centre trim panel

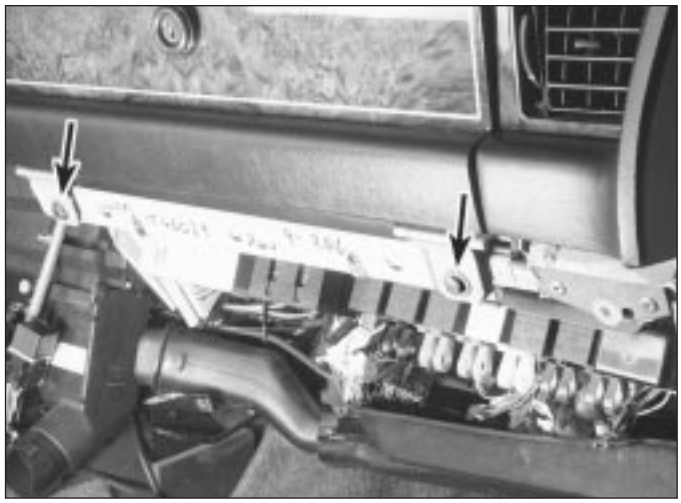
5 Carefully pull outward to detach the centre trim panel from the instrument panel **(see illustration)**.
6 Refitting is the reverse of removal.

Glove box

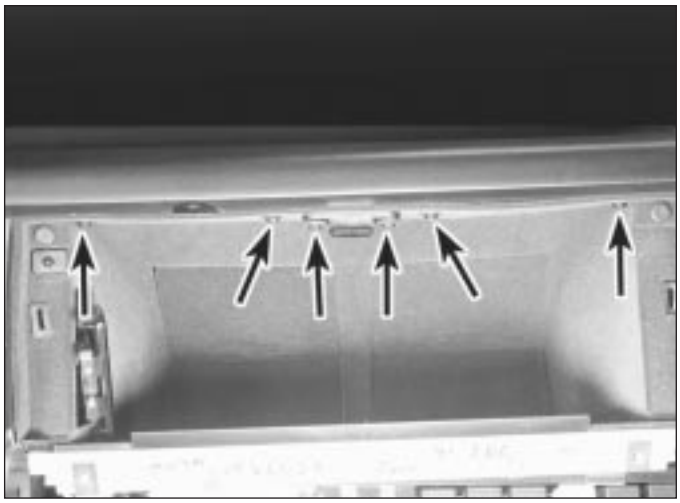
7 Detach the passenger side knee bolster as described in Steps 2 and 3.
8 Remove the glove box door hinge bolts **(see illustration)**.
9 Open the glove box door, then detach it from the vehicle.
10 Detach the heater duct and the relay mounting panel from the bottom of the glove box.
11 Detach the remaining screws securing the upper edge of the glove box **(see illustration)**.
12 Disconnect the lamp from the glove box and remove the assembly from the vehicle.
13 Refitting is the reverse of removal.

27 Steering column cover - removal and refitting

Warning: Later models are equipped with airbags. To prevent the accidental deployment of the airbag, which could cause



26.8 With the passenger side knee bolster removed, unscrew the glove box door hinge bolts



26.11 Remove the screws along the top edge (arrowed), pull the glove box out and remove the lamp assembly

16.5 To determine if a heating element has broken, check the voltage at the centre of each element. If the voltage is 6-volts, the element is unbroken; if the voltage is 12-volts, the element is broken between the centre and the positive end. If there is no voltage, the element is broken between the centre and earth

16.7 To find the break, place the voltmeter positive lead against the heated window positive terminal, place the voltmeter negative lead with the foil strip against the heating element at the positive terminal end and slide it toward the negative terminal end - the point at which the voltmeter reading changes abruptly is the point at which the element is broken

6 If the voltage is 6 volts, the element is okay (there is no break). If the voltage is 12 volts, the element is broken between the centre of the element and the positive end. If the voltage is 0 volts the element is broken between the centre of the element and earth.
7 To find the break, place the voltmeter positive lead against the defogger positive terminal. Place the voltmeter negative lead with the foil strip against the heating element at the positive terminal end and slide it toward the negative terminal end. The point at which the voltmeter deflects from zero to several volts is the point at which the heating element is broken **(see illustration)**.

