VAUXHALL CAVALIER

Oct 1988 to 1995 (F to N registration) Petrol

Haynes Service and Repair Manual

Includes **Fault Finding** and **MOT Test Check** Sections

2 Also check the security and condition of all the engine related pipes and hoses. Ensure that all cable-ties or securing clips are in place, and in good condition. Clips that are broken or missing can lead to chafing of the hoses, pipes or wiring, which could cause more serious problems in the future.

3 Carefully check the radiator hoses and heater hoses along their entire length. Renew any hose that is cracked, swollen or deteriorated. Cracks will show up better if the hose is squeezed. Pay close attention to the hose clips that secure the hoses to the cooling system components. Hose clips can pinch and puncture hoses, resulting in cooling system leaks. It is always beneficial to renew hose clips whenever possible.

4 Inspect all the cooling system components (hoses, joint faces, etc.) for leaks.

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A leak in the cooling system will usually show up as white or rust coloured deposits on the area adjoining the leak

5 Where any problems are found on system components, renew the component or gasket with reference to Chapter 3.

6 Where applicable, inspect the automatic transmission fluid cooler hoses for leaks or deterioration.

7 With the vehicle raised, inspect the petrol tank and filler neck for punctures, cracks and other damage. The connection between the filler neck and tank is especially critical. Sometimes a rubber filler neck or connecting hose will leak due to loose retaining clamps or deteriorated rubber.

8 Carefully check all rubber hoses and metal fuel lines leading away from the petrol tank. Check for loose connections, deteriorated hoses, crimped lines, and other damage. Pay particular attention to the vent pipes and hoses, which often loop up around the filler neck and can become blocked or crimped. Follow the lines to the front of the vehicle, carefully inspecting them all the way. Renew damaged sections as necessary.

9 From within the engine compartment, check the security of all fuel hose attachments and pipe unions, and inspect the fuel hoses and vacuum hoses for kinks, chafing and deterioration.

10 Where applicable, check the condition of the power steering fluid hoses and pipes.

5 Steering and suspension check

Front suspension and steering check

1 Raise the front of the car, and support on axle stands ("*Jacking and Vehicle Support*").

2 Visually inspect the balljoint dust covers and the steering rack-and-pinion gaiters for splits, chafing or deterioration. Any wear of these components will cause loss of lubricant, together with dirt and water entry, resulting in rapid wear of the balljoints or steering gear.

3 On vehicles with power steering, check the fluid hoses for chafing or deterioration, and the pipe and hose unions for fluid leaks. Also check for signs of fluid leakage under pressure from the steering gear rubber gaiters, which would indicate failed fluid seals within the steering gear.

4 Grasp the roadwheel at the 12 o'clock and 6 o'clock positions, and try to rock it **(see illustration)**. Very slight free play may be felt, but if the movement is appreciable, further investigation is necessary to determine the source. Continue rocking the wheel while an assistant depresses the footbrake. If the movement is now eliminated or significantly reduced, it is likely that the hub bearings are at fault. If the free play is still evident with the footbrake depressed, then there is wear in the suspension joints or mountings.

5 Now grasp the wheel at the 9 o'clock and 3 o'clock positions, and try to rock it as before. Any movement felt now may again be caused by wear in the hub bearings or the steering track-rod balljoints. If the inner or outer balljoint is worn, the visual movement will be obvious.

6 Using a large screwdriver or flat bar, check for wear in the suspension mounting bushes by levering between the relevant suspension component and its attachment point. Some movement is to be expected as the mountings are made of rubber, but excessive wear should be obvious. Also check the condition of any visible rubber bushes, looking for splits, cracks or contamination of the rubber.

7 Inspect the front suspension lower arms for distortion or damage (Chapter 10, Section 5).

8 With the car standing on its wheels, have an assistant turn the steering wheel back and forth about an eighth of a turn each way. There should be very little, if any, lost movement between the steering wheel and roadwheels. If this is not the case, closely observe the joints and mountings previously described, but in addition, check the steering column universal joints for wear, and the rack-and-pinion steering gear itself.

Suspension strut/shock absorber check

Note: *Suspension struts/shock absorbers should always be renewed in pairs on the same axle.*

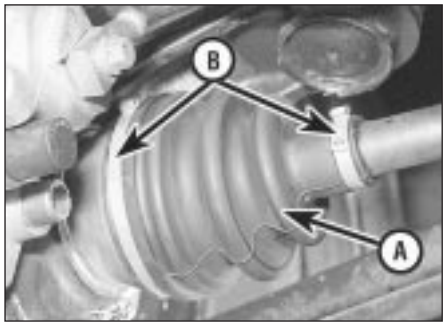
5.4 Check for wear in the hub bearings by grasping the wheel and trying to rock it

9 Check for any signs of fluid leakage around the suspension strut/shock absorber body, or from the rubber gaiter around the piston rod. Should any fluid be noticed, the suspension strut/shock absorber is defective internally, and should be renewed.

10 The efficiency of the suspension strut/shock absorber may be checked by bouncing the vehicle at each corner. The body will return to its normal position and stop after being depressed. If it rises and returns on a rebound, the suspension strut/shock absorber is probably suspect. Examine also the suspension strut/shock absorber upper and lower mountings for any signs of wear.

6 Driveshaft gaiter check

With the vehicle raised and securely supported on stands, turn the steering onto full lock, then slowly rotate the roadwheel. Inspect the condition of the outer constant velocity (CV) joint rubber gaiters, squeezing the gaiters to open out the folds **(see illustration)**. Check for signs of cracking, splits or deterioration of the rubber, which may allow the grease to escape, and lead to water and grit entry into the joint. Also check the security and condition of the retaining clips. Repeat these checks on the inner CV joints. If any damage or deterioration is found, the gaiters should be renewed as described in Chapter 8.



6.1 Check the condition of the driveshaft gaiters (A) and clips (B)

Piston rings

Number (per piston) (all models)	2 compression, 1 oil control
Ring end gap (mm):	
Compression	0.3 to 0.5
Oil control (top and bottom sections)	0.4 to 1.4
Ring gap offset (to gap of adjacent ring)*	180º

** See Section 32 for oil control ring sections*

Cylinder head

Material (all models)	Light alloy
Maximum permissible distortion of sealing face (all models)	0.025 mm
Height of cylinder head (sealing surface to sealing surface) (all models)	96.00 ± 0.25 mm
Valve seat width (mm):	
14 NV, 16 SV, C16 NZ, X 16 SZ and C16 NZ2	
Inlet	1.3 to 1.5
Exhaust	1.6 to 1.8
18 SV, C18 NZ, 20 NE, C20 NE and 20 SEH	
Inlet	1.0 to 1.5
Exhaust	1.7 to 2.2

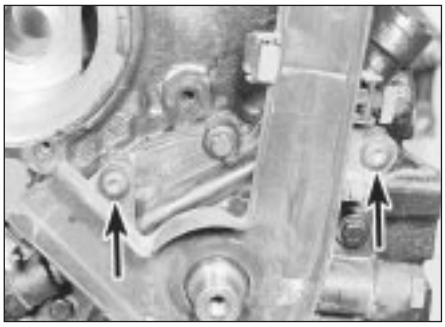
Camshaft

Camshaft bearing journal diameter:	**Normal (mm)**	**0.1 mm undersize**
14 NV, 16 SV, C16 NZ and X16 SZ:		
No 1	39.435 to 39.455	
No 2	39.685 to 39.705	
No 3	39.935 to 39.955	
No 4	40.185 to 40.205	
No 5	40.435 to 40.455	
C16 NZ2, 18 SV, C18 NZ, 20 NE, C20 NE and 20 SEH:		
No 1	42.455 to 42.470	42.355 to 42.370
No 2	42.705 to 42.720	42.605 to 42.620
No 3	42.955 to 42.970	42.855 to 42.870
No 4	43.205 to 43.220	43.105 to 43.120
No 5	43.455 to 43.470	43.355 to 43.370
Camshaft bearing diameter in housing:		
14 NV, 16 SV, C16 NZ and X16 SZ:		
No 1	39.500 to 39.525	
No 2	39.750 to 39.775	
No 3	40.000 to 40.025	
No 4	40.250 to 40.275	
No 5	40.500 to 40.525	
C16 NZ2, 18 SV, C18 NZ, 20 NE, C20 NE and 20 SEH:		
No 1	42.500 to 42.525	42.400 to 42.425
No 2	42.750 to 42.775	42.650 to 42.675
No 3	43.000 to 43.025	42.900 to 42.925
No 4	43.250 to 43.275	43.150 to 43.175
No 5	43.500 to 43.525	43.400 to 43.425
Cam lift (mm):		
14 NV (inlet and exhaust)	6.12	
16 SV and C16 NZ:		
Inlet	5.61	
Exhaust	6.12	
C16 NZ2, 18 SV and C18 NZ		
Inlet	6.01	
Exhaust	6.39	
C20 NE and 20 NE (inlet and exhaust)	6.67	
20 SEH (inlet and exhaust)	6.70	
Maximum permissible radial run-out (mm) (all models)	0.04	
Endfloat (mm) (all models)	0.09 to 0.21	

Timing belt (engines without automatic tension roller)

Tension, using Vauxhall gauge KM-51 0-A (see Section 11):	
14NV, 16 SV and C16 NZ:	
New belt, cold	5.5
New belt, warm	8.0
Used belt, cold	4.0
Used belt, warm	7.0

11.17A Loosening the main rear timing belt cover lower securing bolt - 2.0 litre engine



11.17B Main rear timing belt cover lower securing bolts (arrowed) - 1.6 SV engine

11.18 Unscrewing the coolant pump rear belt cover securing bolt - 2.0 litre engine

9 The crankshaft pulley must now be removed. On 1.4 and 1.6 litre engines (except C 16 NZ2), the pulley is secured by a single bolt, which also secures the crankshaft sprocket. On C 16 NZ2, 1.8 and 2.0 litre engines, the pulley is secured by four bolts, which must be unscrewed using an Allen key or hexagon bit. On manual transmission models, if the engine is in the vehicle, the crankshaft can be prevented from turning by having an assistant engage first gear and depress the brake pedal. Alternatively, the flywheel ring gear teeth can be jammed using a large screwdriver or similar tool.

10 With the crankshaft pulley removed, the timing belt can be withdrawn.

11 If desired, the sprockets and the rear timing belt cover can be removed as follows, otherwise go on to paragraph 23.

12 To remove the camshaft sprocket, first disconnect the breather hose(s) from the camshaft cover, then unscrew the securing bolts noting the locations of the HT lead brackets and any other wiring brackets, and remove the camshaft cover.

13 Recover the gasket. Prevent the camshaft from turning by holding it with a spanner on the flats provided between No's 3 and 4 camshaft lobes, and unscrew the camshaft sprocket bolt.

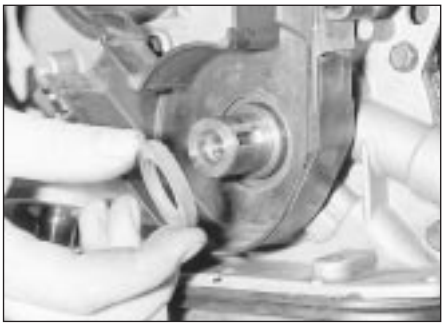
14 Withdraw the sprocket from the end of the camshaft.

15 To remove the crankshaft sprocket on 1.4 and 1.6 litre engines (except C 16 NZ2), if necessary, remove the lower securing bolts from the main rear timing belt cover and use two large screwdrivers behind the cover to lever off the sprocket. Remove the Woodruff key if it is loose.

16 To remove the crankshaft sprocket on C 16 NZ2, 1.8 and 2.0 litre engines, it will be necessary to prevent the crankshaft from turning, as described in paragraph 9. Take care when unscrewing the sprocket bolt, as it is very tight. If necessary, use a two-legged puller to remove the sprocket. Recover the Woodruff key and the thrustwasher from the end of the crankshaft.

17 To remove the main rear timing belt cover on C 16 NZ2, 1.8 and 2.0 litre models disconnect the TDC sensor wiring plug and unclip the wiring from the belt cover. Then unscrew the two upper securing bolts and the lower securing bolt(s) (one in the case of C 16 NZ2, 1.8 and 2.0 litre engines, two on other SOHC engines). Withdraw the cover, manipulating it from the smaller rear belt cover on the coolant pump **(see illustrations)**.

18 If desired, the smaller rear belt cover can be removed from the coolant pump, after unscrewing the securing bolt **(see illustration)**, by rotating it to disengage it from the retaining flange on the pump.



11.20A Refit the thrustwasher . . .

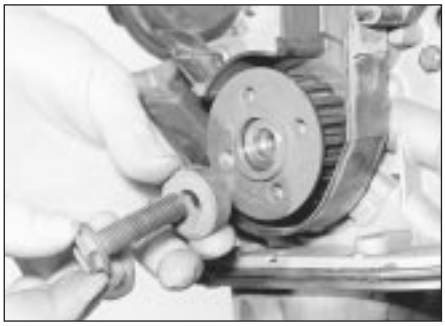
11.20B . . . the Woodruff key . . .

Refitting

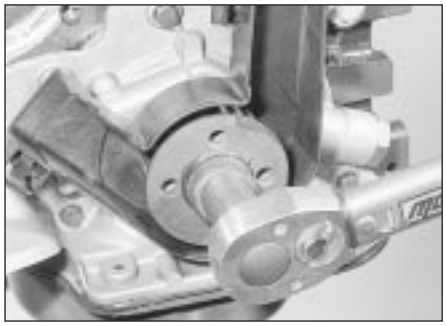
19 Refit the rear timing belt cover(s) using a reversal of the removal procedure, and ensuring that the main cover engages correctly with the smaller cover on the coolant pump.

20 On C 16 NZ2, 1.8 and 2.0 litre engines, refit the thrustwasher and the Woodruff key to the end of the crankshaft. Then refit the crankshaft sprocket, and tighten the securing bolt to the specified torque in the two stages given in the Specifications. Ensure that the washer is in place under the bolt head, and prevent the crankshaft from turning as during removal **(see illustrations)**.

11.20C . . .the crankshaft sprocket . . .



11.20D . . .and the washer and bolt



11.20E Tighten the bolt to the specified torque . . .

23 Cylinder head - inspection and renovation

Note: *Refer to a dealer for advice before attempting to carry out valve grinding or valve seat reciting operations, as these operations may not be possible for the DIY mechanic. This is due to the fitment of hardened valve seats for use with unleaded petrol*

Warning: The exhaust valves fitted to 20 XEJ and C 20 XE (DOHC) models are fitted with sodium to improve their heat transfer. Sodium is a highly reactive metal, which will ignite or explode spontaneously on contact with water (including water vapour in the air). These must NOT be disposed of with ordinary scrap. Seek advice from a Vauxhall dealer or your Local Authority, if the valves are to be disposed of.

Inspection

1 Remember that the cylinder head is of light alloy construction and is easily damaged, use a blunt scraper or rotary wire brush to clean all traces of carbon deposits from the combustion spaces and the ports. The valve stems and valve guides should also be freed from any carbon deposits. Wash the combustion spaces and ports down with paraffin and scrape the cylinder head surface free of any foreign matter with the side of a steel rule, or a similar article.

2 If the engine is installed in the car, clean the pistons and the top of the cylinder bores. If the pistons are still in the block, it is essential that great care is taken to ensure that no carbon gets into the cylinder bores. This could scratch the cylinder walls or cause damage to the pistons and rings. To ensure this does not happen, first turn the crankshaft so that two of the pistons are at the top of their bores. Insert rag into the other two bores or seal them off with paper and masking tape. The waterways should also be covered with small pieces of masking tape, to prevent particles of carbon entering the cooling system and damaging the coolant pump.

3 Press a little grease into the gap between the cylinder walls and the two pistons that are to be worked on. With a blunt scraper, carefully scrape away the carbon from the piston crown, taking great care not to scratch the aluminium. Also scrape away the carbon from the surrounding lip of the cylinder wall. When all carbon has been removed, scrape away the grease that will now be contaminated with carbon particles, taking care not to press any into the bores. To assist prevention of carbon build-up, the piston crown can be polished with a metal polish. Remove the rags or masking tape from the other two cylinders, and turn the crankshaft so that the two pistons that were at the bottom are now at the top. Place rag or masking tape in the cylinders that have been decarbonised, and continue as just described.

