

RANGE ROVER REQUIRED MAINTENANCE • 49 STATES AND CALIFORNIA  
 FIRST 1,000 MILE SERVICE ONLY

Renew engine oil	Check front wheel alignment
Renew transfer box oil (LT230)	Check PCV system for leaks and hoses for security and condition (Positive crankcase ventilation).
Check/top up transfer box oil (Borg Warner)	Check operation of throttle mechanical linkage and transmission cable
Renew front axle oil	Check ignition wiring and HT leads for security, and fraying
Renew rear axle oil	Check/adjust all drive belts
Renew steering swivel oil	Check operation of all instruments fuel and temperature gauges, warning indicators, lamps, horns and audio unit
Check/top up power steering fluid	Check operation of front and rear screen and headlamp wash/wipers
Check/top up automatic transmission fluid	Check operation of rear view mirrors and for security, cracks and crazing
Check for oil/fluid leaks from:- Suspension, dampers and self levelling unit, engine and transmission units, front and rear axles	Check condition and security of seats, seat belt mountings, belts and buckles
Check brake pipes/unions for security, chafing, leaks and corrosion	Check exhaust system for leaks, security and damage
Check power steering system for leaks, hydraulic pipes/unions for security, chafing and corrosion	Check tyres comply with Manufacturers specification
Check fuel system for leaks	Check tyres for cuts, lumps, bulges, uneven wear, tread depth and road wheels for damage
Check cooling and heater systems for leaks, hoses for security and condition	Check and adjust tyre pressures including spare
Check security and operation of park brake	Check and tighten road wheel retaining nuts
Check foot brake operation	
Check condition and security of steering unit, joints and gaiters	
Check/adjust steering box	

## RANGE ROVER REQUIRED EMISSION MAINTENANCE • CALIFORNIA

INTERVALS MILES X 1000	7.5	15	22.5	30	37.5	45
Renew engine oil	.	.	.	.	.	.
Renew engine oil filler	.	.	.	.	.	.
Renew spark plugs				.		
Check exhaust system for leaks, security and damage	.	.	.	.	.	.
Check condition of driving belts-adjust if required	.	.	.	.	.	.

CALIFORNIA MODELS • FOR MAINTENANCE AFTER 45,000 MILES WE RECOMMEND THAT THE 49 STATES REQUIRED MAINTENANCE BE CARRIED OUT IN ADDITION TO THE RECOMMENDED MAINTENANCE.

Continued

## RANGE ROVER REQUIRED EMISSION MAINTENANCE • 49 STATES

MAINTENANCE INTERVALS MILES X 1000	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105
Renew PCV intake filter check and clean PCV system (Positive crankcase ventilation)							.							.
Renew engine oil	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Renew engine oil filter	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Renew fuel filter							.							.
Renew air cleaner element/check/clean dump valve				.				.				.		
Renew charcoal canister														.
Renew spark plugs				.				.				.		
Renew catalytic converters														.
Renew oxygen sensors											.			
• Check exhaust system for leaks, security and damage	.	.	.	.	.	.	.	.	.	.	.	.	.	.
• Check condition of driving belts-adjust if required	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Check/top up cooling system	.	.	.	.	.	.	.	.	.	.	.	.	.	.
• Check ignition wiring and HT leads for fraying, chafing and deterioration							.							.
Clean distributor cap and rotor arm, check for cracks and tracking. Lubricate rotor spindle with rotor arm removed							.							.
• Check/adjust ignition timing							.							.
• Check engine idle speed							.							.
• Check fuel evaporative loss control system for leaks							.							.
• Check fuel filler cap seal for leaks							.							.
• Check fuel pipes, filler hoses and connections for leaks and security							.							.
† Check engine emission control system hoses, tubes and vacuum lines for security and condition							.							.
† Check operation of electronic control unit/systems														.
• Check operation of auxiliary emission control devices							.							.
Reset emission maintenance reminder							.							.

NOTE: The owner of the vehicle need not perform the items marked . in order to maintain the emission warranty or manufacturer's recall liability.

NOTE: The above Required Emission Maintenance Schedule for 49 States reflects 1988 model year vehicles. Vehicles prior to 1988 model year require maintenance to be carried out on the following components at the stated service intervals:-

Renew charcoal canister and check operation of electronic control unit/systems ) at 52,500 and 105,000 miles )

Renew oxygen sensors ) at 52,500 and 105,000 miles ) instead of 82,500 miles

**RANGE ROVER RECOMMENDED MAINTENANCE**

MAINTENANCE INTERVALS MILES X 1000	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105
Check/top up transfer box oil	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Renew transfer box oil				.				.				.		
Check/top up front axle oil	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Renew front axle oil				.				.				.		
Check/top up rear axle oil	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Renew rear axle oil				.				.				.		
Check/top up steering swivel housing oil	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Renew steering swivel housing oil				.				.				.		
Renew automatic transmission fluid				.				.				.		
Renew automatic transmission fluid filter				.				.				.		
Check/top up power steering fluid	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Check/top up automatic transmission fluid	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Check/top up brake fluid	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Check for oil/fluid leaks from: Suspension, dampers and self levelling unit	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Check foot brake operation	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Check condition and security of steering unit, joints and gaiters		.		.		.		.		.		.		.
Check/adjust steering box		.		.		.		.		.		.		.
Check front wheel alignment		.		.		.		.		.		.		.
Check PCV system for leaks and hoses for security and condition (Positive crankcase ventilation)				.				.				.		
Check and clean PCV system and breathers (Positive crankcase ventilation)				.				.				.		
Check/clean air cleaner dump valve and element		.		.		.		.		.		.		.
Check operation of throttle mechanical linkage and transmission cable		.		.		.		.		.		.		.
Check battery condition		.		.		.		.		.		.		.
Clean and grease battery terminals	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Check ignition wiring and HT leads for security, fraying, chafing, deterioration		.		.		.		.		.		.		.
Clean distributor cap and rotor arm, check for cracks and tracking		.		.		.		.		.		.		.
Lubricate distributor rotor spindle with rotor arm removed				.				.				.		

