TR7
TR8
ROVER 3500

TRIUMPH FUEL INJECTION

NORTH AMERICAN SPECIFICATION — 1981 MODEL YEAR

EMISSION AND EVAPORATIVE LOSS CONTROL EQUIPMENT
AND
MAINTENANCE INFORMATION

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EMISSION AND EVAPORATIVE LOSS CONTROL SYSTEMS

All Rover-Triumph models entering the North American markets incorporate emission control systems. These systems enable the vehicles to conform with all current Regulations governing the emission of hydrocarbons, carbon monoxide, nitric oxide and the emission of fuel, by evaporation, from the fuel system.

Fuel

CAUTION: It is essential that unleaded fuels are used in these vehicles otherwise serious damage will be caused to the catalytic converter and the oxygen sensor(s) fitted in the exhaust system.

Emission Control Systems – Servicing

The importance of servicing at the correct intervals cannot be over-stressed, as improvements in design and manufacturing techniques count for nothing if the servicing standards are not upheld.

Routine servicing, carried out at the mileage intervals quoted in the 'Maintenance Summary', helps to prevent deterioration of the systems.
It is recommended that all servicing, particularly of the emission and evaporative loss control systems, be carried out by skilled and competent personnel.

After any attention to these systems, or after a change to the engine settings, it is essential that the exhaust emission levels are checked using suitable equipment.

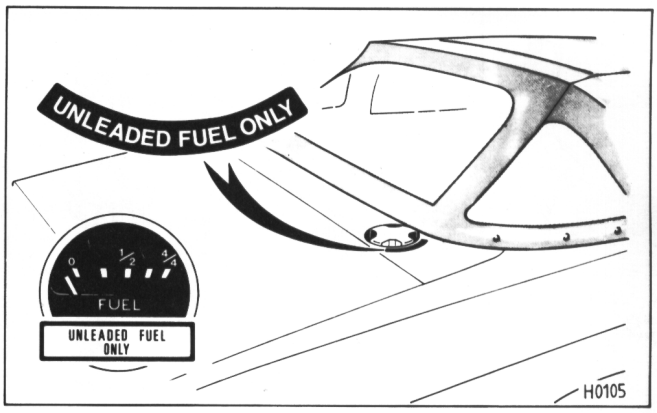

Fig. 1 TR7 and TR8 Fuel Instructions

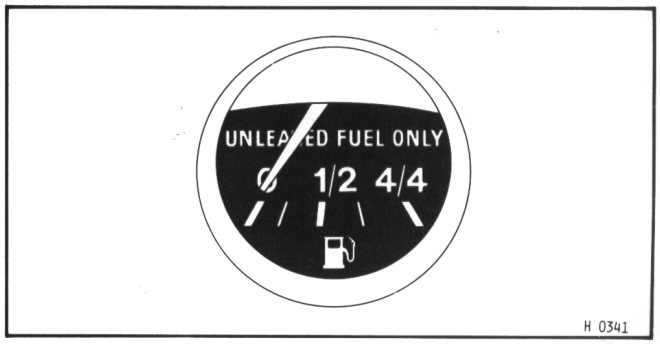

Fig. 2 Rover 3500 Fuel Instructions

EMISSION AND EVAPORATIVE LOSS CONTROL SYSTEMS

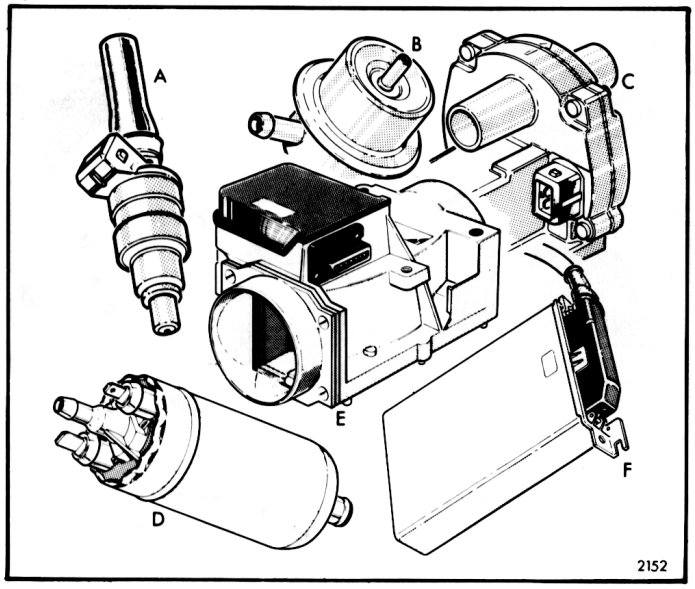

Fig. 3 Main electronic fuel injection system components

Electronic Fuel Injection

In conventional carburetter fuel systems, fuel mixes with the air stream entering the engine combustion chambers by means of fixed and/or variable jets in the carburetter(s). Despite advances in design, the carburetter is not a totally efficient means of dispensing fuel for all the many and varied engine operating conditions, particularly when stringent exhaust emission levels must be met. For this reason an electronic fuel injection system is fitted to these models.

Key to Fig. 3

(A) Fuel injector
(B) Fuel pressure regulator
(C) Extra Air Valve
(D) Fuel pump
(E) Air Flow Meter
(F) Electronic control unit

Fuel Injection System

Fuel is drawn from a tank at the rear of the vehicle and pressurised to approximately 2,5 kgf/cm' (36 lbf/in') by an electric fuel pump located beneath the car floor. The fuel pump will only operate when the ignition and/or the starter motor circuits are energised. From this pump fuel passes through fuel filters located in the engine compartment (Rover 3500) or beneath the car floor (TR models) to a pressure regulator, the spring chamber of which is connected to the engine intake manifold. As a result, the difference between the intake manifold pressure and the fuel pressure is held constant, excess fuel being returned to the fuel tank via an anti-surge chamber.

A fuel rail links the pressure regulator with the fuel injectors, one injector being fitted into each inlet manifold spur. The injectors may be either 'open' or 'closed' and are solenoid operated. The injector solenoids are energised through a relay actuated by the ignition circuit and are pulsed to 'open' by the electronic control unit (E.C.U.) completing the circuit to 'earth'. When 'open' the injectors spray fuel into the inlet manifold to be drawn into the engine cylinders at the next induction stroke of the working cycle.

Therefore there needs to be no fixed relationship between the injector timing and the engine ignition or valve timing.

The injectors are programmed to 'open' in banks of four, in unison, twice per engine operating cycle (two revolutions). On eight cylinder engines the two banks of four injectors operate alternately. The time that the injectors are 'open' governs the amount of fuel supplied to the engine and this 'open' time is computed by the electronic control unit from the input it receives from various sensors.

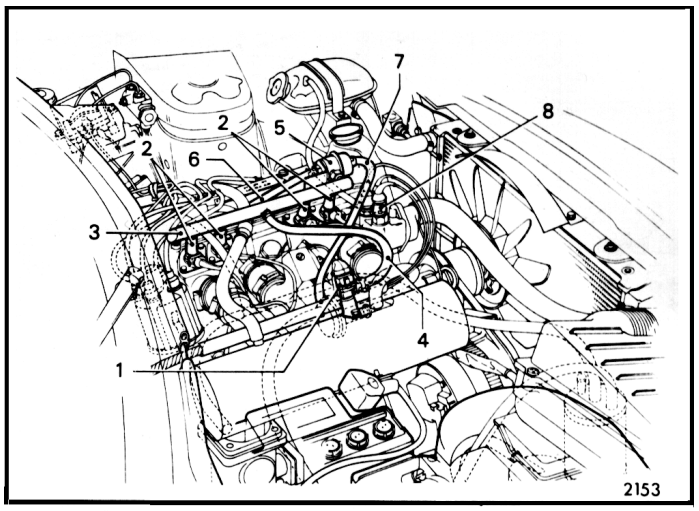

Fig. 4 TR7 Fuel injection system components

Key to Fig. 4

(1) Cold start injector
(2) Injectors
(3) Fuel rail
(4) Cold start injector – fuel feed pipe
(5) Fuel pressure regulator
(6) Return line to fuel tank
(7) Pipe to plenum chamber
(8) Thermo time switch

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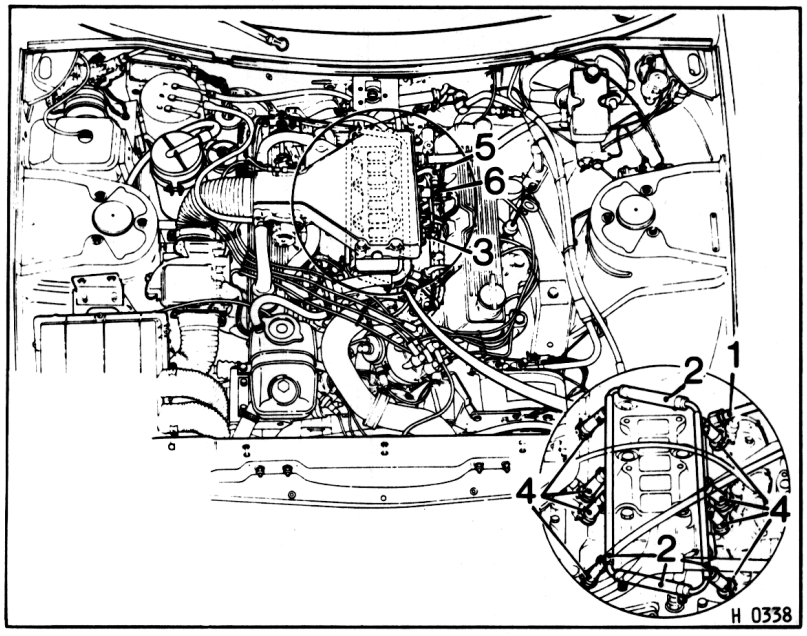

Fig. 5 TR8 Fuel injection system components

(1) Fuel feed pipe from tank
(2) Fuel rail
(3) Manifold depression to pressure regulator pipe
(4) Injectors
(5) Cold start injector fuel feed pipe
(6) Cold start injector

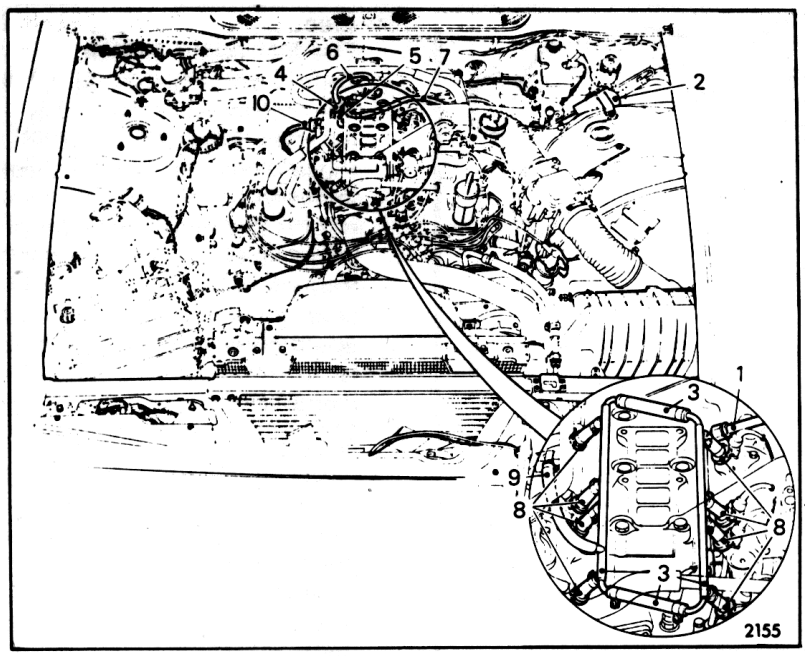

Fig. 6 Rover 3500 Fuel injection system components

(1) Fuel feed pipe from tank
(2) Fuel filter(s)
(3) Fuel rail
(4) Pressure regulator
(5) Fuel inlet to pressure regulator
(6) Manifold depression to pressure regulator pipe
(7) Excess fuel return to tank from pressure regulator
(8) Injectors
(9) Cold start injector fuel feed pipe
(10) Cold start injector

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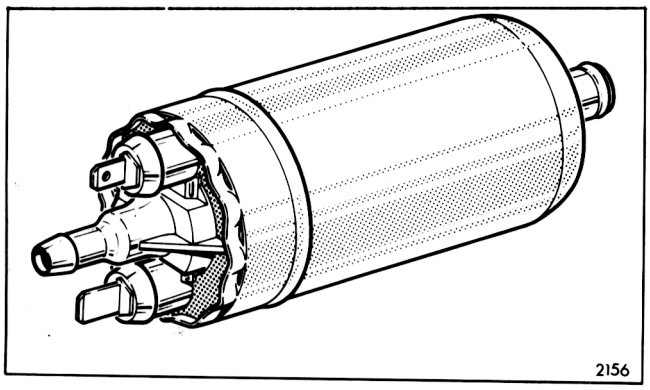

Fig. 7 Electric fuel pump

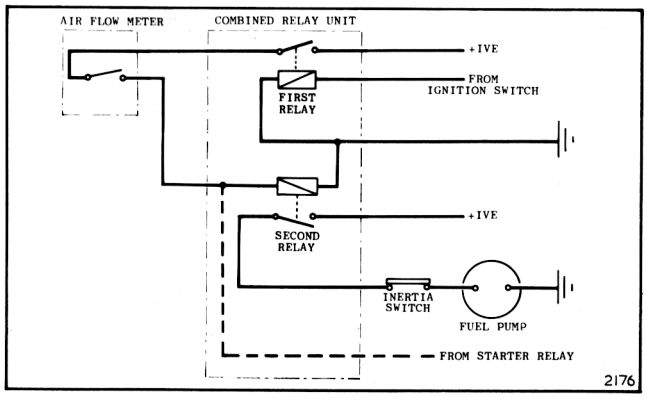

Fig. 8 Circuit principles of fuel pump operation

Electric Fuel Pump Operation

The fuel pump is energised, independent of the electronic control unit, from an output terminal on the combined relay. The combined relay is the component that provides an interface between the main vehicle electrical harness and those items that are specifically related to the electronic fuel injection system. An inertia switch is included in the circuit to isolate the fuel pump and prevent it from operating in the event of an impact type accident. The circuit is also routed through the electronic control system Air Flow Meter where a simple contact switch ensures that the fuel pump cannot operate when no air is flowing into the engine i.e. the engine is not running. This contact switch is by-passed when the starter motor circuit is energised.

Once the engine is running a circuit from the ignition switch passes through a relay to earth, via the electronic control unit on TR7 models. When energised this relay permits a circuit to be made to the Air Flow Meter contact switch. Providing the contact switch is closed a circuit is completed through a second relay, again to earth. When energised this second relay completes the circuit to operate the fuel pump.

Under engine starting conditions the Air Flow Meter contact switch would normally isolate the fuel pump as no air is flowing through the engine. To overcome this an input is taken direct from the starter motor circuit to energise the second relay and thus permit the fuel pump to operate during the engine starting operation.

Cold Starting Fuel Injection System Components

To assist cold starting, a separate cold start injector sprays a fine jet of fuel against the air stream entering the plenum chamber before fuel is added to it by the main injectors. The cold start injector is energised from the engine starter motor circuit and has in series with it a thermotime switch. This switch is dual activated by the engine coolant temperature (heat) and a heater coil around a bi-metal strip (time), the coil being again energised from the starter motor circuit. The purpose of the thermotime switch is to ensure that the cold start injector will not be energised when the engine is at normal operating temperature or should the starter motor be used for prolonged periods when the engine is below normal operating temperature, Thus the switch prevents extra fuel being supplied to the engine when it is not required. The switch will isolate the cold start injector after approximately 8 to 12 seconds at – 20'C (– 4'F) decreasing this time as the engine approaches its normal operating temperature.

Although the cold start injector and thermotime switch operate independently of the electronic control unit, an input to the E.C,U. is taken from the starter motor circuit. This input causes the E.C.U. to slightly lengthen the time that the main injectors are 'open' thus allowing more fuel to be supplied to the engine whenever the starter motor is operated. This takes place irrespective of the information supplied to the E.C.U. by the other sensors or any operation of the cold start injector.

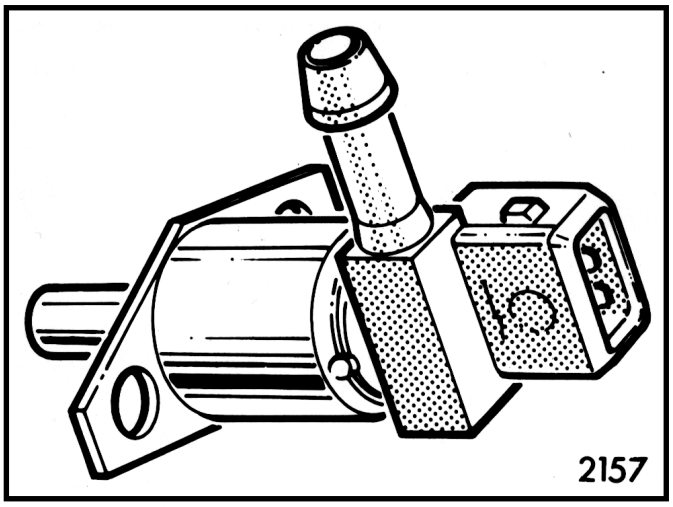

Fig. 9 Cold starting injector

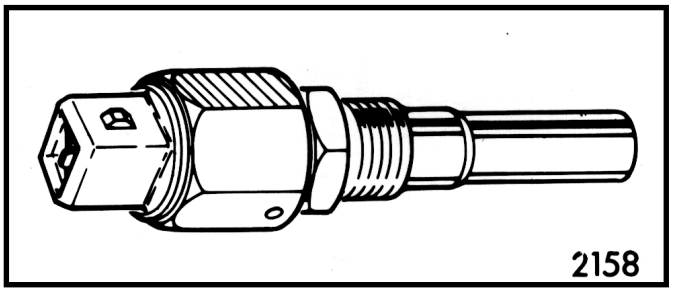

Fig. 10 Thermotime switch

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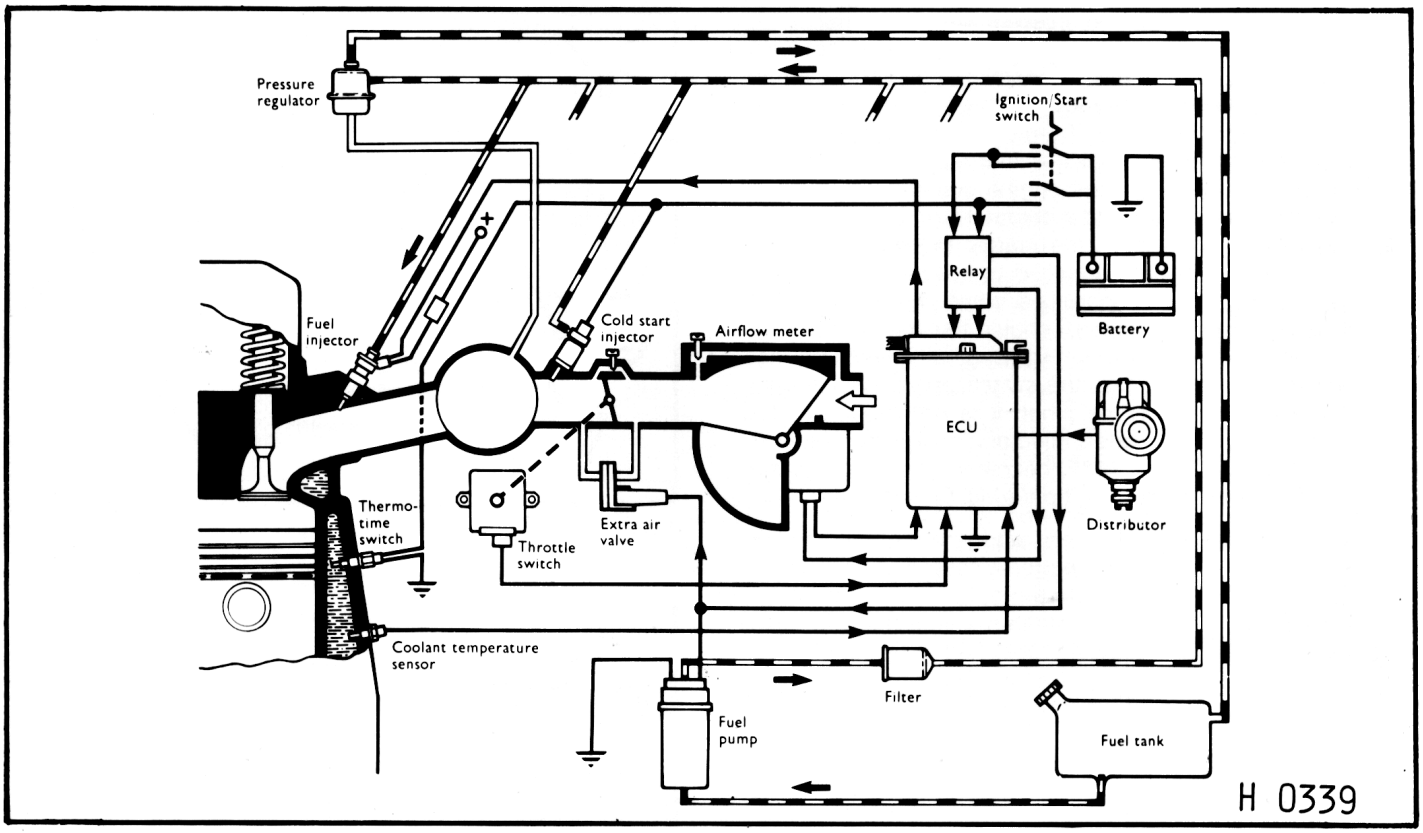