23.9 Renewing the thermostat housing sealing ring - 2.0 litre engine

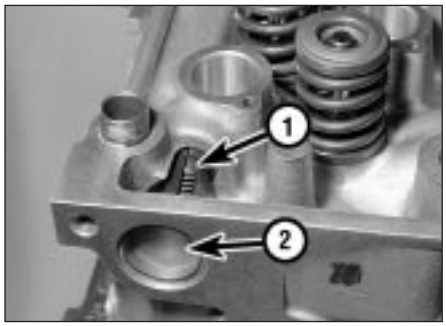
4 Examine the heads of the valves for pitting and burning, especially the heads of the exhaust valves. The valve seatings should be examined at the same time. If the pitting on the valve and seat is very slight, the marks can be removed by grinding the seats and valves together with coarse, and then fine, valve grinding paste.

5 Where bad pitting has occurred to the valve seats, it will be necessary to recut them and fit new valves. This latter job should be entrusted to the local dealer or engineering works. In practice it is very seldom that the seats are so badly worn. Normally it is the valve that is too badly worn for refitting, and the owner can easily buy a new set of valves and match them to the seats by valve grinding.

Renovation

6 Valve grinding is carried out as follows. Smear a trace of coarse carborundum paste on the seat face and apply a suction grinder tool to the valve head. With a semi-rotary motion, grind the valve head to its seat, lifting the valve occasionally to redistribute the grinding paste. When a dull matt even surface is produced on both the valve seat and the valve, wipe off the paste and repeat the process with fine carborundum paste, lifting and turning the valve to redistribute the paste as before. A light spring placed under the valve head will greatly ease this operation. When a smooth unbroken ring of light grey matt finish is produced, on both valve and valve seat faces, the grinding operation is complete. Carefully clean away every trace of grinding compound, taking great care to leave none in the ports or in the valve guides. Clean the valves and valve seats with a paraffin-soaked rag, then with a clean rag, and finally, if an air line is available, blow the valves, valve guides and valve ports clean.

7 Check that all valve springs are intact. If any one is broken, all should be renewed. Check the free height of the springs against new ones. If some springs are not long enough, replace them all. Springs suffer from fatigue and it is a good idea to renew them even if they look serviceable.



23.10 Oil pressure regulating valve (1) and plug (2) - 2.0 litre engine

8 The cylinder head can be checked for warping either by placing it on a piece of plate glass or using a straight-edge and feeler blades. If there is any doubt or if its block face is corroded, have it re-faced by your dealer or motor engineering works.

9 On 1.8 and 2.0 litre, always renew the sealing ring between the cylinder head and the thermostat housing when the head is removed for overhaul **(see illustration)**. Reference to Chapter 21 will show that a considerable amount of work is involved if it is wished to renew the sealing ring with the cylinder head installed.

10 If the oil pressure regulating valve in the cylinder head is to be renewed, access is gained through the circular plug covering the end of the valve **(see illustration)**. The old valve must be crushed, then its remains extracted, and a thread (M10) cut in the valve seat to allow removal using a bolt. A new valve and plug can then be driven into position. In view of the intricacies of this operation, it is probably best to have the valve renewed by a Vauxhall dealer if necessary.

24 Hydraulic valve lifters - inspection

Inspection

1 On engines that have covered a high mileage, or for which the service history (particularly oil changes) is suspect, it is possible for the valve lifters to suffer internal contamination. In extreme cases this may result in increased engine top end noise and wear. To minimise the possibility of problems occurring later in the life of the engine, it is advisable to dismantle and clean the hydraulic valve lifters as follows whenever the cylinder head is overhauled. Note that no spare parts are available for the valve lifters, and if any of the components are unserviceable, the complete assembly must be renewed **(see illustration)**.

2 With the cylinder head removed and dismantled as described in Sections 21 and 23, first inspect the valve lifter bores in the

5 Note that the rubber plug located next to the bellhousing flange on the cylinder block covers the aperture for the installation of a diagnostic TDC sensor. The sensor, when connected to a monitoring unit, indicates TDC from the position of the pins set into the crankshaft balance weight.

37 Examination and renovation - general

General

1 With the engine completely stripped, clean all components and examine them for wear. Each component should be checked, and where necessary renewed or renovated, as described in the relevant Sections of this Chapter.

2 Renew main and big-end bearing shells as a matter of course, unless it is known that they have had little wear, and are in perfect condition.

3 If in doubt whether to renew a component that is still just serviceable, consider the time and effort that will be incurred should the component fail at an early date after rebuild. Obviously, the age and expected life of the vehicle must influence the standards applied.

4 Gaskets, oil seals and O-rings must all be renewed as a matter of routine. Flywheel, cylinder head, and main and big-end bearing cap bolts must be renewed, because of the high stress to which they are subjected.

5 Renew the engine core plugs while they are easily accessible, if they show signs of leakage. Knock out the old plugs with a hammer and chisel or punch. Clean the plug seats, smear the new plugs with sealing compound, and tap them squarely into position.

38 Initial start-up after major overhaul or repair

1 Make a final check to ensure that everything has been reconnected to the engine, and that no rags or tools have been left in the engine compartment.

2 Check that oil and coolant levels are correct.

3 Start the engine. This may take a little longer than usual, as fuel is pumped to the engine.

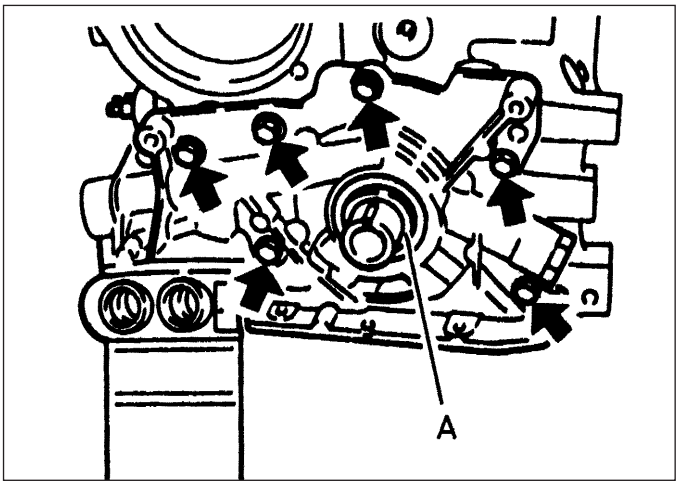
4 Check that the oil pressure warning lamp goes out when the engine starts. This may take a few seconds as the new oil filter fills with oil.

5 Run the engine at a fast tickover, and check for leaks of oil, fuel and coolant. If a new camshaft has been fitted, pay careful attention to the running-in procedure given in Section 18, paragraphs 17 and 18. Where applicable, check the power steering and/or automatic transmission fluid cooler unions for leakage. Some smoke and odd smells may be experienced, as assembly lubricants and sealers burn off the various components.

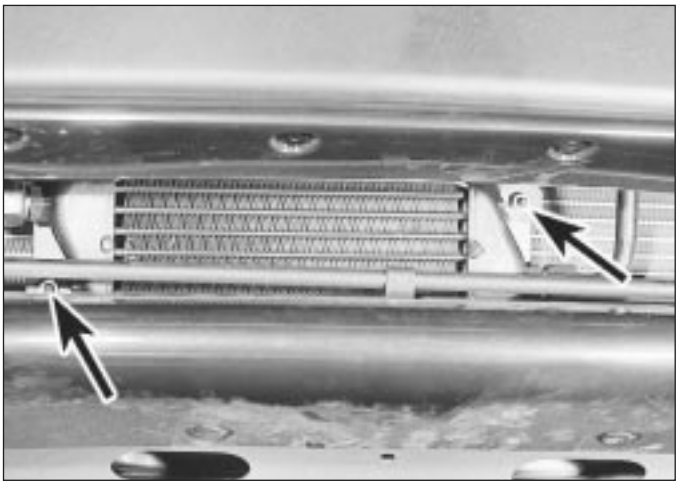
6 Bring the engine to normal operating temperature. Check the ignition timing, idle speed and the mixture (where applicable), as described in Chapter 4A or 4B.

7 Allow the engine to cool, then recheck the oil and coolant levels. Top-up if necessary

8 If new bearings, pistons, etc., have been fitted, the engine should be run-in at reduced speeds and loads for the first 500 miles (800 km) or so. It is beneficial to change the engine oil and filter after this mileage.



14.3 Oil pump securing bolts (arrowed) and crankshaft spacer ring (A)



15.1 Oil cooler viewed through front spoiler. Securing nuts arrowed

of the way **(see illustration)**.

3 Remove the spacer ring from the end of the crankshaft **(see illustration)**.

Refitting

4 Coat the oil pump mating face of the spacer ring with sealing compound, then push the spacer ring onto the end of the crankshaft until it is seated against the oil pump.

5 The timing belt should be renewed, see Sections 4 and 5, for details.

6 Remember also to reconnect the oil cooler pipes to the oil pump, and tighten the unions.

15 Oil cooler - removal and refitting

Removal

1 To gain sufficient access to remove the oil cooler, the radiator must be removed (as described in Chapter 3). Alternatively, the front bumper can be removed, as described in Chapter 11 **(see illustration)**.

2 With the appropriate component(s) removed for access, unscrew the oil cooler pipe unions from the oil cooler. Be prepared for oil spillage, and plug the open ends of the pipes, to prevent further oil leakage and dirt ingress.

3 Unscrew the two securing nuts, and withdraw the oil cooler from its mounting brackets.

Refitting

4 Refitting is a reversal of removal, but on completion, check and if necessary top-up the engine oil level, as described in Chapter 1.

16 SV engine

Idle speed		
Manual transmission	925 ± 25 rpm	
Automatic transmission	825 ± 25 rpm (in 'park' or 'neutral')	
Idle mixture (CO content)	0.5 to 1.5%	
Fast idle speed	2000 to 2400 rpm	
Choke valve gap	1.5 to 3.5 mm	
Choke pull-down gap:		
Up to 1990:		
"Small"	1.3 to 1.7 mm	
"Large"	1.9 to 2.3 mm	
From 1990:		
"Small"	1.5 to 1.7 mm	
"Large"	2.0 to 2.2 mm	
Idle fuel jet	45	
Idle air bleed	132.5	
	Primary	**Secondary**
Venturi diameter	20.0 mm	24.0 mm
Main jet:		
Up to 1990	X95	X105
From 1990	X92.5	X105

18 SV engine

Idle speed	925 ± 25 rpm	
Idle mixture (CO content)	0.5 to 1.5%	
Fast idle speed	1900 to 2300 rpm	
Choke valve gap	1.5 to 3.5 mm	
Choke pull-down gap:		
"Small"	2.2 ± 0.2 mm	
"Large"	3.3 ± 0.2 mm	
Idle fuel jet	42.5	
Idle air bleed	132.5	
	Primary	**Secondary**
Main jet	107.5	125

Torque wrench settings

	Nm	**lbf ft**
Exhaust manifold nuts	22	16
Exhaust downpipe-to-manifold bolts	25	18
Exhaust fixings except flexible joint bolts	25	18
Exhaust flexible joint bolts	12	9
Fuel pump bolts	18	13
Fuel tank mounting strap bolts	20	15
Inlet manifold nuts	22	16

1 General description

The fuel system on all carburettor models comprises a fuel tank, a fuel pump, a vapour separator (1.6 and 1.8 litre models only), a downdraught carburettor, and a thermostatically-controlled air cleaner.

The fuel tank is mounted under the rear of the vehicle, forward of the rear suspension. The tank is ventilated to the atmosphere, and has a simple filler pipe and a fuel gauge sender unit.

The fuel pump is a mechanical diaphragm type, actuated by a pushrod bearing on the camshaft.

The fuel vapour separator is used to stabilise the fuel supply to the carburettor. Vapour is purged from the carburettor fuel supply, thus improving hot starting qualities.

The carburettor is a Pierburg 2E3 type, a full description of which is given in Section 12.

The air cleaner has a wax or vacuum-controlled air inlet supplying a blend of hot and cold air to suit the prevailing engine operating conditions. A fuller description is given in Section 4.

All engines available within the Cavalier range can be operated on unleaded petrol - see Chapter 5.

2 Fuel system - precautions

1 Certain adjustment points in the fuel system are protected by tamperproof caps, plugs or seals. In some territories, it is an offence to drive a vehicle with broken or missing tamperproof seals. Before disturbing a tamperproof seal, check that no local or national laws will be broken by doing so, and fit a new tamperproof seal after adjustment is complete, where required by law. Do not break tamperproof seals on a vehicle that is still under warranty.

2 When working on fuel system components, scrupulous cleanliness must be observed, and care must be taken not to introduce any foreign matter into fuel lines or components. Carburettors in particular are delicate instruments, and care should be taken not to disturb any components unnecessarily. Before attempting work on a carburettor, ensure that the relevant spares are available. Full overhaul procedures for carburettors have not been given in this Chapter. Complete stripdown of a carburettor is unlikely to cure a fault that is not immediately obvious, without introducing new problems. If persistent problems are met, it is recommended that the advice of a Vauxhall dealer or carburettor specialist is sought. Most dealers will be able to provide carburettor re-setting and servicing facilities, and if necessary it should be possible to buy a reconditioned carburettor.

3 Refer to Chapter 5, for precautions to be observed when working on vehicles fitted with an engine management system.

Refitting

6 On refitting the filter, press it into the union until it catches **(see illustration)**. The remainder of the reassembly procedure is the reverse of removal.

22 Throttle valve dashpot (automatic models) - adjustment

1 Remove the air cleaner or air box, refer to Section 3.
2 Ensure that the lever **(see illustration)** is in the idling position.
3 Slacken the locknut and unscrew the dashpot until a gap of 0.05 mm (0.002 in) exists between the lever and the dashpot tip. Then screw the dashpot downwards 2.5 full turns and tighten the locknut.
4 Refit all removed components.

23 Throttle position sensor (automatic transmission models) - removal and refitting

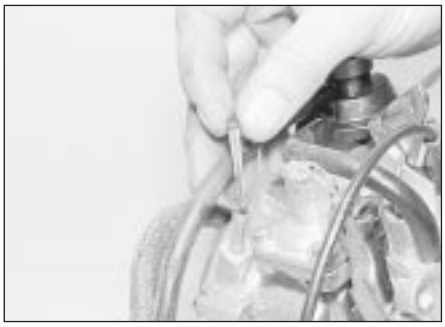
Removal

1 Disconnect the battery earth lead.
2 Disconnect the wiring plug from the sensor.
3 Either unscrew the two securing screws and withdraw the sensor from its bracket, or unbolt the bracket.

Refitting

4 Refitting is the reverse of the removal procedure, noting the following points.

*a) Install the sensor when the throttle valve is fully closed and ensure that the adapter, "1" **(see illustration),** seats correctly on the throttle valve spindle.*
b) Tighten the screws carefully.



21.6 Refitting the carburettor fuel filter

24 Idle speed increase valve - testing

1 Certain models are fitted with an idle speed increase valve that is attached to the side of the carburettor.
2 To test the operation of this valve first remove the air filter and vacuum hose.
3 With the valve's plug connected, have someone turn the ignition on (but do not start the engine). A mechanical shifting noise should be heard. If not replace the unit.
4 After refitting replace the vacuum hose and air filter.

25 Idle cut-off solenoid (1.8 litre models) - description and testing

Note: *Refer to Section 2 before proceeding*

Description

1 On 1.8 litre models, the carburettor is fitted with an idle cut-off solenoid. This is an electrically operated valve, which interrupts the idle mixture circuit when the ignition is switched off, thus preventing the engine from running-on **(see illustration)**.
2 The idle cut-off solenoid is energised all the time that the ignition is switched on. A defective solenoid, or a break in its power supply, will cause the engine to stall or idle roughly, although it will run normally at speed.

Testing

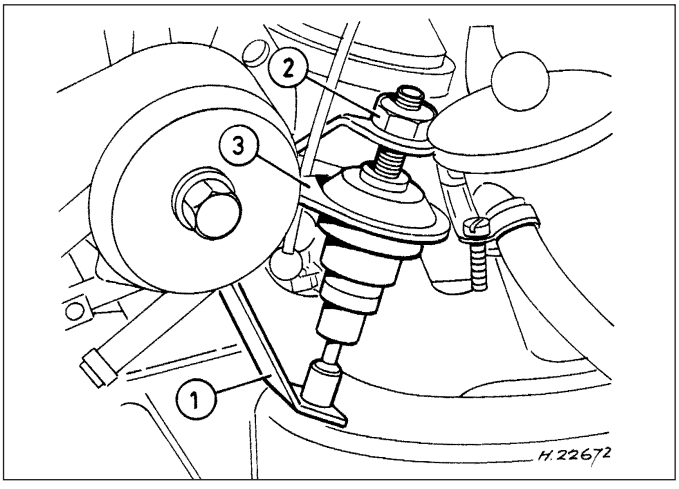
3 If the operation of the solenoid is suspect, first check that battery voltage is present at the solenoid terminal when the ignition is switched on. Use a 12 volt test lamp or similar test device.
4 If no voltage is present, then the fault lies in the wiring to the solenoid. If voltage is present, the solenoid can be tested as follows.
5 With the solenoid unscrewed from the carburettor, connect the body of the solenoid to the negative terminal of a 12 volt battery. When the battery positive terminal is connected to the solenoid centre terminal, there should be an audible click, and the needle at the tip of the solenoid should retract.
6 A defective idle cut-off solenoid must be renewed.