Repair

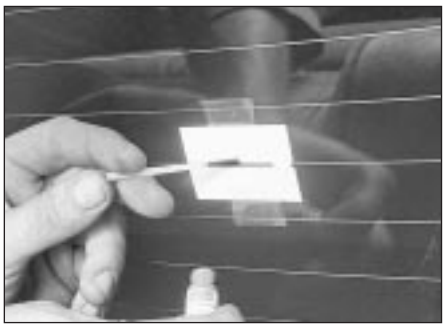
8 Repair the break in the element using a repair kit specifically recommended for this purpose.
9 Prior to repairing a break, turn off the system and allow it to cool off for a few minutes.
10 Lightly buff the element area with fine steel wool, then clean it thoroughly with rubbing alcohol.
11 Use masking tape to mask off the area being repaired.
12 Thoroughly mix the epoxy, following the instructions provided with the repair kit.
13 Apply the epoxy material to the slit in the masking tape, overlapping the undamaged area about 3/4-inch on either end **(see illustration)**.
14 Allow the repair to cure for 24 hours before removing the tape and using the system.

17 Headlights - renewal

Warning: Later models are equipped with halogen gas-filled headlight bulbs which are under pressure and may shatter if the surface is damaged or the bulb is dropped. Wear eye protection and handle the bulbs carefully, grasping only the base whenever possible. Do not touch the surface of the bulb with your fingers because the oil from your skin could cause it to overheat and fail prematurely. If you do touch the bulb surface, clean it with rubbing alcohol.

Sealed beam units

1 Remove the radiator grille (see Chapter 11).
2 Detach the headlight bezel trim cover **(see illustration)**.
3 Remove the headlight bezel **(see illustrations)**.
4 Remove the screws which secure the retaining ring and withdraw the ring. Support the light as this is done **(see illustration)**.