Fig. 11 Airflow meter system

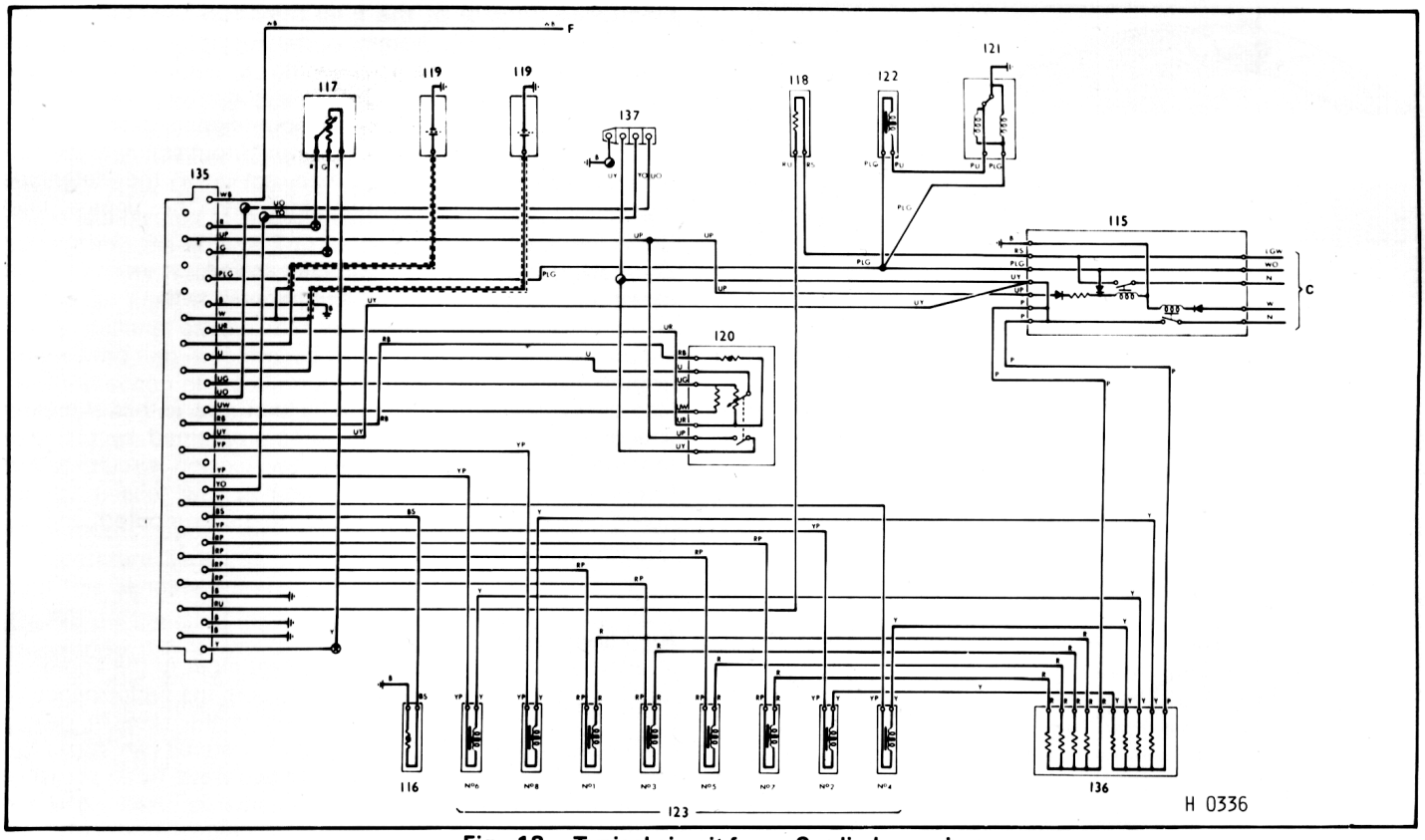

Fig. 12 Typical circuit for an 8 cylinder engine

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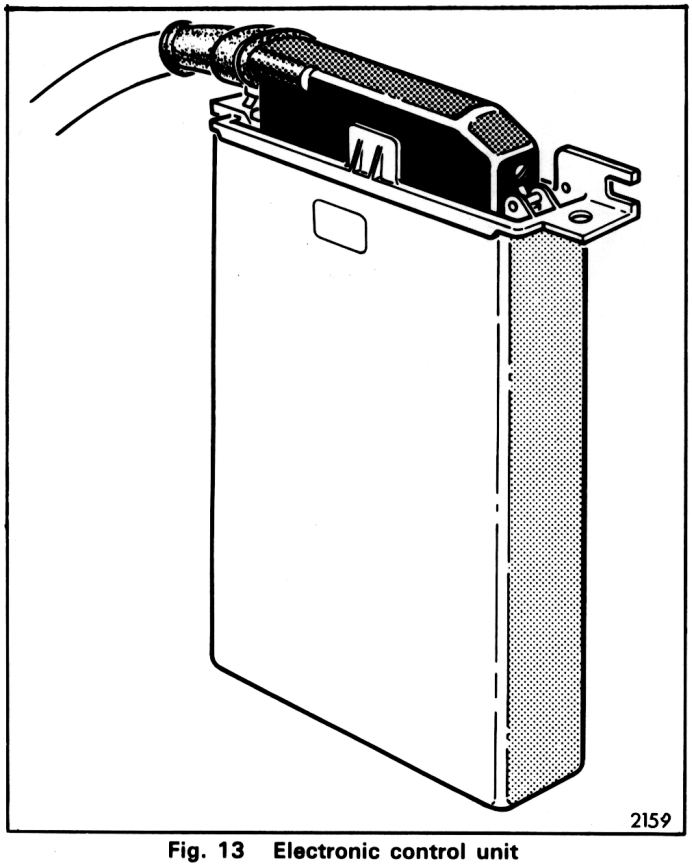

Fig. 13 Electronic control unit

Electronic Control of the Fuel Injection System

At the heart of the system is the Electronic Control Unit (E.C.U.) which is located beneath a plate on the front passenger footwell (Rover 3500) or under the glove box (TR models). The E.C.U. receives input signals from various sensors and computes from these an output signal to the fuel injector solenoid circuits. When activated the solenoids 'open' the injectors to spray fuel into the engine inlet manifold

The electronic control unit is sealed, it requires no maintenance and should not be tampered with.

Engine Speed

One of the first inputs required by the E.C.U. is that of engine speed and this input is very simply obtained by taking a tapping from the ignition coil low tension circuit output (negative terminal). Thus the ignition low tension circuit pulses are passed to the E.C.U. to be computed into an engine speed input.

Air Flow Meter

In addition to fuel, the most important input to the engine is air and the ratio of air to fuel affects both the performance of the engine and the emission levels of the exhaust gases. Electronically controlled fuel injection systems can 'measure' the air used by the engine in one of two ways, by air pressure or by air flow. The air flow alternative is used on these models.

Continued

To measure the air flow into the engine an Air Flow Meter is fitted in the engine compartment between the air cleaner and a plenum chamber above the engine. The plenum chamber acts as a collecting box for the ingoing air and helps to smooth out any rapid fluctuations in air flow that might upset the Air Flow Meter signals. The Air Flow Meter itself is basically a short tube in which there is a pivoted measuring flap that is moved by air flowing past it into the engine. To reduce excessive fluttering of this flap, such as would be caused by sudden changes or pulses in the air flow, a compensating flap is fitted as part of the same casting as the measuring flap. The position of the measuring flap is controlled by the air drawn into the engine and the action of a coil return spring. The mass of air drawn into the engine at any time is indicative of the engine load and a signal, proportional to the flap position, is passed to the E.C.U.

However, the air mass is related to air density which in turn is dependent upon air temperature. Therefore an Air Temperature Sensor is incorporated into the Air Flow Meter and this sends a separate electrical signal to the E.C.U.

Due to the action of the coil return spring, the Air Flow Meter measuring flap is almost closed when the engine is idling and an idle air by-pass channel is provided to assist the engine to breathe at this low speed. Air passing through the by-pass channel is not registered by the Air Flow Meter measuring flap.

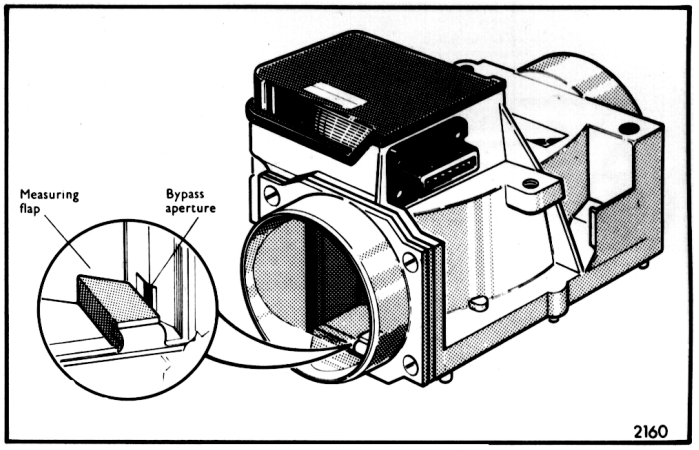

Fig. 14 Air flow meter

Injectors

The injector consists of a solenoid operated valve. The moveable plunger is rigidly attached to the nozzle needle. In the closed position a helical compression spring holds the nozzle against the valve seat.

The solenoid winding is mounted in the rear section of the valve body, with the guide to the nozzle needle in the front section. The electrical pulses from the control unit are passed through a magnetic field. As a result, the plunger is attracted away from the nozzle seat allowing pressurised fuel to enter the inlet port.

The valve lift is approximately 0.15 mm (0.006 in) for the fully open position, and the response time about one millisecond.

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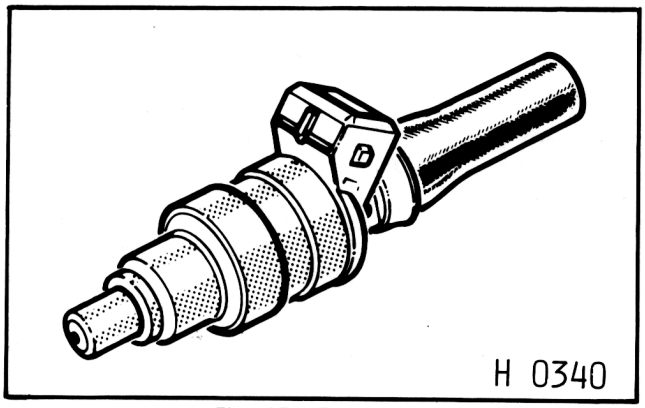

Fig. 15 Fuel injector

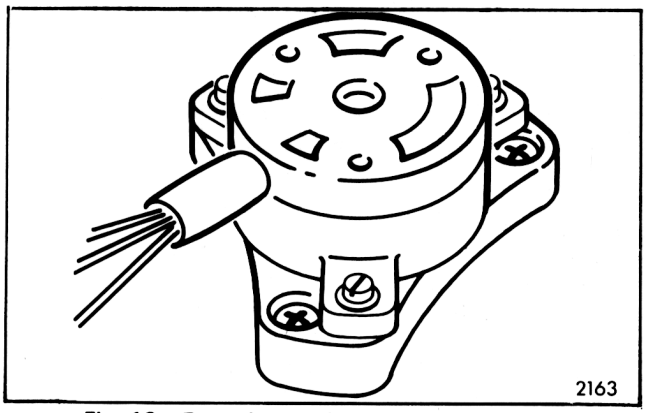

Fig. 16 Potentiometer type throttle switch

The amount of fuel delivered is governed by the period of time the injector is kept open. The exact injector 'open' time is dependent on a number of factors including rate of airflow, engine speed, engine temperature, inlet air temperature, atmospheric pressure etc., but will be in the region of 1.5 to 10 milliseconds.

Throttle Switches

Throttle switches form part of the electronic control system and provide the E.C.U. with information on throttle operating conditions. Two types of switches can be used dependent upon the type of information required by the E.C.U. to perform its function.

A contact type switch is fitted to TR7 models and is located on the throttle body in the engine compartment. The switch contacts close when the accelerator pedal is fully depressed, signalling to the E.C.U. to lengthen the time that the main injectors are 'open', thus supplying extra fuel for the acceleration required.

A potentiometer type switch is fitted to TR8 and Rover 3500 models on the engine plenum chamber in line with the throttle input spindle. This switch is a simple electrical potentiometer (variable resistance) whose electrical signal to the E.C.U. depends upon the position of the throttle spindle and hence the accelerator pedal. The E.C.U. will detect changes in throttle position by the voltage output from the potentiometer. Using this together with information from the other sensors it will adjust the fuel input accordingly, either for degrees of acceleration and deceleration or for constant engine speed. When acceleration is signalled to the E.C.U. by the throttle potentiometer, all injectors are pulsed to operate once simultaneously to ensure adequate engine response.

Coolant Temperature Sensor

This sensor is located at the top of the engine (TR7) or between the cylinder heads (TRB and Rover 3500) and provides coolant temperature information to the E.C.U. This information causes the E.C.U. to lengthen the time that the main injectors are 'open' reducing this time as the engine warms up and cutting it off when normal engine operating temperature is reached. In practice the sensor functions by modifying an output voltage from the E.C.U. through an 'earth' return circuit.

Extra Air Valve

This valve is mounted above a water passage near the inlet manifold and registers the same temperature as the engine coolant. Its purpose is to provide the additional air required to maintain a satisfactory engine idle speed until the engine reaches normal operating temperature. Air is taken from a point before the throttle butterfly (but after the Air Flow Meter, so that the air is registered by the E.C.U.) and returned to the plenum chamber after the throttle butterfly. To allow air to pass through the Extra Air Valve, and thus by-pass the throttle butterfly, an opening in a rotatable metal disc is aligned with the inlet and outlet tubes on the valve. The position of this disc is controlled by a bi-metal strip which deflects according to the temperature it experiences. As the bi-metal strip heats up it rotates the metal disc until its opening no longer lines up with the air valve tubes and the extra air source is reduced and finally terminated as normal engine operating temperature is reached. The bi-metal strip is heated from two sources, the coolant temperature and a heater coil around the strip. The heater coil is energised from the fuel injection system combined relay while the engine is running.

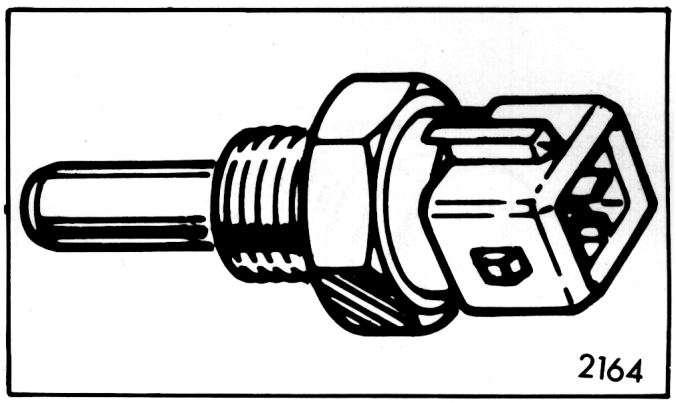

Fig. 17 Coolant temperture sensor

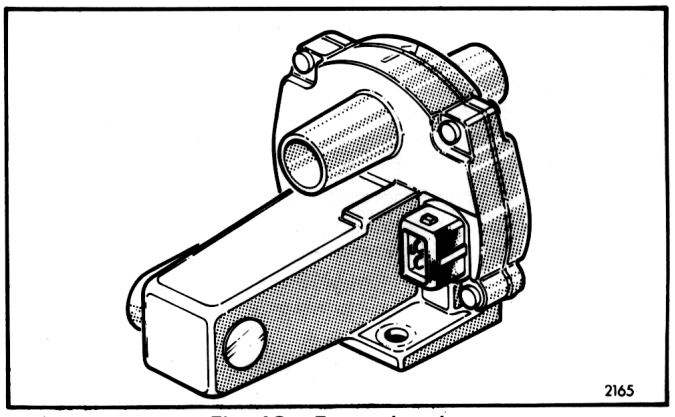

Fig. 18 Extra air valve

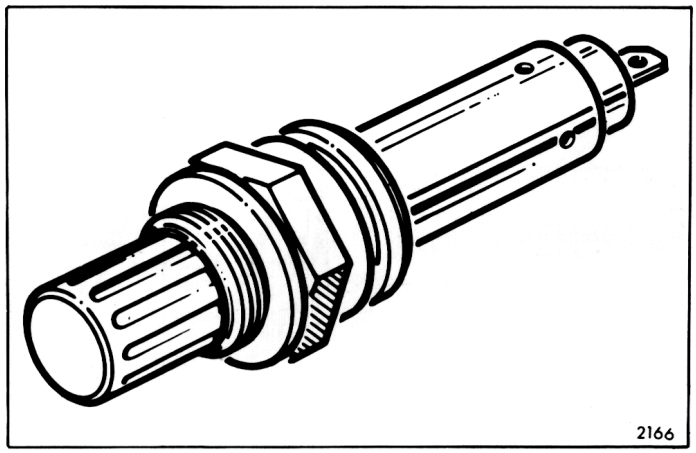

Fig. 19 Oxygen sensor

Overrun Valve

This second air flow control device bleeds air into the engine inlet manifold, via the plenum chamber, when the manifold depression is high and thus maintains combustion during engine overrun.

The valve operates independently of the electronic control system and on TR7 models is incorporated in the throttle butterfly connecting the constant depression region between the throttle and the Air Flow Meter measuring flap. On V8 models it is a separate valve on the side of the throttle body.

Oxygen Sensor

A single sensor is fitted to TR7 models and two sensors are fitted to TR8 and Rover 3500 vehicles.

They are located in the exhaust system near to the catalyst(s). The sensor is used to monitor the oxygen content of the exhaust and provide a feed back control. It passes information to the control unit, enabling changes to the air/fuel ratio to be made. This type of arrangement is known as 'closed loop control' The oxygen sensor can only be used with UNLEADED FUEL. This sensor, together with suitable catalysts will be able to cope with the most harmful contaminants. The probe is fitted in a housing which protects the ceramic body Against mechanical damage. The outer part of the ceramic body is positioned in the stream of exhaust gases, while the inner part is in contact with the ambient air. Each surface (inner and outer) is coated with an electrode made of a thin layer of platinum permeable to gas. In addition a porous ceramic layer is applied to the surface exposed to the exhaust gases. This layer protects the surface of the electrodes against contamination caused by combustion residues in the exhaust gases. Like catalysts, however the oxygen sensor has a limited life, and should, therefore be replaced at the intervals stated in the maintenance summary. The ceramic material used becomes conductive for oxygen atoms at a temperature of about 300'C and above. If the concentration of oxygen inside the probe differs from that outside, an electrical voltage is developed between the two surfaces that change when the outer electrode has catalytic activity. The voltage is a measure for the difference in the oxygen concentration on the two sides of the probe. The special sensitivity of the probe makes it possible to feed the output signal from the probe as an actual value to the control unit. Consequently, it is possible to construct a closed loop. If the mixture deviates from the ideal value, this is sensed by the probe on the basis of the oxygen content in the

exhaust gas and this condition is communicated to the control unit in the form of an electrical signal. The control unit after processing this signal, modifies the duration of injections and thus makes a correction. The by-products of combustion that remain can then be reduced by the exhaust catalyst.

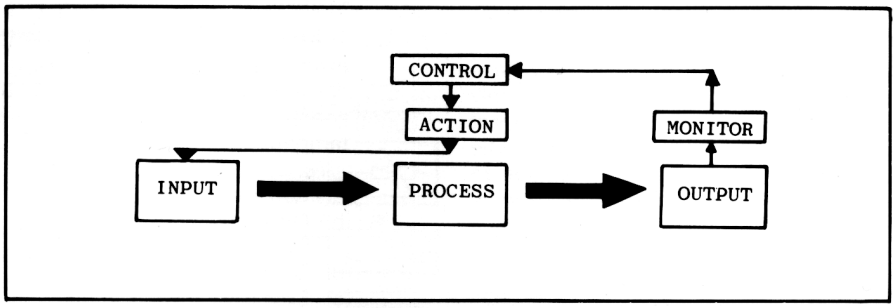

Fig. 20 The general 'closed loop' feed back control system

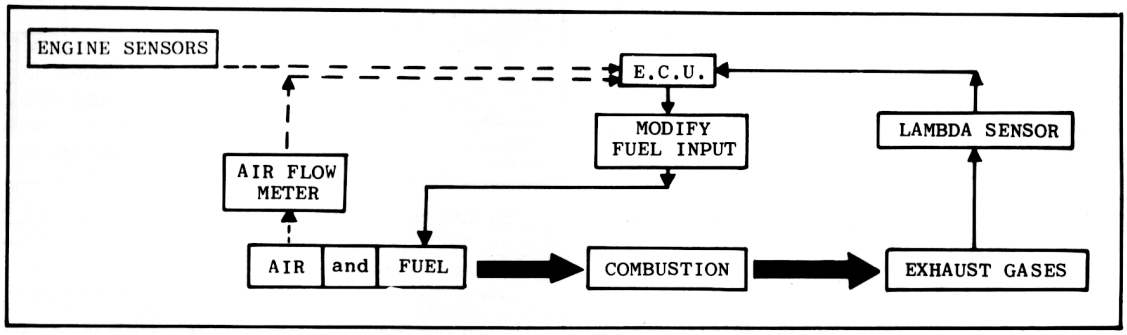

Fig. 21 Electronic fuel injection 'closed loop' feed back control system

EMISSION AND EVAPORATIVE LOSS CONTROL SYSTEMS

CATALYTIC DEVICES

The following precautions apply to catalytic devices:–

(1) In order to maintain the efficiency of the emission control system it is essential to use UNLEADED gasoline only; this fuel also minimises spark plug fouling thereby sustaining engine performance.

(2) DO NOT tamper with the engine settings; they have been established to ensure that the vehicle will comply with stringent exhaust emission regulations. Incorrect engine settings could cause unusually high catalytic converter temperatures and thus result in damage to the converter and vehicle. If adjustment to the settings is considered necessary, this should be performed by a Rover Triumph Dealer or other qualified facility.

(3) A correctly tuned engine optimises exhaust emissions, performance and fuel economy and it is recommended that the vehicle is maintained as outlined under the MAINTENANCE SUMMARY of this handbook.

(4) DO NOT continue to operate the vehicle if any engine malfunction is evident; malfunctions should be rectified immediately. For instance, misfire, loss of engine performance or engine run-on may lead to unusually high catalytic converter temperatures and may result in damage to the converter and car.

(5) NEVER leave the vehicle unattended with the engine running.

(6) The use of a catalytic converter increases exhaust system temperatures, (particularly under engine malfunction), therefore do not operate or park the vehicle in areas where combustible materials such as dry grass or leaves may come into contact with the exhaust system.

(7) The vehicle is designed for normal road use. Below are examples of abuse which could damage the catalytic converter and car and may lead to a dangerous condition due to excessively high catalytic converter temperatures.

(a) Competition use
(b) Off roadway use
(c) Excessive engine revolutions
(d) Overloading the vehicle
(e) Excessive towing loads
(f) Switching off the engine and coasting in gear

(8) DO NOT run the engine with either a spark plug lead disconnected or a spark plug removed. DO NOT use any device that requires an insert into a spark plug hole in order to generate air pressure, (e.g. tyre pump, paint spray attachment, etc.), as this could result in catalytic converter damage.

(9) DO NOT push or tow the vehicle to start it, this could damage the catalytic converter. It is recommended that jumper leads are used.

(10) Heavy impact on the convert casing must be avoided as it contains ceramic material which is easily damaged.