26 Inlet manifold - removal and refitting

Note*: Refer to Section 2 before proceeding. A new manifold gasket must be used on refitting*

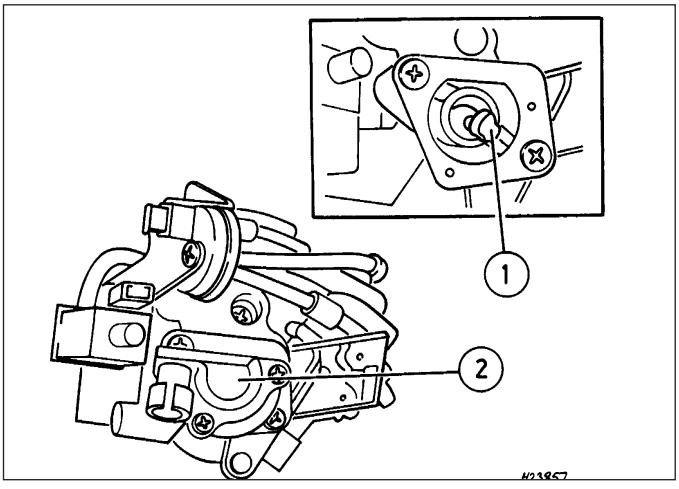
Removal

1 Disconnect the battery negative lead.
2 Drain the cooling system, as described in Chapter 3.
3 Proceed as described in Section 13, paragraphs 2 to 7 inclusive, ignoring the reference to coolant spillage in paragraph 5.



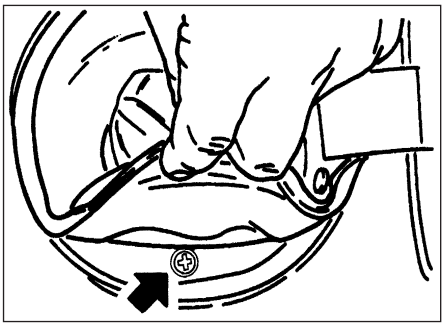
22.2 Adjusting the throttle valve dashpot - models with automatic transmission

1 Lever 2 Locknut 3 Dashpot



23.4 Throttle position sensor - models with automatic transmission

1 Adapter 2 Sensor

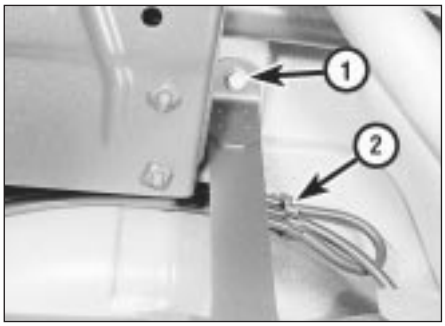


16.5 Fuel filler pipe securing screw (arrowed) - models with semi-trailing arm rear axles

d) Disconnect the fuel pump hose and wiring as described in Section 12.
e) When releasing the tank mounting straps, note that the fuel filter must either be moved aside or removed completely, whichever is most convenient
f) One of the fuel hoses connects to a pipe in the side of the tank.

DOHC models

2 Disconnect the battery negative lead.
3 Siphon out any remaining fuel in the tank through the filler pipe. Siphon the fuel into a clean metal container that can be sealed.
4 Chock the front wheels, then jack up the rear of the vehicle, and support on axle stands placed under the body side members (see "*Jacking and Vehicle Support*").
5 Open the fuel filler flap, then pull back the rubber seal to expose the fuel filler pipe securing screw **(see illustration)**. Remove the screw.
6 Release the fuel tank vent hoses from the clips on the underbody.
7 Support the weight of the fuel tank on a jack, with an interposed block of wood.
8 Unscrew the securing bolts from the tank mounting straps. Then remove the straps and lower the tank sufficiently to enable the fuel hoses, vent hoses and fuel tank sender unit wiring to be disconnected **(see illustration)**.
9 Disconnect the vent hoses and the fuel tank sender unit wiring. Note the positions of the vent hoses as an aid to refitting.
10 Disconnect the fuel hoses from the tank and the fuel tank sender unit, making a note of the hose positions for use when refitting. Be prepared for fuel spillage, and take adequate fire precautions. Plug the open ends of the hoses, to prevent dirt ingress and further fuel loss.
11 Lower the fuel tank, and withdraw it from under the vehicle.
12 If the tank contains sediment or water, it may be cleaned out using two or three rinses with clean fuel. Shake vigorously using several changes of fuel, but before doing so, remove the fuel tank sender unit, as described in Section 17. *This procedure should be carried out in a well-ventilated area, and it is vital to take adequate fire precautions - refer to the "Safety first!" Section at the beginning of this manual for further details.*



16.8 Fuel tank mounting - models with semi-trailing arm rear axles
1 Strap securing bolt 2 Vent hose securing

Refitting

13 Any repairs to the fuel tank should be carried out by a professional.
14 Refitting is a reversal of removal, ensuring that all hoses are reconnected to their correct locations as noted during removal.
15 On completion, fill the fuel tank, then run the engine and check for leaks. If leakage is evident, stop the engine immediately, and rectify the problem without delay.

17 Fuel tank sender unit - removal and refitting

Note: *Refer to Section 2 before proceeding*

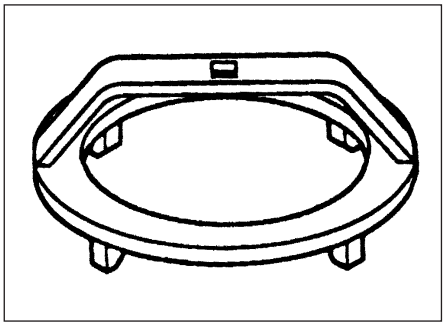
Removal

SOHC models

1 Remove the fuel tank, (refer to Section 16), if necessary. Note that there is only one hose connected to the sender unit. This must also be disconnected from the union on the inside of the unit before it can be withdrawn completely from the tank **(see illustration).**

DOHC models

2 Remove the fuel tank, as described in Section 16.
3 Make alignment marks on the sender unit and the fuel tank so that the sender unit can be refitted in its original position.
4 To remove the sender unit, an improvised tool must be used which engages with the cut-outs in the sender unit retaining ring. The Vauxhall special tool KM-673 for this purpose is shown **(see illustration)**.
5 Withdraw the unit carefully, to avoid bending the float arm.
6 Recover the sealing ring.



17.4 Vauxhall special tool KM-673 for removing fuel level sender units

17.1 Fuel level sender unit - models with semi-independent rear axles

Refitting

7 Refitting is a reversal of removal, remembering the following points.
8 Renew the sealing ring.
9 Ensure that the marks made on sender unit and fuel tank before removal are aligned.
10 Refit the fuel tank, (Section 16).

18 Fuel flow damper - removal and refitting

Note: *Refer to Section 2 before proceeding*

Removal

1 The fuel flow damper is located on the fuel pump bracket under the rear of the vehicle, on the right-hand side of the spare wheel well or in front of the fuel tank, depending on model **(see illustration)**. The damper is positioned in the fuel feed line between the fuel pump and the fuel filter, and its purpose is to reduce pressure fluctuations in the fuel return line, thus reducing noise levels.
2 Disconnect the battery negative lead.
3 Have a container to hand, to catch the fuel that will be released as the damper is removed.

18.1 Fuel flow damper - models with semi-trailing arm rear axles

12 Unscrew and remove the top alternator mounting nut and bolt.
13 Make a final check to ensure that all relevant hoses, pipes and wires have been disconnected.
14 Unscrew the securing nuts, and withdraw the manifold from the cylinder head. Recover the gasket **(see illustrations).**
15 It is possible that some of the manifold studs may be unscrewed from the cylinder head when the manifold securing nuts are unscrewed. In this event, the studs should be screwed back into the cylinder head once the manifold has been removed, using two manifold nuts locked together.
16 If desired, the ancillary components can be removed from the manifold, referring to the relevant Chapter.

Refitting

17 Refitting is a reversal of removal, remembering the following points.
18 Where applicable refit any ancillary components to the manifold, with reference to relevant Sections of Chapters 4A or 4B.
19 If the alternator mounting bracket has been unbolted from the manifold, refit it before refitting the manifold, as access to the securing bolt is extremely limited once the manifold is in place.
20 Refit the manifold using a new gasket, and tighten the securing nuts to the specified torque.
21 Ensure that all relevant hoses, pipes and wires are correctly reconnected.
22 On completion, check and if necessary top-up the coolant level, (Chapter 3).
23 Check and if necessary adjust the throttle cable free play, as described in Chapters 4A or 4B, as applicable.
24 If any of the fuel system components have been disturbed or renewed, check and if necessary adjust the idle mixture, as described in Chapters 4A or 4B, as applicable.

39 Inlet manifold (SOHC with Multec) - removal and refitting

Removal

1 Depressurise the fuel system Section 8).
2 Remove the air box (see Section 5).
3 Disconnect the battery negative lead.
4 Either remove the throttle body assembly (see Section 32), or disconnect the throttle cable, wiring, fuel and vacuum hoses and pipes to allow the manifold to be removed with the throttle body.
5 Drain the cooling system (see Chapter 3).
6 Continue as described in Chapter 4A, Section 26, paragraph 4 onwards.

Refitting

7 Refitting is the reverse of the removal procedure; renew all gaskets and seals disturbed.

38.14A Unscrew the securing nuts

38.14B ...and withdraw the inlet manifold - SOHC models

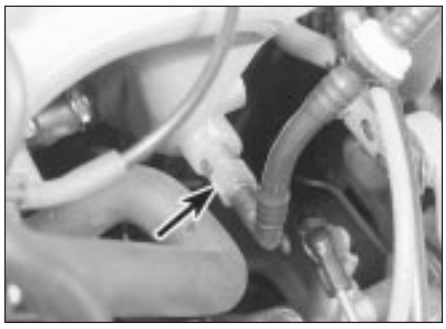
40 Inlet manifold (DOHC models) - removal and refitting

Removal

1 Disconnect the battery negative lead.
2 Disconnect the wiring plug from the air mass meter. Recover the sealing ring.
3 Loosen the clamp screw securing the air trunking to the right-hand end of the air mass meter.
4 Using an Allen key or hexagon bit, unscrew the four bolts securing the air box to the throttle body. Lift the air box from the throttle body, and disconnect the hose from the base of the air box then withdraw the air box/air mass meter assembly.
5 Disconnect the wiring plug from the throttle position sensor.
6 Slide the throttle cable end from the throttle valve lever. Then pull the cable end grommet from the bracket on the inlet manifold and move the throttle cable to one side out of the way.
7 Disconnect the two breather hoses from the rear of the camshaft cover. Disconnect the larger hose from the throttle body, and remove the hose completely.
8 Position a wad of rag beneath one of the fuel hose unions on the fuel rail, to absorb the fuel that will be released as the union is disconnected.
9 Slowly loosen the fuel hose union, to gradually relieve the pressure in the fuel feed line, then disconnect the hose from the fuel rail. Be prepared for fuel spillage, and take adequate fire precautions. Plug the end of the fuel hose, to prevent dirt ingress and further fuel leakage.
10 Repeat paragraphs 9 and 10 for the remaining fuel hose-to-fuel rail union.
11 Disconnect the vacuum pipe from the top of the fuel pressure regulator.
12 Disconnect the wiring harness housing from the fuel injectors and move it to one side, taking care not to strain the wiring. Pull up on the wiring harness housing, and compress the wiring plug retaining clips to release the housing from the injectors.
13 Unscrew the union nut, and disconnect the brake servo vacuum hose from the left-hand side of the inlet manifold **(see illustration)**.
14 Unscrew the retaining nut, and remove the fuel hose bracket from the left-hand side of the throttle body.
15 Unscrew the securing nuts, and disconnect the earth leads from the fuel rail securing studs at either end of the fuel rail.
16 Unscrew the securing bolt, and remove the cable/hose bracket from the left-hand end of the inlet manifold.
17 Remove the idle speed adjuster, as described in Section 22.
18 Unscrew and remove the top alternator mounting nut and bolt.
19 Make a final check to ensure that all relevant hoses, pipes and wires have been disconnected.
20 Unscrew the securing nuts, and withdraw the manifold from the cylinder head. Recover the gasket.
21 It is possible that some of the manifold studs may be unscrewed from the cylinder head when the manifold securing nuts are unscrewed. In this event, the studs should be screwed back into the cylinder head once the manifold has been removed, using two manifold nuts locked together.
22 If desired, the ancillary components can be removed from the manifold, with reference to the relevant Sections of Chapters 4A or 4B.

Refitting

23 Refitting is a reversal of the removal procedure.



40.13 Brake servo vacuum hose connection at inlet manifold (arrowed) - DOHC models

28 The system also incorporates a separate ignition amplifier module that transmits amplified signals from the main system module to trigger the HT pulse from the ignition coil. The module is mounted on the ignition coil's bracket/baseplate.
29 Additionally, the Motronic module receives information from a cylinder block-mounted knock sensor, which senses "knocking" (or pre-ignition) just as it begins to occur, enabling the module to retard the ignition timing, thus preventing engine damage.

Simtec 56.1

30 This system uses increased amount of electronic components instead of mechanical parts as sensors and actuators with the Simtec engine management system. This provides more precise operating data as well as greater problem free motoring.
31 The control unit is equipped with electronic ignition control. Called 'Microprocessor Spark Timing System, inductive triggered', (or MSTS-i), and means that the mechanical high voltage distributor is no longer needed. It is located behind the trim panel, on the right-hand side footwell (door pillar).
32 The ignition coil is replaced by a dual spark ignition coil, which is switched directly by the output stages in the control unit.
33 A camshaft sensor will maintain emergency operation, should the crankshaft inductive pulse pick-up, malfunction. These sense TDC ('Top Dead Centre'), crankshaft angle and engine speed. The signals are used by the control unit to calculate ignition point and for fuel injection.
34 The 'hot film airflow meter' determines the mass of air taken in by the engine. The system uses this information to calculate the correct amount of fuel needed for injection in the engine.
35 The air inlet temperature sensor (NTC), is fitted in the air inlet duct between the air cleaner and the hot mass air flow meter.
36 A controlled canister purge valve is actuated by the system. The tank ventilation is monitored closely with the Lambda control (or oxygen sensor) and adaptation by the computer within the control unit.
37 A knock control system is also fitted. This eliminates the need for octane number adjustment, as it is performed automatically through the control unit.

3 Electrical system - precautions

Warning: The HT voltage generated by an electronic ignition system is extremely high and, in certain circumstances, could prove fatal. Take care to avoid receiving electric shocks from the HT side of the ignition system. Do not handle HT leads, or touch the distributor or coil, when the engine is running. If tracing faults in the HT circuit, use well-insulated tools to manipulate live leads

1 It is necessary to take extra care when working on the electrical system, to avoid damage to semi-conductor devices (diodes and transistors), and to avoid the risk of personal injury. Along with the precautions given in the *"Safety first!"* Section at the beginning of this manual, take note of the following points when working on the system.
2 *Always remove rings, watches, etc. before working on the electrical system.* Even with the battery disconnected, discharge could occur if a component live terminal is earthed through a metal object. This could cause a shock or nasty burn.
3 *Do not reverse the battery connections.* Components such as the alternator, or any other component having semi-conductor circuitry, could be irreparably damaged.
4 If the engine is being started using jump leads and a slave battery, connect the batteries *positive to positive* and *negative to negative.* This also applies when connecting a battery charger.
5 Never disconnect the battery terminals, or alternator multi-plug connector, when the engine is running.
6 The battery leads and alternator wiring must be disconnected before carrying out any electric welding on the vehicle.
7 Never use an ohmmeter of the type incorporating a hand-cranked generator for circuit or continuity testing.
8 Engine management modules are very sensitive components, and certain precautions must be taken, to avoid damage to the module when working on a vehicle equipped with an engine management system, as follows.
9 When carrying out welding operations on the vehicle using electric welding equipment, the battery and alternator should be disconnected.
10 Although underbonnet-mounted modules will tolerate normal underbonnet conditions, they can be adversely affected by excess heat or moisture. If using welding equipment or pressure washing equipment near the module, take care not to direct heat, or jets of water or steam, at the module. If this cannot be avoided, remove the module from the vehicle, and protect its wiring plug with a plastic bag.
11 Before disconnecting any wiring, or removing components, always ensure that the ignition is switched off.
12 Do not attempt to improvise fault diagnosis procedures using a test lamp or multimeter, as irreparable damage could be caused to the module.
13 After working on ignition/engine management system components, ensure that all wiring is correctly reconnected before reconnecting the battery or switching on the ignition.
14 Any ignition system that uses a "Hall-effect" generator in the distributor, **cannot** be tested. Test equipment that uses its own power source (e.g. an ohmmeter), when connected to the distributor or the "Hall-effect" generator, will be damaged.