Continued

RANGE ROVER RECOMMENDED MAINTENANCE  
Continued

MAINTENANCE INTERVALS MILES X 1000	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105
Clean/adjust spark plugs		•				•				•				•
Check/adjust ignition timing			•				•			•				•
Check condition and security of seats, seat belt mountings, belts and buckles	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check tightness of propeller shaft coupling bolts		•		•		•		•		•		•		•
Check exhaust system for leaks, security and damage	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check operation of cruise control		•		•		•		•		•		•		•
Check tyres comply with Manufacturer's specification	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check tyres for cuts, lumps, bulges, uneven wear, tread depth and road wheels for damage	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check/adjust tyre pressures including spare	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check/adjust headlamp and auxiliary lamp alignment						•	•	•		•	•	•		•
Check operation of all instruments, gauges, warning indicators, lamps, horns and stereo unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check operation of front and rear screen and headlamp wash/wipers		•		•		•		•		•		•		•
Clear sunroof drain tubes • if applicable	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check operation of all doors, hood, and tailgate locks and window controls	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lubricate all locks (not steering lock) and door check mechanisms		•		•		•		•		•		•		•
Check operation of heater and air conditioning systems		•		•		•		•		•		•		•
Check brake pipes/unions for security, chafing, leaks and corrosion	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check power steering system for leaks, hydraulic pipes/unions for security, chafing and corrosion	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check fuel lines/hoses for leaks	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check cooling and heater systems for leaks, hoses for security and condition		•		•		•		•		•		•		•
Check/top up cooling system	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Inspect brake pads for wear, calipers for leaks and discs for condition	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Check security and operation of parking brake	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lubricate parking brake mechanical linkage	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lubricate drive shaft universal joints	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lubricate drive shaft sealed sliding joints			•			•			•			•		•

It is recommended that:

At 15,000 mile intervals or every 18 months, whichever is the sooner, the hydraulic brake fluid should be completely renewed.

At 37,500 mile intervals or every 3 years, whichever is the sooner, all hydraulic brake fluid, seals and flexible hoses should be renewed, all working surfaces of the master cylinder, wheel cylinders and caliper cylinders should be examined and renewed where necessary.

At 37,500 mile intervals remove all suspension dampers, test for correct operation, refit or renew as necessary.

At 2 yearly intervals or at the onset of the second winter the cooling system should be drained, flushed and refilled with the required water and antifreeze solution.

The battery electrolyte level should be checked and topped up if required, once per year in high ambient temperatures, and once every three years in moderate ambient temperatures.

**NOTE:**

Climatic and operating conditions affect maintenance intervals to a large extent; in many cases, therefore, the determination of such intervals must be left to the good judgement of the owner or to advice from a Range Rover Authorized Dealer, but the recommendations will serve as a firm basis for maintenance work. Vehicles operating under arduous conditions will require more frequent servicing, therefore, at a minimum, the maintenance intervals should be reduced by half.

For low mileage vehicles it is recommended that the maintenance is carried out at periodic intervals, for example the 7,500 mile service should be carried out at 7.5 months, the 15,000 mile service at 15 months and so on.

The owner need not perform recommended maintenance in order to maintain the emission warranty or manufacturer recall liability.

# JACKING

The following instructions must be carried out before raising the vehicle off the ground.

1. Use a solid level ground surface.
2. Apply the parking brake.
3. Select 'P' in main gearbox.
4. Select Low range in transfer gearbox with differential lock engaged.

**CAUTION:** To avoid damage occurring to the under body components of the vehicle the following jacking procedures must be adhered to.

**DO NOT POSITION JACKS OR AXLE STANDS UNDER THE FOLLOWING COMPONENTS.**

Body structure  
Bumpers  
Fuel lines  
Brake lines  
Front radius arms  
**Panhard** rod  
Steering linkage  
Rear Trailing links  
Fuel tank  
Engine sump  
Gearbox bellhousing

Jack or support vehicle by axles only.

## Vehicle jack

The jack provided with the vehicle is only intended to be used in an emergency, for changing a tyre. Do NOT use the jack for any other purpose. Refer to Owner's Manual for vehicle jack location points and procedure. Never work under a vehicle supported by the vehicle jack.

## Hydraulic Floor Jack

A hydraulic jack with a minimum 3,300 lbs load capacity must be used.

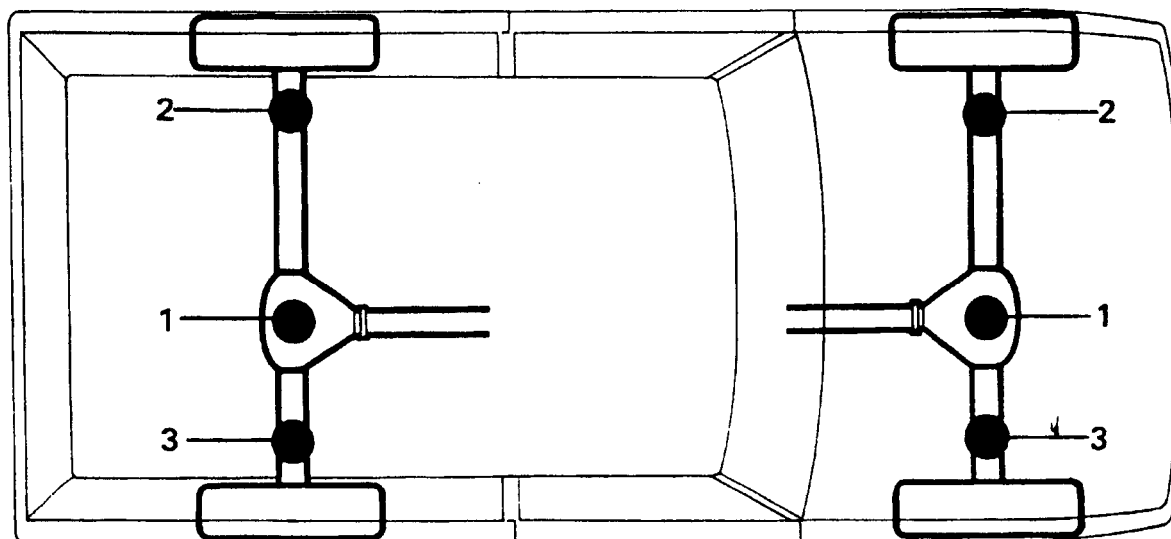
**CAUTION:** DO NOT COMMENCE WORK ON THE UNDERSIDE OF THE VEHICLE UNTIL SUITABLE AXLE STANDS HAVE BEEN POSITIONED UNDER THE AXLE(S):

## Raise the front of the vehicle

1. Position the cup of the hydraulic arm under the differential casing.

**NOTE:** The differential casing is not central to the axle. Care should be taken when raising the front road wheels off the ground as the rear axle has less sway stiffness.

Continued



RR1839E

2. Raise the front road wheels off the ground high enough to enable an axle stand to be installed under the left hand axle tube.
3. Position an axle stand under the right hand axle tube, carefully lower the floor jack until the axle sits securely on both axle stands, remove the floor jack.
4. Before commencing work on the underside of the vehicle recheck the security of the vehicle on the stands.
5. Reverse the procedure when removing the vehicle from the stands.