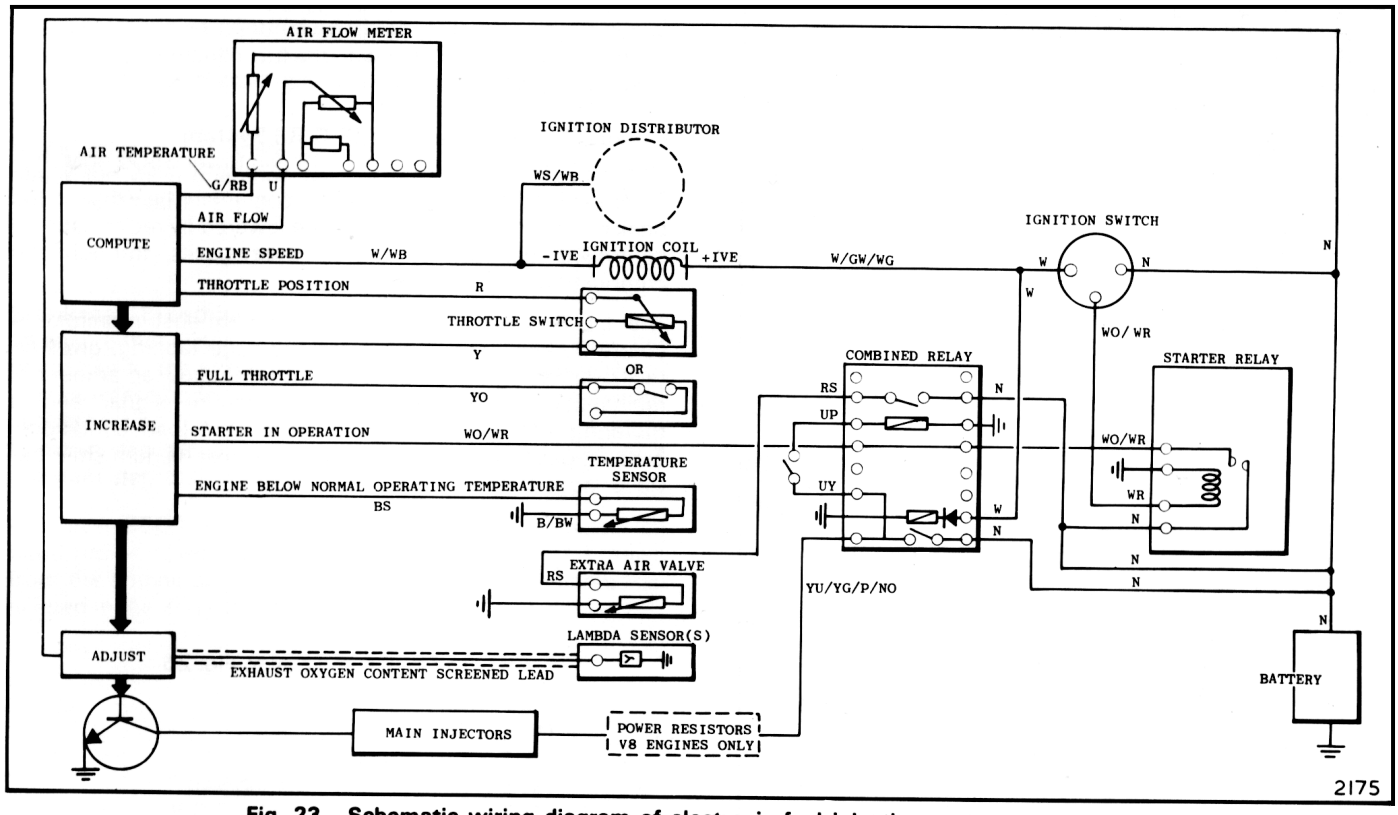

Fig. 23 Schematic wiring diagram of electronic fuel injection system components
(note that alternative cable colours are shown according to model fitment)

EMISSION AND EVAPORATIVE LOSS CONTROL SYSTEMS

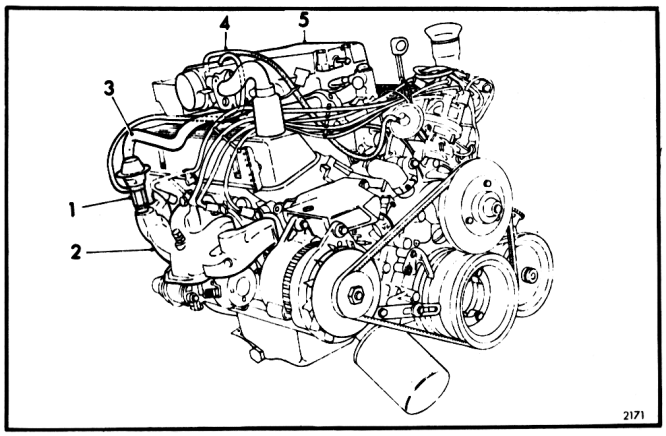

Fig. 24 TR8 E.G.R. system

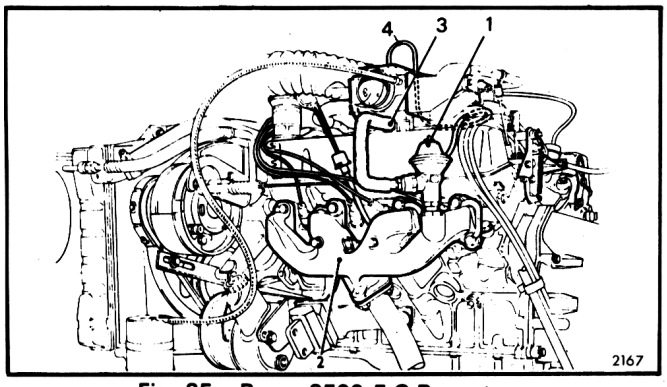

Fig. 25 Rover 3500 E.G.R. system

The remaining emission and evaporative loss control system components (including the catalyst) described in this section are not directly connected with the fuel injection system or its electronic control devices.

Exhaust Gas Recirculation (E.G.R.) System

The E.G.R. valve is fitted to the TR8 and Rover 3500 only.

To reduce the Nitrous Oxide (NOx) content in the exhaust, the peak combustion temperatures are lowered by recirculating a controlled quantity of the exhaust gases through the combustion process.

The E.G.R. valve is mounted on the exhaust manifold. A control signal, taken from a throttle edge tapping, gives no recirculation at idle or full load, but does allow an amount of recirculation, dependent on the vacuum signal and a metering profile on the valve under part-load conditions. Exhaust gas flows from the valve to the inlet plenum chamber via a lagged pipe.

Key to Fig. 24 and Key to Fig. 25

(1) E.G.R. valve
(2) Exhaust manifold
(3) E.G.R. pipe (asbestos lagged)
(4) Throttle edge vacuum to E.G.R. valve
(5) Plenum chamber

Function Checks

Warm the engine to normal running temperature. Ensure that the idle speed returns to normal. Blip the throttle and observe the valve, which should open and close as the engine speed changes.

If the valve is not operating, remove the E.G.R. valve and check the valve operation using a vacuum test gauge. Fit a new E.G.R. valve if it is found to be defective.

Crankcase Breathing

To ensure that piston 'blow by' gases do not escape from the crankcase to the atmosphere, a depression is maintained in the crankcase under all operating conditions. This is achieved by connecting the crankcase breathing housing to a point between the air meter flap and the throttle plate i.e. a constant depression region.

On Rover 3500 and TR8 models air is drawn into the left hand rocker cover via an air filter and restrictor and drawn from the engine on the right hand rocker cover. A flame trap is fitted in the draw off housing.

Evaporative Loss Control System

The function of this control system is to prevent fuel hydrocarbon vapours from entering the atmosphere. This is achieved by providing no direct external fuel tank breathing and venting the tank through two adsorption canisters located in the engine compartment.

To prevent the canisters flooding due to thermal expansion of any fuel in the tank, the tank filler neck is entered well down into the tank, and a pipe let into the tank at maximum fuel level vents into the filler neck to allow for fuel expansion. A liquid vapour separator is incorporated into the fuel tank vent pipe to reduce the quantity of vapour passed to the canisters.

Any fuel vapour is purged from the canisters once the engine is running by means of a connection to a constant depression region between the air meter flaps and the throttle butterfly.

WARNING: The use of compressed air to clean an adsorption canister or clear a blockage in the evaporative system is very dangerous. An explosive gas present in a partly saturated canister may be ignited by the heat generated when compressed air passes through the canister.

EMISSION AND EVAPORATIVE LOSS CONTROL SYSTEMS

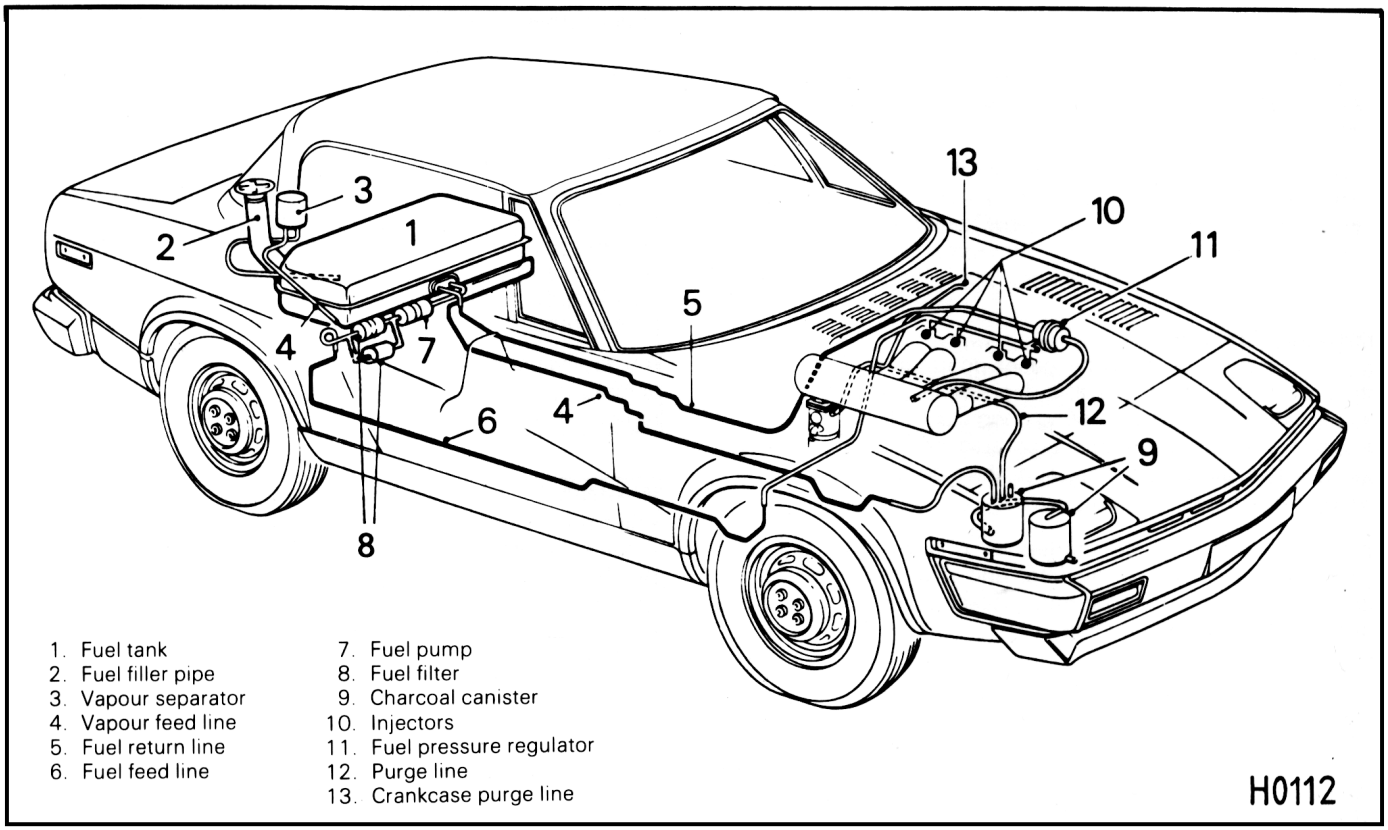

Fig. 26 TR7 Crankcase breathing and evaporative loss control systems

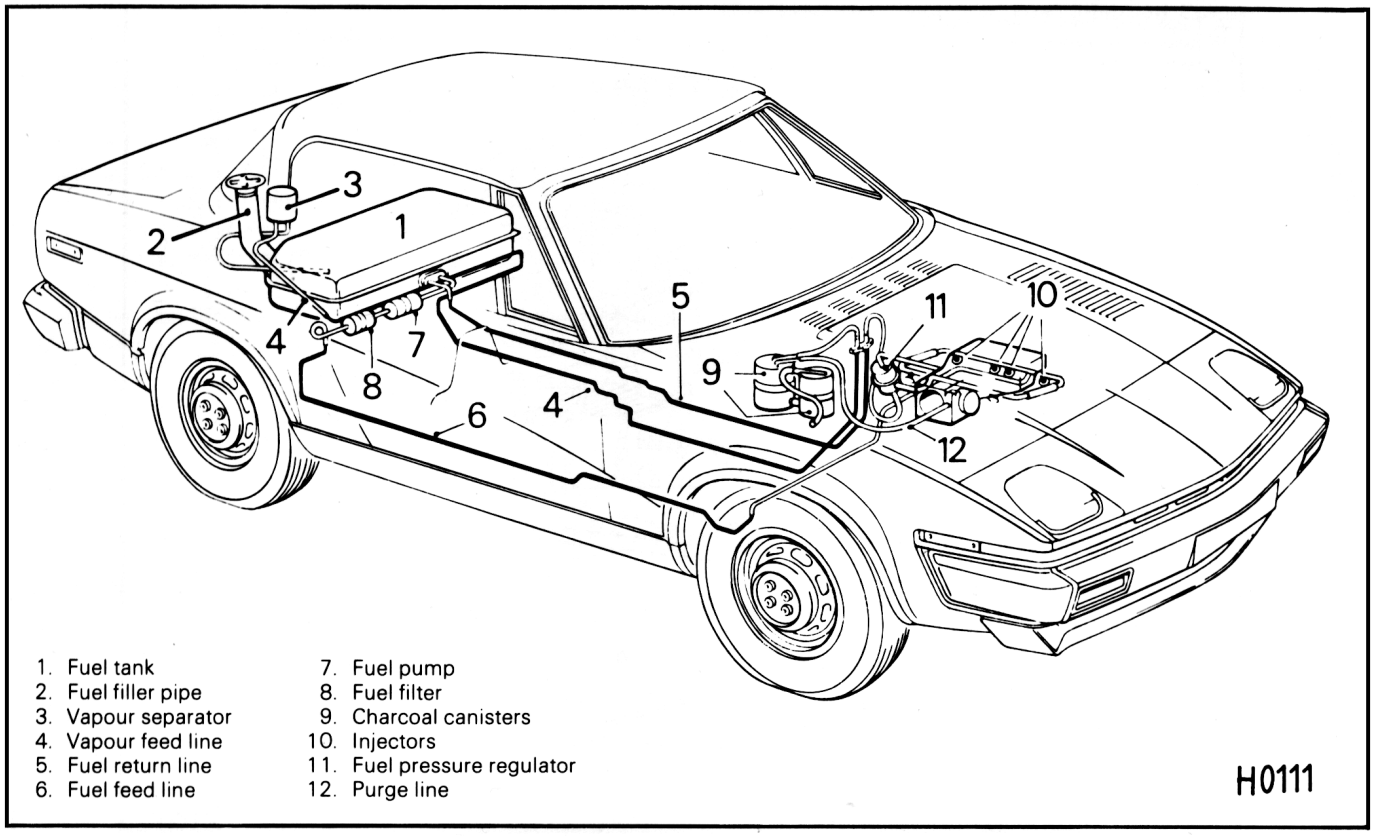

Fig. 27 TR8 Crankcase breathing and evaporative loss control systems

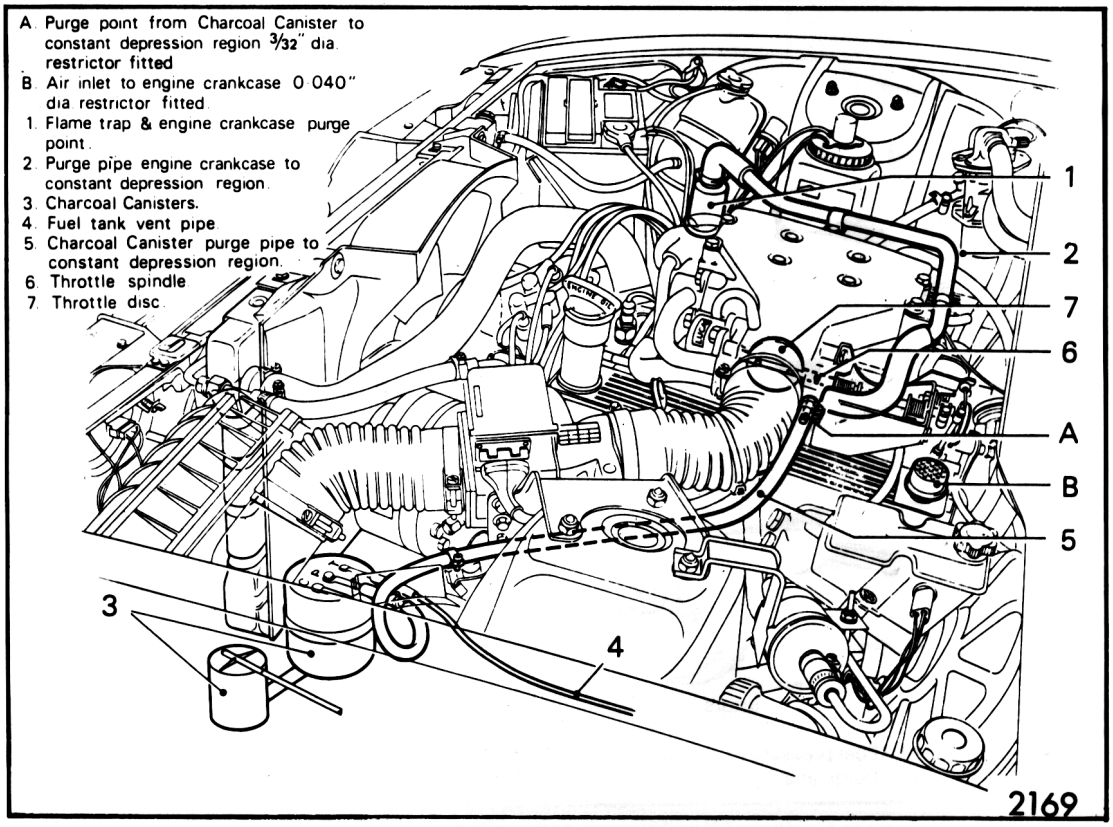

Fig. 28 Rover 3500 Crankcase breathing and evaporative loss control systems

Maintenance

Maintenance of the fuel injection, emission and evaporative loss control system components is limited (the components being sealed units) to the routine checks as stated in the Maintenance Summary. Certain components, however require renewal at predetermined intervals.

The Oxygen Sensor(s) require renewal at the intervals stated in the Maintenance Summary. Please contact your Dealer, or qualified service outlet, in order that the Sensors be renewed, and the warning lamp actuating mechanism be reset using the special tool.

The fuel filter also requires renewal at the interval as stated in the Maintenance Summary.

Should it be necessary to remove or renew an injector a new sealing ring must be fitted.

Checking the Electronic Fuel Injection Control System

Apart from the obvious functional checks possible as a result of reading the foregoing component .and system descriptions, the detailed checking of the electronic control system for malfunction requires training and the use of special test equipment. It is therefore recommended that these checks are entrusted to your Dealer or to any service outlet that has the specialised knowledge and test equipment.

EMISSION AND EVAPORATIVE LOSS CONTROL SYSTEMS

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MAINTENANCE SUMMARY
NORTH AMERICAN SPECIFICATION – 1981 MODEL YEAR

The following items should be checked by the driver weekly or before a long journey:–

Engine oil level
Brake fluid level
Automatic transmission fluid level
Radiator coolant level
Battery electrolyte level
All washer reservoir water levels
All tyres for pressure and condition
All lights for operation
All wipers and washers for operation

MAINTENANCE INTERVALS
SEE SEPARATE CHART SETS FOR 1981 CARBURETTED MODELS

Service Code Letter	DISTANCE MILEAGE X 1000 IN ANY EVENT, THE PERIOD BETWEEN SERVICES SHOULD NOT EXCEED TWELVE MONTHS													
A	1													
B		7.5		22.5		37.5		57.5		72.5		87.5		
C			15				45		65				95	
D					30						80			
E	50													100

Specified otherwise:-

Should the vehicle be used for a high proportion of short journeys or be operated in severe conditions, it may require more frequent servicing or particular attention to specific items. Your Dealer will be pleased to advise you regarding particular service requirements under these conditions. See items marked (0).
Additional maintenance information is given at the end of the Maintenance Summary on the following pages.

* Operations indicated are applicable up to 50 000 miles only
** Operations indicated are applicable from 50 000 miles onwards only.
O Operations indicated are to be considered severe service only.
X Operations indicated are to be considered routine service items.

OPERATING DESCRIPTION	SERVICE A	B	C	D	E
LUBRICATION & FLUIDS					
Renew engine oil	X	X	X	X	X
Renew engine oil filter		X	X	X	X
Check/top up brake fluid reservoir	X	X	X	X	X
Check/top up clutch fluid reservoir	X	X	X	X	X
Check/top up automatic transmission fluid	X	X	X	X	X
Renew automatic transmission oil and filter				X	
Check/top up battery electrolyte	X	X	X	X	X
Check/top up cooling system	X	X	X	X	X
Check/top up gearbox oil	X	X	X	X	X
Check/top up rear axle/final drive unit oil	X	X	X	X	X
Lubricate distributor (Not TR7)				X	
Lubricate accelerator control linkage and pedal pivot, check operation			X	X	
Check/top up power steering reservoir fluid	X	X	X	X	
Lubricate all locks, hinges and door check mechanisms (not steering lock)	X	X	X	X	X
Lubricate steering rack and pinion (TR7/TR8)			X	X	
Lubricate all grease points except hubs		X	X	X	
ENGINE					
Check for oil leaks	X	X	X	X	X
* Check/adjust all driving belts	O	O	O	X	
** Check/adjust all driving belts, renew as necessary		X	X	X	
Check cooling and heater systems for leaks and hoses for security and condition	O	O	O	O	
Renew air cleaner element				X	

	OPERATING DESCRIPTION	SERVICE A	B	C	D	E
	ENGINE					
	Renew crankcase breather filter (TR8/Rover 3500)				X	
**	Clean crankcase breather flame trap				X	
**	Check crankcase breathing and evaporative loss control systems					X
	Check hoses/pipes and restrictors for blockage, security and condition			X	X	
	Check/adjust torque of cylinder head nuts and bolts (TR7)	X				
	IGNITION					
*	Renew sparking plugs				X	
**	Clean/adjust spark plugs, renew as necessary			O	X	
*	Check ignition wiring (including electric fuel pump wiring), for security, fraying and chafing				O	
**	Check ignition wiring (including electric fuel pump wiring), for security, fraying and chafing			X	X	
**	Check/adjust ignition timing using electronic equipment			X	X	X
**	Check security of distributor vacuum unit line and operation of vacuum unit			X	X	
	FUEL AND EXHAUST SYSTEMS					
	Check fuel system for leaks, pipes and unions for chafing and corrosion	X	X	X	X	X
	Check exhaust system for leaks and security	X	X	X	X	X
	Check condition of fuel filler cap seal			O	O	
*	Renew fuel filter					X
**	Renew fuel filter				X	X
	Renew oxygen sensor(s) and reset service interval counter				X	
*	Check/adjust idle speed	X				
**	Check/adjust idle speed			X		

MAINTENANCE SUMMARY

	OPERATING DESCRIPTION	SERVICE A	B	C	D	E
	TRANSMISSION, BRAKES, STEERING AND SUSPENSION					
	Check for oil leaks	X	X	X	X	X
	Check for condition and security of steering unit, joints and gaiters		X	X	X	
	Inspect brake pads/linings for wear, discs/drums for condition, adjust as necessary		X	X	X	
	Check brake servo hoses for security and conditions	X	X	X	X	X
	Check/adjust front wheel adjustment	X				
	Check visually brake and clutch hydraulic hoses/pipes and unions for cracks, chafing, leaks and corrosion	X	X	X	X	
	Check tightness of propeller shaft coupling bolts	X		X	X	
	Check/adjust front hub bearing end float	X		X	X	
	WHEELS AND TYRES					
	Check tyres for tread depth and visually for external cuts in fabric, exposure of ply or cord structure, lumps, bulges or uneven wear	X	X	X	X	
	Check that tyres comply with manufacturer's specifications	X	X	X	X	
	Check/adjust tyre pressures, including spare wheel	X	X	X	X	
	Check tightness of road wheel fastenings	X	X	X	X	X
	ELECTRICAL					
	Check/adjust operation of all washers and top up reservoirs	X	X	X	X	X
	Check function of original equipment, lamps, horns, wipers and all warning indicators	X	X	X	X	X
	Check wiper blades and arms, renew if necessary		X	X	X	X
	Check/adjust headlamp alignment		X	X	X	X
	Clean and grease battery connections			X	X	X

OPERATING DESCRIPTION	SERVICE				
	A	B	C	D	E
BODY					
Check condition, security and operation of seats and seat belts	X	X	X	X	X
Check operation of all passenger door, bonnet, boot, rear door and steering column locks	X	X	X	X	X
Check operation of window controls	X	X	X	X	X
GENERAL					
Road/roller test. Check brake operation and function of all instrumentation	X	X	X	X	X
Report additional work required	X	X	X	X	X

Additional Preventative Maintenance

In addition to the recommended periodical inspection of brake components it is advisable as the car ages, and as a precaution against the effects of wear and deterioration, to make a more searching inspection and renew parts as necessary.