4 Ignition system testing - general

Note: *Refer to Section 3 before proceeding. Always switch off the ignition before disconnecting or connecting any component and when using a multi-meter to check resistances. Any voltmeter or multi-meter used to test ignition system components must have an impedance of 10 meg ohms or greater*
1 Electronic ignition system components are normally very reliable. Most faults are far more likely to be due to loose or dirty connections, or to "tracking" of HT voltage due to dirt, dampness or damaged insulation than to component failure. Always check all wiring thoroughly before condemning an electrical component and work methodically to eliminate all other possibilities before deciding that a particular component is faulty.
2 The old practice of checking for a spark by holding the live end of a HT lead a short distance away from the engine is not recommended. Not only is there a high risk of a powerful electric shock, but the ignition coil or amplifier module will be damaged. Similarly, never try to "diagnose" misfires by pulling off one HT lead at a time. Note also that the ECU is at risk if the system is triggered with an open (i.e., not properly earthed) HT circuit; ECU's are very expensive to replace, so take care!
3 If you are in any doubt as to your skill and ability to test an ignition system component or if you do not have the required equipment, take the vehicle to a suitably equipped Vauxhall dealer. It is better to pay the labour charges involved in having the vehicle checked by an expert than to risk damage to the system or to yourself.
4 If the engine either will not turn over at all, or only turns very slowly, check the battery and starter motor. Connect a voltmeter across the battery terminals (meter positive probe to battery positive terminal) and disconnect the ignition coil HT lead from the distributor cap and earth. Note the voltage reading obtained while turning over the engine on the starter for (no more than) ten seconds. If the reading obtained is less than approximately 9.5 volts, check the battery, battery connections, starter motor and charging system.

22.3 Octane coding plug (arrowed) - 2.0 litre model

in a clip at the left-hand rear of the engine compartment **(see illustration)**.

4 The plug is reversible in its connector, and is marked either "A" or "98" on one side, which corresponds to the position for use with 98 RON leaded petrol. On the other side either "B" or "95", which corresponds to the position to use with 95 RON unleaded petrol. All vehicles are set for use with 95 RON unleaded petrol before they leave the factory.

5 To change the coding for use with a different type of petrol, first allow the fuel tank to become practically empty.

6 Fill the fuel tank with the required type of petrol.

7 Ensure that the ignition is switched off, then remove the coding plug from its clip and disconnect the wiring connector.

8 Rotate the plug through 180°, so that the appropriate octane mark is uppermost (see paragraph 4), then reconnect the wiring connector and refit the plug to its clip.

9 Note that using petrol with a higher octane rating than that set will not cause damage, but petrol with a lower octane rating than that set must not be used.

20 XE, C20 XE and X20 XEV models

10 The ignition coding plug found on these models is **not** an octane coding plug (although its method of operation is similar) and must not be altered from its factory setting. Its purpose is to ensure that the Motronic module uses the correct information, pre-programmed (or "mapped") into its memory, to enable the vehicle to comply with the relevant national noise and exhaust emission legislation.

11 On these models, the knock sensor circuit allows the Motronic module to compensate for differences in the octane value of the petrol used, without the need for manual intervention. Remember, however, that all catalytic converter-equipped vehicles must use unleaded petrol only. This means that these models can use any grade of unleaded petrol on sale in the UK without the need for adjustment.

23 Electronic modules - removal and refitting

Note: *Refer to Section 3 for precautions to be observed when working with electronic modules. Heat sink compound must be used when refitting the module.*

HEI module (14 NV models)

Removal

1 The module is mounted on a metal plate, beneath the ignition coil, on the left-hand side of the engine compartment.

2 Remove the ignition coil as described in Section 16, and slide the coil from its clamp.

3 The module can be removed from the mounting plate by unscrewing the two securing screws.

4 Before refitting the module, heat sink compound should be applied to the mounting plate to improve heat dissipation. If a new module is being fitted, it should be supplied with heat sink compound. Similar compounds can be bought from DIY electrical shops.

Refitting

5 Refitting is a reversal of removal.

MSTS-i module (1.6 and 1.8 litre models)

Removal

6 The module is mounted on the engine compartment bulkhead, above the steering rack **(see illustration)**.

7 Disconnect the battery negative lead.

8 If desired, for improved access, remove the air box from the top of the carburettor.

9 Disconnect the wiring plug from the module.

10 Unscrew the two securing nuts, and withdraw the module from the bulkhead.

Refitting

11 Refitting is a reversal of removal.

Motronic module

Removal

12 The module is mounted in the driver's footwell, behind the side trim panel.

23.15 Lowering the Motronic module from the footwell - 2.0 litre model

23.6 MSTS-i module location - 1.6 litre model

13 Disconnect the battery negative lead.

14 Remove the driver's footwell side trim panel, as described in Chapter 11.

15 Unscrew the three module securing screws, two at the top of the module, and a single screw at the bottom, and lower the module from the footwell **(see illustration)**.

16 Release the retaining clip, and disconnect the module wiring plug **(see illustration)**.

17 Withdraw the module, noting the plastic insulating sheet on its rear face.

Refitting

18 Refitting is a reversal of removal, but ensure that the insulating sheet is in place on the rear face of the module.

24 MSTS-i components - removal and refitting

Note: *Refer to Section 3 before proceeding. Procedures for removal and refitting of the ignition system components and electronic module are given elsewhere in the relevant Sections of this Chapter*

Manifold pressure sensor

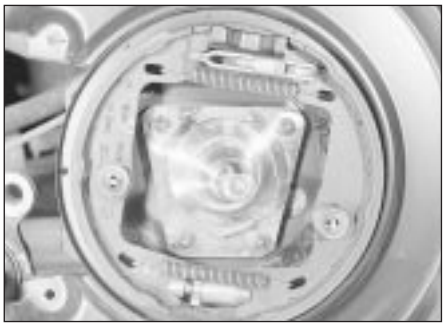
Removal

1 The sensor is located on the engine compartment bulkhead, to the left of the MSTS-i module, under the edge of the windscreen cowl panel **(see illustration)**.

2 Disconnect the battery negative lead.

23.16 Releasing the Motronic module wiring plug clip - 2.0 litre model

7.16A Fitting the lower shoe return spring - SOHC models



7.16B Handbrake shoe components correctly assembled - SOHC models

5 If any one of the shoes has worn below the specified limit, all four handbrake shoes must be renewed as a set, as follows.

SOHC models

Removal

6 Clean the dust and dirt from the various components, but take care not to inhale it.
7 Disconnect the handbrake cable and the return spring from the handbrake operating lever at the brake backplate. If necessary, slacken the handbrake cable adjustment, with reference to Section 26.
8 Remove the shoe hold-down pins, springs and cups by depressing the cups and turning them through 90° using a pair of pliers. Note that the hold-down pins are removed through the rear of the brake backplate.
9 The shoes, adjuster, handbrake operating lever and return springs can now be removed together as an assembly.
10 Note the position and orientation of all components, then unhook the upper and lower return springs from the shoes, and recover the handbrake operating lever and the adjuster.

Refitting

11 Apply a little brake grease to the threads of the adjuster, then screw it together to its minimum length. Also apply a little brake grease to the shoe rubbing areas on the lockplate.
12 Fit one of the new brake shoes, and secure it to the backplate with the hold-down pin, spring and cup.
13 Fit the handbrake operating lever in position.
14 Fit the remaining brake shoe, and secure with the hold-down pin, spring and cup.
15 Hook the upper return spring onto the shoes.
16 Fit the adjuster between the lower ends of the shoes, as noted before dismantling, then fit the lower return spring **(see illustrations)**.
17 Reconnect the handbrake cable and the return spring to the handbrake operating lever.
18 Refit the hub/disc, and adjust the wheel bearing play, as described in Chapter 10, but do not refit the roadwheel at this stage.
19 Repeat the operations on the remaining side of the vehicle.
20 Check the handbrake cable adjustment, as described in Section 26.
21 Refit the roadwheels and lower the vehicle to the ground. Do not fully tighten the roadwheel bolts until the vehicle is resting on its wheels.

DOHC models

Removal

22 Proceed as described in paragraphs 6 and 7.
23 Remove the shoe hold-down pins, springs and cups by turning the cups through using a screwdriver. Note that the hold-down pins are removed through the rear of the brake backplate. Note also the position and orientation of all components, then unhook the upper and lower return springs from the shoes, and recover the handbrake operating lever and the adjuster.

Refitting

24 Proceed as described in paragraphs 11 to 14 inclusive.
25 Hook the lower return spring onto the shoes.
26 Fit the adjuster between the upper ends of the shoes, as noted before dismantling, then fit the upper return spring **(see illustration)**.
27 Reconnect the handbrake cable and the return spring to the handbrake operating lever.
28 Refit the brake disc as described in Section 10, but do not refit the roadwheel at this stage.
29 Proceed as described in paragraphs 19 to 21 inclusive.

7.26 Handbrake shoe adjuster and upper return spring correctly fitted - DOHC models

8 Front disc caliper - removal, overhaul and refitting

Note: *Refer to the note at the beginning of Section 3 before proceeding. Before dismantling a caliper, check that replacement parts can be obtained, and retain the old components to compare them with the new ones. New sealing rings must be used on the fluid hose union bolt on refitting*

Models with solid discs

Removal

1 Where applicable, remove the wheel trims, then loosen the relevant front roadwheel bolts and apply the handbrake. Jack up the front of the vehicle, and support securely on axle stands (see "*Jacking and Vehicle Support*") positioned under the body side members. Remove the roadwheel.
2 Remove the brake disc pads, as described in Section 4.
3 Working under the bonnet, remove the brake fluid reservoir cap, and secure a piece of polythene over the filler neck with a rubber band, or by refitting the cap. This will reduce the loss of fluid during the following procedure.
4 Unscrew the brake fluid hose union bolt from the rear of the caliper, and disconnect the hose. Recover the two sealing rings from the union bolt (one either side of the hose end fitting). Be prepared for fluid spillage, and plug the open ends to prevent dirt ingress and further fluid loss.
5 Prise out the two caliper bracket mounting bolt dust caps from the inboard edge of the caliper bracket, then using an Allen key or hexagon bit, unscrew the mounting bolts, and withdraw the caliper assembly from the vehicle.

Overhaul

6 If desired, the caliper can be overhauled as follows. Otherwise, go on to paragraph 24 for details of refitting.
7 Brush the dirt and dust from the caliper, but take care not to inhale it.
8 Mount the caliper bracket in a soft-jawed vice. Then separate the caliper body from the mounting bracket by pressing the front face of the caliper body downwards and simultaneously sliding the caliper body from the locating pins on the bracket. Recover the guide springs from the bracket, noting their orientation.
9 Using a screwdriver, prise the dust seal retaining clip from the piston dust seal, then carefully prise off the dust seal.
10 Place a thin piece of wood in front of the piston to prevent it from falling out of its bore and sustaining damage. Then apply low air pressure - e.g. from a foot pump - to the hydraulic fluid union hole in the rear of the caliper body, to eject the piston from its bore.

8 Disconnect the battery negative lead.
9 Unclip the lid and open the relay box, then pull out the relay **(see illustration)**.

Refitting

10 Refitting is a reversal of removal, with reference to paragraph 6.

24 Rear brake pressure-proportioning valves - removal and refitting

Note: *Refer to the note at the beginning of Section 3 before proceeding. Note also that the valve must only be renewed in pairs, and both valves must be of the same calibration. Ensure that correct type of valves are fitted. The bodies have been stamped for easier identification.*

Master cylinder-mounted valves

Removal

1 Remove the brake fluid reservoir cap, and secure a piece of polythene over the filler neck with a rubber band, or by refitting the cap. This will reduce the loss of fluid during the following procedure.
2 Locate a container beneath the master cylinder, to catch the brake fluid that will be released.
3 Identify the two lower brake pipes for position, then unscrew the union nuts and disconnect the pipes from the proportioning valves in the base of the master cylinder. Plug the open ends of the pipes to prevent dirt ingress.
4 Unscrew the proportioning valves from the master cylinder, and plug the open ends of the cylinder to prevent dirt ingress.

Refitting

5 Refitting is a reversal of removal, but on completion, remove the polythene from the brake fluid reservoir filler neck, and bleed the complete hydraulic system, as described in Section 3.

Rear underbody-mounted valves

Removal

6 Proceed as described in paragraph 1.
7 Chock the front wheels, then jack up the rear of the vehicle, and support securely on axle stands (see "*Jacking and Vehicle Support*") positioned under the body side members.
8 Working under the rear of the vehicle, unscrew the union nut and disconnect the brake pipe from one of the valves. Be prepared for fluid spillage, and plug the open end of the pipe to prevent dirt ingress and further fluid spillage.
9 Similarly, disconnect the flexible hose from the valve.
10 Pull the valve retaining clip from the bracket on the underbody, noting that on certain models, the retaining clip also secures the ABS sensor wiring, and withdraw the valve **(see illustration)**.
11 Repeat the procedure for the other valve.

23.9 ABS surge arrester relay (arrowed)

Refitting

12 Proceed as described in paragraph 5.

25 Brake fluid pipes and hoses - general, removal and refitting

Note: *Refer to the note at the beginning of Section 3, before proceeding.*

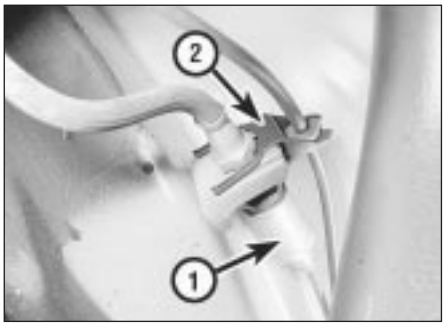
General

1 When checking the condition of the system's pipes and/or hoses, carefully check that they do not foul other components such as the power steering gear pipes (where applicable), so that there is no risk of the pipes chafing. If necessary use clips or ties to secure braking system pipes and hoses well clear of other components.

Rigid pipes

Removal

2 Some of the commonly used brake pipes can be obtained from Vauxhall parts dealers, ready-formed and complete with unions, but other brake pipes must be prepared using 4.75 mm (0.19 in) diameter brake pipe. Kits for making the brake pipes can be obtained from certain motor accessory shops.
3 Before removing a brake pipe, remove the brake fluid reservoir cap, and secure a piece of polythene over the filler neck with a rubber band, or by refitting the cap. This will reduce the loss of fluid when the pipe is disconnected.



24.10 Brake pressure-proportioning valve on rear underbody - DOHC model
1 Valve 2 Retaining clip

4 Jack up the vehicle, and support securely on axle stands (see "*Jacking and Vehicle Support*") positioned under the body side members.
5 To remove a brake pipe, unscrew the unions at each end, and release the pipe from the retaining clips.

Refitting

6 Refitting is a reversal of removal, taking care not to overtighten the unions.
7 On completion, remove the polythene from the brake fluid reservoir filler neck, and bleed the relevant hydraulic circuit(s), as described in Section 3.

Flexible hoses

Removal

8 Proceed as described previously for the rigid pipes, but note that a flexible pipe must never be installed twisted, although a slight "set" is permissible to give it clearance from adjacent components.

Refitting

9 When reconnecting a flexible hose to a front brake caliper, note that the sealing rings on the union bolt must be renewed.

26 Handbrake - adjustment

Models with rear drum brakes

1 The handbrake will normally be kept in correct adjustment by the self-adjusting action of the rear brake shoes. However, due to cable stretch over a period of time, the travel of the handbrake lever may become excessive, in which case the following operations should be carried out.
2 Chock the front wheels, jack up the rear of the vehicle, and support securely on axle stands (see "*Jacking and Vehicle Support*") positioned under the body side members.
3 Fully release the handbrake.
4 Turn the knurled nut on the cable adjuster (mounted on the torsion beam), until the brake shoes can just be heard to rub when the rear wheels are turned by hand in the normal direction of rotation **(see illustration)**.