#### **Raise the rear of the vehicle**

1. Position the cup of the hydraulic arm under the differential casing.
2. Raise the vehicle high enough to enable axle stands to be installed under the left and right hand axle tubes.
3. Lower the floor jack until the axle sits securely on the axle stands, remove the floor jack.
4. Before commencing work on the underside of the vehicle recheck the security of the vehicle on the stands.
5. Reverse the procedure when removing the vehicle from the stands.

#### **HYDRAULIC VEHICLE HOIST (FOUR POST)**

Use only a 'drive on' type hoist which supports the vehicle by its own road wheels. If a 'wheel-free' condition is required, use a 'drive on' hoist incorporating a 'wheel-free' system that supports under the axle casings. Alternatively, place the vehicle on a firm, flat floor and support on axle stands.

#### **TWO POST VEHICLE HOISTS**

**The manufacturer of RANGE ROVER VEHICLES DOES NOT recommend using 'Two Post' hoists that employ four adjustable support arms. These are NOT considered safe for Range Rover vehicles.**

**If the vehicle is installed on a Two Post hoist the responsibility for the safety of the vehicle and safety of the personnel performing service operations is in the hands of the Service Provider.**

#### **DYNAMOMETER TESTING OF PERMANENT FOUR-WHEEL DRIVE VEHICLES (Vehicles fitted with LT230 transfer gearbox)**

##### **Four-wheel dynamometers**

Provided that front and rear rollers of the equipment are rotating at the same peripheral speed and that normal workshop safety standards are observed, there is no speed restriction on the use of four-wheel (double axle) roller rigs for the testing of permanent four-wheel drive vehicles.

**NOTE: The centre differential must not be locked during brake testing. The brake servo-assistance will not be maintained without the engine running.**

##### **Two-wheel dynamometers**

Testing of a four-wheel drive vehicle on a single axle roller rig must be restricted to a maximum roller peripheral speed of 5kph (3 mph) with the centre differential unlocked and the transfer gearbox in neutral. For tests above this speed on a single axle rig, the centre differential must be locked and the drive shaft to the stationary axle must be removed.

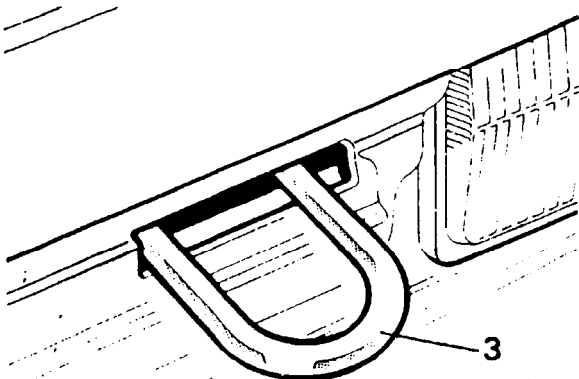
#### **TOWING**

**CAUTION: Range Rovers have permanent four-wheel drive. Should the vehicle need to be towed, the following instructions must be adhered to:**

**Towing the vehicle on all four wheels with driver operating steering and brakes.**

1. Insert the Ignition key and turn to the auxiliary switch position '1' to release the steering lock.
2. Select neutral in main gearbox and transfer gearbox with the differential unlocked.
3. Towing rope, chain or cable should be fitted to the towing eye that protrudes out of the front of the spoiler immediately below the front bumper.
4. Release the parking brake.

Continued ↓



RR2026E

**CAUTION:** The brake servo and power assisted steering system will not be functional without the engine running. Greater pedal pressure will be required to apply the brakes, the steering system will require greater effort to turn the front road wheels.

The vehicle tow connection should be used only in normal road conditions, 'snatch' recovery should be avoided.

#### Suspended tow by breakdown vehicle

**CAUTION:** To prevent damage to the vehicle the front or rear drive shaft **MUST BE** removed, dependent upon which axle is being trailed.

1. Mark the drive shaft drive flanges at the transfer gearbox and axle differential with identification lines to enable the drive shaft to be refitted in its original position,
2. Remove the fixings from the differential drive flange to drive shaft/transfer box drive flange to drive shaft, withdraw the shaft complete from beneath the vehicle.
3. If the front axle is to be trailed it is necessary to insert the ignition key and turn to the auxiliary switch position '1' to release the steering lock.

**CAUTION:** The steering wheel and/or linkage must be secured in a straight ahead position. **DO NOT** use the steering lock mechanism for this purpose.

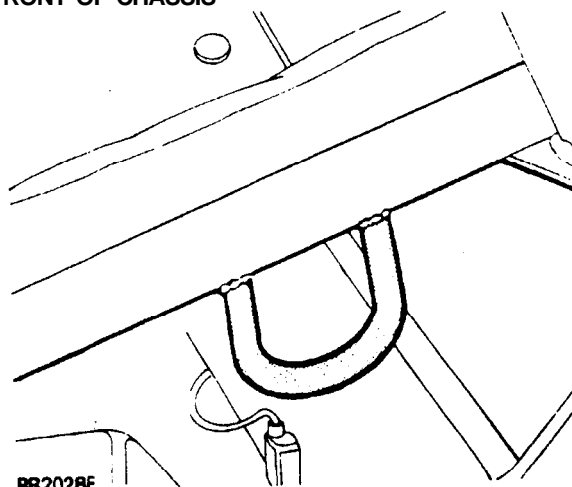
#### TRANSPORTING THE VEHICLE BY TRAILER

Lashing eyes are provided on the front and rear of the chassis side members, to facilitate the securing of the vehicle to a trailer or other means of transportation.

**CAUTION:** Underbody components must not be used as lashing points.

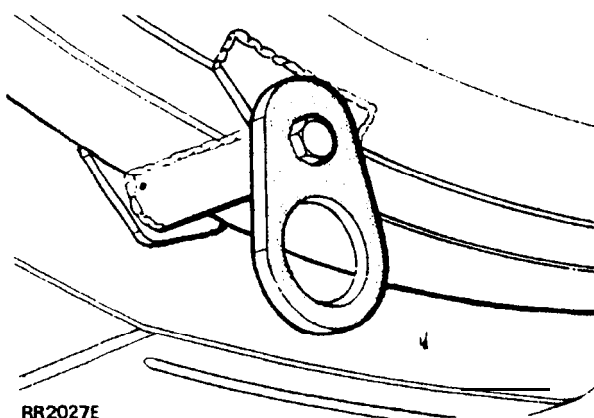
Install the vehicle on the trailer and apply the parking brake. To prevent damage occurring to the parking pawl of the automatic gearbox select neutral 'N' gear in main gearbox.