It is recommended that;-

(1) Disc brake pads, drum brake linings, hoses and pipes should be examined at intervals no greater than those laid down in the Maintenance Summary.

(2) Brake fluid should be changed completely every 18 months or 37.500 km (22 500 miles) whichever is the sooner.

If the vehicle is frequently subjected to severe driving or operating conditions, it may be necessary to change the brake fluid at shorter intervals.

(3) All fluid seals in the hydraulic system, all flexible hoses, the brake servo filter and load sensing valve (where fitted), should be renewed every 3 years or 62.500 km (37 000 miles) whichever is the sooner. At the same time the working surfaces of the piston and bores in the master cylinders and other slave cylinders should be examined and new parts fitted where necessary.

Continued

(4) Care must be taken always to observe the following points:-

(a) At all times use the recommended brake fluid.

(b) Never leave fluid in unsealed containers. It absorbs moisture quickly and can be dangerous if used in the braking system in this condition.

(c) Fluid drained from the system or used for bleeding should be discarded.

(d) The necessity for absolute cleanliness throughout cannot be over-emphasised.

Replacement Brake Pads and Shoes

When it becomes necessary to renew brake pads and shoes, it is essential that only genuine components with the correct grade of lining are used. Always fit new pads or shoes as complete axle sets, never individually or as a single wheel set. Serious consequences could result from out of balance braking due to mixing of linings.

Replacement brake pads and shoes are obtainable from your Dealer.

The operations tabled in the maintenance summary are listed on this and the following pages, with sufficient detail to enable a person with average knowledge of motor vehicle technology to complete them. Where appropriate, weekly checks not included in the maintenance interval summary have been interspersed with the tabled operations.

Replacement or repair of the emission control devices and systems may be performed by any automotive repair establishment or individual using any automotive part which has been certified by the part manufacturer.

However, it is recommended that only skilled and experienced personnel attend to items relating to the engine tune or the emission and evaporative loss control systems. When these items have received attention, the exhaust emission level should be checked using proper equipment to ensure that it conforms to the standards laid down for these models.

Lubricate All Grease Points (Except Hubs)

Using a recommended grease, lubricate the handbrake mechanical linkage and cable guides and, where fitted, the automatic transmission exposed selector linkage.

Using a medium oil, lubricate the brake and clutch pedal pivots taking care to wipe away all surplus oil to avoid staining the carpet.

Lubricate Steering Rack end Pinion

TR7 and TR8 only

Using a recommended grease, lubricate the steering rack and pinion as follows:-

(1) Wipe clean the plug and surrounding area.
(2) Remove the plug, taking care not to disturb the larger damper plug.
(3) Fit a suitable grease nipple in place of the plug.
(4) Turn the steering wheel to full right hand lock.
(5) Apply a grease gun to the grease nipple and give 5 strokes only.

CAUTION: Overgreasing can cause damage to the protective gaiters and/or seals.

(6) Remove the grease nipple and refit the plug.
(7) Wipe away any surplus grease.

Check/Top up Engine Oil level

(1) Stand the car on level ground.
(2) If the engine has been running, allow time for the oil to drain back into the sump.
(3) Withdraw the dipstick.
(4) Using a non fluffy cloth, wipe the dipstick clean and replace it.
(5) Withdraw the dipstick and note the oil level. Replace the dipstick.
(6) Add a recommended grade of oil, as necessary, through the filler cap.

DO NOT OVERFILL

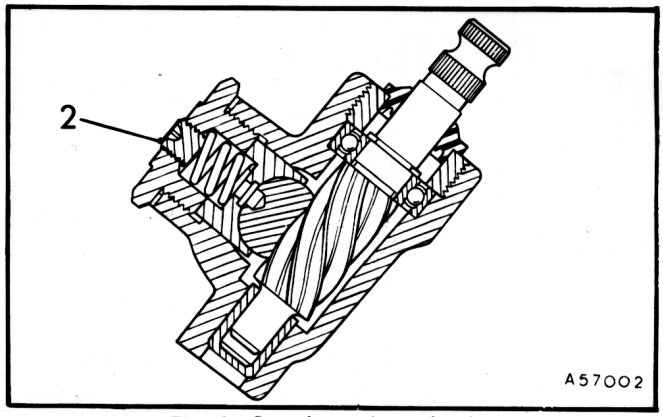


Fig. 1 Steering unit lubrication

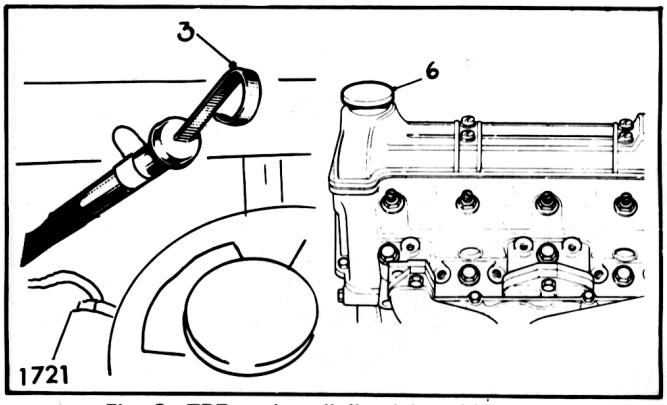


Fig. 2 TR7 engine oil dipstick and filler cap

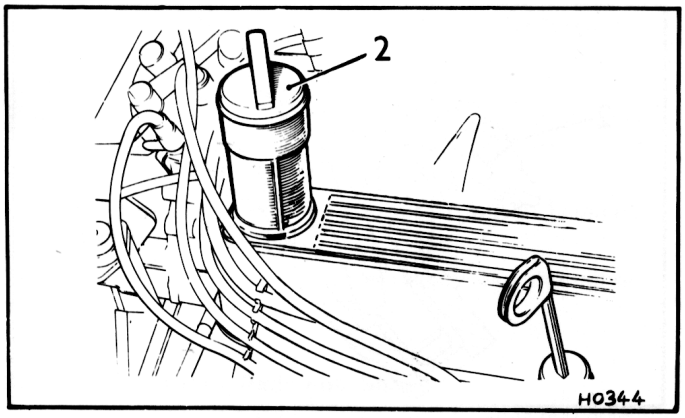


Fig. 3 V8 engine oil dipstick and filler cap

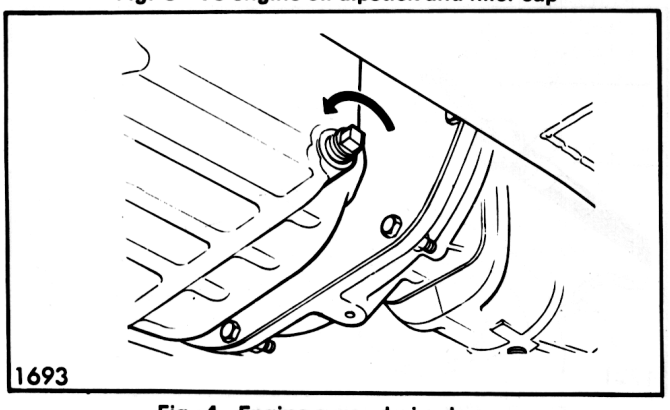


Fig. 4 Engine sump drain plug

Renew Engine Oil

(1) Stand the car on level ground.
(2) If the engine has been running, allow time for the oil to drain back into the sump.
(3) Using the dipstick, check the sump oil level and place a suitable container beneath the sump drain plug.
(4) Slowly unscrew the drain plug until the oil starts to flow. When the flow lessens remove the plug and drain the sump.
(5) Refit the drain plug.
(6) Add a recommended grade of oil, as necessary, through the filler cap.
(7) Run the engine, check for oil leaks and finally top up the oil to the correct level.

DO NOT OVERFILL

Renew Engine Oil Filter

TR7

(1) Unscrew the securing bolt.
(2) Remove the container.
(3) Discard the element. Wash out the container and insert a new element.
(4) Renew the sealing ring ensuring that it is correctly located in the cylinder block.
(5) Re-attach the filter assembly and tighten the bolt sufficiently to ensure an oil-tight joint.

V8

(1) Unscrew and discard the filter assembly.
(2) Smear the sealing ring of the replacement filter with clean engine oil. (3) Screw the filter on to the filter block and tighten the canister two thirds of a turn by hand only.
(4) Run the engine, check for leaks and finally top up the oil to the correct level.

Check/Top-up Brake Fluid Reservoir

The fluid level is visible through the translucent casing of the reservoir, do not remove the cap. A gradual lowering of the level over a long period is caused by brake pad wear and does not require topping-up. A sudden appreciable drop in the level must be investigated, the cause ascertained and rectified immediately.

Do not allow the level to drop below the danger line on the side of the casing.

Continued

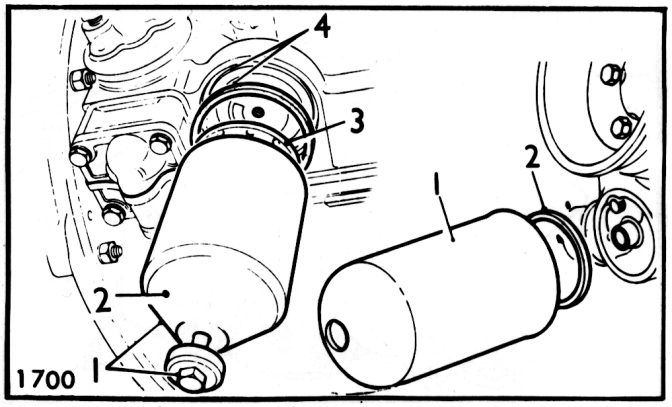


Fig. 5 TR7 and V8 engine oil filters

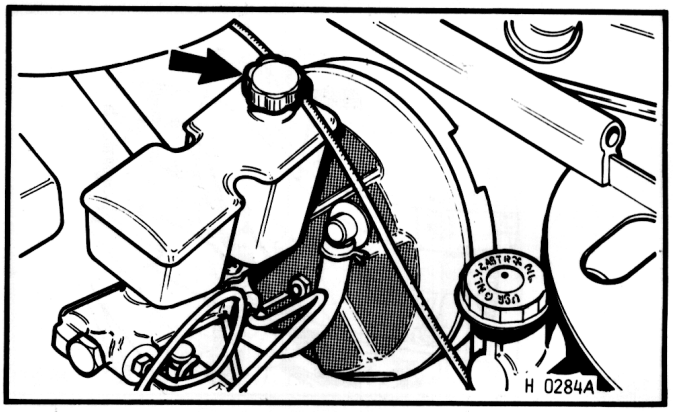


Fig. 6 Brake fluid reservoir

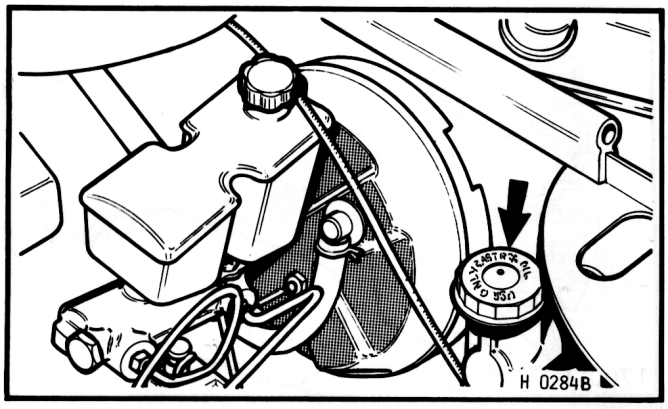


Fig. 7 Clutch fluid reservoir

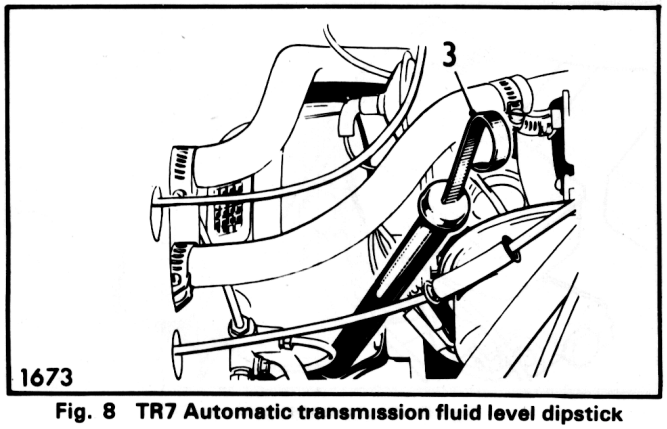


Fig. 8 TR7 Automatic transmission fluid level dipstick

To avoid dirt entering the system ensure that the reservoir is clean externally before removing the cap. Use only new fluid taken from a sealed container and re-seal the container after use. Replace the reservoir cap immediately after filling.

Check/Top-up Clutch Fluid Reservoir

To prevent dirt entering the system, clean the cap and surrounding area prior to removing the cap. Top-up the fluid until it is level with the line on the side of the reservoir.

Check/Top-up Automatic Transmission Fluid

Check the fluid level as follows:-

(1) Stand the car on level ground and apply the handbrake firmly. Start the engine from cold and, with the footbrake firmly applied, run the engine at idle speed for 2 to 3 minutes, passing the selector lever through the complete range of positions to ensure that the transmission is primed,
(2) Select the 'P' (Park) position and apply the handbrake, Leave the engine running at idle speed.
(3) Remove the transmission dipstick and wipe it with a clean, non-fluffy cloth.
(4) Replace the dipstick, ensuring that it is pushed fully into the tube and withdraw it immediately for reading.
(5) Check the fluid level on the side of the dipstick marked 'COLD' and if necessary, add fluid; see Lubricants and Capacities
(6) Repeat instructions 1 to 5 until the fluid level is correct.

DO NOT OVERFILL THE TRANSMISSION

Continued

Where the reverse side of the dipstick carries marks denoted 'HOT', the fluid level check may be carried out with the transmission at normal operating temperature. The procedure is as described above except that the vehicle must be driven for 25-30 km (15 miles) to warm the transmission. The check is then carried out using the 'HOT' side of the dipstick.

When operating at high ambient temperatures and on unmetalled roads, periodically inspect and remove dust and mud deposits from the slots and screen on the underside of the torque converter housing, and from the under side of the transmission oil sump these deposits can adversely affect proper cooling of the unit.

Renew Automatic Transmission Fluid and Filter

Borg Warner automatic transmission (TRB and Rover 3500) It is recommended that at intervals of 48.000 km (30 000 miles) the oil strainer be replaced using the following procedure;-

CAUTION: Utmost cleanliness must be maintained at all times during this procedure.

(1) Drain the transmission by removing the filler tube and nut from the boss.

(2) Remove the oil pan.

(3) Remove the oil strainer and gasket.

(4) Fit a new strainer and gasket, tightening the securing bolts to a torque of 0,23 to 0,35 kgf m (1.7 to 2.5 lbf ft).

(5) Clean out the oil pan and refit it using a new gasket. Tighten the securing bolts evenly to a torque of 0,69 to 1,1 kgf m (5 to 8 lbf ft).

(6) Refit the filler tube and securing nut.

(7) Add transmission fluid until the level is correct on the transmission dipstick before running the engine and topping up the fluid level in accordance with the procedure detailed under Check/top-up automatic transmission fluid in this handbook.

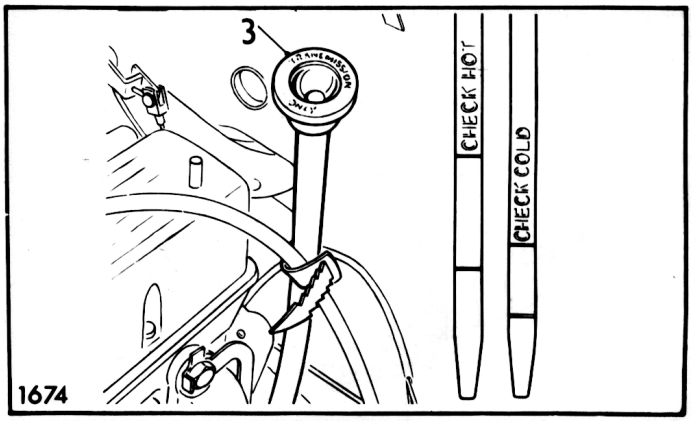


Fig. 9 V8 automatic transmission fluid level dipstick

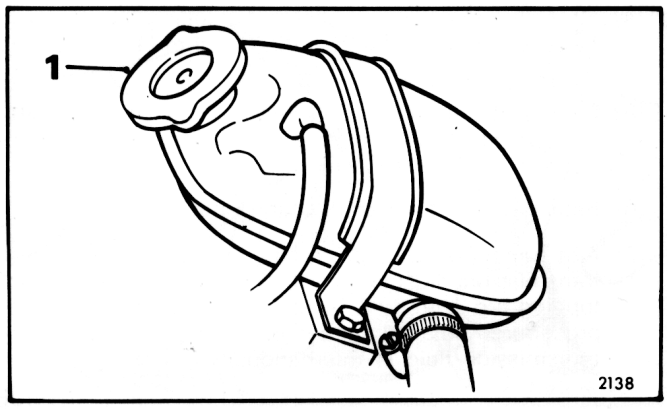


Fig. 10 Cooling system header tank

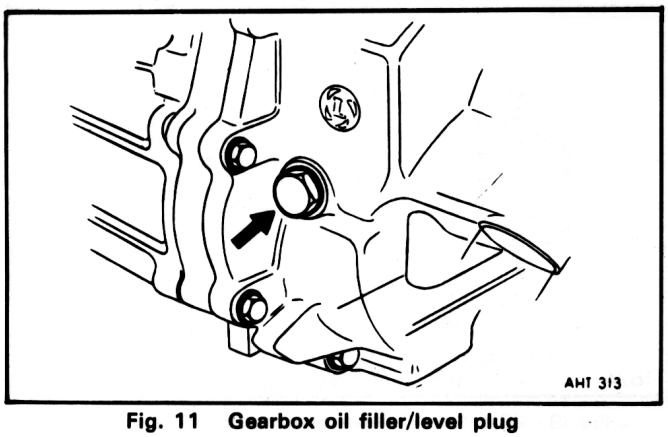


Fig. 11 Gearbox oil filler/level plug

Check/Top-up Battery Electrolyte

Examine the level of the electrolyte in the cells and top-up with distilled water if necessary. The electrolyte level should just cover the separators. More frequent checks should be made during hot weather and if the car is subjected to long journeys.

WARNING: Never use a naked flame when examining the battery since the mixture of oxygen and hydrogen given off by the battery is dangerously explosive.

Check/Top up Cooling System

The pressurised cooling system incorporates a header tank which provides a single point for coolant filling and level checking.

The coolant level should be maintained at 25 mm (1 inch) below the neck of the header tank. (1)

If the cooling system has been drained the procedure for refilling the system is as follows:-

(1) Remove the header tank filler cap.

(2) Set the interior heater controls to the maximum heat position.

(3) Fill the system until the coolant level is 25 mm (1 inch) below the neck of the header tank.

(4) Refit the header tank filler cap and run the engine at approximately 1500 rev/min until the coolant temperature rises sufficiently to open the thermostat.

(5) Stop the engine and, observing the following warning remove the header tank filler cap.

Continued

(6) Top up the coolant level as necessary until it is 25mm (1 inch) below the header tank filler neck.
(7) Refit the filler cap.

WARNING: When it is necessary to remove the pressure/filler cap from a hot engine, exercise great care by protecting the hands against escaping steam. Slowly turn the pressure cap anti-clockwise until resistance of the safety stop is felt. Leave the cap in this position until all pressure is released. Press the cap downwards against the spring to clear the safety stops, and continue turning until it can be lifted off.

Check/Top-up Manual Gearbox Oil

With the vehicle standing on level ground.
(1) Remove the oil level filler plug.
(2) Top up the oil until it is level with the bottom of the filler plug threads.
(3) Allow surplus oil to drain away before wiping clean and refitting the plug.

Check/Top-up Rear Axle Oil

With the vehicle standing on level ground.
(1) Remove the oil level filler plug.
(2) Top up the oil until it is level with the bottom of the filler plug threads.
(3) Allow surplus oil to drain away before wiping clean and refitting the plug.

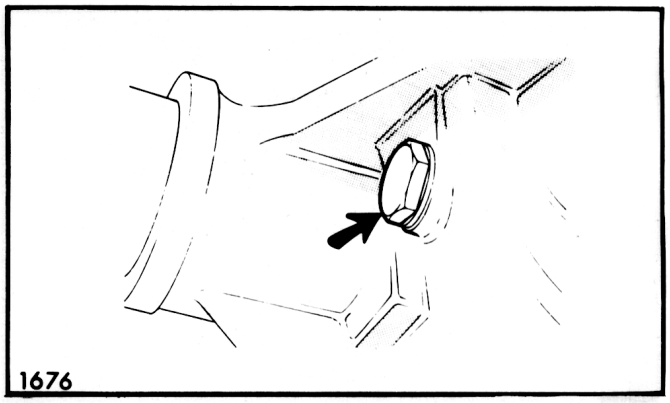


Fig. 12 Axle oil filler/level plug — TR8 and Rover 3500

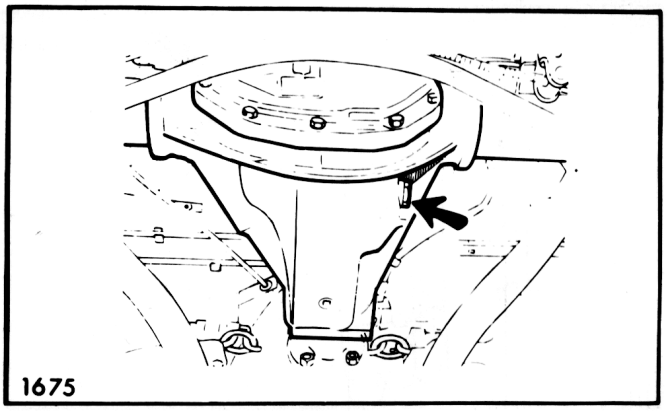


Fig. 13 Axle oil filler/level plug — TR7

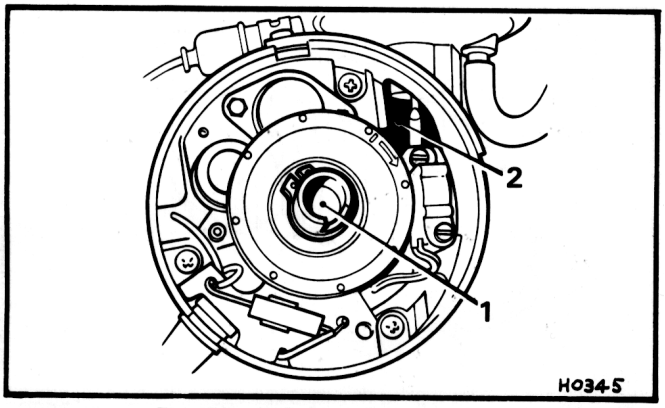


Fig. 14 Distributor lubrication

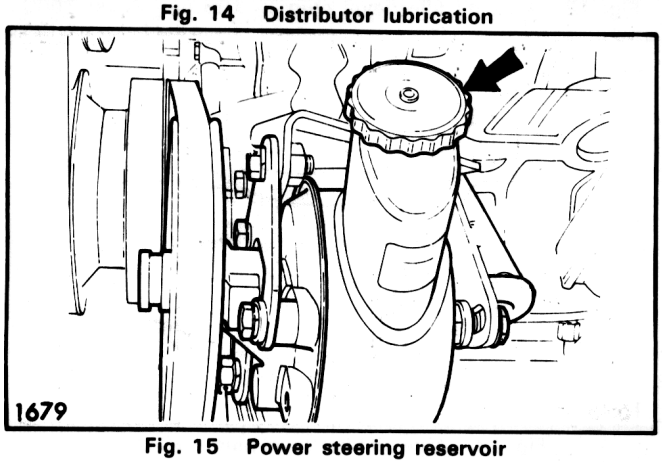


Fig. 15 Power steering reservoir

Lubricate Distributor

(1) Remove the distributor cap.
(2) Pull off the rotor.
(3) Remove the plastic anti-flash cover.
(4) Apply two drops of engine oil to the felt pad to lubricate the rotor carrier bearing (1)
(5) Inject five drops of engine oil through the apertures to lubricate the centrifugal timing control (2)
(6) Apply one drop of engine oil to each of the two lubrication apertures of the moving plate bearing.
(7) Reverse instruction (1) to (3).