26.4 Handbrake cable adjuster. Knurled nut arrowed - all SOHC models

4.7 Unscrewing the suspension strut top mounting nut

4.8 Withdrawing a suspension strut

4.13A Lift off the strut upper mounting rubber . . .

4 Front suspension strut - removal, overhaul and refitting

Note: *A balljoint separator tool will be required during this procedure, and a spring compressor tool will be required if the strut is to be overhauled. The tie-rod end balljoint self-locking nut, the driveshaft retaining snap ring, and the hub nut must be renewed on refitting*

Removal

1 Where applicable, remove the wheel trim, then loosen the relevant front roadwheel bolts. Apply the handbrake, then jack up the front of the vehicle, and support securely on axle stands (see "*Jacking and Vehicle Support*") positioned under the body side members. Remove the relevant front roadwheel.

2 Where applicable, remove the ABS wheel sensor from the hub carrier, referring to Chapter 9, if necessary, and disconnect the wiring from the strut.

3 Remove the brake caliper from the hub carrier, as described in Chapter 9. The caliper can be suspended out of the way, using wire or string, to avoid the need to disconnect the hydraulic fluid hose.

4 Unscrew and remove the self-locking nut from the tie-rod end to suspension strut balljoint.

5 Using a balljoint separator, disconnect the tie-rod end to suspension strut balljoint.

6 Disconnect the outboard end of the driveshaft from the hub carrier, as described in Chapter 8. Support the driveshaft by suspending with wire or string. Do not allow the driveshaft to hang down under its own weight.

7 Working in the engine compartment, unscrew the nut securing the suspension strut to the suspension turret. To unscrew the nut, it will be necessary to counterhold the suspension strut piston rod using a splined key **(see illustration)**. Support the suspension strut as the nut is unscrewed, as once the nut has been removed, the strut is free to drop from the vehicle.

8 Withdraw the suspension strut/hub carrier assembly from the vehicle **(see illustration)**.

9 If desired, the suspension strut can be overhauled as follows, otherwise go on to paragraph 30 for details of the refitting procedure.

Overhaul

10 The hub, wheel bearing and brake disc shield can be removed, as described in Section 2.

11 With the suspension strut resting on a bench or clamped in a vice, fit a spring compressor tool, and compress the coil spring to relieve the pressure on the upper spring seat. Ensure that the compressor tool is securely located on the spring, according to the tool manufacturer's instructions.

12 Hold the strut piston rod with the splined key used during strut removal, and unscrew the piston rod nut.

13 Lift off the strut upper mounting rubber and the bearing **(see illustrations)**.

4.13B . . . and the bearing

14 Lift off the upper spring seat and damper ring, then carefully release the spring compressor and remove the spring **(see illustration)**. Note which way up the spring is fitted.

15 Slide the bellows and the rubber buffer that fits inside the bellows from the strut **(see illustration)**.

16 To remove the shock absorber cartridge, the ring nut must be unscrewed from the top of the strut tube. This nut is extremely tight. One method that can be used to unscrew the nut is to invert the strut and clamp the nut in a vice, then lever the strut round using a long bar and a bolt passed through the tie-rod bracket.

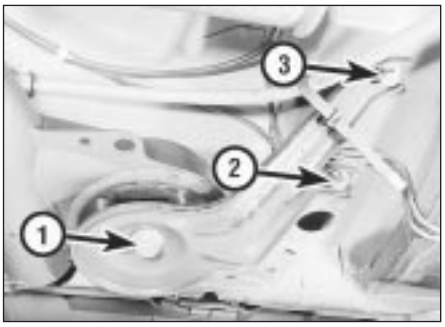
17 With the ring nut removed, the shock absorber cartridge can be withdrawn **(see illustrations)**.

18 The shock absorber can be tested by clamping the lower end in a vice, then fully extending and contracting the shock absorber several times. Any evidence of jerky

4.14 Lift off the upper spring seat and damper ring

4.15 Slide off the bellows and the rubber buffer

4.17A Remove the ring nut . . .



26.13 Forward crossmember fixings - DOHC model

1 Securing bolt
2 and 3 Crossmember mounting bracing bracket bolts

10 Carefully lower the trolley jack supporting the crossmember rear plate, until the coil springs and their rubber dampers can be withdrawn. Note the orientation of the springs as they are removed.
11 Make a check to ensure that all relevant hoses, pipes, cables and wires are clear of the rear suspension assembly.
12 With the weight of the rear suspension assembly supported on the trolley jack positioned under the crossmember rear plate, unscrew and remove the two forward crossmember securing bolts. Note that the bolts also pass through the crossmember mounting bracing brackets.
13 Unscrew and remove the two bolts in each case securing the crossmember mounting bracing brackets to the underbody. Then with the help of an assistant, carefully lower the rear suspension assembly and withdraw it from under the vehicle **(see illustration)**.
14 If desired, the assembly can be dismantled with reference to the relevant Sections of this Chapter.
15 The crossmember front mounting bushes can be renewed using a tube or socket, nut, bolt, washers and distance pieces as necessary to draw out the old bushes and fit the new ones. Lubricate the rear bushes with a little soapy water to aid fitting.

Refitting

16 Begin refitting by positioning the rear suspension assembly under the rear of the vehicle, and raising it (with the aid of an assistant) using a trolley jack positioned under the crossmember rear plate as during removal.
17 Refit the two forward crossmember securing bolts, ensuring that they also pass through the crossmember mounting bracing brackets, but do not fully tighten them at this stage.
18 Refit the crossmember mounting bracing bracket to underbody bolts and tighten them to the specified torque, then tighten the two forward crossmember securing bolts to the specified torque.
19 If necessary, lower the trolley jack supporting the crossmember rear plate, and refit the coil springs and their dampers between the semi-trailing arms and the underbody, as noted during removal.
20 Carefully raise the trolley jack supporting the crossmember rear plate, then fit the two crossmember rear tube securing bolts, and tighten them to the specified torque. Withdraw the trolley jack.
21 Reconnect the fuel outlet hose to the fuel filter, and tighten the clamp screw.
22 Working on each side of the vehicle in turn, raise the semi-trailing arm with a trolley jack to allow the lower shock absorber securing bolt and washer to be fitted. Tighten the bolts to the specified torque, then withdraw the trolley jack.
23 Refit the brake calipers and the ABS sensor brackets to the brake backplates, and tighten the securing bolts to the specified torque.
24 Reconnect the brake fluid lines to their brackets on the semi-trailing arms, and secure with the locking clips.
25 Refit the handbrake cables to their brackets on the semi-trailing arms, and reconnect the cable ends and return springs to the handbrake operating levers, then check the handbrake cable adjustment, as described in Chapter 9.
26 Refit the rear half of the exhaust system, with reference to Chapter 3.
27 Refit the roadwheels and lower the vehicle to the ground. Finally tighten the roadwheel bolts with the vehicle resting on its wheels.

27 Rear suspension semi-trailing arm (DOHC models) - removal and refitting

Removal

1 Loosen the relevant rear roadwheel bolts, chock the front wheels, then jack up the rear of the vehicle, and support securely on axle stands positioned under the body side members. Remove the roadwheel.
2 Working under the rear of the vehicle, remove the locking clip and release the brake fluid line from its bracket on the semi-trailing arm. Note that the locking clip also supports the ABS sensor wire.
3 Unscrew the two securing bolts, and withdraw the brake caliper and the ABS sensor bracket from the brake backplate. Support the caliper and the ABS sensor bracket out of the way by suspending with string or wire from the vehicle underbody.
4 Disconnect the handbrake cable and its return spring from the handbrake operating lever, with reference to Chapter 9.
5 Withdraw the handbrake cable from the bracket on the semi-trailing arm.
6 Disconnect the anti-roll bar end link from the semi-trailing arm, by unscrewing the single securing nut and bolt. Recover the rubber bush and the spacer sleeve.
7 Support the semi-trailing arm with a trolley jack, then unscrew and remove the bolt and washer securing the lower end of the shock absorber to the semi-trailing arm.
8 Carefully lower the trolley jack sufficiently to enable the coil spring and its rubber dampers to be withdrawn. Note the orientation of the spring as it is removed. Once the spring has been removed, withdraw the jack.
9 Check that all relevant hoses, pipes, cables and wires have been positioned clear of the semi-trailing arm.
10 Unscrew and remove the two self locking nuts and bolts securing the forward end of the semi-trailing arm to the suspension crossmember, then withdraw the semi-trailing arm from under the vehicle.
11 Refer to Section 23 for details of removal and refitting of the rear hub components.
12 The semi-trailing arm mounting bushes can be renewed using a tube or socket, nut, bolt, washers and distance pieces as necessary to draw out the old bushes and fit the new ones. To aid removal of the old bushes, the protruding ends of the bushes can be cut off using a sharp knife. Lubricate the new bushes with a little soapy water to aid fitting.

Refitting

13 Begin refitting by manipulating the forward end of the semi-trailing arm into position in the suspension crossmember brackets.
14 Fit the semi-trailing arm securing bolts, with new self-locking nuts, but do not fully tighten them at this stage. Note that the bolt heads must face each other.
15 Support the semi-trailing arm with a trolley jack, then refit the coil spring and its rubber dampers as noted during removal.
16 Carefully raise the trolley jack to allow the lower shock absorber securing bolt and washer to be fitted. Tighten the bolt to the specified torque then withdraw the trolley jack.
17 Refit the rubber bush and the spacer sleeve, and reconnect the anti-roll bar end link to the semi-trailing arm. Tighten the securing nut to the specified torque while counter-holding the bolt using a spanner.
18 Refit the handbrake cable to the bracket on the semi-trailing arm, and reconnect the cable end and return spring to the handbrake operating lever, then check the handbrake cable adjustment, as described in Chapter 9.
19 Refit the brake caliper and the ABS sensor bracket to the brake backplate, and tighten the securing bolts to the specified torque.
20 Reconnect the brake fluid line to its bracket on the semi-trailing arm, and secure with the locking clip.
21 Refit the roadwheel, then lower the vehicle to the ground. Finally tighten the roadwheel bolts with the vehicle resting on its wheels.
22 With the vehicle resting on its wheels, release the handbrake, and “bounce” the rear of the car to settle the suspension components.

wax-based underbody protective coating, it is a good idea to have the whole of the underframe of the vehicle steam cleaned, engine compartment included, so that a thorough inspection can be carried out to see what minor repairs and renovations are necessary. Steam cleaning is available at many garages and is necessary for removal of the accumulation of oily grime that sometimes is allowed to become thick in certain areas. The dirt can then be simply hosed off. Note that these methods should not be used on vehicles with wax-based underbody protective coating or the coating will be removed. Such vehicles should be inspected annually, preferably just before winter, when the underbody should be washed down and any damage to the wax coating repaired. Ideally, a completely fresh coat should be applied. It would also be worth considering the use of such wax-based protection for injection into door panels, sills, box sections, etc., as an additional safeguard against rust damage where such protection is not provided by the vehicle manufacturer.

After washing paintwork, wipe off with a chamois leather to give an unspotted clear finish. A coat of clear protective wax polish, will give added protection against chemical pollutants in the air. If the paintwork sheen has dulled or oxidised, use a cleaner/polisher combination to restore the brilliance of the shine. This requires a little effort, but such dulling is usually caused because regular washing has been neglected. Care needs to be taken with metallic paintwork, as special non-abrasive cleaner/polisher is required to avoid damage to the finish.

Always check that the door and ventilator opening drain holes and pipes are completely clear so that water can be drained out. Bright work should be treated in the same way as paint work. Windscreens and windows can be kept clear of the smeary film that often appears, by using a glass cleaner. Never use any form of wax or other body or chromium polish on glass.

3 Upholstery and carpets - maintenance

Mats and carpets should be brushed or vacuum cleaned regularly to keep them free of grit. If they are badly stained remove them from the vehicle for scrubbing or sponging and make quite sure they are dry before refitting. Seats and interior trim panels can be kept clean by wiping with a damp cloth. If they do become stained (which can be more apparent on light coloured upholstery) use a little liquid detergent and a soft nail brush to scour the grime out of the grain of the material. Do not forget to keep the headlining clean in the same way as the upholstery. When using liquid cleaners inside the vehicle do not over-wet the surfaces being cleaned. Excessive damp could get into the seams and padded interior causing stains, offensive odours or even rot. If the inside of the vehicle gets wet accidentally it is worthwhile taking some trouble to dry it out properly, particularly where carpets are involved. Do not leave oil or electric heaters inside the vehicle for this purpose.

4 Minor body damage - repair

Repairs of minor scratches in bodywork

If the scratch is very superficial, and does not penetrate to the metal of the bodywork, repair is very simple. Lightly rub the area of the scratch with a paintwork renovator, to remove loose paint from the scratch and to clear the surrounding bodywork of wax polish. Rinse the area with clean water.

Apply touch-up paint to the scratch using a fine paint brush; continue to apply fine layers of paint until the surface of the paint in the scratch is level with the surrounding paintwork. Allow the new paint at least two weeks to harden: then blend it into the surrounding paintwork by rubbing the scratch area with a paintwork renovator or a very fine cutting paste and apply wax polish.

Where the scratch has penetrated right through to the metal of the bodywork, causing the metal to rust, a different repair technique is required. Remove any loose rust from the bottom of the scratch with a penknife, then apply rust inhibiting paint, to prevent the formation of rust in the future. Using a rubber or nylon applicator fill the scratch with bodystopper paste. If required, this paste can be mixed with cellulose thinners to provide a very thin paste that is ideal for filling narrow scratches. Before the stopper-paste in the scratch hardens, wrap a piece of smooth cotton rag around the top of a finger. Dip the finger in cellulose thinners and then quickly sweep it across the surface of the stopper-paste in the scratch; this will ensure that the surface of the stopper-paste is slightly hollowed. The scratch can now be painted over as described earlier in this Section.

Repair of dents in bodywork

When deep denting of the vehicle's bodywork has taken place, the first task is to pull the dent out, until the affected bodywork almost attains its original shape. There is little point in trying to restore the original shape completely, as the metal in the damaged area will have stretched on impact and cannot be reshaped fully to its original contour. It is better to bring the level of the dent up to a point that is about 8 in (3 mm) below the level of the surrounding bodywork. In cases where the dent is very shallow anyway, it is not worth trying to pull it out at all. If the underside of the dent is accessible, it can be hammered out gently from behind, using a mallet with a wooden or plastic head. Whilst doing this, hold a block of wood firmly against the outside of the panel to absorb the impact from the hammer blows and thus prevent a large area of the bodywork from being "belled-out".

Should the dent be in a section of the bodywork that has a double skin or some other factor making it inaccessible from behind, a different technique is called for. Drill several small holes through the metal inside the area particularly in the deeper section. Then screw long self-tapping screws into the holes just sufficiently for them to gain a good purchase in the metal. Now the dent can be pulled out by pulling on the protruding heads of the screws with a pair of pliers.

The next stage of the repair is the removal of the paint from the damaged area, and from an inch or so of the surrounding "sound" bodywork. This is accomplished most easily by using a wire brush or abrasive pad on a power drill, although it can be done just as effectively by hand using sheets of abrasive paper. To complete the preparation for filling, score the surface of the bare metal with a screwdriver or the tang of a file, or alternatively, drill small holes in the affected area. This will provide a good "key" for the filler paste.

To complete the repair see the Section on filling and re-spraying.

Repair of rust holes or gashes in bodywork

Remove all paint from the affected area and from an inch or so of the surrounding "sound" bodywork, using an abrasive pad or a wire brush on a power drill. If these are not available a few sheets of abrasive paper will do the job just as effectively. With the paint removed you will be able to gauge the severity of the corrosion and therefore decide whether to renew the whole panel (if this is possible) or to repair the affected area. New body panels are not as expensive as most people think and it is often quicker and more satisfactory to fit a new panel than to attempt to repair large areas of corrosion.

Remove all fittings from the affected area except those which will act as a guide to the original shape of the damaged bodywork (e.g. headlamp shells, etc.). Then, using tin snips or a hacksaw blade, remove all loose metal and any other metal badly affected by corrosion. Hammer the edges of the hole inwards to create a slight depression for the filler paste.

Wire brush the affected area to remove the powdery rust from the surface of the remaining metal. Paint the affected area with rust inhibiting paint. If the back of the rusted area is accessible treat this also.

Before filling can take place it will be necessary to block the hole in some way. This can be achieved by using aluminium or plastic mesh, or aluminium tape.

28.5 Front bumper retaining clips released from body

28.8A Remove the trim panel . . .

28.8B . . . to expose the bumper securing nuts

6 Carefully withdraw the bumper from the vehicle.

Refitting

7 Refitting is a reversal of removal.

Rear bumper

Removal

8 Remove the rear trim panel from the luggage compartment by prising up the top edge to release the clips, then lift the panel upwards to free it from the lower locating tags. The bumper retaining nuts are now exposed **(see illustrations)**.