#### FRONT OF CHASSIS



RR2028E

#### REAR OF CHASSIS



RR2027E

## JUMP STARTING

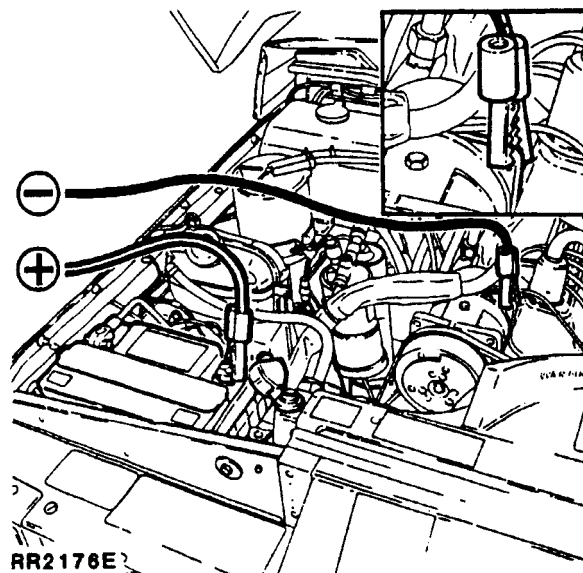
**WARNING:** Hydrogen and oxygen gases are produced during normal battery operation. This gas mixture can explode if flames, sparks or lighted tobacco are brought near the battery. When charging or using a battery in an enclosed space, always provide ventilation and shield your eyes.

Keep out of reach of children. Batteries contain sulphuric acid. Avoid contact with skin, eyes, or clothing. Also, shield your eyes when working near the battery to protect against possible splashing of the acid solution. In case of acid contact with skin, eyes, or clothing, flush immediately with water for a minimum of fifteen minutes. If acid is swallowed, drink large quantities of milk or water, followed by milk of magnesia, a beaten egg, or vegetable oil. **SEEK MEDICAL AID IMMEDIATELY.**

### To Jump Start- Negative Ground Battery

**WARNING:** To avoid any possibility of injury use particular care when connecting a booster battery to a discharged battery.

1. Position the vehicles so that the jumper leads will reach, ensuring also that the vehicles **DO NOT TOUCH**, alternatively a fully charged slave battery may be used positioned on the floor adjacent to the vehicle.
2. Ensuring that the ignition and all electrical accessories are switched off, that the parking brake is applied and neutral (N) or park (P) is selected in main gearbox, connect the jumper cables as follows;
  - A. Connect one end of the first jumper cable to the positive (+) terminal of the booster battery.
  - B. Connect the other end of the first jumper cable to the positive (+) terminal of the discharged battery.
  - C. Connect one end of the second jumper cable to the negative (-) terminal of the booster battery.



- D. Connect the other end of the second jumper cable to the rear lug of the air conditioning compressor, keep the jumper lead well away from any engine moving parts ie pulleys, drive belts and fan blade assembly. **NOT TO THE NEGATIVE (-) TERMINAL OF THE DISCHARGED BATTERY.**

**WARNING:** Making the final cable connection could cause an electrical arc which if made near the battery could cause an explosion.

3. If the booster battery is installed in another vehicle, start the engine of that vehicle and allow it to idle.
4. Start the engine of the vehicle with the discharged battery, following the starting procedure in the Owners' Manual.

**CAUTION:** If the vehicle fails to start within a maximum time of 12 seconds, switch the ignition off and investigate the cause. Failing to follow this instruction could result in irreparable damage to the catalyts.

5. Remove the positive (+) jumper cable from the positive terminals of both the booster battery and discharged battery.
6. Likewise remove the negative (-) jumper cable.

## LUBRICATION

This first part of the maintenance section covers renewal of lubricating oils for the major units of the vehicle and other components that require lubrication, as detailed in the 'Maintenance Schedules'. Refer to Section 09 for Capacities and Recommended Lubricants.

Vehicles operating under severe conditions of dust, sand, mud and water should have the oils changed and lubrication carried out at more frequent intervals than that recommended in the maintenance schedules.

Draining of used oil should take place after a run when the oil is warm. Always clean the drain and filler-level plugs before removing. In the interests of safety disconnect the vehicle battery to prevent the engine being started and the vehicle moved inadvertently, while oil changing is taking place.

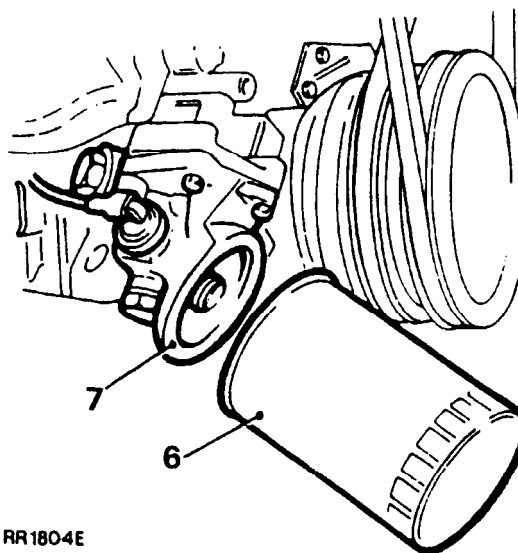
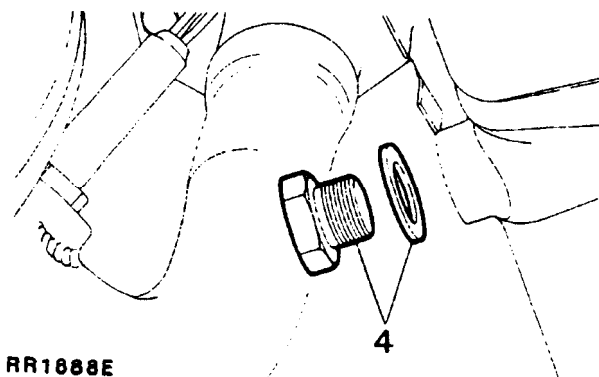
Allow as much time as possible for the oil to drain completely except where blown sand or dirt can enter the drain holes. In these conditions clean and refit the drain plugs immediately the main bulk of oil has drained.

Where possible, always refill with oil of the make and specification recommended in the lubrication charts and from sealed containers.

## RENEW ENGINE OIL AND FILTER

### DRAIN THE OIL

1. Before changing the oil ensure that the vehicle is level on either hoist or ground.
2. Run the engine to warm the oil; switch off the ignition and disconnect the battery for safety.
3. Place an oil tray under the drain plug.
4. Remove the drain plug in the bottom of the sump at the left-hand side. Allow oil to drain away completely. Fit new copper washer and replace the plug, tighten to the correct torque value.