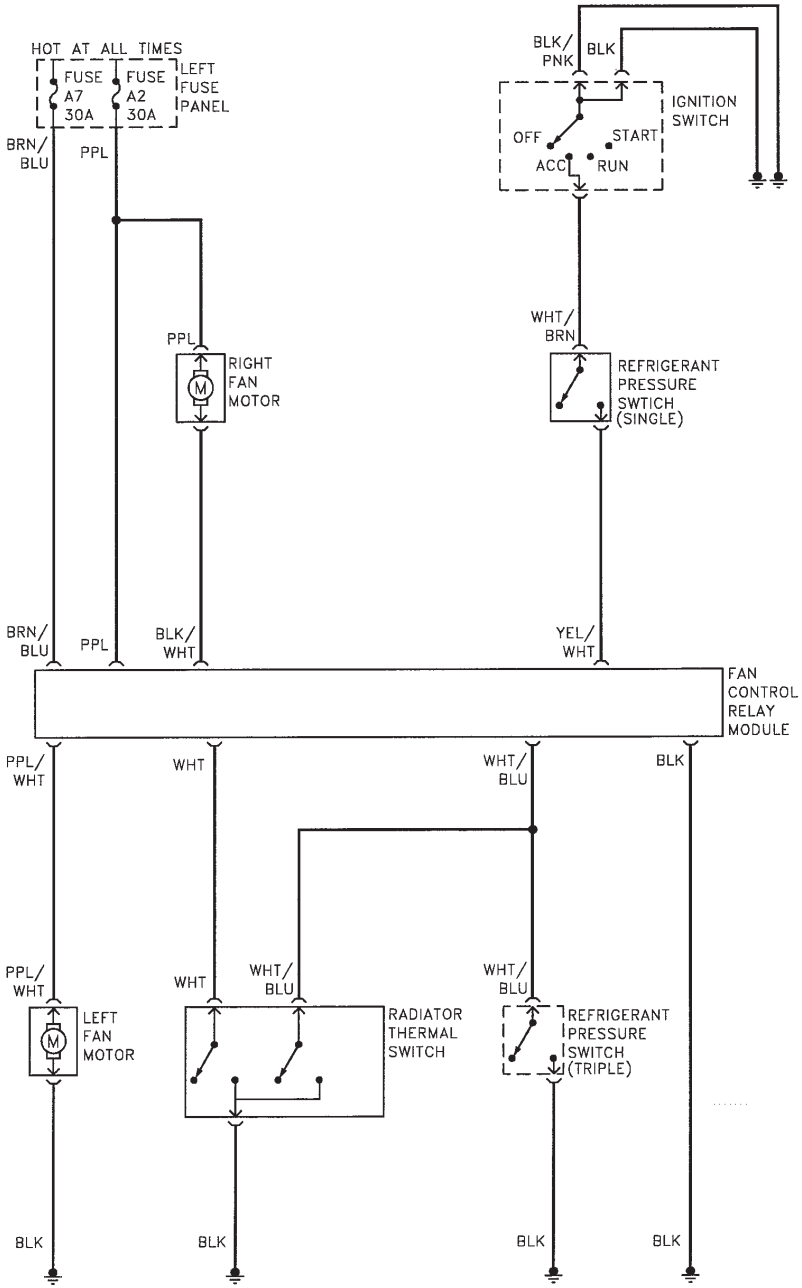


16.13 Apply masking tape to the inside of the window at the damaged area, then brush on the special conductive coating

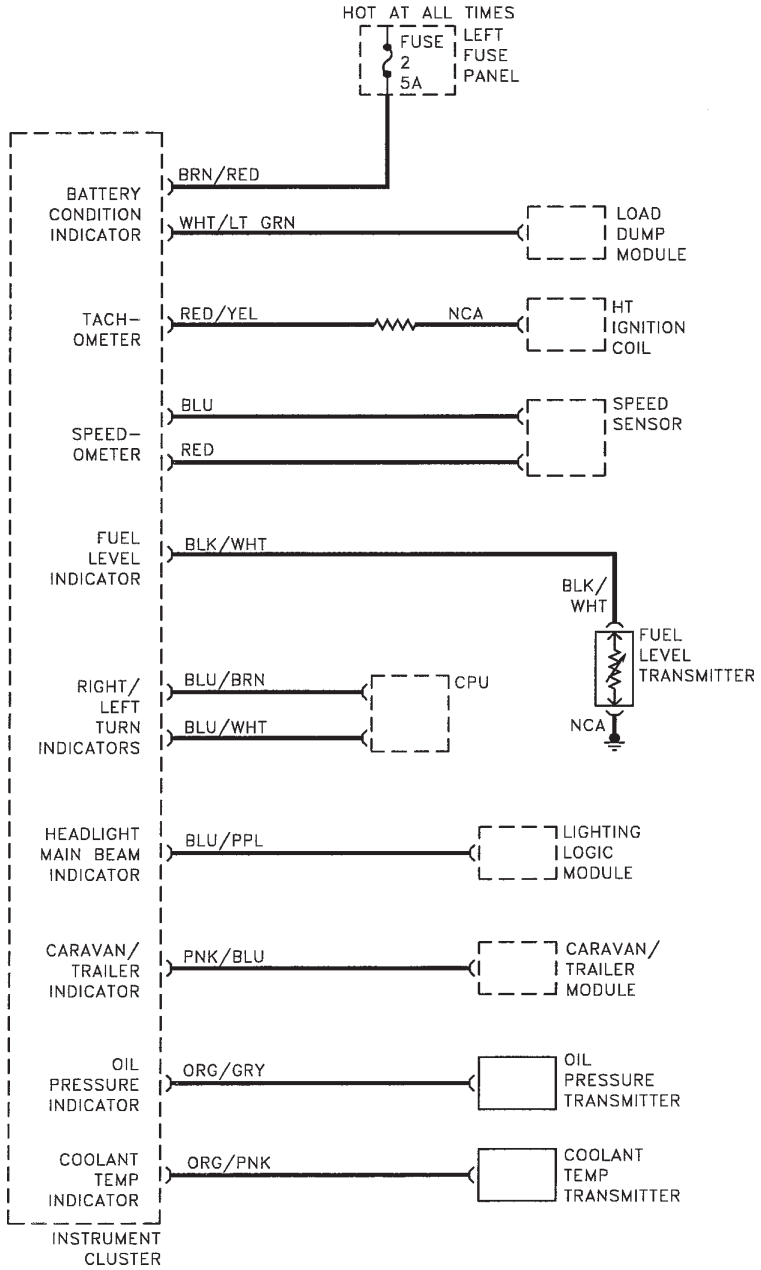
17.2 Remove the screws (arrowed) and detach the headlight bezel trim cover