9 Note that the bumper is removed as a complete assembly with its lower trim panel.

10 Disconnect the battery negative lead, then prise the number plate lamp from the bumper, and disconnect the wiring.

11 Unscrew the bumper retaining nuts, and recover the washers. On DOHC models, the bumper securing nuts are accessible from underneath the vehicle.

12 Where fitted, remove the special locking rivets, one each side, securing the bumper to the wheel arch.

13 Additional clips may be present on the underside of the bumper which must also be removed.

14 Release the bumper retaining clips at the front edges of the bumper by tapping the centre pin through the expanding clip, using a pin punch or similar. The pin will drop out as it is pushed through - recover it for refitting.

15 Push each end of the bumper towards the rear of the vehicle, then pull the end of the bumper from the rear wing.

29.1 Freeing a radiator grille panel retaining clip using a screwdriver

16 Carefully withdraw the bumper from the vehicle, taking care not to strain the number plate lamp wiring.

Refitting

17 Refitting is a reversal of removal. The expanding clips at the front edges of the bumper are secured by pushing the pin into the clip until flush.

29 Radiator grille panel - removal and refitting

All SOHC models

Removal

1 With the bonnet fully open and supported, pull the upper edge of the grille panel forwards and free the retaining clips using a screwdriver. Then lift the panel to release the lower locating lugs from their grommets in the lower body front panel **(see illustration)**.

Refitting

2 Refitting is a reversal of removal, but ensure that the lower locating lugs seat correctly in their grommets, and take care not to push the grommets from their holes in the body front panel.

DOHC and 1993-on models

Removal

3 Extract the three screws securing the grille panel to the body front panel, then lift the grille panel to release the lower locating lugs from their grommets in the lower body front panel.

Refitting

4 Refitting is a reversal of removal, with reference to paragraph 2.

30 Windscreen cowl panel - removal and refitting

Removal

1 Remove the wiper arms, referring to Chapter 12, if necessary.

2 Disconnect the washer fluid hose from the reservoir, and feed it through the cowl panel, noting its routing as a guide to refitting. Be prepared for fluid spillage.

3 Where applicable, disconnect the battery negative lead, then disconnect the underbonnet lamp wiring plug and feed it through the cowl panel, noting its routing as a guide to refitting.

4 Working from one end of the cowl panel, carefully prise the panel from the body. Care must be taken, as the panel is easily damaged.

Refitting

5 Refitting is a reversal of removal, ensuring that the panel is correctly seated along its length, and that the washer fluid hose, and where applicable the underbonnet lamp wiring, is correctly routed.

31 Wheel arch liners - general

1 The plastic wheel arch liners are secured by a combination of self-tapping screws and plastic clips. Removal and refitting is self explanatory, remembering the following points **(see illustration)**.

2 Some of the securing clips may be held in place using a central pin, which must be tapped out to release the clip.

3 The clips are easily broken during removal, and it is advisable to obtain a few spare clips for possible use when refitting.

31.1 Removing a wheel arch liner

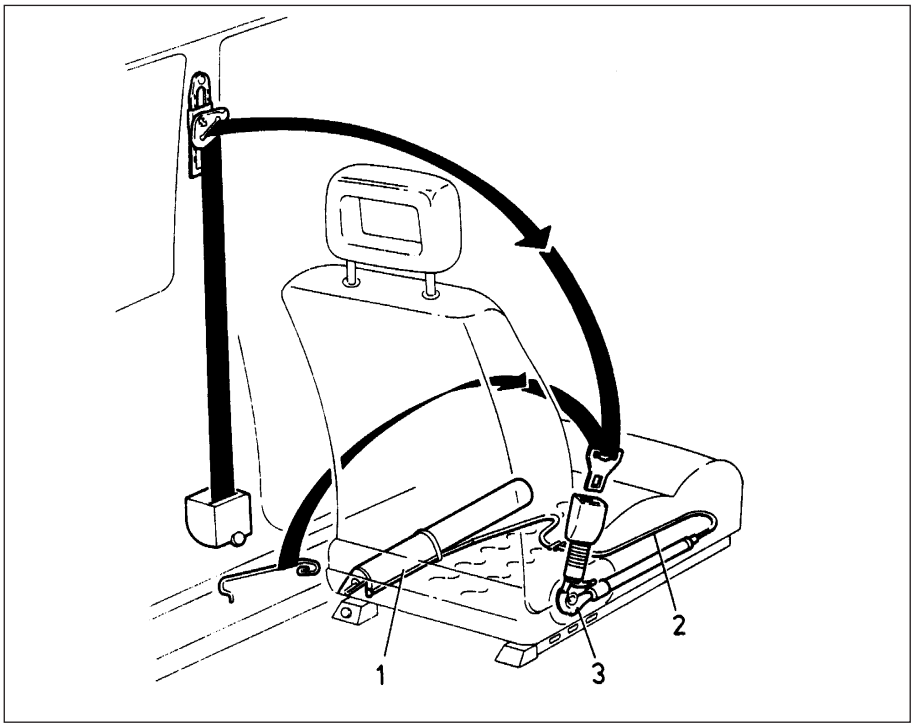
3 The tensioner assembly, fitted to the underside of the front seat, is maintenance free and, once triggered, must be replaced as a complete unit.
4 Due to the specialist safety related nature of the seat belt tensioner system, replacement must be entrusted to a suitably equipped Vauxhall dealer.

43 Front seats (with seat belt tensioners) - removal and refitting

Warning: The seat belt tensioners fitted to the front seat assemblies may cause injury if triggered inadvertently. Before carrying out any work on the front seats, a safety fork must be inserted into the seat belt tensioner cylinder, to prevent the possibility of the tensioner being triggered (see paragraphs 7 and 8 below). Seats should always be transported and installed with the safety fork in place. If a seat is to be disposed of, the tensioner must be triggered before the seat is removed from the vehicle, by inserting the safety fork, and striking the tensioner cylinder sharply with a hammer. If the tensioner has been triggered due to a sudden impact or accident, the unit must be renewed, as it cannot be reset. Due to safety considerations, tensioner renewal should be entrusted to a Vauxhall dealer.

Removal

1 Remove the single securing screw from the front edge of the outer seat rail trim, release the rear retaining lug and remove the trim rearwards.
2 Unclip the trim from the rear edge of the inner seat rail.



42.1 Mechanical seat belt tensioner system

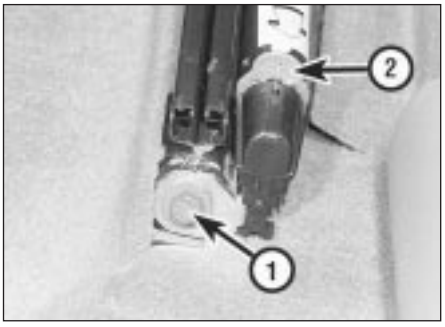
1 Spring *2 Bowden cable* *3 Fulcrum mechanism*

3 Locate the plastic safety fork for the seat belt tensioner, which is usually taped to the outside of the tensioner spring cylinder.
4 Insert the fork into the aperture provided at the rear of the spring cylinder, ensuring that the fork engages securely **(see illustration)**.
5 Remove the four bolts which secure the seat rails to the floor, then withdraw the seat complete with rails **(see illustration)**. Recover the washers and backplates.
6 Seek the advice of a Vauxhall dealer if there is any doubt about the condition of the seat belt tensioner assembly.

Refitting

7 Refitting is a reversal of removal. Note that the manufacturers recommend the use of new bolts to secure the seat rails to the floor. Tighten the bolts to the specified torque wrench settings (see Specifications) in the order - rear inner, front inner, rear outer, front outer.

43.4 Inserting the safety fork into the aperture in the seat belt tensioner spring cylinder



43.5 Front outer seat rail fixings
1 Securing bolt
2 Seat belt tensioner safety fork (inserted in the spring cylinder)

26 Headlamp aim adjustment motor - removal and refitting

Removal

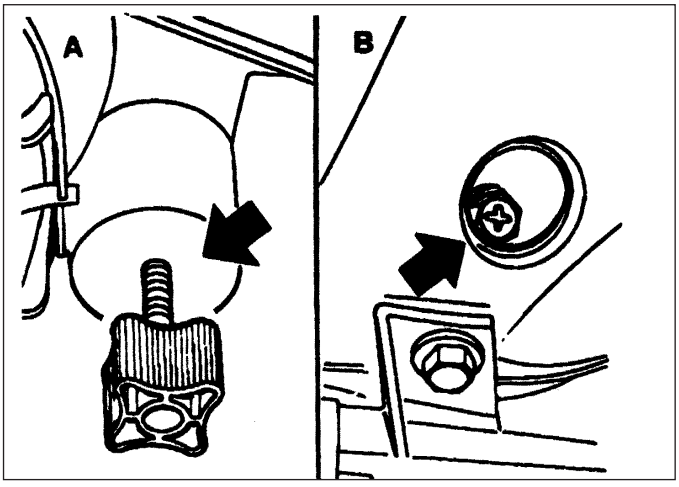
1 Remove the headlamp, (Section 25).
2 Twist the motor clockwise to release it from the headlamp, then carefully disconnect the motor from the balljoint **(see illustrations)**.

Refitting

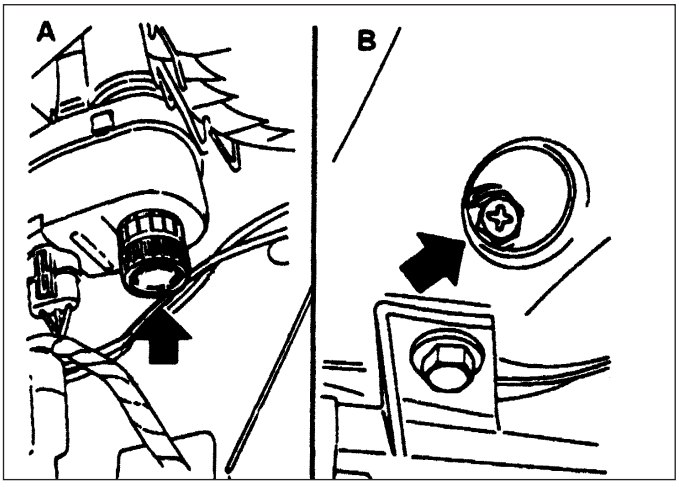
3 Refitting is a reversal of removal, but ensure that the motor is correctly engaged with the balljoint.

26.2A Headlamp aim adjustment motor (headlamp removed)

26.2B Headlamp aim adjuster balljoint (arrowed)



27.3A Headlamp alignment adjustment screws - models without electric aim adjustment
A Vertical adjustment screw B Horizontal adjustment screw



27.3B Headlamp alignment adjustment screws - models with electric aim adjustment
A Vertical adjustment screw B Horizontal adjustment screw

27 Headlamps - alignment

1 Correct alignment of the headlamp beams is most important, not only to ensure good vision for the driver, but also to protect other drivers from being dazzled.
2 Accurate alignment should be carried out using optical beam setting equipment.
3 In an emergency, adjustments may be made by turning the adjustment screws shown **(see illustrations)**. If an adjustment is made, the alignment should be checked using beam setting equipment at the earliest opportunity.
4 All 1992-on models are fitted with the headlamp aim adjustment system, operated through the facia-mounted switch **(see illustration)**.

a) Position '0', is for correct alignment if just the driving seat is occupied.
b) Position '1', if all seats are occupied.
c) Position '2', if all seats occupied and luggage.
d) Position '3', for just driver and luggage.

28 Headlamp dim-dip system - general, removal and refitting

General

1 The system (where fitted) is governed by the dim-dip control unit mounted either behind and above the glovebox (early models), or behind the main fuse panel (later models).
2 The control unit uses the oil pressure warning lamp circuit to ensure that, when the engine is running and the sidelamps are switched on, reduced current is fed to the headlamp dipped-beam circuits. This lights the headlamps with approximately one-sixth of their normal power so that the vehicle cannot be driven using sidelamps alone.
3 To locate the dim-dip control unit, open the main fuse panel covering flap and unclip it from its bottom and top mountings (Section 3). Then use a torch to see whether the unit is fastened to the plastic bracket behind the facia and fuse panel. The unit is usually rectangular, of black plastic, and can be identified by the colours of the five wires leading to it (see applicable wiring diagram).

27.4 The headlamp aim adjustment switch - 1992-on models

Removal

4 If the unit can be seen, remove the driver's side lower facia and footwell trim panels (Chapter 11), then unscrew the four retaining screws and lower the plastic bracket until the control unit can be detached.
5 If the unit cannot be seen, remove the glovebox assembly (Chapter 11). The unit will be fastened to the underside of the facia top surface.

Refitting

6 Refitting is the reverse of the removal procedure.

56 Airbag unit, drivers side - removal and refitting

Warning: Read warning at the beginning of Section 55, before starting work.

Note: *On power steering models in particular, it will be advantageous to jack up the front of the car and support it on axle stands placed under the body side members, so that the steering wheel can be turned more easily.*

Removal

1 Disconnect the battery negative lead and cover the battery terminal. Wait a minimum of 1 minute.
2 With the steering wheel positioned in the straight-ahead position, turn it 90° clockwise so that the left-hand spoke is accessible from the rear.
3 Using a Torx type socket, undo the first airbag retaining bolt from the rear of the steering wheel **(see illustration)**.
4 Turn the steering wheel 180° anti-clockwise so that the right-hand spoke is accessible from the rear.
5 Undo the second retaining bolt from the rear of the steering wheel.
6 Return the steering wheel to the straight-ahead position then carefully lift up the airbag unit.
7 Disconnect the wiring plug and remove the airbag from the car.

Warning: Stand the unit with the cover uppermost and do not expose it to heat sources in excess of 100ºC. Do not attempt to open or repair the airbag unit, or apply any voltage to it. Do not use any airbag unit that is visibly damaged or has been tampered with.

Refitting

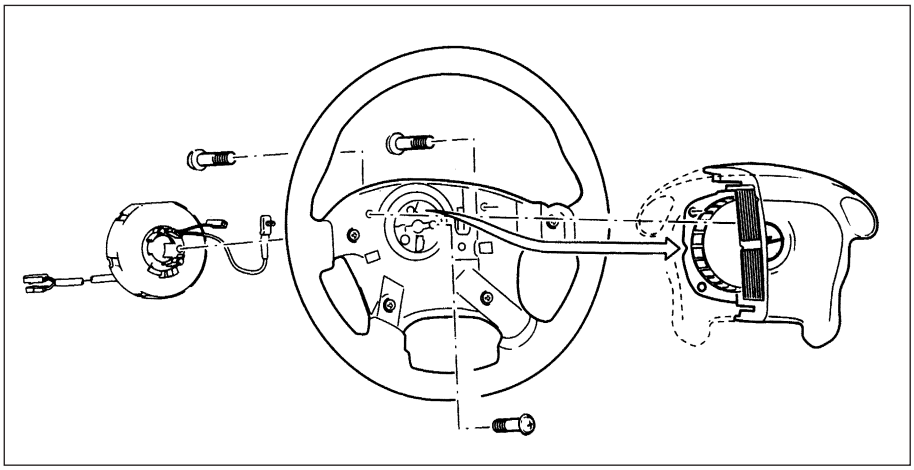
8 Refitting is a reversal of removal.

57 Steering wheel (with airbag) - removal and refitting

Note: *Read warning at the beginning of Section 55, before starting work. A two-legged puller will be required for this operation. Note also that the steering wheel is a very tight fit on the shaft.*

Removal

1 Remove the airbag unit as described previously.
2 Ensure that the steering wheel is in the straight ahead position.
3 From the centre of the steering wheel unscrew the two screws securing the airbag contact unit.

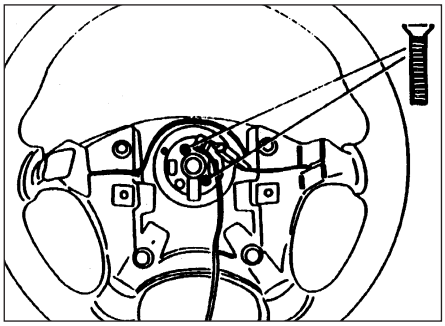


56.3 Airbag, steering wheel and contact unit details

4 Using a screwdriver, prise back the tabs on the lockwasher securing the steering wheel retaining nut.
5 Unscrew and remove the steering wheel retaining nut and the lockwasher.
6 Make alignment marks between the steering wheel and the end of the column shaft.
7 A suitably small two-legged puller must now be fitted to the steering wheel in order to pull it from the column shaft.
8 Once the steering wheel has been released from the column shaft, disconnect the horn wiring and remove the steering wheel.