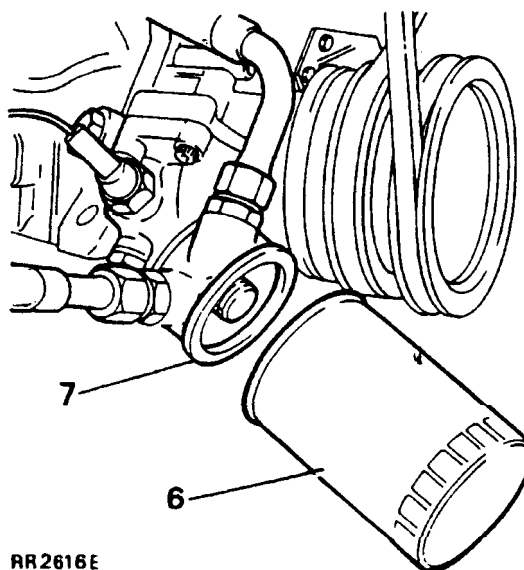
RR1804E

Fit new oil filter

5. Remove the engine under-tray if the vehicle is a 7989 model year (See Section 76, page 60). Place an oil tray under the engine.

**NOTE:** 1989 model year vehicles have an engine oil cooler. The oil cooler adaptor is secured to the oil pump cover, see RR2616E.

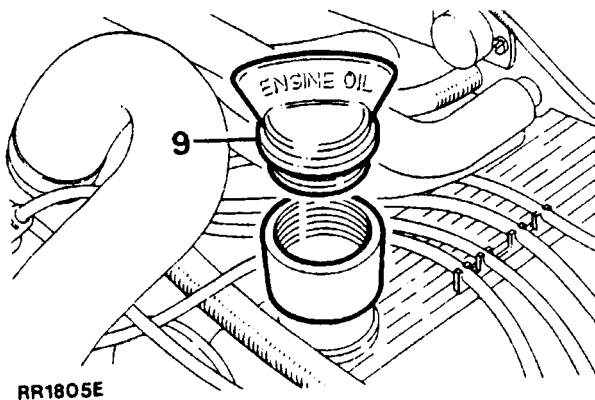
6. Unscrew the filter counter-clockwise, using a strap wrench as necessary.
7. Clean the oil pump mating face (1989 Models: oil cooler adaptor mating face) and coat the rubber washer of the new filter with clean engine oil, screw the filter on clockwise until the rubber sealing ring touches the machined face, tighten a further half turn by hand only. **DO NOT** over-tighten.



RR2616E

### Refill sump with oil

8. Check that the drain plug is tight.
9. Clean the outside of the oil filler cap, remove it from the extension filler neck and clean the inside.



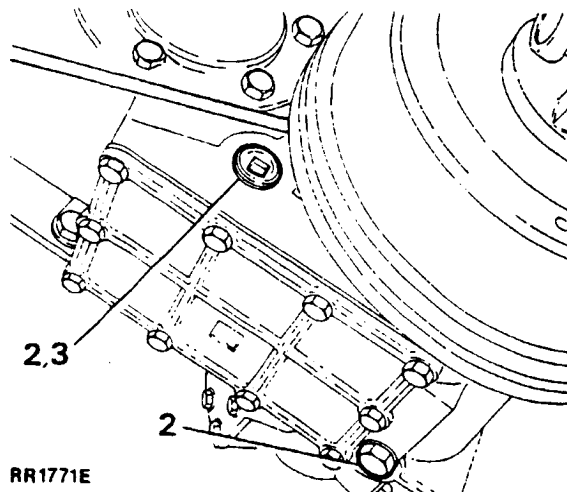
10. Pour in the correct quantity of new oil of the correct grade from a sealed container to the high mark on the dipstick and firmly replace the filler cap. DO NOT FILL ABOVE 'HIGH' MARK. Reconnect the battery.
11. Run the engine and check for leaks from the filter. Stop the engine, allow the oil to run back into the sump for a few minutes, then check the oil level again and top up if necessary.

### RENEW MAIN AND TRANSFER GEARBOX OILS

#### DRAIN AND RENEW LT230 TRANSFER GEARBOX OIL

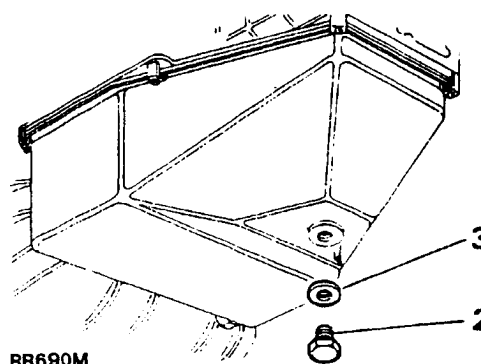
1. Before changing the oil ensure that the vehicle is level on either hoist or ground. Place a container under the gearbox to catch the old oil. Disconnect the battery.
2. Remove the drain and level/filler plugs and allow the oil to drain. Fit the drain plug using a new washer, if necessary, and tighten to the correct torque value. Do not over-tighten.

3. Inject the approximate quantity of the recommended oil until it reaches the level/filler plug hole. Fit the level/filler plug and tighten to the correct torque value, do not over-tighten, wipe away any surplus oil.



#### RENEW ZF AUTOMATIC GEARBOX FLUID

1. Before changing the oil ensure that the vehicle is level on either hoist or ground. Obtain a suitable container to drain the gearbox fluid into. Disconnect the battery.
2. Remove the gearbox dipstick located at the rear of the right hand rocker cover, to aid oil drainage. Release the plug from the bottom of the sump and allow time for the fluid to drain.
3. Refit the plug using a new sealing washer and tighten to the correct torque value. Do not over-tighten.

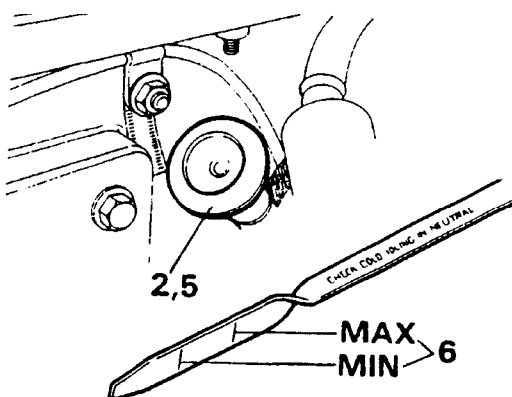


Continued

# Refill ZF Automatic Gearbox and Check Fluid level.

**NOTE:** The fluid level in the ZF automatic gearbox is checked when the fluid is cold and the engine idling in neutral gear.