Lubricate Accelerator Control Linkage and Pedal Pivot

The accelerator control linkage will not require adjustments during normal operation. To ensure complete throttle closure a degree of 'lost motion' or slackness is incorporated into the linkage; no attempt must be made to eliminate this.

Lubricate all Locks, Hinges and Door Check Mechanisms
(Not steering lock)

Check/Top-up Fluid in Power Steering Reservoir

Stand the vehicle on level ground
(1) Wipe clean the reservoir cap and surrounding areas.
(2) Remove the reservoir cap.
(3) Wipe the dipstick clean and replace it in position.
(4) Withdraw the dipstick again and note the fluid level against the marks on the dipstick.

If topping-up is necessary:

(5) Add a recommended fluid via the filler cap to bring the level just below the high mark on the dipstick.

DO NOT OVERFILL

(6) Replace the reservoir cap.

Check for Engine Oil Leeks

Check/adjust all Driving Belts

Check/adjust all Driving Belts, Renew as Necessary

(1) Inspect all drive belts.

(2) Renew any belt that is either:- (a) worn or (b) damaged.

(3) Check driving belt tension using the following as a guide:-

Alternator driver belt total deflection – 13 to 19 mm (½ to ¾ in)

Power steering pump drive belt total deflection – 19 to 25 mm (¾ to 1 in).

Air conditioning pump drive belt total deflection – 19 to 25 mm (¾ to 1 in)

Measured at the mid point of the longest belt run between pulleys.

(4) Should adjustment be necessary:-

Slacken, but do not remove, the appropriate unit mounting nuts/bolts.

Slacken, but do not remove, the unit pivot nuts/bolts. Adjust the position of the unit to achieve correct belt tension.

Re-tighten the pivot and mounting nuts/bolts

(5) To renew a drive belt, follow the procedure under Instruction (4), noting that other drive belts may have to be removed for access.

CAUTION: It is essential that the drive belts are correctly tensioned. This work should be carried out by your Dealer as soon as possible.

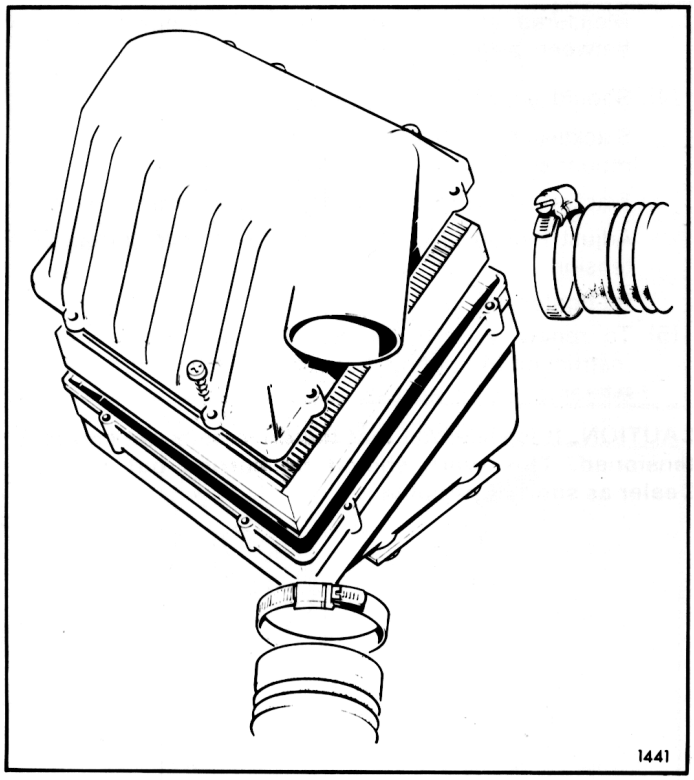


Fig. 16 Air cleaner element

Check Cooling and Heater Systems for leaks and Hoses for security and condition.

Renew Air Cleaner Element

The air cleaner is located in the engine compartment forward of the front suspension turret, on the right hand side for TR models and the left hand side for Rover 3500.

To renew the air cleaner element:-

(1) Remove the pipe(s) from the air cleaner case.

(2) **TR8** – Remove four nuts/bolts securing the air cleaner case to the car body.

Rover 3500 – Remove the single wing nut screw fixing securing the air cleaner case to its mounting bracket.

V8 models only

Lift the air cleaner clear of the car.

(3) Remove the screws to release the two halves of the air cleaner case.

(4) Carefully lift off the top half of the case to expose the air cleaner element.

(5) Remove and discard the element.

(6) Clean the interior of the air cleaner case and fit a new element.

(7) Reverse instructions (1) to (4).

Check/Adjust Torque of Cylinder Head Nuts/Bolts – TR7

(1) To avoid distortion of the cylinder head it is important that the retaining nuts and bolts are tightened in alphabetical order, as illustrated in (Fig 7) to the correct torque of 7.6-8.3kgf m (55-60lbf/ft).

(2) When releasing the nuts and bolts, prior to removing the cylinder head, the sequence must be reversed.

(3) When checking the torque loading of the nuts and bolts they should first be slackened off to overcome static friction and then re-tightened to the correct torque figure.

Clean Crankcase Breather Flame Trap
V8 Engines only

(1) Detach the hose from the flame trap.

(2) Unscrew the flame trap.

(3) Clean the flame trap thoroughly, renew it if satisfactory cleaning is not possible or there are signs of deterioration or damage.

(4) Refit the flame trap and reconnect the hose.

(5) Run the engine until it is at normal operating temperature and, if necessary, adjust the idle speed.

Check Crankcase Breathing and Evaporative Loss Control Systems

Check Hoses/Pipes and Restrictors for Blockage. Security and Condition

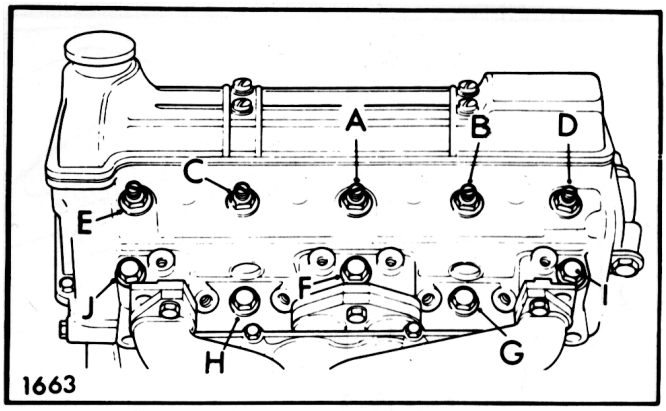


Fig. 17 TR7 cylinder head fastenings

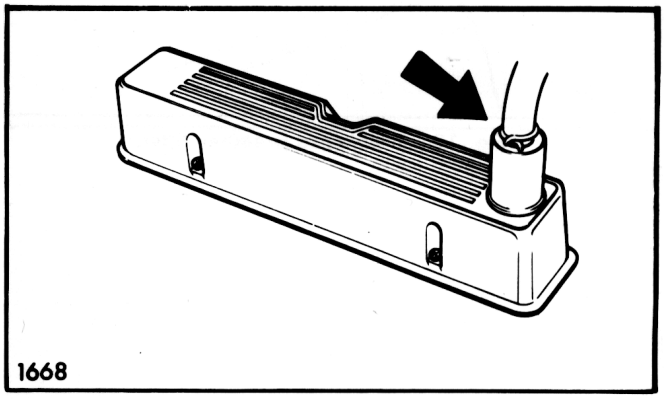


Fig. 18 Flame trap

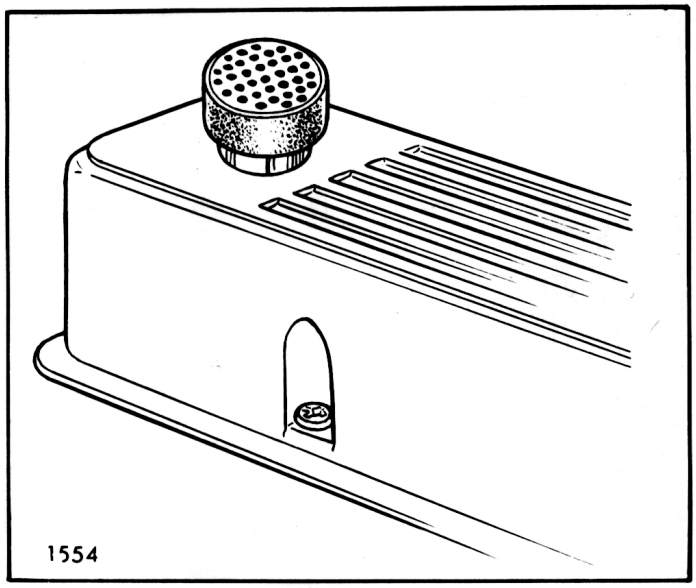


Fig. 19 Crankcase breather filter

Renew Crankcase Breather Filter
V8 Engines only

The breather filter is located at the rear of the left hand rocker cover.
To renew the filter:-

(1) Using the fingers and thumb, prise the filter upwards to release it from the rocker cover.

(2) Discard the filter.

(3) Fit a new filter, pressing it gently onto the rocker cover until it clips into place.

Clean/Adjust Spark Plugs, Renew as Necessary
Renew Spark Plugs

(1) Remove the leads from the spark plugs.

(2) Use a special spark plug spanner when removing or refitting spark plugs.

(3) Use a sand/grit air blast service unit to clean the plug electrodes and a stiff wire brush to clean the plug threads.

(4) Wipe clean the ceramic surface and inspect for cracks or damage. Renew the plug if necessary.

(5) Set the electrode gap to the recommended clearance, (See General Specification) using a special spark plug gauge and setting tool, moving the side electrode only.

Continued

(6) Take great care when fitting spark plugs not to cross-thread the plug, otherwise costly damage to the cylinder head will result.
(7) Tighten the plugs just sufficient to ensure a leakproof joint with the cylinder head.

DO NOT OVERTIGHTEN

(8) When fitting the leads to the plugs ensure that the shrouds are firmly seated on the plugs.

It is important that only the specified spark plugs are used for replacements. See General Specification.

Incorrect grades of plug may lead to piston over-heating and engine failure.

Check Security of Distributor Vacuum Line and Operation of Vacuum Unit

Check Ignition Wiring (including electric fuel pump wiring) for security, fraying. chaffing and deterioration

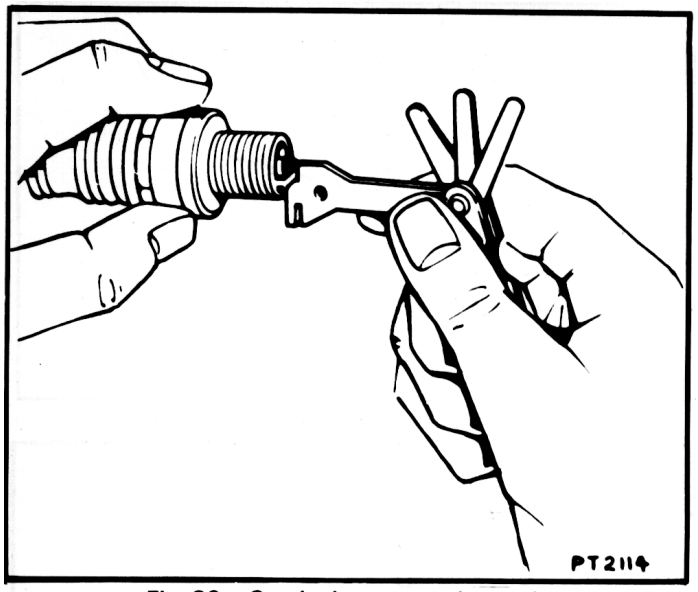


Fig. 20 Spark plug gap setting tool

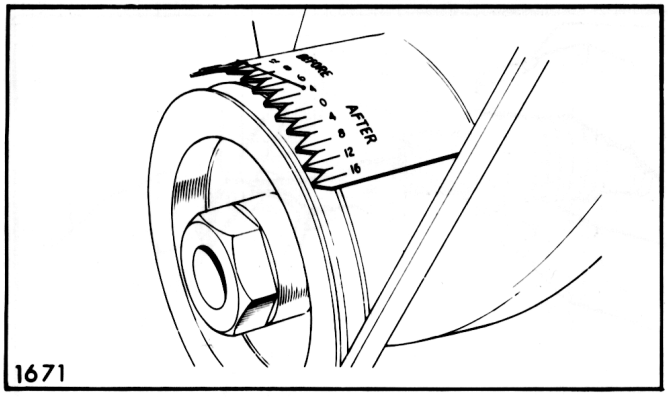


Fig. 21 TR7 crankshaft timing marks

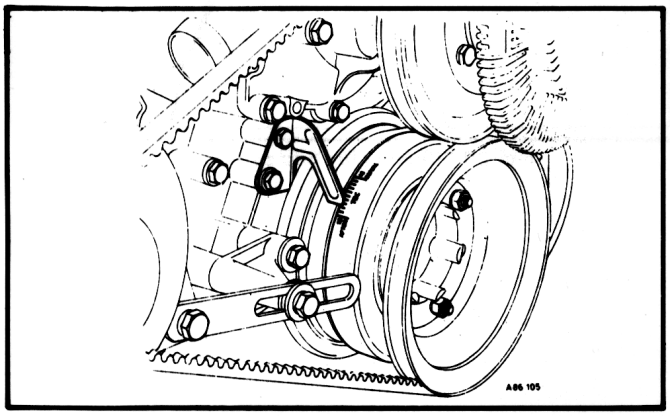


Fig. 22 V8 crankshaft timing marks

Check/Adjust Ignition Timing Using Electronic Equipment

(1) Refer to General Specification section for the correct settings.
(2) Use recognised proprietary equipment to verify ignition timing with the engine running. **Connect the equipment following the manufacturer's instructions.**

If adjustment is necessary.

(3) Stop the engine and slacken the distributor clamp bolt.

(4) Rotate the distributor body slightly clockwise to advance the timing or anti-clockwise to retard the timing.
(5) Tighten the distributor clamp bolt.

Check Fuel System for leaks, Pipes and Unions for chafing and corrosion.

Check Exhaust System for leaks and security.

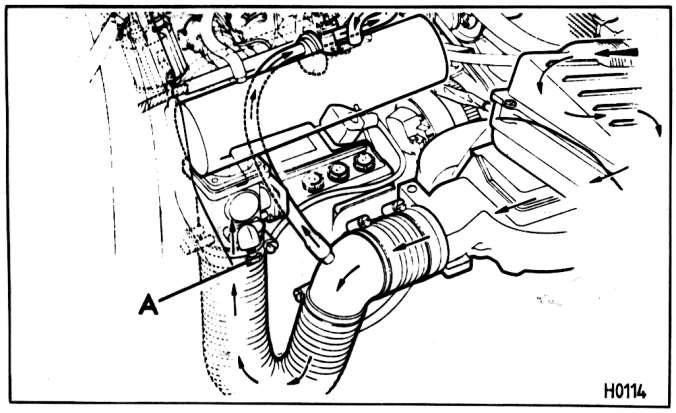


Fig. 24 TR7 Engine setting screws

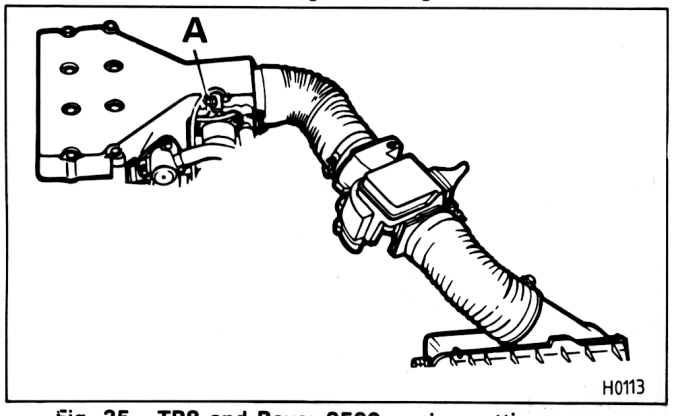


Fig. 25 TR8 and Rover 3500 engine setting screws

Check/Adjust Engine Idle Speeds

Ensure that all other factors affecting the correct running of the engine are in good order, e.g. ignition timing and fuel supply system operation etc.

If necessary have the correct operation of the electronic fuel injection control system verified by your Dealer or other service outlet using the special equipment required.

(1) Run the engine until it reaches normal operating temperature.
(2) Using the air bleed screw (A) on the plenum chamber, adjust the engine idle speed to be within the limits given in the General Specification section.

Renew Fuel Filter

On TR models the fuel filter is located under the body, forward of the rear axle.

On Rover 3500 models the fuel filter is located in the engine compartment, rearward of the left hand front suspension turret.

Continued

(1) Depressurise the fuel system by disconnecting the fuel pump earth lead and cranking the engine for several seconds. Reconnect the fuel pump earth lead.
(2) Release the fuel pipes from the filter, clamping them to prevent spillage.
(3) Slacken off the filter clamp bracket fastenings.
(4) Withdraw the filter noting its fitted position.
(5) Fit a new filter and reverse instructions (2) to (4).

Check Condition of Fuel Filler Cap Seal

Renew Oxygen Sensor(s) and Reset Service Interval Counter

The oxygen (Lambda) sensor is located on the exhaust manifold on TR7 models and one sensor is located on each exhaust pipe forward of the catalyst, on TR8 and Rover 3500 models.
To renew the sensor(s):-

(1) Disconnect the electrical lead from the sensor.
(2) Unscrew the sensor from the exhaust manifold/pipe, taking care not to strain the exhaust system.
(3) Lubricate the threads of the new sensor and fit it to the exhaust manifold/pipe. Tighten the sensor sufficient to make a gas tight seal, but do not overtighten.
(4) Reconnect the electrical leads to the sensor.
(5) Reset the Service Interval Counter using the special tool necessary for this purpose.

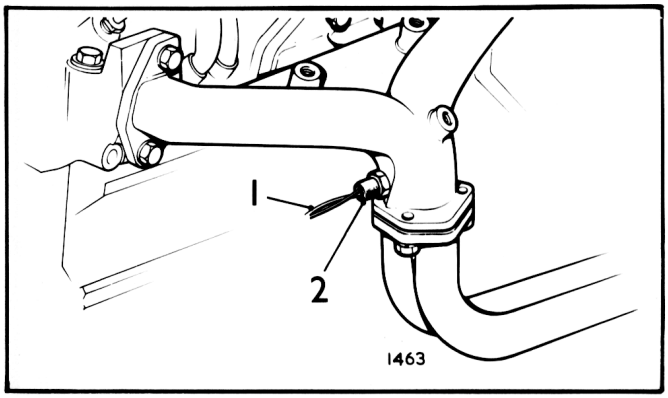


Fig. 26 Oxygen sensor — TR7

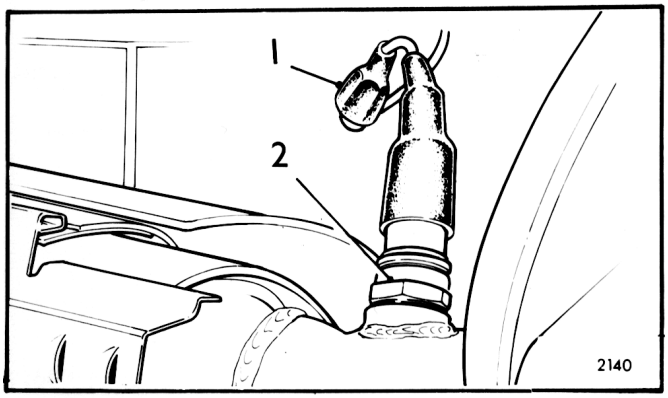


Fig. 27 Oxygen sensor — TR8 and Rover 3500

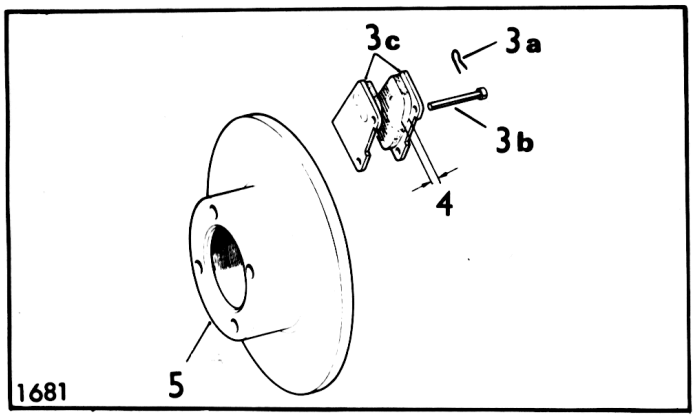


Fig. 28 Front brake disc and pads

Check for Oil/Fluid leaks

Check condition and security of Steering Unit, Joints and Gaiters

Inspect Brake Pads for wear and Discs for condition

(1) Jack up the front of the car and support the body on stands.
(2) Remove the road wheel.
(3) Remove the disc brake pads, as follows:-
  (a) Withdraw the two spring pins from the brake pad retaining pins.
  (b) Withdraw the brake pad retaining pins.
  (c) Lift out the brake pads complete with any damping shims fitted.

CAUTION: Do not depress the brake pedal whilst the pads are removed.

(4) Check the pad condition. If the friction lining has been reduced to 3mm (0.125in) or if there is not sufficient material to provide a thickness of 3mm (0.125in) before the next service interval, the pads should be renewed.
(5) Check the brake disc for excessive scoring and run-out.
(6) If new brake pads are to be fitted, remove the cap from the brake master cylinder and then press the caliper pistons into their respective bores.
(7) Clean the brake pad locations in the caliper.
(8) Fit the brake pads complete with any damping shims fitted.
(9) Fit the brake pad retaining pins to the caliper and secure with the spring pins.
(10) Fit the front wheel and lower the car.
(11) Firmly depress the footbrake several times to correctly locate the friction pads.
(12) Top-up the brake master cylinder with new brake fluid and replace the cap.