Refitting

9 Begin refitting by positioning the steering wheel on the column shaft, ensuring that the marks made on removal are aligned, and that the wheel correctly engages with the airbag contact unit. It may be necessary to tap the steering wheel fully home on the column shaft using a metal tube and socket.
10 Reconnect the horn wiring.
11 Refit the lockwasher and the steering wheel retaining nut, and tighten the nut to the specified torque. Bend up the lockwasher to secure.
12 Refit the two screws securing the airbag contact unit.
13 Refit the airbag as described previously.



58.3 Airbag contact unit retaining screws

58 Airbag contact unit - removal and refitting

Note: *Read warning at the beginning of Section 55, before starting work.*

Removal

1 Remove the airbag and the steering wheel as described previously.
2 Remove the steering column upper and lower shrouds, referring to Chapter 10, if necessary.
3 Disconnect the contact unit wiring plug below the steering column and withdraw the contact unit from the column, noting its fitted position as a guide to reassembly **(see illustration)**.

Refitting

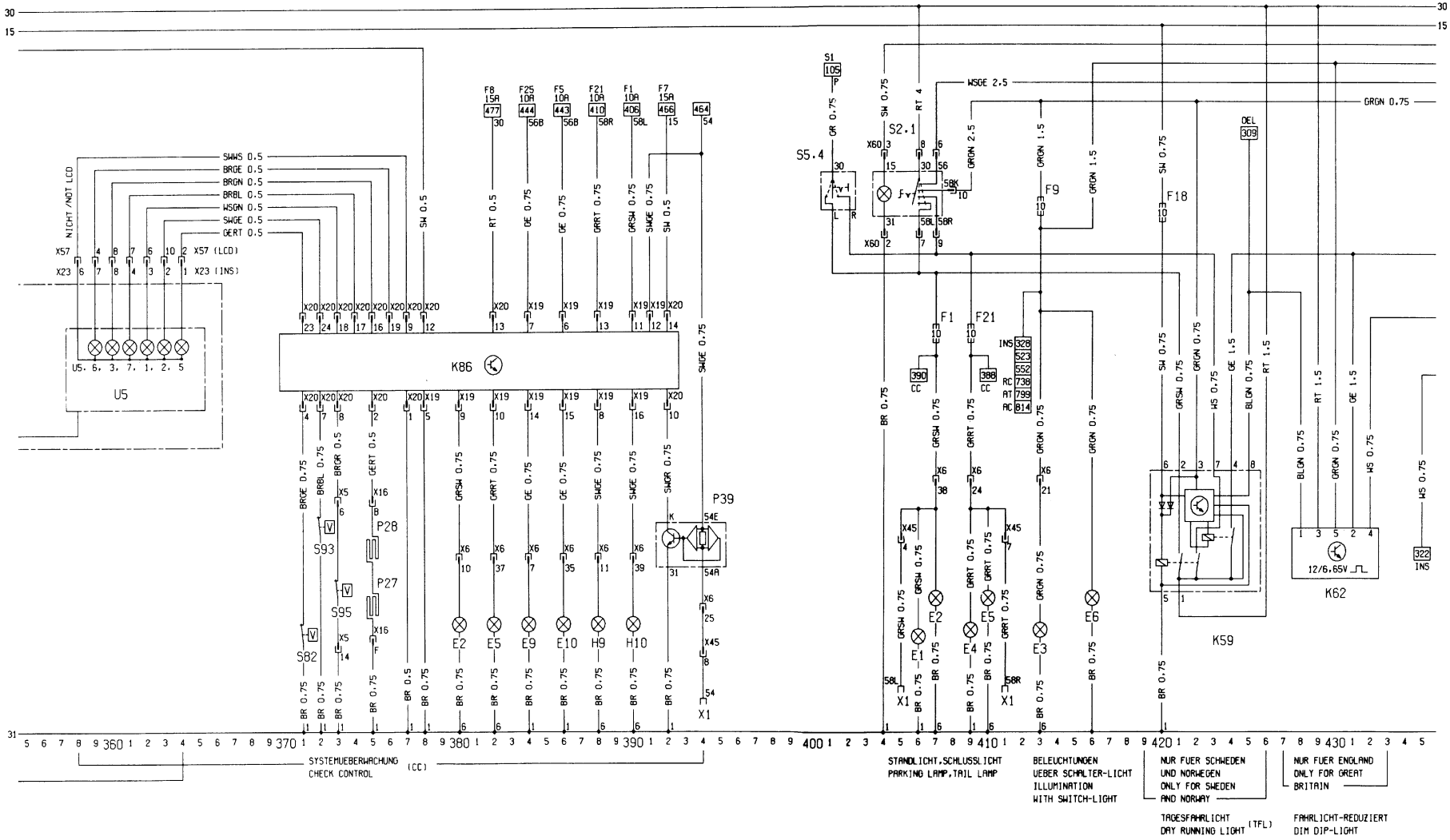
4 Before refitting the contact unit, ensure that the front wheels are in the straight-ahead position.
5 Place the contact unit on the column in the correct position as noted during removal.
6 Route the wiring harness under the steering column lock/ignition switch and connect the wiring plug.
7 Refit the steering column shrouds.
8 Refit the steering wheel and airbag as described previously.

59 Airbag unit, passengers side - removal and refitting

Note: *Read warning at the beginning of Section 55, before starting work.*

Removal

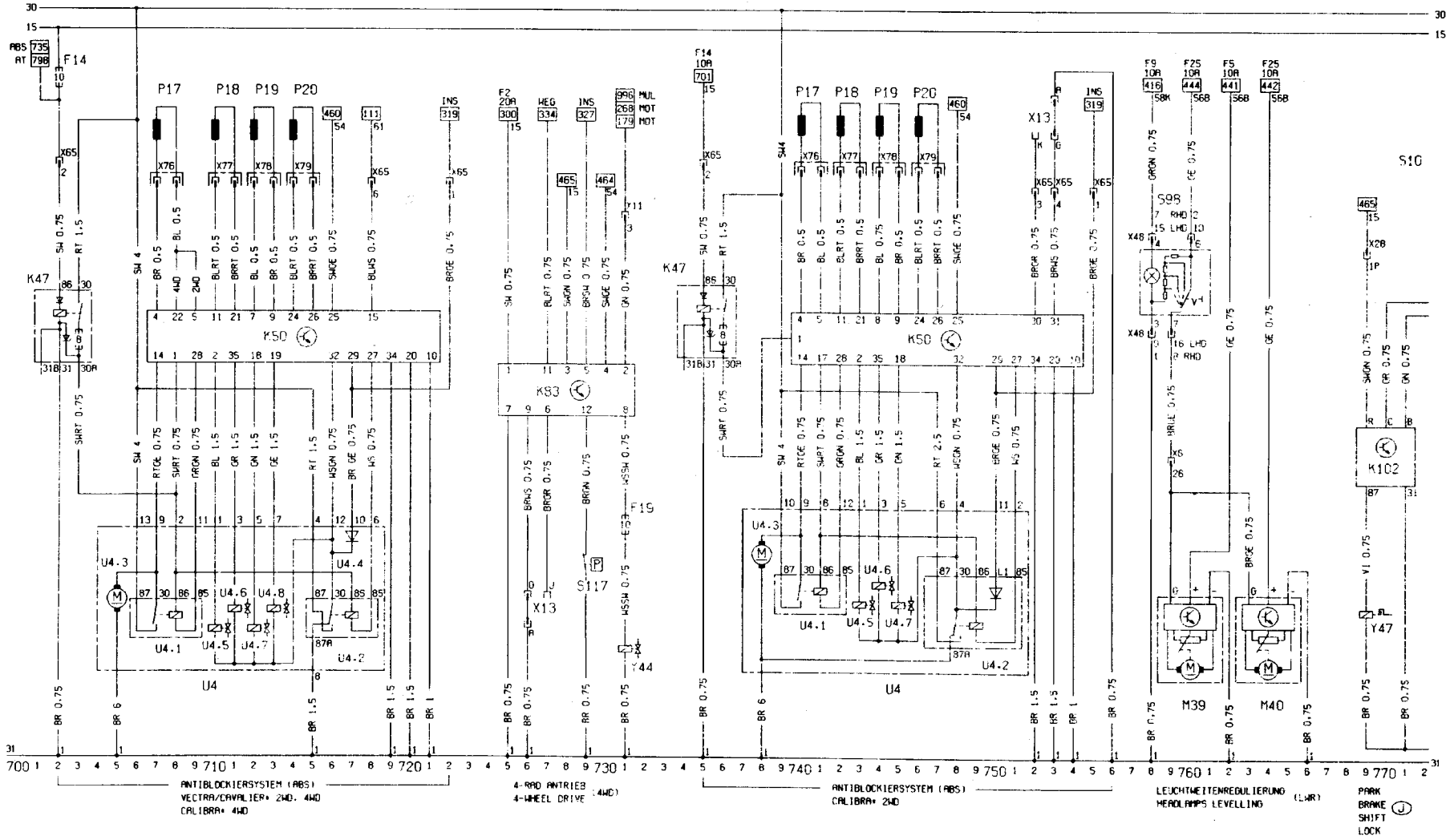
1 Disconnect the battery, cover the terminals and wait at least 1 minute.
2 Remove the glovebox assembly. Refer to Chapter 11, for further details if necessary.
3 Remove the right hand ventilation air duct.



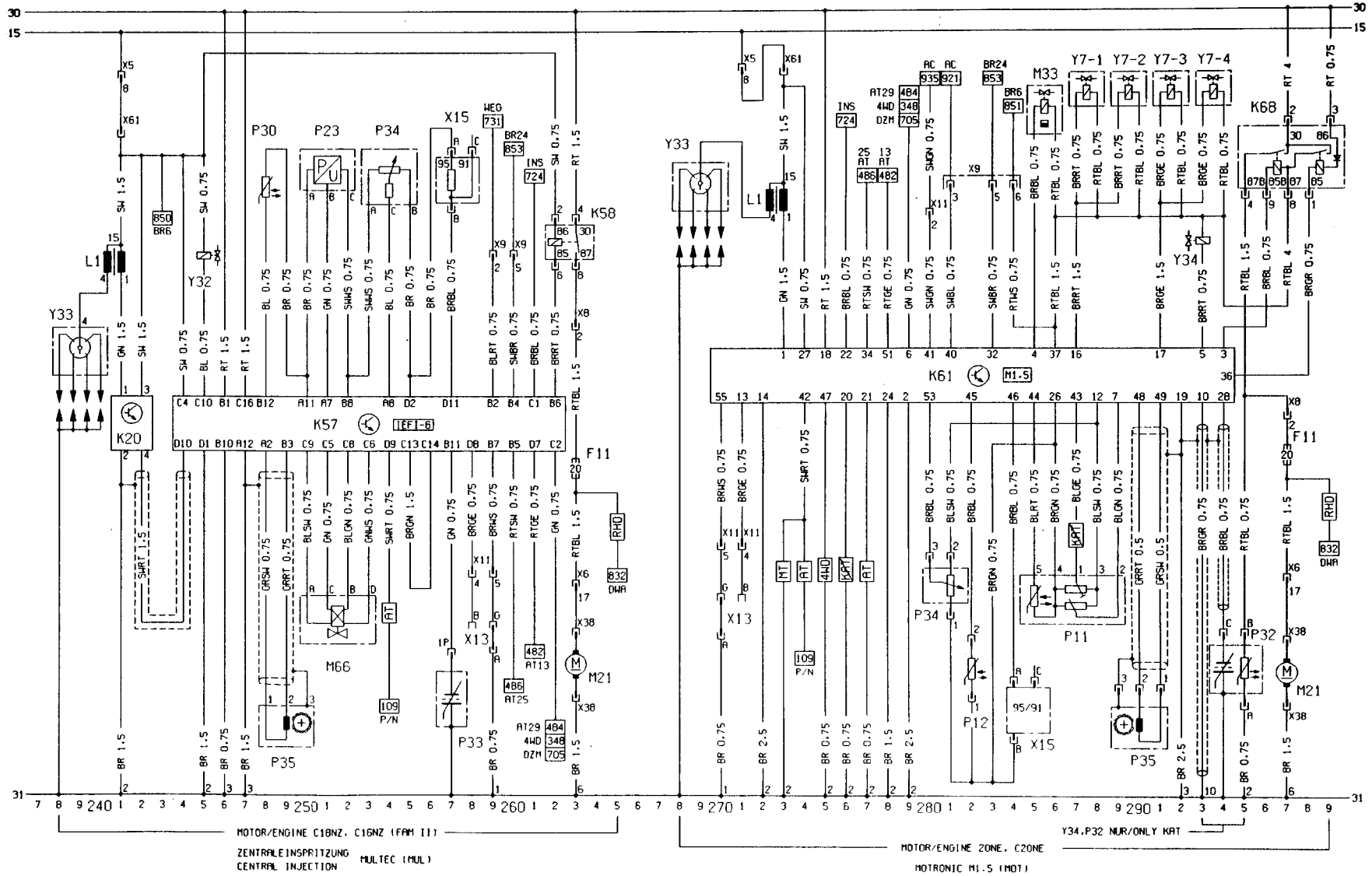
Wiring diagram for 1989 models (continued)

Key to wiring diagrams for 1991 models (continued)