4. Ensure the vehicle is on level ground.
5. Refill or top-up with the correct quantity and grade of fluid (see Lubricants and Fluids Section 09) at the combined filler/dipstick tube.
6. Reconnect the battery, start and run the engine, ensure that the fluid level registers between the minimum and maximum level markings on the dipstick.



RR 092M

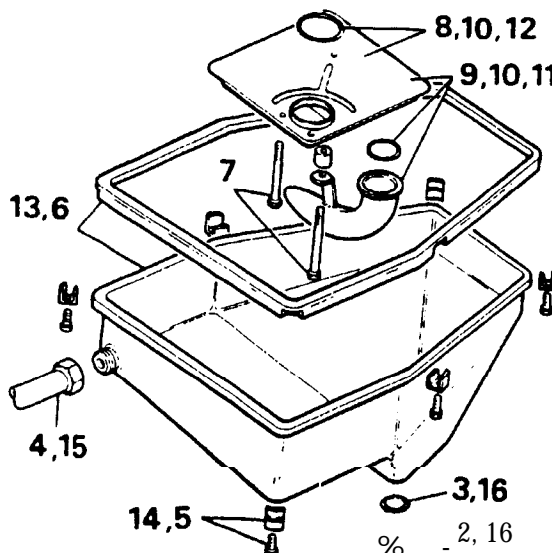
## OIL SCREEN REPLACEMENT ZF AUTOMATIC GEARBOX

### Removing

1. Place the vehicle on a hoist or over a pit, open the hood and disconnect the battery leads.
2. From underneath the vehicle drain the gearbox using a suitable container.
3. Discard the oil pan plug seal ring.
4. Remove the filler/level tube from the oil pan.
5. Remove the six retaining plates and bolts.
6. Remove the oil pan and discard the gasket.
7. Using TX27 Torx bit remove the three screws which hold the oil screen.
8. Remove the oil screen and discard the 'O' rings.
9. Separate the oil screen from the suction tube and discard the 'O' ring and oil screen.

### Refitting

10. Fit two new 'O' rings to the oil screen using a light grease for ease of assembly.
11. Fit the suction tube to the oil screen.

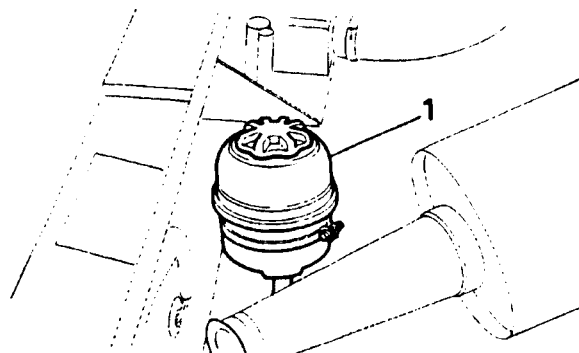


RR691M

12. Fit the oil screen to the control unit and secure with three bolts using TX27 Torx bit tighten to the specified torque value.
13. Refit the oil pan using a new gasket.
14. Secure using the six retaining plates and bolts (two straight and four corner plates), tighten to the specified torque value.
15. Reconnect the oil level/filler tube.
16. Fit oil pan plug using a new seal.
17. Connect the battery leads.
18. Fill the gearbox with the correct oil through the filler/level tube located within the engine bay (see Lubricants and Fluids Section 09).
19. Ensuring the vehicle is on level ground with the park-brake applied, check oil level while engine is running at idle with neutral selected.

### POWER STEERING-FLUID RESERVOIR

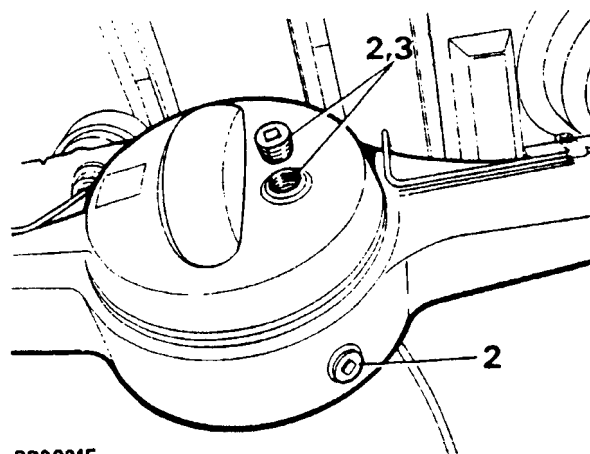
1. Clean and remove the reservoir cap, wipe the dipstick which is incorporated into the cap and refit the cap. Remove the cap again and check the fluid level is up to the high mark on the dipstick.
2. If necessary top-up with a recommended fluid (see Lubricants and fluids Section 09).
3. Refit the cap.



RR1850E

### RENEW FRONT AND REAR AXLE OIL

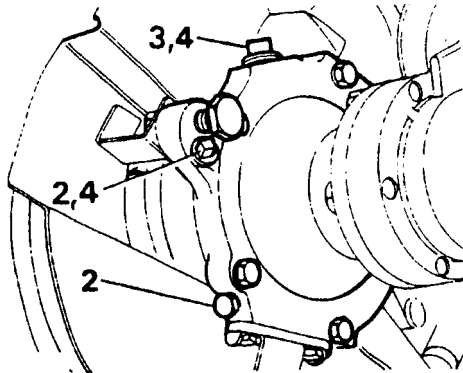
1. The vehicle must be level. Place a container under the axle to be drained.
2. Using a wrench with a 13mm (0.5 in) square drive remove the drain and filler/level plugs from the axle and allow the oil to drain completely. Clean and refit the drain plug.
3. Inject new oil of a recommended make and grade until it reaches the level hole. Clean and refit the filler/level plug and wipe away any surplus oil.



RR2031E

## RENEW SWIVEL PIN HOUSING OIL

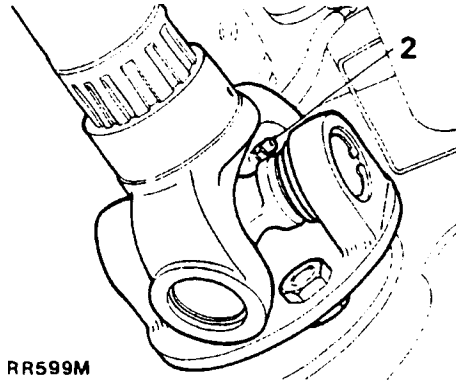
1. The vehicle must be level. Place a container under each swivel housing to catch the old oil.
2. Remove the drain and level plugs and allow the oil to drain completely, clean and refit the drain plug.
3. Remove the filler plug and inject the recommended make and grade of oil until oil reaches the level hole.
4. Clean and refit the level and filler plugs, wipe away any surplus oil.