Inspect Brake Linings for wear and Drums for condition

(1) Jack up the rear of the car and support the body on stands.
(2) Remove the car road wheels.
(3) Remove the rear brake drum as follows:–
  (a) Release the handbrake
  (b) Remove the countersunk screws securing the brake drum to the hub and withdraw the brake drum.
(4) Check the brake linings for wear. If they are excessively worn, damaged, or contaminated by oil or grease the linings should be replaced. If the brake linings are contaminated with oil or grease contact your Dealer for the necessary rectification work to be carried out.
(5) Clean and replace the brake drum.
(6) Fit the rear road wheels and lower the car.

Check/Adjust Footbrake Operation

Self-adjusting brakes are fitted to the front and rear. Front adjustment is hydraulically self-compensating to provide for brake pad wear. In the rear brakes a self-adjusting mechanism incorporated in the brake-shoe handbrake linkage maintains a fixed brake liner/drum running clearance; self-adjustment occurs on the application of the handbrake.

(1) With the handbrake off, check the brake pedal for spongy operation and excessive travel.
(2) If the pedal has a spongy operation, bleed the brakes, as described on the following pages.

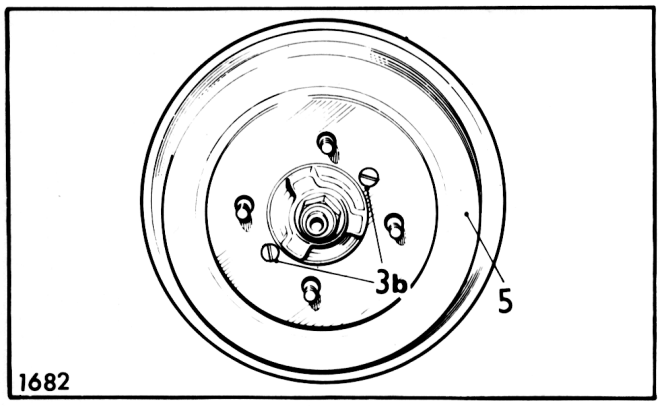


Fig. 29 Rear brake drum

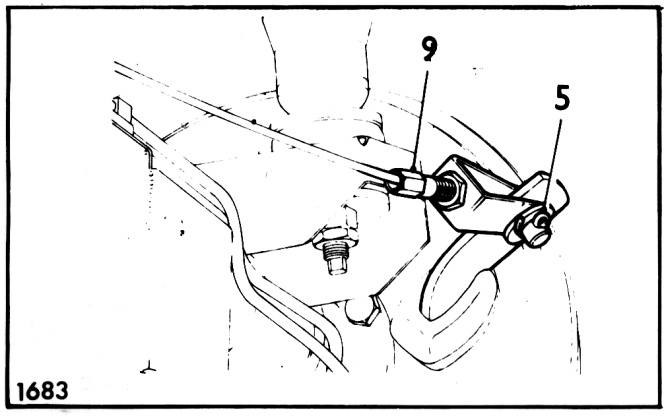


Fig. 30 Handbrake cable adjustment — TR models

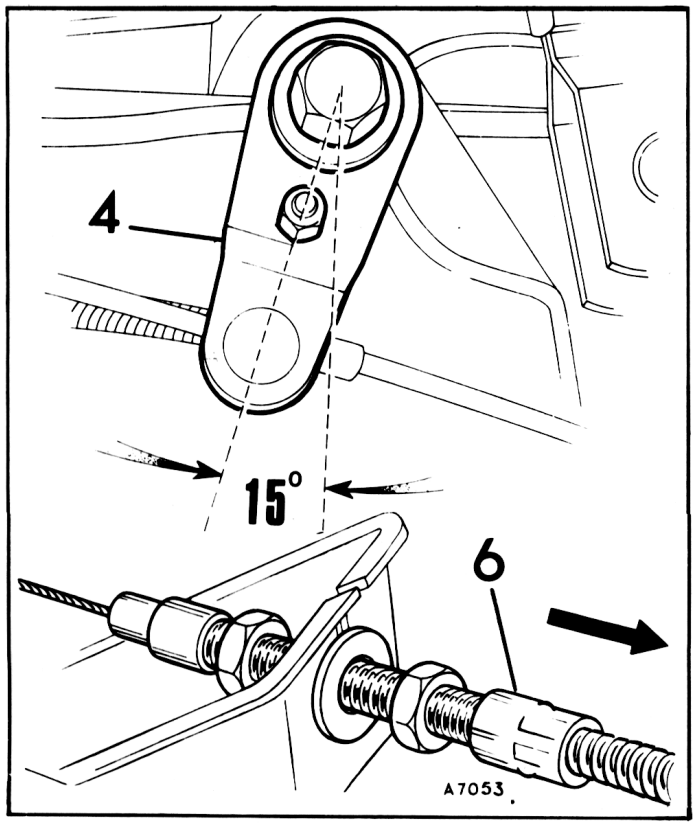


Fig. 31 Handbrake adjustment — Rover 3500

Check/Adjust Handbrake Operation

(1) With the foot clear of the brake pedal, check the handbrake for excessive travel.
(2) If the handbrake travel is excessive, adjust the handbrake as follows:-
(3) Jack up the rear of the vehicle and support the axle on stands.
(4) Release the handbrake.

TR Models

(5) Disconnect the handbrake cables from the rear brake backplate levers.
(6) Applying finger pressure, push the brake operating levers inboard to ensure that the operating levers are in contact with the brake-shoe webs.
(7) Maintaining the compensator in the vertical position, adjust the cable forks so that the clevis pin can be entered through them and the operating levers without straining the cables.
(8) Insert and fix the clevis pins.
(9) Screw in each fork adjuster 3½ complete revolutions and tighten the locknuts.
(10) Apply alternately the hand and foot brakes several times. With 25lbf effort applied to the handbrake, the travel of the lever should be between four and seven inches.

Ensure that the rear wheels do not drag.

ROVER 3500

Ensure that the hydraulic system is free of air before commencing this procedure.

(1) Completely slacken all handbrake cables.

(2) Release the handbrake.
(3) Press the footbrake hard three times.
(4) Using the fork adjuster take all the slack out of the left hand rear cable and operating lever, maintaining the compensator at 15% to the left of vertical.
(5) Tighten the locknut.
(6) Take the slack out of the inner cable by adjusting the outer cable and tighten the locknuts against the tunnel abutment bracket.
(7) With 25lbs. effort applied to the handbrake, the brakes should be hard on at the third notch with no retardation at the first notch (if not satisfactory repeat operation 6).
Ensure that the rear wheels do not drag.

Bleeding the Brake System

Do not allow the fluid level in the reservoir to fall below half capacity. When topping-up during the bleeding process, DO NOT USE aerated fluid exhausted from the system, DO NOT bleed the system with the servo in operation (engine running).

(1) Disconnect the wires to the pressure failure switch and remove the pressure failure switch from the underside of the master cylinder.
(2) Release the handbrake.
(3) Attach the bleed tube to the bleed nipple of the front caliper farthest from the master cylinder, allowing the free end of the bleed tube to hang submerged in brake fluid in a transparent container.
(4) Open the bleed nipple (90 to 180 degrees).
(5) Fully depress the brake pedal and follow with three rapid successive strokes. Allow the pedal to return. Repeat this procedure until fluid free from air bubbles issues from the wheel cylinder.
(6) Depress the brake pedal, close the nipple and release the pedal.
(7) Remove the bleed tube.
(8) Attach the bleed tube to the opposite front caliper and repeat instructions (4) to (7).
(9) Attach the bleed tube to the single nipple on the rear right hand backplate and repeat instructions (4) to (7).
(10) Fit the pressure failure switch to the master cylinder and connect the wires. The P.D.W.A. shuttle fitted to this vehicle is self-centering.

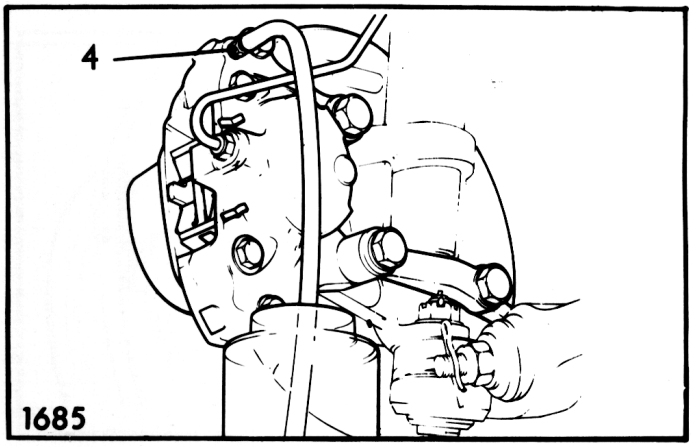


Fig. 32 Bleeding a front brake

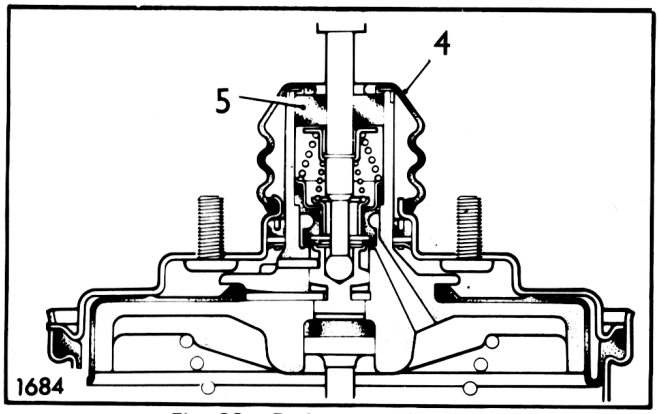


Fig. 33 Brake servo filter

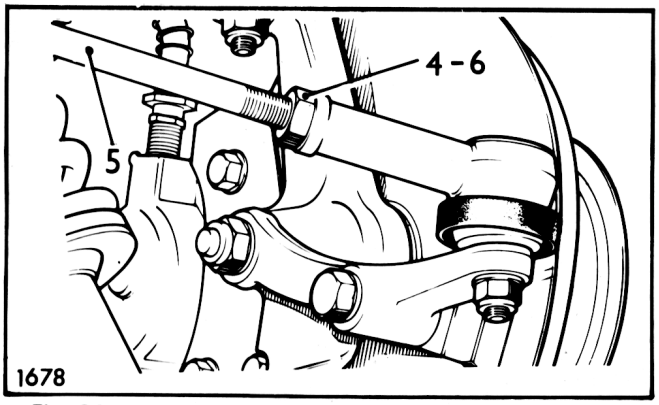


Fig. 34 Adjusting front wheel alignment — TR models

Check Brake Servo Hoses for security and condition

Renew Brake Servo Filter

(1) Rover 3500 models – remove the driver's glovebox.
(2) Remove the brake stop light switch.
(3) Remove the split pin, plain washer and clevis pin securing the servo rod to the brake pedal.
(4) Remove the rubber boot from the push-rod.
(5) Withdraw the filter.
(6) Reverse instructions (1) to (5) as applicable.

Check/Adjust Front Wheel Alignment

Checking

(1) Locate the car on level ground and position the front wheels in the straight-ahead position.
(2) Using wheel alignment equipment, check the front wheels for toe-in. The following requirements should be met:-
(a) Centralized steering-wheel.
(b) Centralized steering-rack.
(c) Front wheels parallel to 1,59mm (1/16 in.) toe-in TR7 or parallel to 3,1mm (1/8 in) toe-in Rover 3500, kerb condition.
(d) Ball centres of both tie-rods equal.

Continued

Adjusting

(3) Slacken the outer clips on the rack gaiters.
On Rover 3500 the gaiters are oil filled.
(4) Slacken the locknut and the tie-rod outer ball joints.
(5) Shorten or lengthen both tie-rods by an equal amount to obtain the required setting, ensuring that the ball centres on both tie-rods are equal.
(6) Tighten the locknuts at the tie-rod outer ball joints.
(7) Tighten the gaiter clips and, Rover 3500 only, replenish any oil lost.

Check Visually Brake and Clutch Hydraulic Hoses/Pipes and Unions for cracks. chafing, leaks and corrosion.

Adjust Front Hub Bearings End Float

Jack up the front of the car and support the body on stands. Remove the road wheel and check the hub bearings for end float. If excessive, adjust as follows:

(1) Prise off the grease cap, withdraw the split pin and remove the nut retaining cap, where fitted.
(2) Whilst spinning the hub tighten the slotted nut to 5lb ft and unscrew the nut one flat to give 0,05mm to 0,2mm (0.002in to 0.008in) hub end float.

CAUTION: This torque figure must not be exceeded.

(3) Replace the nut retaining cap, fit a new split pin. Replace the grease cap and road wheel. Repeat operation on opposite hub.

Continued

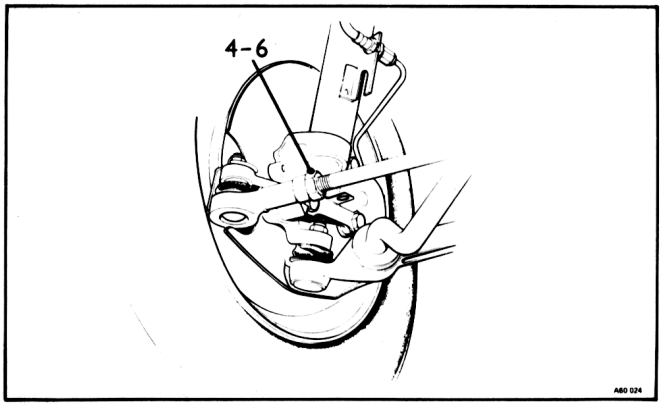


Fig. 35 Adjusting front wheel alignment — Rover 3500

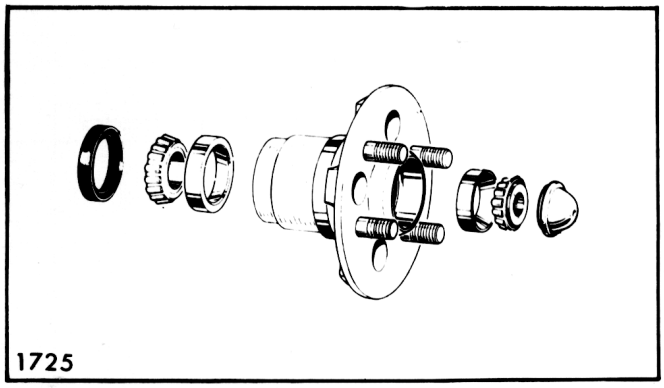


Fig. 36 TR Front hub

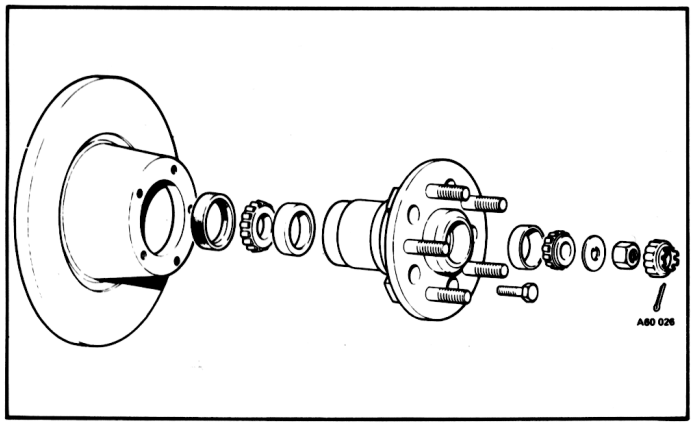


Fig. 37 Rover 3500 Front hub

At major overhaul period or every 24.000 km (15 000 miles) if the car is being used for competition work, re-pack the front hubs with grease as follows:

(1) Jack up the front of the car and remove the road wheel.
(2) Without disturbing the hydraulic pipe unions, unscrew the caliper securing bolts and lift the caliper from the disc, tying it to a convenient point to prevent it hanging by the attached hydraulic pipe. Note the number of shims fitted between the caliper and the vertical links.
(3) Prise off the grease cap, withdraw the split pin and unscrew the slotted nut. Remove the 'D' washer and pull the hub assembly from the stub axle.
(4) Wash all grease from the hub and bearings. Pack the hub and bearings with grease, working it well into' the rollers and re-assemble. Renew the hub seal if worn or damaged.
(5) Adjust the end float as described above.
(6) Re-assemble the brake caliper unit, refitting any shims removed during dismantling.
(7) Refit the road wheel, repeat the above operations with the opposite wheel hub and lower the car.

Check Tightness of Propeller Shaft Coupling Bolts.

If correct these bolts will be tightened to a torque of 4,7 kgf m (34lbf ft).

Check tyres for tread depth, visually for external cuts in tyre fabric, exposure of ply or cord structure, lumps, bulges or uneven wear

Check that tyres conform to manufacturer's specification

Check/Adjust Tyre Pressures Including Spare Wheel.
Adjust tyre pressures in accordance with the recommendations given below.

Adjust the pressures whilst the tyres are cold, i.e. before a journey. As tyres warm up, their pressures increase. A warm tyre bled to the recommended pressure will be under-inflated when cold.

Should the vehicle be tuned to increase its maximum speed, or be used for racing, consult the respective tyre company regarding the need for tyres of full racing construction.

Check tightness of Road Wheel Fastenings
If correct these will be tightened to a torque of
TR Models
Standard wheel – 10.2 kgf m (74 lbf ft).
Optional wheel – 12.2 kgf m (88 lbf ft)
Rover 3500 – 9,1 kgf m (66 lbf ft)

Inflation Pressures							
		Front			Rear		
Tyre Size and Type	Loading Conditions	Kgf/cm^2	lbf/in^2	bars	Kgf/cm^2	lbf/in^2	bars
TR7 185/70 SR 13 Radial ply tubeless	All	1.6	24	1.7	1.9	28	2.0
TR8 185/70 SR 13 Radial ply tubeless	All	1.6	24	1.7	1.9	24	2.0
Rover 3500 185 HR 14 or 195/70 HR 14 Radial ply tubeless	1 – 4 up (no luggage)	1.8	26	1.8	1.8	26	1.8
	More than 4 up	1.8	26	1.8	2.1	30	2.1

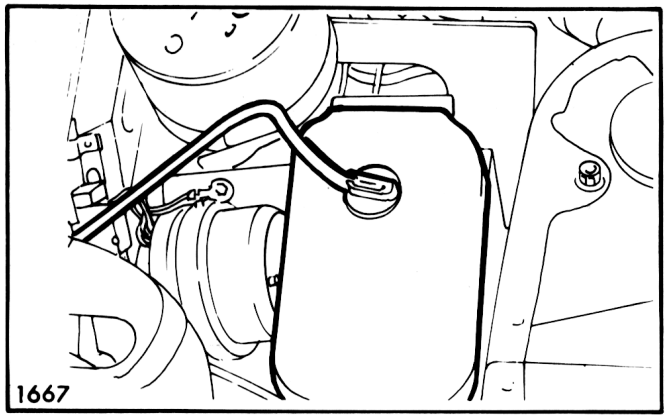


Fig. 38 TR Windscreen washer reservoir

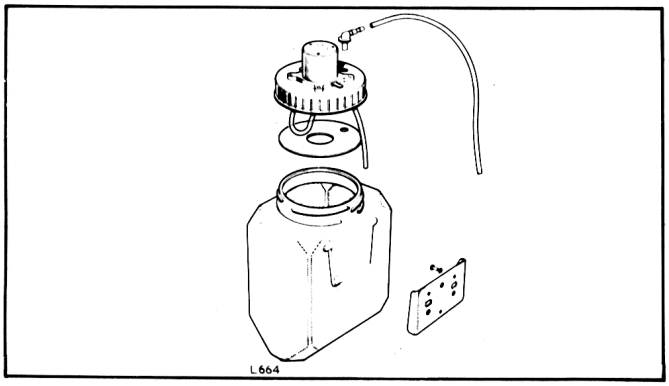


Fig. 39 Rover 3500 windscreen washer reservoir

Check/Adjust Operation of all Washers and Top-up Reservoir(s)
Check the level of water in the translucent windscreen washer container and, if required, replenish the container with clean soft water.

During freezing conditions it is beneficial to fill the container with an ethanol/water solution (to a maximum concentration of 50%) or a methanol/water solution may be used. This will assist in the dispersal of snow and ice from the screen.

Do not add anti-freeze solutions to the container as this will discolour the paintwork and damage wiper blades and sealing rubber.

Should a screen washer jet become obstructed, a strand of fine wire not greater than 0,7mm (0.030in) diameter can be used to clear the jet orifice.

Check function of original equipment i.e. lamps, horns, wipers and all warning indicators.

Check, if necessary, renew Wiper Blades

Examine each wiper blade in turn for damage. Wet the glass before operating the wipers and check the wiper blade operation for smearing and adequate removal of dirt. Replace any wiper blade that is damaged or unsatisfactory in operation.

Service position of wiper arms and blades – Wet the windscreen. Switch on ignition and wipers. Stop the wiper assembly in a vertical position by switching off the ignition at an appropriate moment and lift the wiper arm and blade from the screen.

Do not switch on the ignition until the arm is returned to its normal position on the screen. If this is done the pantograph arm, TR models, will jam, the motor will stall and the appropriate fuse will 'blow' to prevent damage to the arm or motor.

Renew Driver's Wiper Blade – TR models
Depress the clip and withdraw the wiper blade from the pivot block.

Renew Passenger's Wiper Blade – TR models
Renew either Wiper Blade – Rover 3500
Depress the clip and withdraw the wiper blade from the arm.

Refit the wiper blades by reversing the removal procedure.