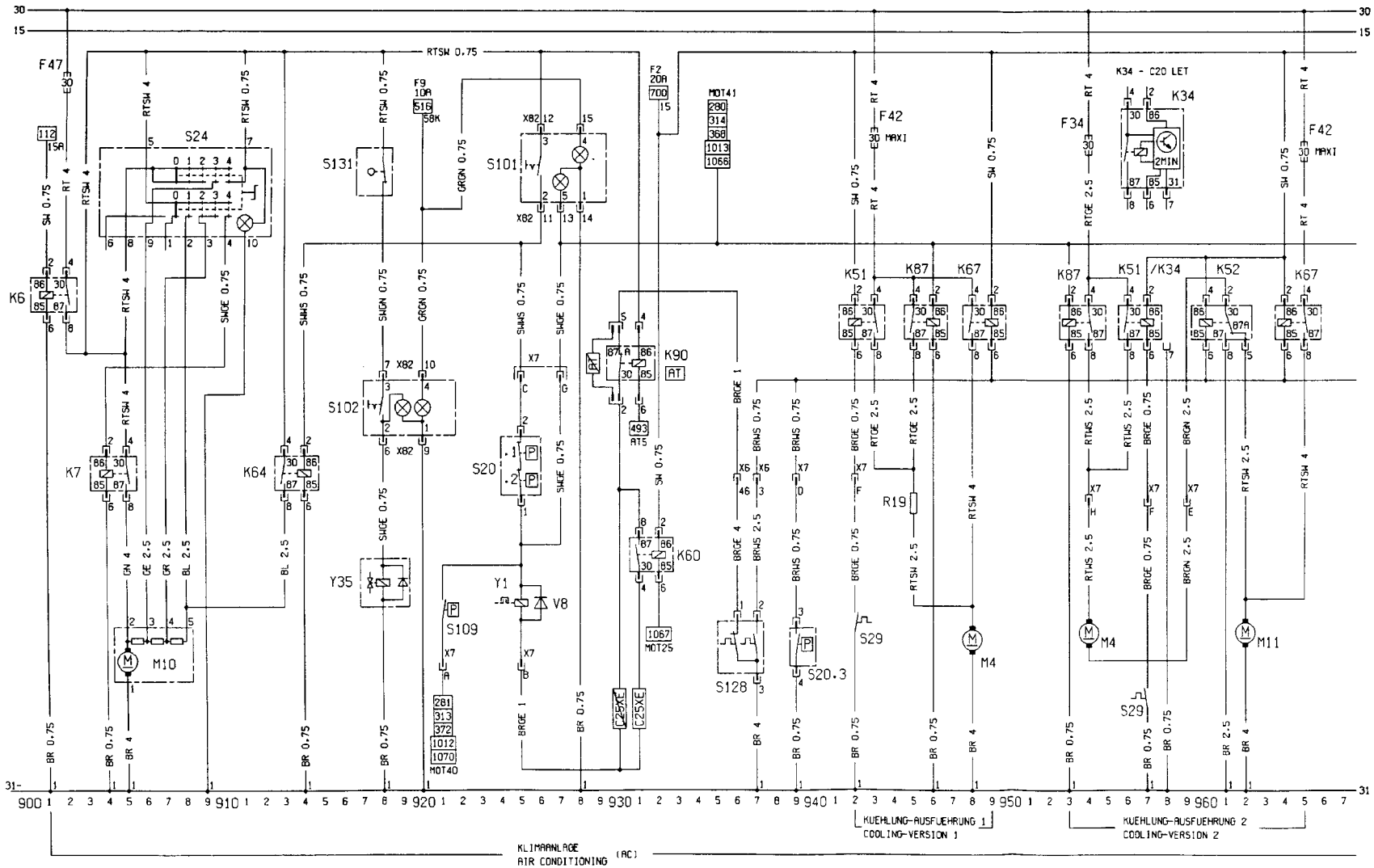
No	Description	Track
S1.2	Key contact switch	586
S2.1	Lighting switch	404 to 407
S2.2	Courtesy lamp switch	487
S2.3	Instrument illumination lamp dimmer	328
S3	Heater blower switch	853 to 860
S4	Heated rear window and mirror switch	554 to 556
S5.2	Dipped beam switch	438 to 439
S5.3	Direction indicator switch	480 to 482
S5.4	Sidelamp switch	401 to 402
S7	Reversing lamp switch	497
S8	Brake lamp switch	462
S9.2	Windscreen wiper interval switch	501 to 504
S9.5	Rear window washer/wiper switch	514 to 516
S10	Automatic transmission starter inhibitor switch	773 to 779
S11	Brake fluid level warning sensor	31
S13	Handbrake-on warning switch	315
S14	Oil pressure switch	310
S15	Luggage compartment lamp switch	485
S17	Passenger door courtesy lamp switch	490
S21	Front fog lamp switch	450 to 452
S22	Rear foglamp switch	455 to 457
S24	Air conditioning blower motor switch	804 to 811
S27	Air conditioning compressor low-pressure switch	821
S28	Air conditioning compressor high-pressure switch	821
S29	Cooling fan switch	113
S30	Driver's seat heater switch	560 to 562
S31	Rear door courtesy lamp switch - left	491
S32	Rear door courtesy lamp switch - right	491
S37	Driver's door electric window switch assembly	668 to 694
S37.1	Electric window switch - front left	668 to 670
S37.2	Electric window switch - front right	686 to 688
S37.3	Electric window switch - rear left	674 to 676
S37.4	Electric window switch - rear right	692 to 694
S37.5	Electric window safety cut-out switch	672 to 673
S37.6	Electric window anti-jam switch	690
S37.7	Electric window automatic control	677 to 682
S39	Electric window switch - rear left door	678 to 680
S40	Electric window switch - rear right door	696 to 698
S41	Central locking switch - driver's door	601 to 603
S42	Central locking switch - passenger door	605
S44	Throttle position sensor	278 to 279
S47	Driver's door courtesy lamp switch	493 to 494
S52	Hazard warning flasher switch	469 to 474
S55	Passenger seat heater switch	564 to 566
S57	Sunroof switch	864 to 869, 872 to 877
S63.1	Trip computer function reset switch	656
S63.2	Trip computer clock hours adjustment switch	657
S63.3	Trip computer function select switch	658
S63.5	Trip computer clock minutes adjustment switch	659
S64	Horn switch	592, 595
S68.1	Door mirror adjustment switch	538 to 540, 945 to 950
S68.3	Door mirror left/right selector switch	537 to 541, 946 to 950
S68.4	Door mirror parking position switch	952
S76	Air conditioning compressor switch - high-pressure fan	827
S82	Washer pump switch	347, 392
S88	Cooling fan switch	115 to 116, 935 to 936
S93	Coolant level sensor	348, 393
S95	Oil level sensor	349, 394
S98	Headlamp aim adjustment switch	758 to 760
S99	Electric window switch - driver's door	685
S100	Electric window switch - passenger door	683
S101	Air conditioning compressor switch	822 to 824
S102	Air conditioning circulation switch	816 to 818
S104	Automatic transmission kickdown switch	794
S105	Automatic transmission "Winter" mode button	796 to 798
S106	Automatic transmission "Economy/Sport" mode button	793
S109	Air conditioning compressor switch	818
S115	Automatic transmission coolant temperature switch	788 to 789
S116	Brake lamp switch	464 to 465
S117	Four-wheel-drive hydraulic pressure switch	729
S119	Air conditioning refrigerant temperature switch	829, 843
S120	Anti-theft alarm bonnet switch	635
S127	Central locking switch - tailgate (Calibra models)	630
S128	Air conditioning refrigerant temperature cooling switch	825 to 826
S131	Air conditioning defroster lever limit switch	815
U2	Trip computer	651 to 662
U4	ABS hydraulic modulator assembly	705 to 718, 738 to 751
U4.1	ABS hydraulic pump relay	706 to 709, 739 to 742
U4.2	ABS solenoid valves relay	715 to 718, 747 to 751
U4.3	ABS hydraulic pump	705, 738
U4.4	ABS diode	717
U4.5	ABS solenoid valve - front left	710, 743
U4.6	ABS solenoid valve - front right	711, 744
U4.7	ABS solenoid valve - rear left	712, 745
U4.8	ABS solenoid valve - rear right	713
U5	Check control display	347 to 355
U5.1	Check control washer fluid level warning lamp	352
U5.2	Check control oil level warning lamp	351
U5.3	Check control coolant level warning lamp	350
U5.4	Check control tail lamp and dipped beam bulb failure warning lamp	349
U5.5	Check control brake lamp bulb failure warning lamp	348
U5.6	Check control brake wear warning lamp	347
U6	LCD instruments	
U6.1	Check control washer fluid level warning lamp	392
U6.2	Check control oil level warning lamp	394
U6.3	Check control coolant level warning lamp	393
U6.4	Check control tail lamp and dipped beam bulb failure warning lamp	391
U6.5	Check control brake lamp bulb failure warning lamp	395
U6.6	Check control brake pad wear warning lamp	396
U12.1	Temperature switch (Diesel models)	898, 931
U12.2	Fuel filter heater (Diesel models)	899, 932
U13	AF 14/20 automatic transmission	782 to 786
U13.1	Solenoid - 1/2 and 3/4 shift up	782
U13.2	Solenoid - 2/3 shift up	783
U13.3	Solenoid - converter lock-up control	784
U13.4	Solenoid - main fluid pressure control	785
V1	Brake fluid level warning lamp test diode	312
V8	Air conditioning compressor diode	820
Y1	Air conditioning compressor clutch	821
Y4	Headlamp washer solenoid valve	520
Y5	Fuel solenoid valve (Diesel models)	893, 928
Y7	Fuel injectors	187 to 194, 280 to 287
Y10	Distributor (Hall-effect)	246 to 251
Y23	Distributor (inductive discharge)	123 to 127
Y24	Distributor (inductive discharge)	129 to 136
Y25	Idle-up solenoid valve (automatic transmission)	242
Y30	Cold start valve (Diesel models)	896
Y32	Fuel injector	140, 979
Y33	Distributor	170, 262, 972 to 974
Y34	Fuel tank vent valve	193, 292
Y35	Air conditioning circulation solenoid valve	816
Y44	Four-wheel-drive solenoid valve	731
Y47	Parking brake lock lifting magnet (automatic transmission)	769
X13	Diagnostic equipment connector	149, 170 to 171, 254 to 255, 269 to 270, 325, 339 to 340, 752 to 753, 774 to 775, 992 to 993
X15	Octane coding plug	160, 184 to 185, 248 to 249, 990 to 991
X54	Ignition coding plug	270 to 271
X1 on	Wiring connectors	Various



Wiring diagram for 1991 models (continued)



Wiring diagram for 1992-on models (continued)



Wiring diagram for 1992-on models (continued)

Special tools

The tools in this list are those which are not used regularly, are expensive to buy, or which need to be used in accordance with their manufacturers' instructions. Unless relatively difficult mechanical jobs are undertaken frequently, it will not be economic to buy many of these tools. Where this is the case, you could consider clubbing together with friends (or joining a motorists' club) to make a joint purchase, or borrowing the tools against a deposit from a local garage or tool hire specialist. It is worth noting that many of the larger DIY superstores now carry a large range of special tools for hire at modest rates.

The following list contains only those tools and instruments freely available to the public, and not those special tools produced by the vehicle manufacturer specifically for its dealer network. You will find occasional references to these manufacturers' special tools in the text of this manual. Generally, an alternative method of doing the job without the vehicle manufacturers' special tool is given. However, sometimes there is no alternative to using them. Where this is the case and the relevant tool cannot be bought or borrowed, you will have to entrust the work to a dealer.

☐ *Valve spring compressor*
☐ *Valve grinding tool*
☐ *Piston ring compressor*
☐ *Piston ring removal/installation tool*
☐ *Cylinder bore hone*
☐ *Balljoint separator*
☐ *Coil spring compressors (where applicable)*
☐ *Two/three-legged hub and bearing puller*
☐ *Impact screwdriver*
☐ *Micrometer and/or vernier calipers*
☐ *Dial gauge*
☐ *Stroboscopic timing light*
☐ *Dwell angle meter/tachometer*
☐ *Universal electrical multi-meter*
☐ *Cylinder compression gauge*
☐ *Hand-operated vacuum pump and gauge*
☐ *Clutch plate alignment set*
☐ *Brake shoe steady spring cup removal tool*
☐ *Bush and bearing removal/installation set*
☐ *Stud extractors*
☐ *Tap and die set*
☐ *Lifting tackle*
☐ *Trolley jack*

Buying tools

Reputable motor accessory shops and superstores often offer excellent quality tools at discount prices, so it pays to shop around.

Remember, you don't have to buy the most expensive items on the shelf, but it is always advisable to steer clear of the very cheap tools. Beware of 'bargains' offered on market stalls or at car boot sales. There are plenty of good tools around at reasonable prices, but always aim to purchase items which meet the relevant national safety standards. If in doubt, ask the proprietor or manager of the shop for advice before making a purchase.

Care and maintenance of tools

Having purchased a reasonable tool kit, it is necessary to keep the tools in a clean and serviceable condition. After use, always wipe off any dirt, grease and metal particles using a clean, dry cloth, before putting the tools away. Never leave them lying around after they have been used. A simple tool rack on the garage or workshop wall for items such as screwdrivers and pliers is a good idea. Store all normal spanners and sockets in a metal box. Any measuring instruments, gauges, meters, etc, must be carefully stored where they cannot be damaged or become rusty.

Take a little care when tools are used. Hammer heads inevitably become marked, and screwdrivers lose the keen edge on their blades from time to time. A little timely attention with emery cloth or a file will soon restore items like this to a good finish.

Working facilities

Not to be forgotten when discussing tools is the workshop itself. If anything more than routine maintenance is to be carried out, a suitable working area becomes essential.

It is appreciated that many an owner-mechanic is forced by circumstances to remove an engine or similar item without the benefit of a garage or workshop. Having done this, any repairs should always be done under the cover of a roof.

Wherever possible, any dismantling should be done on a clean, flat workbench or table at a suitable working height.

Any workbench needs a vice; one with a jaw opening of 100 mm is suitable for most jobs. As mentioned previously, some clean dry storage space is also required for tools, as well as for any lubricants, cleaning fluids, touch-up paints etc, which become necessary.

Another item which may be required, and which has a much more general usage, is an electric drill with a chuck capacity of at least 8 mm. This, together with a good range of twist drills, is virtually essential for fitting accessories.

Last, but not least, always keep a supply of old newspapers and clean, lint-free rags available, and try to keep any working area as clean as possible.

Micrometer set

Dial test indicator ("dial gauge")

Stroboscopic timing light

Compression tester

Stud extractor set

Braking system

Note: *Before assuming that a brake problem exists, make sure that the tyres are in good condition and correctly inflated, that the front wheel alignment is correct, and that the vehicle is not loaded with weight in an unequal manner. Apart from checking the condition of all pipe and hose connections, any faults occurring on the anti-lock braking system should be referred to a Peugeot dealer for diagnosis.*

Vehicle pulls to one side under braking

- ☐ Worn, defective, damaged or contaminated brake pads/shoes on one side (Chapters 1 and 9).
- ☐ Seized or partially seized front brake caliper/wheel cylinder piston (Chapters 1 and 9).
- ☐ A mixture of brake pad/shoe lining materials fitted between sides (Chapters 1 and 9).
- ☐ Brake caliper or backplate mounting bolts loose (Chapter 9).
- ☐ Worn or damaged steering or suspension components (Chapters 1 and 10).

Noise (grinding or high-pitched squeal) when brakes applied

- ☐ Brake pad or shoe friction lining material worn down to metal backing (Chapters 1 and 9).
- ☐ Excessive corrosion of brake disc or drum. This may be apparent after the vehicle has been standing for some time (Chapters 1 and 9).
- ☐ Foreign object (stone chipping, etc.) trapped between brake disc and shield (Chapters 1 and 9).

Excessive brake pedal travel

- ☐ Inoperative rear brake self-adjust mechanism - drum brakes (Chapters 1 and 9).
- ☐ Faulty master cylinder (Chapter 9).
- ☐ Air in hydraulic system (Chapters 1 and 9).
- ☐ Faulty vacuum servo unit (Chapter 9).

Brake pedal feels spongy when depressed

- ☐ Air in hydraulic system (Chapters 1 and 9).
- ☐ Deteriorated flexible rubber brake hoses (Chapters 1 and 9).
- ☐ Master cylinder mounting nuts loose (Chapter 9).
- ☐ Faulty master cylinder (Chapter 9).

Excessive brake pedal effort required to stop vehicle

- ☐ Faulty vacuum servo unit (Chapter 9).
- ☐ Disconnected, damaged or insecure brake servo vacuum hose (Chapter 9).
- ☐ Primary or secondary hydraulic circuit failure (Chapter 9).
- ☐ Seized brake caliper or wheel cylinder piston(s) (Chapter 9).
- ☐ Brake pads or brake shoes incorrectly fitted (Chapters 1 and 9).
- ☐ Incorrect grade of brake pads or brake shoes fitted (Chapters 1 and 9).
- ☐ Brake pads or brake shoe linings contaminated (Chapters 1 and 9).

Judder felt through brake pedal or steering wheel when braking

- ☐ Excessive run-out or distortion of discs/drums (Chapters 1 and 9).
- ☐ Brake pad or brake shoe linings worn (Chapters 1 and 9).
- ☐ Brake caliper or brake backplate mounting bolts loose (Chapter 9).
- ☐ Wear in suspension or steering components or mountings (Chapters 1 and 10).

Brakes binding

- ☐ Seized brake caliper or wheel cylinder piston(s) (Chapter 9).
- ☐ Incorrectly adjusted handbrake mechanism (Chapter 9).
- ☐ Faulty master cylinder (Chapter 9).

Rear wheels locking under normal braking

- ☐ Rear brake shoe linings contaminated (Chapters 1 and 9).
- ☐ Faulty brake pressure regulator (Chapter 9).

Suspension and steering

Note: *Before diagnosing suspension or steering faults, be sure that the trouble is not due to incorrect tyre pressures, mixtures of tyre types, or binding brakes.*

Vehicle pulls to one side

- ☐ Defective tyre (Chapter 1).
- ☐ Excessive wear in suspension or steering components (Chapters 1 and 10).
- ☐ Incorrect front wheel alignment (Chapter 10).
- ☐ Accident damage to steering or suspension components (Chapter 1).

Wheel wobble and vibration

- ☐ Front roadwheels out of balance (vibration felt mainly through the steering wheel), (Chapters 1 and 10).
- ☐ Rear roadwheels out of balance (vibration felt throughout the vehicle), (Chapters 1 and 10).
- ☐ Roadwheels damaged or distorted (Chapters 1 and 10).
- ☐ Faulty or damaged tyre (Chapter 1).
- ☐ Worn steering or suspension joints, bushes or components (Chapters 1 and 10).
- ☐ Wheel bolts loose (Chapters 1 and 10).

Excessive pitching and/or rolling around corners, or during braking

- ☐ Defective shock absorbers (Chapters 1 and 10).
- ☐ Broken or weak spring and/or suspension component (Chapters 1 and 10).
- ☐ Worn or damaged anti-roll bar or mountings (Chapter 10).

Wandering or general instability

- ☐ Incorrect front wheel alignment (Chapter 10).
- ☐ Worn steering or suspension joints, bushes or components (Chapters 1 and 10).
- ☐ Roadwheels out of balance (Chapters 1 and 10).
- ☐ Faulty or damaged tyre (Chapter 1).
- ☐ Wheel bolts loose (Chapters 1 and 10).
- ☐ Defective shock absorbers (Chapters 1 and 10).

Excessively stiff steering

- ☐ Lack of steering gear lubricant (Chapter 10).
- ☐ Seized track rod end balljoint or suspension balljoint (Chapters 1 and 10).
- ☐ Broken or incorrectly adjusted auxiliary drivebelt - power steering (Chapter 1).