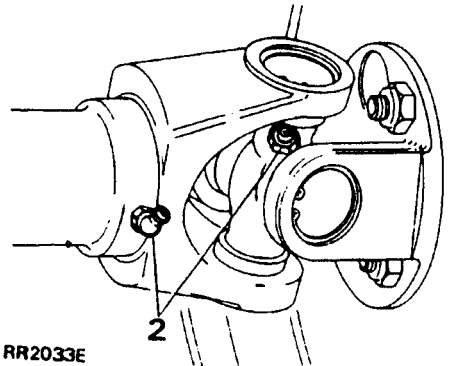
RR2032E

 LUBRICATE FRONT AND REAR DRIVE SHAFT  
 UNIVERSAL AND SLIDING JOINTS

1. Clean all the grease nipples on the front and rear drive shafts.
2. Charge a low pressure hand-grease gun with grease of a recommended make and grade and apply to the grease nipples at the front and rear drive shaft universal and sliding joints.



RR599M



RR2033E

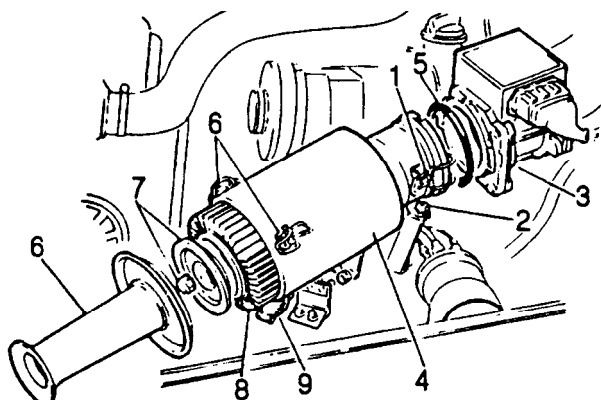
## FILTERS

### AIR CLEANER ELEMENT

#### Remove and refit

##### Removing

1. Release the two clips securing the air cleaner to the airflow sensor.
2. Release the two nuts and bolts securing the air cleaner to the left hand valance mounting bracket.
3. Detach the airflow sensor from the air cleaner, and lay carefully to one side.
4. Detach the air cleaner from the centre mounting bracket and withdraw from the engine compartment.
5. Remove the large 'O' ring from the outlet tube of the air cleaner, inspect for condition, fit a new 'O' ring if in poor condition.
6. Unclip the three catches securing the inlet tube to the air cleaner canister and remove the inlet tube.
7. Remove the nut and end plate securing the air cleaner element in position.
8. Withdraw the air cleaner element and discard.
9. Inspect the dump valve for condition and check that it is clear of obstructions.



RR1854E

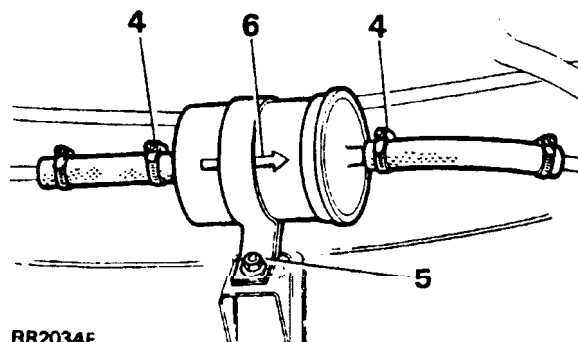
##### Refitting

10. Fit new element and secure in position.
11. Refit the inlet tube to the air cleaner canister.
12. Refit the air cleaner to the mounting bracket and tighten the two nuts and bolts.
13. Clip the air flow sensor to the air cleaner.

### FUEL LINE FILTER

**WARNING:** The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.

1. Depressurize the fuel system. (Refer to Fuel Injection System - Section 19)
2. The fuel line filter is located on the right hand chassis side member forward of the fuel tank filler neck. Access to the filter is gained through the right hand rear wheel arch.
3. Thoroughly clean the immediate area around the hose connections to prevent ingress of foreign matter into the fuel system.
4. Loosen the two hose clamps nearest the filter to enable the hoses to be removed from the filter canister. Plug the end of the hoses to prevent ingress of dirt.
5. Release the securing bolt and bracket and remove the filter from the chassis side member.



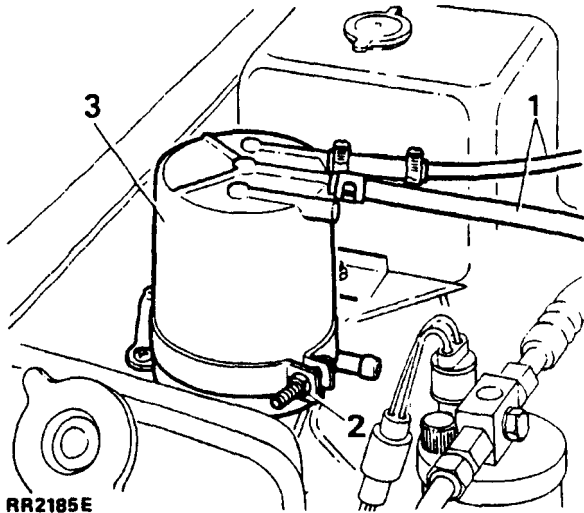
RR2034E

##### Fit new filter

6. Fit a new filter observing the direction of flow arrows stamped on the canister.
7. Start the engine and inspect for fuel leaks around the hose connections.

## CHARCOAL CANISTER

1. Disconnect from the canister:
  - (i) Canister line to fuel tank.
  - (ii) Canister purge line.
2. Loosen the clamp pinch bolt
3. Remove the canister.



RR2185E

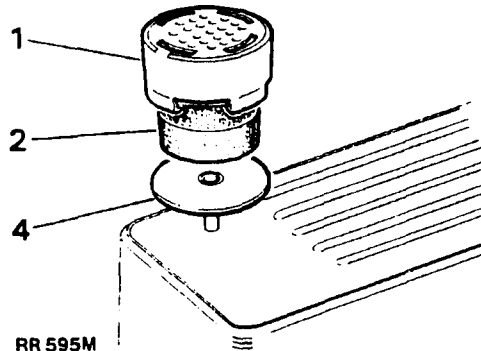
## Fit new canister

4. Secure the canister in the clamp.
5. Reverse instructions 1 and 2 above.

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

## POSITIVE CRANKCASE VENTILATION INTAKE FILTER

1. Pry the filter holder upwards to release it from the rocker cover.
2. Discard the sponge filter.



RR595M

## fit new filter

3. insert a new filter into the plastic body.
4. Push the filter holder onto the rocker cover until it clips firmly into place.