17.3a Remove the two retaining screws at the top and the one in the grille opening (arrowed)

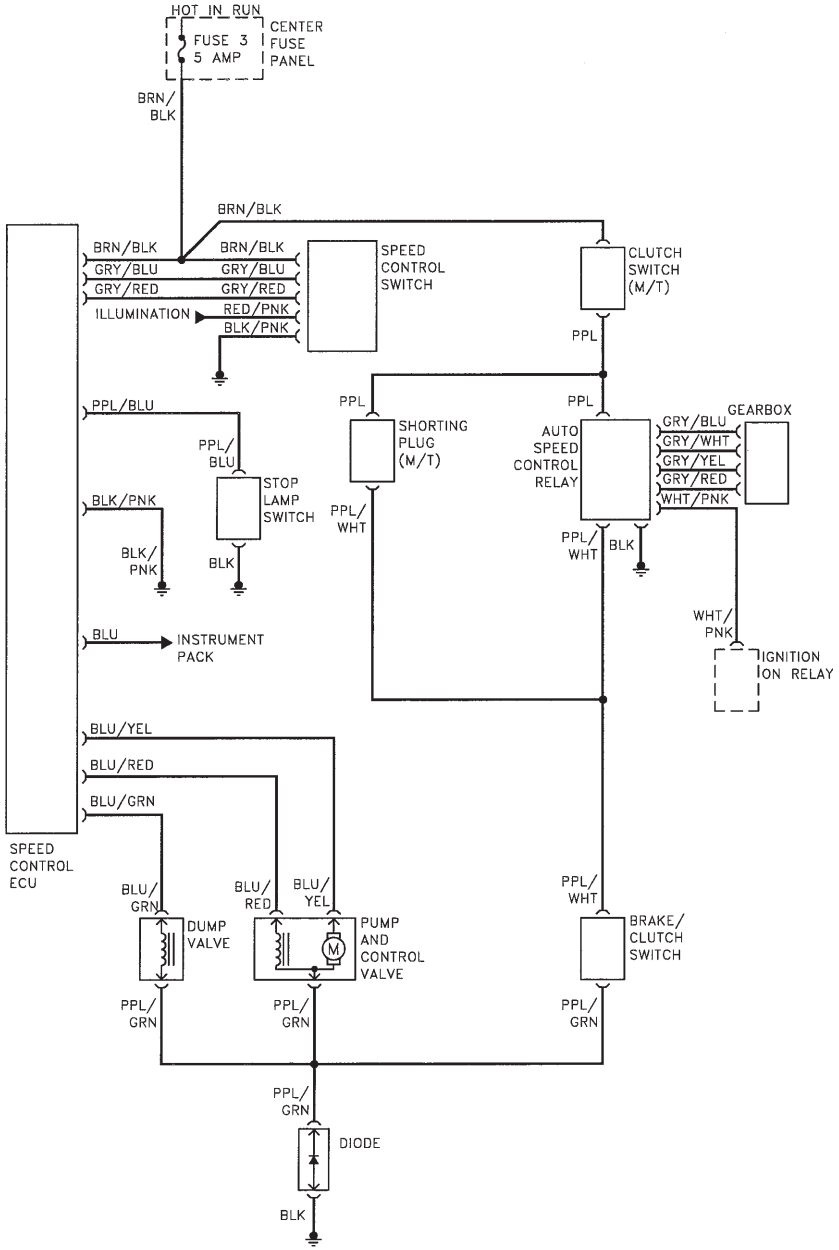
17.3b The retaining screw at the outside lower corner can be accessed from under the bumper