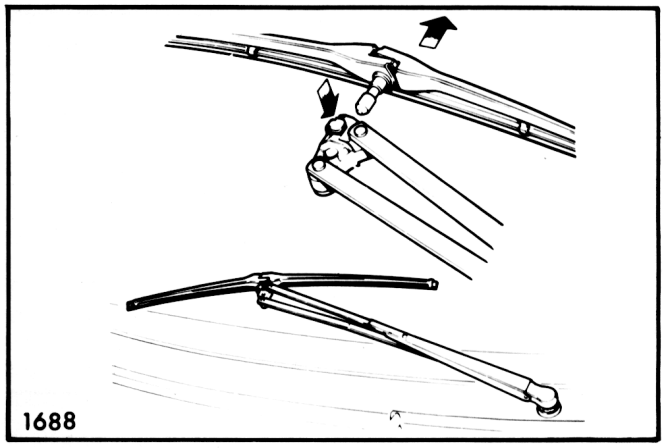


Fig. 40 TR Driver's side wiper blade removal

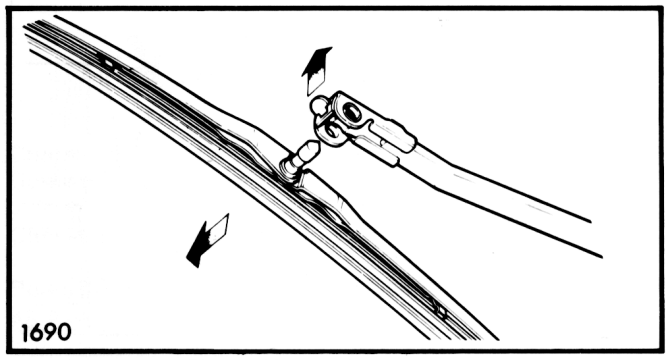


Fig. 41 Wiper blade removal

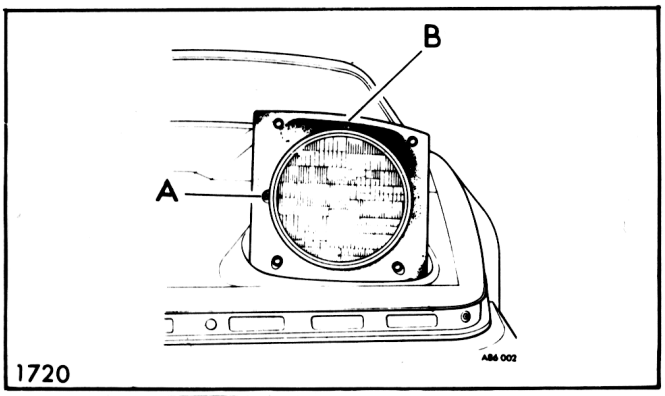


Fig. 42 TR Headlamp beam adjustment

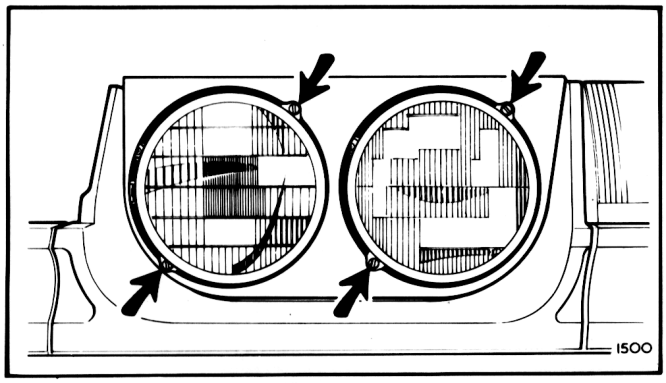


Fig. 43 Rover 3500 Headlamp beam adjustment

Check/Adjust Headlamp Alignment
Beam aiming can best be accomplished using any "free standing" equipment such as a Lucas Beamsetter or Beam Aimer. This or similar equipment is available at most qualified service outlets and its use will ensure maximum road illumination with minimum discomfort to other road users.

Beam Aiming – It should be possible to adjust the beams without removing the headlamp surround. Screw 'A' controls the beam in the horizontal plane. Screw 'B' controls the beam in the vertical plane.

Clean and Grease Battery Connections
Ensure that the battery top and terminals remain clean and dry. Coat the terminals with petroleum jelly (Vaseline) to prevent corrosion. If electrolyte has been spilled, clean the affected area with a cloth moistened with ammonia to neutralise the acid and prevent acid corrosion,

Ensure that the battery is always firmly clamped in position by the retaining assembly. When fitting battery leads do not hammer the terminals to the terminal posts. Such action may damage the battery.

The battery will deteriorate rapidly if left in a discharged condition. If the unit is reduced to a low state of charge it should be recharged at the first opportunity.

Check Condition, Security and Operation of Seats and Seat Belts.
Check fastenings, which if correct will be tightened to the following torque values:-

Seat belt to seat slide, wheel arch and mounting bracket – 7/16 UNF set screw 4,4kgf m (32lbf ft)

Seat Belt Warning Switch to Gearbox Extension – ⅜ in UNC switch 2,0kgf m (15lbf ft)

Seat Slides to Floor – 8mm cap screw 3,0kgf m (22lbf ft)

Seat Slides to Seat Frame – 6mm cap screw 0,9kgf m (7lbf ft)

Check seat belts for signs of wear, damage or deterioration. Renew any belt that is suspect or that has been in use when the vehicle has been involved in an impact accident.

Referring to the driver's/owner's handbook, check that the seat belt warning system is operating correctly.

Check Operation of Seat Belt Inertia Reel Mechanism
To provide the users with maximum freedom during normal driving conditions the seat belts are of the inertia reel type. Hard braking or fast cornering locks the belts immediately.

The following road test must be carried out only under maximum safe road conditions, i.e. on a dry, straight, traffic free road.

Inertia Lock Test (Vehicle in Motion)
in the driver's/owner's handbook, drive the car at 8 km/h (5 m.p.h.).

Ensuring that it is safe to do so, brake sharply.

The safety harness should lock automatically, holding both driver and passenger securely in position.

It is important when braking that the reactions of both driver and passenger are normal, i.e. the body must not be thrown forward in anticipation, thus causing a 'snatching' action of the belt which would operate the locking mechanism.

Inertia Lock Test (Vehicle Stationary)
Whilst seated, fasten the seat belt and grip the shoulder belt at approximately shoulder level with the opposite hand. Pull the belt sharply in a downwards direction, the belt should lock.

If the belt fails to lock on test, consult your Dealer or a competent service outlet.

Check operation of all Door, Bonnet and Luggage Compartment Locks

Check operation of Window Controls

Road/Roller test. Check Brake operation and function of all Instrumentation

Report additional work required

WIRING DIAGRAMS

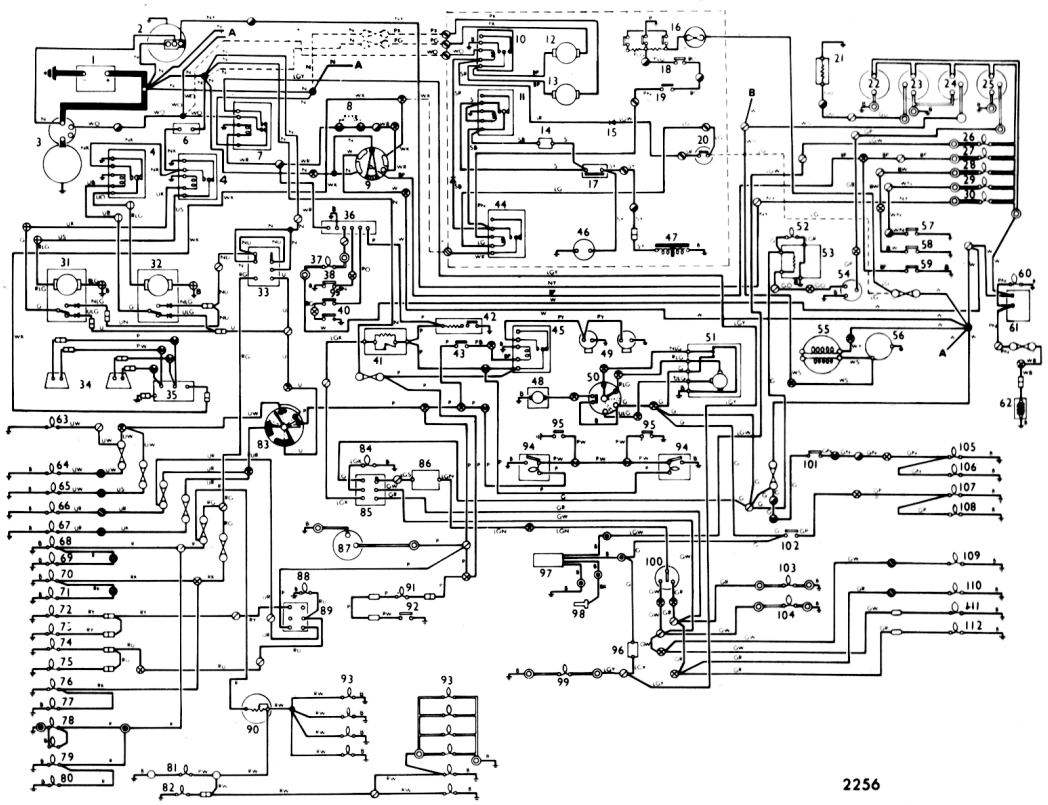
KEY TO WIRING DIAGRAMS ON PAGES 64 TO 69.

(1) Battery
(2) Alternator
(3) Starter Motor
(4) Headlamp Relay
(5) Tailgate Door Lock Solenoid
(6) Headlamp Motor Circuit Breaker
(7) Starter Motor Relay
(8) Starter Motor Inhibitor Switch (Auto. Trans.)
(9) Ignition Switch
(10) Air Conditioning Condenser Fan Relay
(11) Air Conditioning Compressor Clutch Relay
(12) Air Conditioning Condenser Fan Motor – L H
(13) Air Conditioning Condenser Fan Motor – R H
(14) Air Conditioning Circuit Delay Switch
(15) Air Conditioning Circuit Diode
(16) Heater/Air Conditioning Blower Motor Unit
(17) Air Conditioning Pressure Cut-In Switch
(18) Air Conditioning Full Throttle Cut-Out Switch
(19) Air Conditioning Cut-Out Switch
(20) Air Conditioning Radiator Temperature Switch
(21) Engine Temperature Gauge Sensor
(22) Battery Condition Gauge
(23) Engine Temperature Gauge
(24) Tachometer
(25) Fuel Gauge
(26) Low Coolant Level Warning Light
(27) Brake Line Failure Warning Light Switch
(28) Handbrake Warning Light
(29) Low Oil Pressure Warning Light
(30) Ignition Warning Light
(31) Headlamp Motor - L.H.
(32) Headlamp Motor - R.H.
(33) Side/Headlamp Switch
(34) Loudspeakers (35) Radio/Tape Player
(36) Buzzer
(37) Safety Belt Warning Light
(38) Seat Belt Warning System – Driver's Seat Switch
(39) Starter Motor Solenoid
(40) Audible Warning
(41) Hazard Warning Flasher Unit
(42) Cigar Lighter
(43) Horn Push Switch
(44) Air Condition Relay
(45) Horn Relay
(46) Air Conditioning
(47) Throttle Jack
(48) Windscreen Washer Pump Motor
(49) Horns
(50) Windscreen Wiper/Washer Switch
(51) Windscreen Wiper Motor
(52) Low Fuel Level Warning Light
(53) Low Fuel Level Circuit Delay Unit
(54) Fuel Gauge Tank Unit Sensor
(55) Ignition Coil
(56) Ignition Distributor
(57) Low Oil Pressure Warning Light Switch
(58) Handbrake Warning Light Switch
(59) Brake Line Failure Warning Light Switch
(60) Heated Rear Window Warning Light
(61) Heated Rear Window Switch
(62) Heated Rear Window Element
(63) Headlamps Main Beam Warning Light
(64) Headlamps Main Beam - R.H.
(65) Headlamps Main Beam - L.H.
(66) Headlamps Dip Beam - L.H.
(67) Headlamps Dip Beam - L.H.
(68) Side Marker Lamp - R.H.
(69) Front Side Lamp – R.H.
(70) Side Marker Lamp - L.H.
(71) Front Side Lamp - L.H.
(72) Rear Sidelamp - L.H.
(73) Front Fog Lamp - R.H.
(74) Rear Fog Guard Lamp - L.H.
(75) Rear Fog Guard Lamp - R.H.
(76) Rear Sidelamp - L.H
(77) Rear Stde Marker Lamp - L.H.
(78) Rear Number Plate Illumination Lamps
(79) Rear Side Marker Lamp - R.H.
(80) Rear Side Lamp - R H
(81) Automatic Transmission Selector Panel Illumination
(82) Cigar Lighter Illumination
(83) Headlamps Dip/Flash Switch
(84) Hazard Flasher Warning Light
(85) Hazard Warning Switch
(86) Hazard Warning Flasher Unit
(87) Clock
(88) Rear Fog Guard Lamps Warning Light
(89) Fog Lamp Switch
(90) Panel Illumination Rheostat
(91) Luggage Compartment Light
(92) Luggage Compartment Light Switch
(93) Panel Illumination
(94) Interior Light
(95) Door Switch
(96) Service Interval Counter Trip Switch
(97) Low Coolant Level Warning Unit
(98) Low Coolant Level Warning Sensor
(99) Lambda (Oxygen) Sensor Warning Light
(100) Direction Indicator Switch

(101) Reversing Lamps Switch
(102) Brake/Stop Warning Lamps Switch
(103) Direction Indicator Warning Light - L.H.
(104) Direction Indicator Warning Light - R.H.
(105) Reversing Lamp - R.H.
(106) Reversing Lamp - L H.
(107) Brake/Stop Warning Lamp - R.H.
(108) Brake/Stop Warning Lamp - L.H.
(109) Front Direction Indicator Lamp - R.H.
(110) Front Direction Indicator Lamp - L.H.
(111) Rear Direction Indicator Lamp - R.H.
(112) Rear Direction Indicator Lamp - L.H.
(113) Fuel Pump
(114) Fuel Pump Inertia Cut-Out Switch
(115) Fuel Injection Combined Relay
(116) Fuel Injection Temperature Switch/Water Thermistor
(117) Fuel Injection Throttle Switch/Potentiometer
(118) Fuel Injection Extra Air Valve
(119) Fuel Injection Lambda (Oxygen) Sensor
(120) Fuel Injection Air Flow Meter
(121) Fuel Injection Thermotime Switch
(122) Fuel Injection Cold Start Injector
(123) Fuel Injectors
(124) Thermal Fuse
(125) Heater
(126) Air Conditioning Compressor Clutch Coil
(127) Air Conditioning Super Heat Switch
(128) Ignition Coil Ballast Resistor
(129) Seat Belt Warning System - Driver's Seat Switch
(130) Solenoid Valve
(131) Heated Rear Window Relay
(132) Radio Aerial Motor
(133) Air Conditioning Thermostat
(134) Relay
(135) Fuel Injection Electronic Control Unit
(136) Fuel Injection Ballast Resistors
(137) Fuel Injection Feed Back Monitoring Point
(138) Insulated Terminal Block
(139) Battery Terminal Stud
(140) Fuel Injection Power Resistors
(141) Door Window Circuit Thermal Delay Unit
(142) Rear Door Relay
(143) Front Door Relay
(144) Front Door Window Switch - L.H.
(145) Front Door Window Motor - L.H.
(146) Front Door Window Motor - R.H.
(147) Front Door Window Switch - R.H.
(148) Rear Door Window Switch - L.H.
(149) Rear Window Door Switch - L.H.
(150) Rear Door Window Switch - R.H.
(151) Rear Door Window Motor - L.H.
(152) Rear Door Window Motor – R.H.
(153) Rear Window Door Switch - R.H.
(154) Fog Lamp Supply
(155) Sun Visor Illumination
(156) Radio Suppressor
(157) Front Door Lock Solenoid and Key Switch - R.H.
(158) Rear Door Lock Solenoid - R.H.
(159) Front Door Lock Solenoid and Key Switch - L.H.
(160) Rear Door Lock Solenoid - L.H.
(161) Door Lock Relay - Lock
(162) Door Lock Relay - Unlock
(163) Door Lock Driver's Master Switch
(164) Resistor Terminal Block
(165) Air Conditioning Compressor Electro-Magnetic Clutch
(166) Air Conditioning Super Heat Switch
(167) Air Conditioning Thermal Limiter
(168) Engine Sensing Socket Connector
(169) Air Conditioning Ambient Temperature Switch
(170) Resistor Terminal Block
(171) Engine Diagnostic Timing Transducer
(172) Engine Diagnostic Crankshaft Transducer
(174) Brake Line Failure Warning Light Switch
(175) Low Brake Fluid Level Warning Light Switch
(176) Oil Temperature Gauge Sensor
(177) Voltage Stabilizer
(178) Ignition Key Warning Buzzer Switch
(179) Windscreen Intermittent Wipe Unit
(180) Low Coolant Level Warning Light Switch
(181) Engine Temperature Gauge Sensor
(182) Seat Belt Warning System Passenger's Seat Switch
(183) Glove Box Light
(184) Engine Compartment Light Switch
(185) Lambda (Oxygen) Sensor Warning Light
(A) To Fuel Injection Relay
(A1) To Fuel Injection System
(B) Fuel Injection Signal
(C) From Main Harness
(D) To Heated Rear Window Switch
(E) To Terminal No. 1 on Digital Control Box
(F) Ballast Resistor
(G) Starter Motor Relay
(H) Starter Motor Solenoid
(J) Console Switches
(K) Rear Door Window Switches
(L) Front Door Window Switches
(M) E.C.V.
(N) To Starter Inhibitor and Reverse Lamp Switch

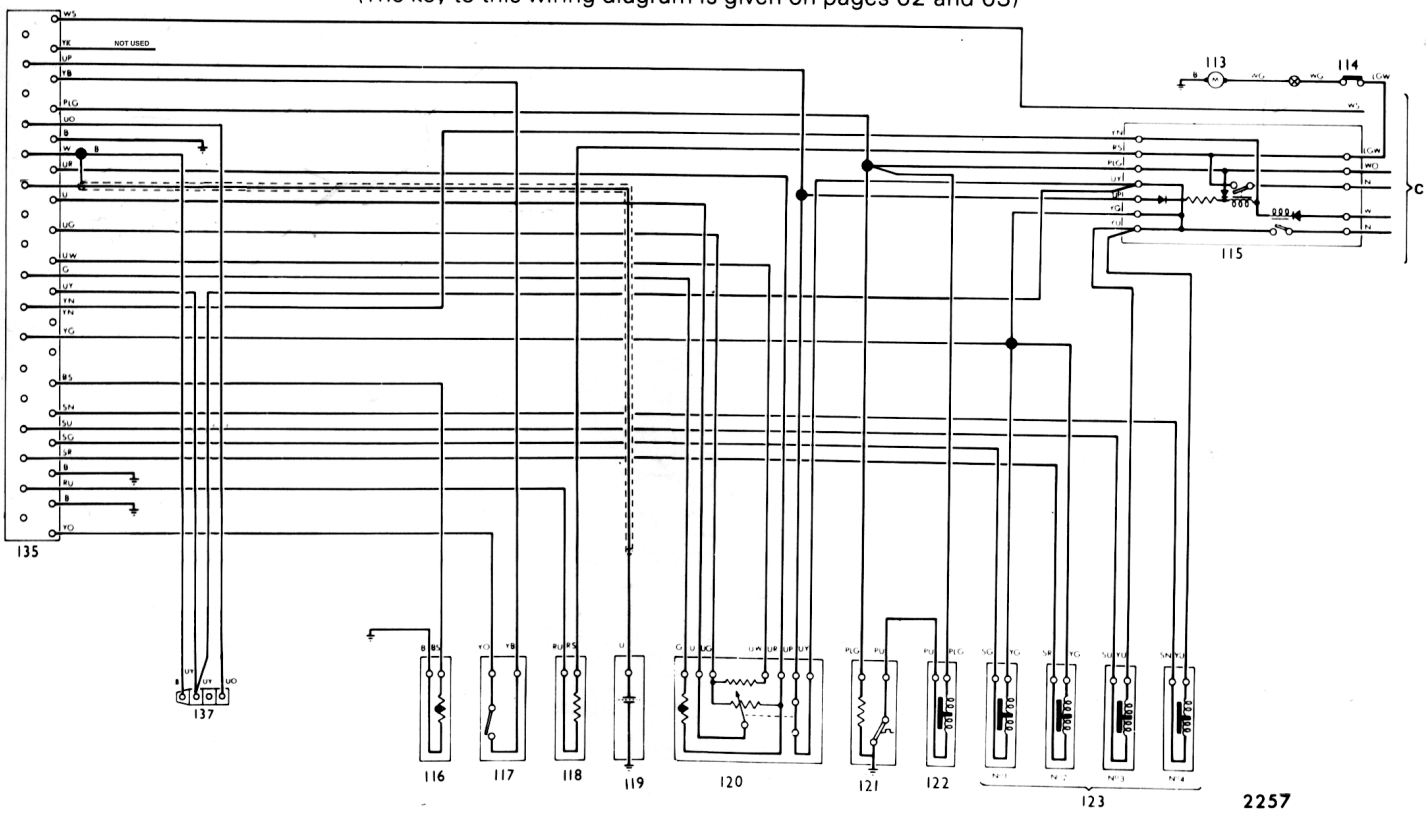
MAIN WIRING DIAGRAM — TR7 — U.S.A. MARKET

(The key to this wiring diagram is given on pages 62 and 63)



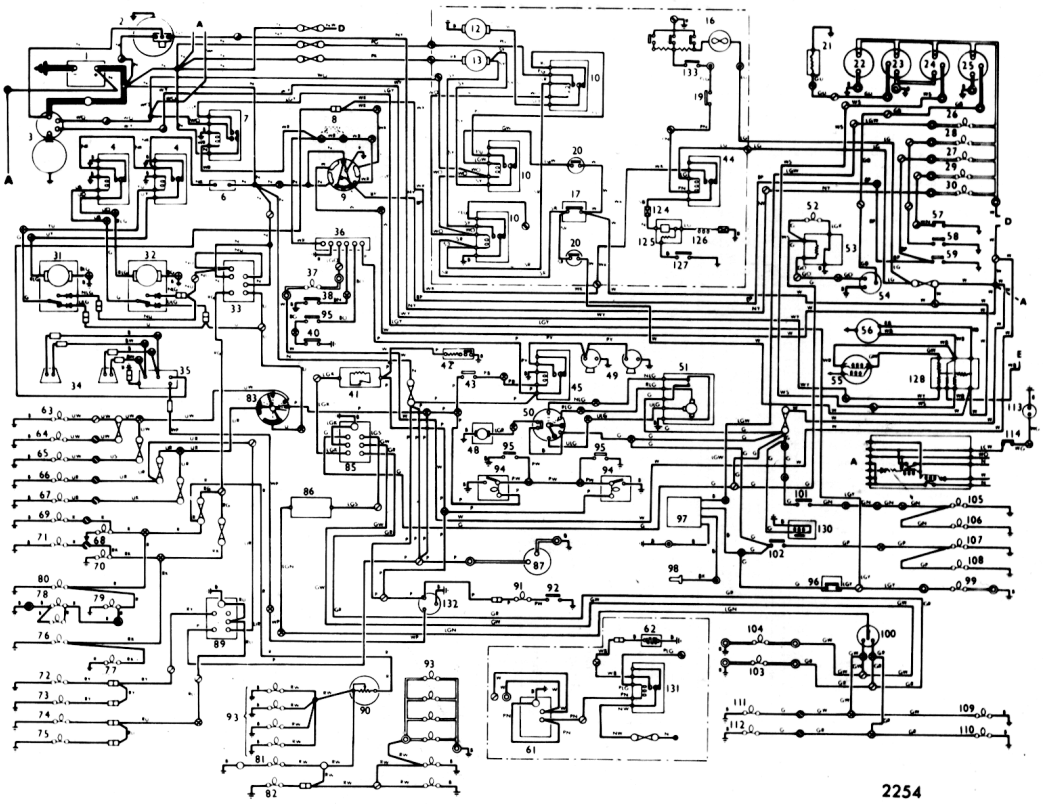
SUPPLEMENTARY WIRING DIAGRAM — TR7 — U.S.A. MARKET

(The key to this wiring diagram is given on pages 62 and 63)



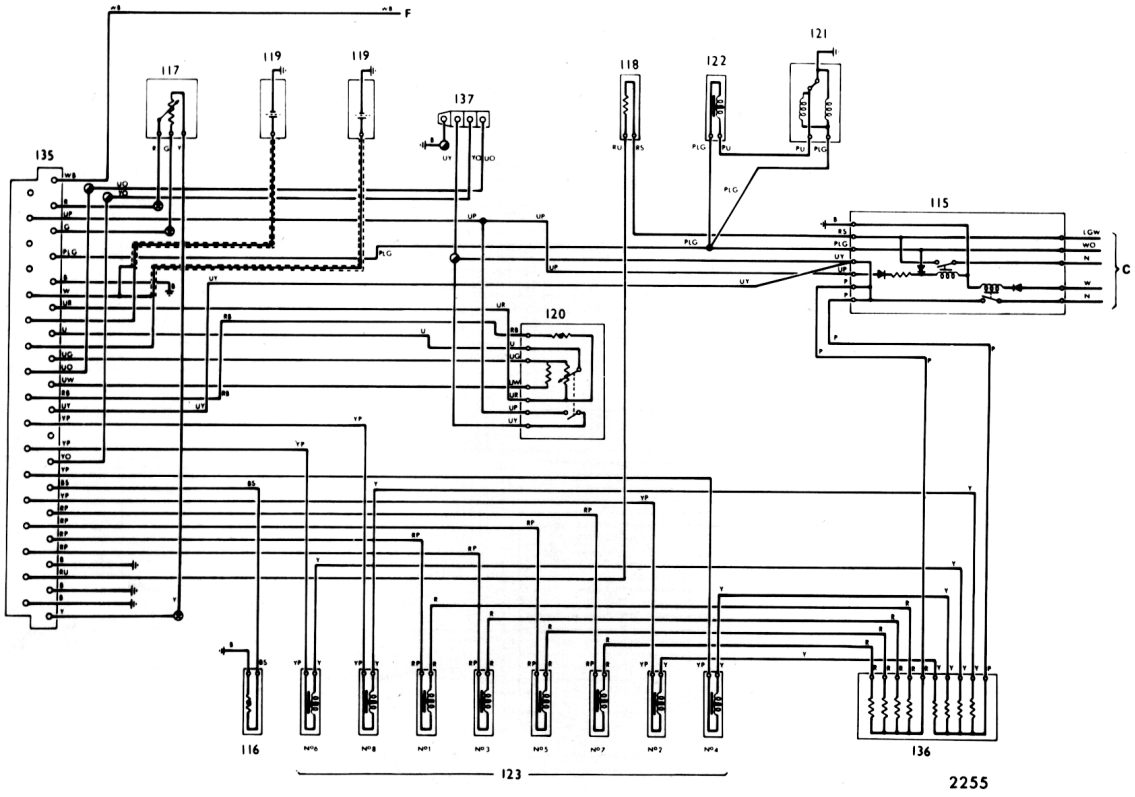
MAIN WIRING DIAGRAM — TR8 — U.S.A. MARKET

(The key to this wiring diagram is given on pages 62 and 63).