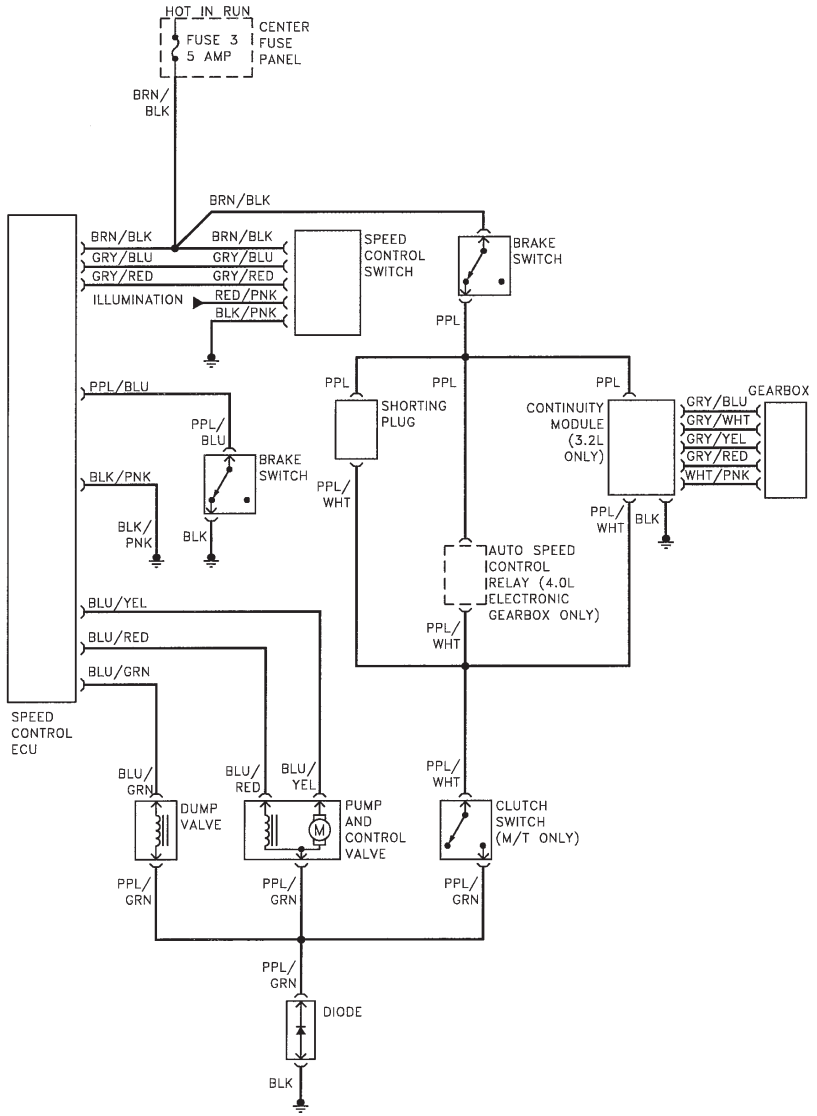
Typical engine cooling fan system



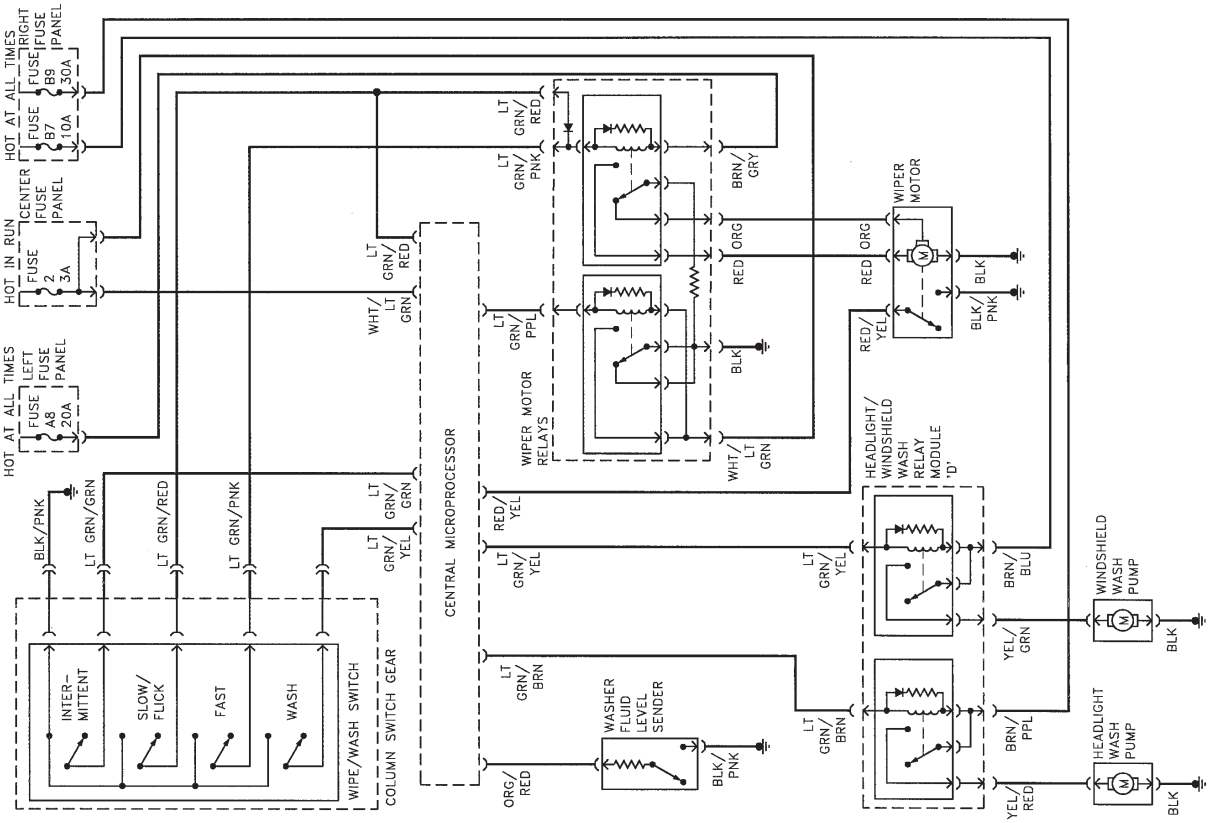
Typical 1988 instrument warning light system



Typical 1988 to 1990 cruise control system



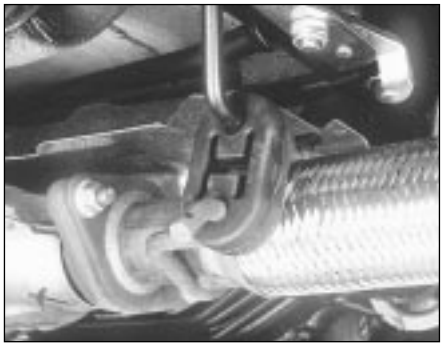
Typical 1991 and 1992 cruise control system



Typical 1993 and 1994 windscreen washer and wiper system

Exhaust system

☐ Start the engine. With your assistant holding a rag over the tailpipe, check the entire system for leaks. Repair or renew leaking sections.



3 Checks carried out WITH THE VEHICLE RAISED AND THE WHEELS FREE TO TURN

Jack up the front and rear of the vehicle, and securely support it on axle stands. Position the stands clear of the suspension assemblies. Ensure that the wheels are clear of the ground and that the steering can be turned from lock to lock.

Steering mechanism

☐ Have your assistant turn the steering from lock to lock. Check that the steering turns smoothly, and that no part of the steering mechanism, including a wheel or tyre, fouls any brake hose or pipe or any part of the body structure.

☐ Examine the steering rack rubber gaiters for damage or insecurity of the retaining clips. If power steering is fitted, check for signs of damage or leakage of the fluid hoses, pipes or connections. Also check for excessive stiffness or binding of the steering, a missing split pin or locking device, or severe corrosion of the body structure within 30 cm of any steering component attachment point.

Front and rear suspension and wheel bearings

☐ Starting at the front right-hand side, grasp the roadwheel at the 3 o'clock and 9 o'clock positions and shake it vigorously. Check for free play or insecurity at the wheel bearings, suspension balljoints, or suspension mountings, pivots and attachments.

☐ Now grasp the wheel at the 12 o'clock and 6 o'clock positions and repeat the previous inspection. Spin the wheel, and check for roughness or tightness of the front wheel bearing.

☐ If excess free play is suspected at a component pivot point, this can be confirmed by using a large screwdriver or similar tool and levering between the mounting and the component attachment. This will confirm whether the wear is in the pivot bush, its retaining bolt, or in the mounting itself (the bolt holes can often become elongated).

☐ Carry out all the above checks at the other front wheel, and then at both rear wheels.

Springs and shock absorbers

☐ Examine the suspension struts (when applicable) for serious fluid leakage, corrosion, or damage to the casing. Also check the security of the mounting points.

☐ If coil springs are fitted, check that the spring ends locate in their seats, and that the spring is not corroded, cracked or broken.

☐ If leaf springs are fitted, check that all leaves are intact, that the axle is securely attached to each spring, and that there is no deterioration of the spring eye mountings, bushes, and shackles.

☐ The same general checks apply to vehicles fitted with other suspension types, such as torsion bars, hydraulic displacer units, etc. Ensure that all mountings and attachments are secure, that there are no signs of excessive wear, corrosion or damage, and (on hydraulic types) that there are no fluid leaks or damaged pipes.

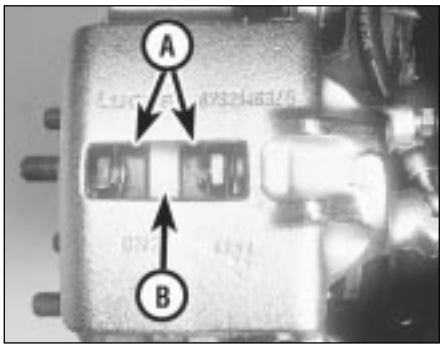
☐ Inspect the shock absorbers for signs of serious fluid leakage. Check for wear of the mounting bushes or attachments, or damage to the body of the unit.

Driveshafts (fwd vehicles only)

☐ Rotate each front wheel in turn and inspect the constant velocity joint gaiters for splits or damage. Also check that each driveshaft is straight and undamaged.

Braking system

☐ If possible without dismantling, check brake pad wear and disc condition. Ensure that the friction lining material has not worn excessively, (A) and that the discs are not fractured, pitted, scored or badly worn (B).



☐ Examine all the rigid brake pipes underneath the vehicle, and the flexible hose(s) at the rear. Look for corrosion, chafing or insecurity of the pipes, and for signs of bulging under pressure, chafing, splits or deterioration of the flexible hoses.

☐ Look for signs of fluid leaks at the brake calipers or on the brake backplates. Repair or renew leaking components.

☐ Slowly spin each wheel, while your assistant depresses and releases the footbrake. Ensure that each brake is operating and does not bind when the pedal is released.