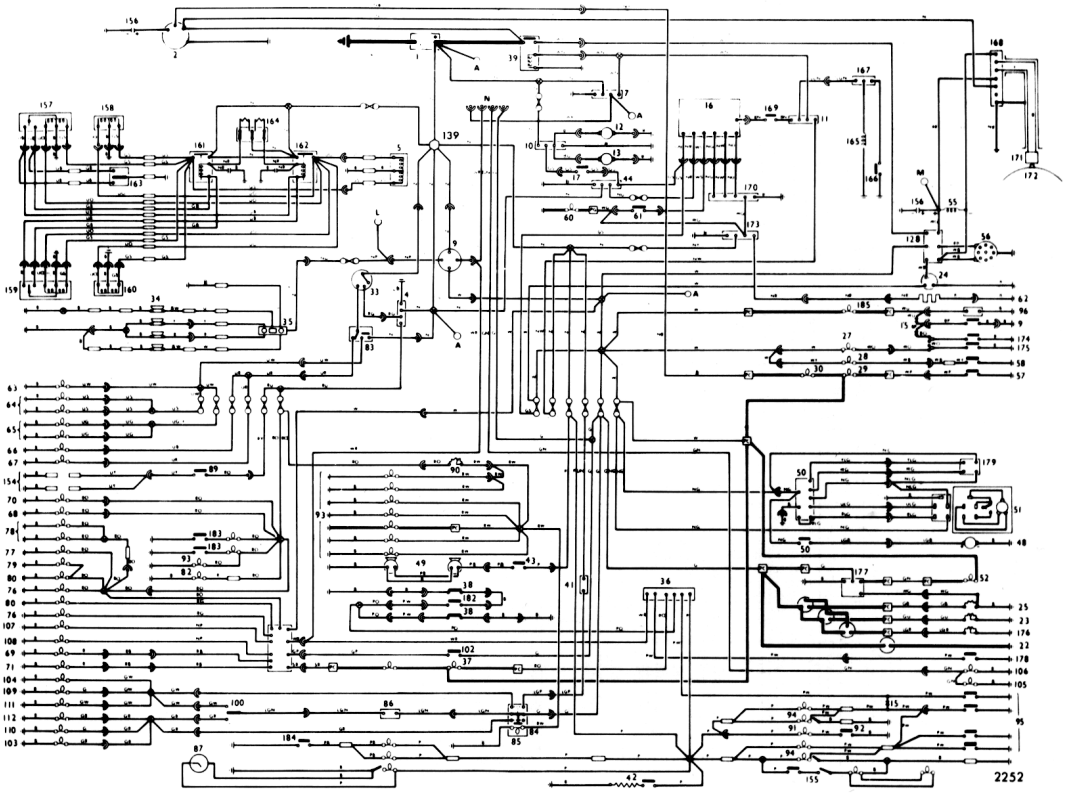
SUPPLEMENTARY WIRING DIAGRAM — TR8 — U.S.A. MARKET

(The key to this wiring diagram is given on pages 62 and 63).



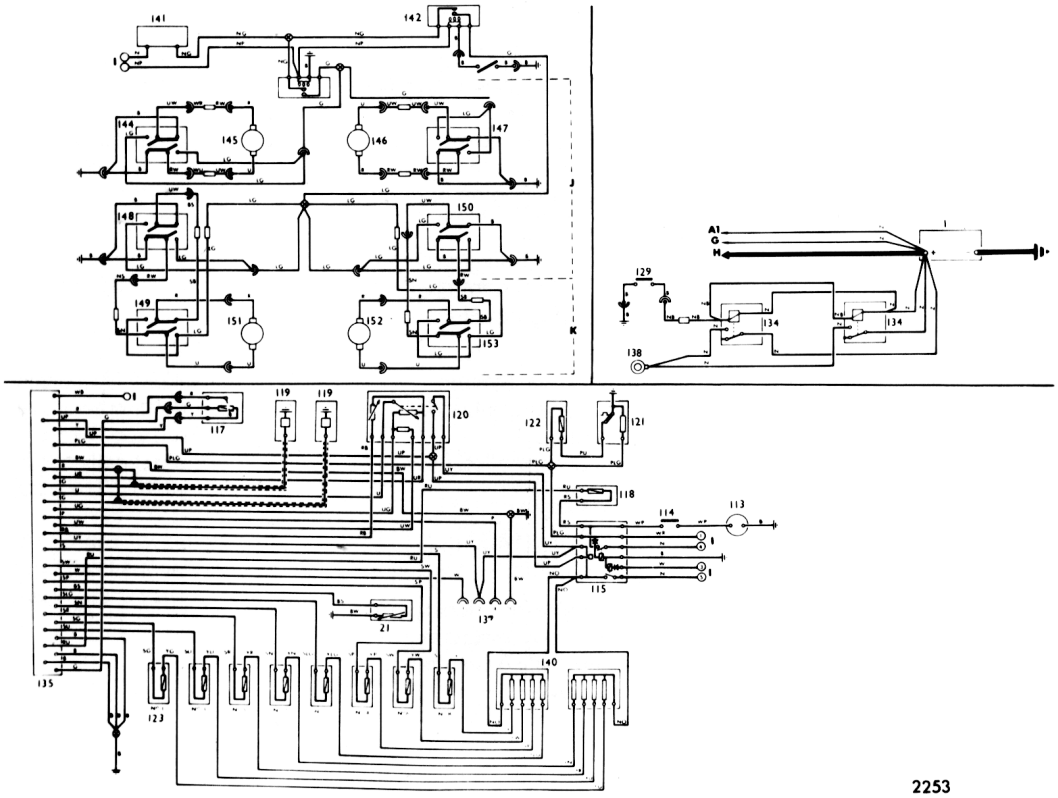
MAIN WIRING DIAGRAM — ROVER 3500 — U.S.A. MARKET

(The key to this wiring diagram is given on pages 62 and 63).



SUPPLEMENTARY WIRING DIAGRAM — ROVER 3500 — U.S.A. MARKET

(The key to this wiring diagram is given on pages 62 and 63).



GENERAL SPECIFICATION

		TR7	TR8 and 3500
ENGINE		4 cylinders in line – inclined at 45%	V8
Bore/Stroke		90,3 mm (3.56 in) / 78 mm (3.07 in)	88,9 mm (3.5 in) / 71,1mm (2.8in)
Capacity		1998 cm^3 (122 in^3)	3528cm^3 (215 in^3)
Compression ratio		8.0:1 nominal	8.13:1 nominal
Valve Timing	Inlet Valve	Opens 16° B.T.D.C.; Closes 56° A.T.D.C.	Opens 30° B.T.D.C.; Closes 75° A.B.D.
	Exhaust Valve	Opens 56° B.B.D.C.; Closes 16° A.T.D.C.	Opens 68° B.B.D.C.; Closes 37° A.T.D.C.
Valve Clearance	Inlet Valve	0,2 mm (0.008 in) Engine Cold	Not applicable – self adjusting
	Exhaust Valve	0,5 mm (0.018 in) Engine Cold	hydraulic tappets
Idle Speeds		700 to 900 rev/min Engine operating temperature	750 to 900 rev/min Engine operating temperature
LUBRICATION		Wet sump system	Wet sump system
Oil pump pressure		3,5 kgf/cm^2 (50 lbf/in^2) nominal	2,5 kgf/cm^2 (35 lbf/in^2) nominal
Oil filter		Full flow type. Replaceable element.	Full flow type. Disposable cartridge.
COOLING SYSTEM		Pressurized 'No Loss' System incorporating a separate header tank	Pressurized 'No Loss' System incorporating a separate header tank
Circulation		Impellor Type Pump	Impellor Type Pump
		Thermostatically controlled flow.	Thermostatically controlled flow.
Pressure Cap		1,05 kgf/cm^2 (15 lbf/in^2)	1,05 kgf/cm^2 (15 lbf/in^2)
Thermostat		88°C (190°F)	88°C (190°F)
Fan		13 Blades, 356 mm (14in) dia. with Viscous Coupling	7 Blades, 406 mm (16in) dia. with Viscous Coupling
		Cars fitted with air conditioning are equipped with two thermostatically controlled electrically driven fans, each having 4 blades.	

		TR7	TR8 and Rover 3500
FUEL SYSTEM		Tank above Rear Axle, No Reserve Tap	Tank (TR8) above rear axle, (Rover 3500) forward of rear axle.
Make/Type		Bosch/Analogue	Lucas/Digital
		Electronic Fuel Injection	Electronic Fuel Injection
Air Cleaner		Replaceable paper element	Replaceable paper element
Crankcase Ventilation and Evaporative Emission Control		See pages 21 to 24	See pages 21 to 24
IGNITION SYSTEM			
Lucas		6 Volt coil with ballast resistor.	6 Volt coil with ballast resistor.
Coil Type		15C	22CI 2
Distributor Type		47DE4 Electronic contactless	35DE8. Electronic contactless
		Pick-up air gap 0.38 mm (0.015 in)	Pick-up air gap 0.38 mm (0.015 in)
AC Delco		Electronic constant energy system	
Coil type		DR512 12volt	
Distributor type		D302	
Rotation viewed on rotor		Anti-clockwise	Clockwise
Timing	Static	10° B.T.D.C.	T.D.C.
	Dynamic at Idle	2° A.T.D.C.	T.D.C.
Sparking Plugs		Champion N12Y or Unipart GSP 131 gap 0,64mm (0.025in)	Champion N12Y, or Unipart GSP 131 gap 0,88mm (0.035in)
ELECTRICAL		12 volt Negative Earth	12 volt Negative Earth
Battery – Amps capacity at 20 HR			
Discharge rate		40	68
Alternator		Lucas 17 ACR or 25 ACR with air conditioning	Lucas 23/25 ACR or Motorola
Starter Motor		Lucas 2M 100 pre-engage	Lucas 3M 100 pre-engage

	TR7						TR8 and Rover 3500					
MANUAL TRANSMISSION	All synchromesh, five speed gearbox						All synchromesh, five speed gearbox					
Clutch	216mm (8.5in) dia						241 mm (9.5in) dia					
Gearbox ratios to 1	Single dry plate diaphragm type						Single dry plate diaphragm type					
Overall ratios	Top	4th	3rd	2nd	1st	Rev	Top	4th	3rd	2nd	1st	Rev
	0.79	1.00	1.40	2.09	3.32	3.43	0.792	1.00	1.40	2.09	3.32	3.43
	2.73	3.45	4.83	7.21	11.45	11.83	2.44	3.08	4.31	6.44	10.23	10.56
Final drive ratio	3.45:1						3.08:1					
Engine rev/min at 10 m.p.h.	405	512	717	1069	1698	**TR8**	362	457	639	955	1517	
Engine rev/min at 10 k.p.h.	252	318	445	664	1054		225	284	397	594	943	
						Rover 3500	356	428	598	894	1422	
							221	266	371	555	883	
Maximum recommended road speed in intermediate gears, corresponding to engine speed of 6500 rev/min (TR7) or 6000 rev/min (TR8)												
m.p.h.			90.7	60.8	38.2	**TR8**			93.9	62.8	39.5	
k.p.h.			145.9	97.8	61.5				151.1	101.1	63.6	
						Rover 3500			100.3	67.1	42.2	
									161.4	108	67.8	
Road speed at 1000 engine rev/min in top gear	24.7 m.p.h. (39.7 km/h)					**TR8**	27.6 m.p.h. (44.4 km/h)					
						Rover 3500	28.1 m.p.h. (45.2 km/h)					

	TR7				TR8 and Rover 3500			
AUTOMATIC TRANSMISSION	Borg Warner type 66				Borg Warner type 66			
	3rd	2nd	1st	Rev	3rd	2nd	1st	Rev
Transmission conversion range	1.00	1.45	2.39	2.09	1.00	1.45	3.08	4.47
Overall ratios to 1	3.08	4.47	7.36	6.44	2.39	2.09	7.36	6.44
Final drive ratio	3.08:1				3.08.1			
Road speed at 1000 engine rev/min in 3rd gear	21.9 m.p.h.(35.2 km/h)				**TR8** 21.9 m.p.h. (35.2 km/h)			
					Rover 3500 23.3 m.p.h. (37.5 km/h)			

Transmission shift speeds	Zero throttle	Light throttle		Part throttle		Zero throttle	Light throttle		Part throttle
Selector	1	D	D	D		1	2	D	D
Shift	2-1	1-2	2-3	3-2	**TR8**	2-1	1-2	2-3	3-2
Road speed m.p.h.	28-39	7-13	12-19	27-43		26-37	9-13	13-17	44 max.
k.p.h.	45-63	11-21	19-31	43-69		42-59	14-21	21-27	71 max.
					Rover 3500	16-26	9-15	14-19	
						27-44	15-25	24-32	

Kickdown

Selector	D	D	D	1	D		D	D	D	1	D	2	2
Shift	1-2	2-3	3-2	2-1	3-1	**TR8**	1-2	2-3	3-2	2-1	3-1	2-1	3-1
Road speed m.p.h.	38-48	70-80	60-72	39-50	25-38		37-46	67-76	56-70	26-37	24-39	37-46	26-37
k.p.h.	61-77	112-128	96-116	63-80	40-61		59-74	108-122	90-113	42-59	39-63	59-74	42-59
						Rover 3500	40-50	73-80	51-64	28-40	28-40	40-50	28-40
							68-85	123-140	86-108	47-68	47-68	68-88	47-68

		TR7	TR8	ROVER 3500
STEERING AIVD SUSPENSION		Rack and Pinion Coil springs front and rear	Rack and Pinion Coil springs front and rear	Rack and Pinion Coil springs front and rear
Steering wheel turns – lock to lock		3	2.8	2.75
Turning circle – between kerbs		8.8m (29 feet)	9.6m (31.6 feet)	10.4m (34¼ feet)
Front wheel alignment		1.5mm (0 to 1/16 in) toe in	1.5mm (0 to 1/16 in) toe in	3.1mm (0 to 7/8 in) toe in
Front camber		¼° negative ± 1°	¼° negative ± 1°	0° ± 1°
castor	kerb condition	3½° ± 1°	3½° ± 1°	1° ± 1°
k.p.i.		11¼° ± 1°	11¼° ± 1°	13½° ± 1°
BRAKES		Hydraulic footbrake operates a tandem master cylinder to front and rear brakes independently. Mechanical handbrake to rear wheels only.		
Front brakes				
	– caliper disc	241 mm (9.5in) dia	244mm (9.61in) dia	258mm (10.125in) dia
	– lining area	107cm² (16.6in²)	1 54.8cm² (24.0in²)	154.8cm² (24.0in²)
	– swept area	1184cm² (183.5in²)	1274cm² (197.5in²)	1370cm² (212.4in²)
Rear brakes				
	– drum	229 x 44.5mm (9 x 1¾in)	229 x 44.5mm (9 x 1¾in)	229 x 57mm (9 x 2¼in)
	– lining area	390cm² (60.4in²)	390cm² (60.4in²)	500cm² (77.5in²)
	– swept area	638cm² (98.9in²)	638cm² (98.9in²)	820.2cm² (127.1in²)
WHEELS		330mm (13in) 5½J	330mm (13in) 5½J	355mm (14in) 6J
DIMENSIONS				
Length		4203mm (165.4in)	4203mm (165.4in)	4852mm (191.0in)
Width		1681mm (66.2in)	1681mm (66.2in)	1768mm (69.6in)
Height unladen		1258mm (49.5in)	1258mm (49.5in)	1382mm (54.4in)
Wheelbase		2160mm (85in)	2160mm (85in)	2815mm (110.8in)
Front track		1409mm (55.5in)	1409mm (55.5in)	1506mm (59.3in)
Rear track		1404mm (55.3in)	1404mm (55.3in)	1506mm (59.3in)

TR7	COUPE		CONVERTIBLE	
WEIGHTS (approximate)	**Manual gearbox**	**Automatic**	**Manual gearbox**	**Automatic**
Showroom – minimum	1051kg (2317lbs)	1048kg (2310lbs)	1059kg (2335lbs)	1056kg (2328lbs)
Unladen – maximum	1139kg (2511lbs)	1136kg (2504lbs)	1135kg (2502lbs)	1132kg (2496lbs)
Gross vehicle	1340kg (2954lbs)	1340kg (2954lbs)	1340kg (2954lbs)	1340kg (2954lbs)
Maximum axle load – front	715kg (1576lbs)	715kg(1576lbs)	715kg (1576lbs)	715kg (1576lbs)
– rear	665kg (1466lbs)	665kg (1466lbs)	665kg (1466lbs)	665kg (1466lbs)
Towing capacity – braked trailer	1016kg (2240lbs)	1016kg (2240lbs)	016kg (2240lbs)	1016kg (2240lbs)

TR8	COUPE		CONVERTIBLE	
WEIGHTS (approximate)	**Manual gearbox**	**Automatic**	**Manual gearbox**	**Automatic**
Showroom – minimum	1121kg (2471lbs)	1111kg (2449lbs)	1133kg (2498lbs)	1123kg (2478lbs)
Unladen – maximum	1214kg (2676lbs)	1204kg (2654lbs)	1214kg (2676lbs)	1204kg (2654lbs)
Gross vehicle	1420kg (3131lbs)	1420kg (3131lbs)	1420kg (3131lbs)	1420kg (3131lbs)
Maximum axle load – front	765kg (1687lbs)	765kg (1687lbs)	765kg (1687lbs)	765kg (1687lbs)
– rear	695kg (1532lbs)	695kg (1532lbs)	695kg (1532lbs)	695kg (1532lbs)
Towing capacity – braked trailer	1270kg (2800lbs)	1270kg (2800lbs)	1270kg (2800lbs)	1270kg (2800lbs)

ROVER 3500	MANUAL GEARBOX	AUTOMATIC GEARBOX
WEIGHTS (approximate)		
Showroom – minimum	1420kg (3131lbs)	1410kg (3108lbs)
Unladen – maximum	1489kg (3283lbs)	1479kg (3261lbs)
Gross vehicle	1965kg (4332lbs)	1965kg (4332lbs)
Maximum axle load – front	985kg (2171lbs)	985kg (2171lbs)
– rear	1010kg (2227lbs)	1010kg (2227lbs)
Towing capacity – braked trailer	1524kg (3360lbs)	1542kg (3360lbs)

LUBRICANTS AND CAPACITIES

Component	Approximate Capacities				Temperature Range	Service Classification	S.A.E. Viscosity Specification
	Conditions		Metric litres	U.S.A. pints	Imperial pints			
Engine	Engine, Drain and Refill	TR7	4.0	8.4	7.0	Above 14°F (-10°C)	API S.E.	SAE 15W/40, SAE 15W/50, SAE 20W/40, SAE 20W/50
		TR8	4.4	9.3	7.75	-5°F to 50°F (-20°C to 10°C)		SAE 10W/30, SAE 10W/40, SAE 10W/50
		Rover 3500	4.8	10.2	8.5			
	Extra for Oil Filter	TR7	0.5	1.2	1.0	Below 14°F (-10°C)		SAE 5W/20, SAE 5W/30
		TR8	0.7	1.2	1.0			
		Rover 3500	0.7	1.2	1.0			
Gearbox	Gearbox from Dry	5 speed	1.5	3.2	2.7	All	ATF M2C 33G	
Hypoid Rear Axle Top up only	Rear Axle from dry	TR7, TR8 and Rover 3500	0.9	1.9	1.6	Above -10°C Below 10°C	API GL4	SAE 90W Hypoid SAE 80W Hypoid
Automatic Transmission	With oil cooler	TR7	5 4	11.4	9.5	All	ATF type G	
		TR8 and Rover 3500	7.0	14.8	12.3			
Power steering			0.7	1.5	1.25		M2C 33G	
Steering Rack Lubrication	TR8 and Rover 3500						NLGI 2	
	TR7					All	Multipurpose Grease	
Hubs and Chassis Grease Points						All	Multipurpose Grease	
Brake and Clutch Fluid						All	DOT3 (FMVSS116) and SAE Specification J 1703d Minimum boiling point 500°F (260°C)	
Windscreen Washer						Below -29°C Methanol/Water 50/50 max solution		
Anti-freeze	Cooling System	TR7	7.6	16.0	13.4	Permanent type ethylene glycol base with suitable inhibitor for mixed metal systems 50% solution		
		TR8	10.9	23.0	19.2			
		Rover 3500	11.0	23.4	19.5			
Fuel Tank				Gallons		91 Octane – Use unleaded Gasoline only		
		TR7 and TR8	54.5	14.4	12.0			
		Rover 3500	63.6	16.8	14.0			

BULB CHART

TR MODELS	ROVER 3500		WATTAGE
Headlamps			50/40
	Headlamps	Outer	60/37.5
		Inner	50
Flasher, stop, reverse lamps	Flasher, stop, reverse and rear fog guard lamps		21
No. plate illumination, tail lamps	Front side, door open guard, boot lamps		5
Warning lights	Instrument illumination, handbrake warning		1.2
Marker lamps			3
	Tail lamps		4
	No. plate illumination, interior, map, glovebox		6
	Hazard warning bulb		1.5
Front side lamps	Fibre optic light source		5
	Underbonnet and brake failure warning light		5
	Cigar lighter illumination		2.2
	Clock illumination		2.2

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END

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