### CLEAN PLENUM CHAMBER VENTILATION PASSAGEWAY

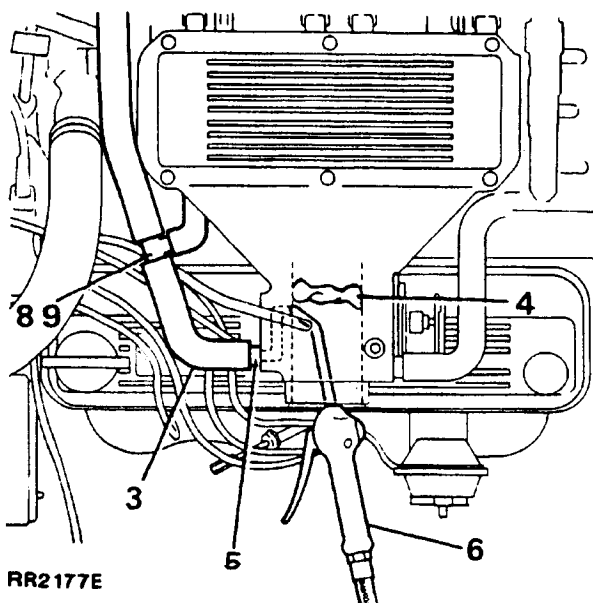
The cleaning of the plenum chamber ventilation passageway can be carried out without removing the plenum chamber from the ram housing.

**CAUTION:** Care must be taken to prevent debris from the passageway passing beyond the throttle valve disc.

**WARNING:** Safety glasses must be worn when performing this operation. Ensure that debris is not blown into the atmosphere which could be harmful to other personnel within the vicinity.

1. Disconnect the battery negative terminal.
2. Release the hose clamp and remove the hose from the plenum chamber inlet neck.
3. Remove the crankcase ventilation hose from the side of the plenum chamber.
4. Insert a piece of lint free cloth down the throttle valve bore to prevent debris passing beyond the throttle valve.
5. Place a cloth over the tube protruding from the side of the plenum from which the ventilation hose was removed to prevent debris from the passageway being blown into the atmosphere.

**NOTE:** 1988 Model Year Vehicles • The ventilation passageway has been modified and is now a straight through drilling into the throttle disc bore. Check and clean as stated in the recommended maintenance schedule.



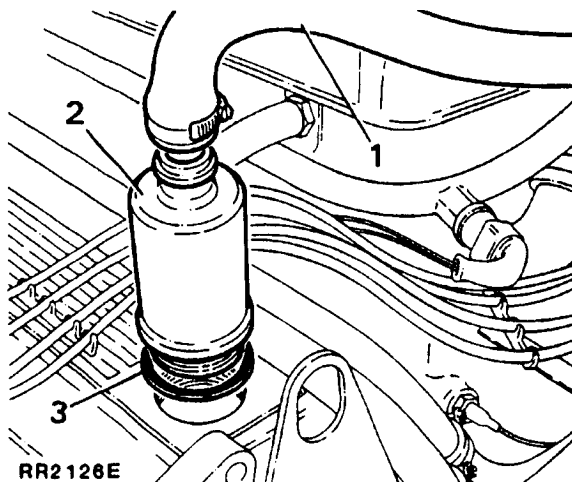
RR2177E

6. Use a compressed air line with a slim bent nozzle to enable the passageway to be cleaned out from within the throttle valve bore.

7. Any remaining consolidated matter can be dislodged using a piece of soft bent wire or a pipe cleaner. Finally the passageway must again be blown out to remove any remaining debris.
8. Remove the small 'T' piece between the crankcase ventilation hoses and check that it is free from blockages, clean as necessary.
9. Refit the 'T' piece and hoses, tighten the hose clamps securely.

### CLEAN POSITIVE CRANKCASE VENTILATION BREATHER FILTER

1. Release the hose clamp and pull the hose off the canister.
2. Unscrew the canister and remove it from the rocker cover.
3. Remove the large 'O' ring from the threaded end of the canister.
4. Visually inspect the condition of the wire screen within the canister, if in poor condition fit a new assembly, if in an acceptable condition clean the screen as follows:



RR2126E

5. Immerse the canister in a small amount of solvent and allow time for the solvent to dissolve and loosen any engine fume debris within the canister.
6. Remove canister from solvent bath and allow to dry out in still air.

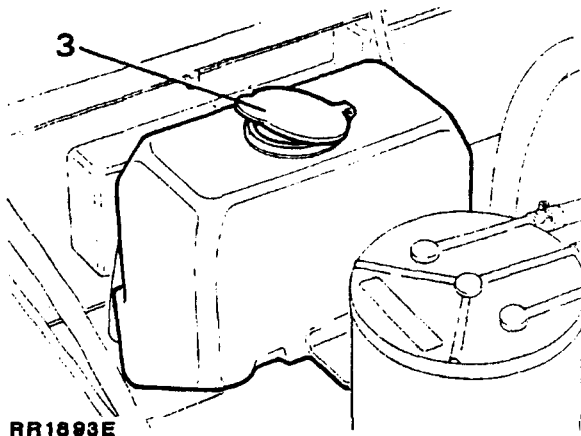
**WARNING:** Do not use a compressed air line to remove any remaining solvent or particles of debris within the canister as this could cause fire or personal injury.

#### Refitting the breather/filter

7. Fit a new rubber 'O' ring.
8. Screw the canister into the rocker cover, hand tight only.
9. Refit hose and tighten hose clamp securely.

**GENERAL MAINTENANCE AND ADJUSTMENTS****CHECK/ADJUST OPERATION OF ALL WASHERS  
AND TOP-UP RESERVOIR**

1. Check the operation of windscreen, tailgate and headlamp washers.
2. Adjust jets if necessary by inserting a needle or very fine sharp implement into the jet orifice and maneuvering to alter the jet direction.
3. Unclip the reservoir cap.
4. Top up reservoir to within 25mm (1 in) below the bottom of the filler neck.  
Use a screen washer solvent/anti-freeze in the reservoir, this will assist in removing mud, flies and road film and protect against freezing.



RR1893E

**CHECK**

Check ignition wiring and high tension leads for fraying, chafing and deterioration.

**CHECK**

Check/adjust ignition timing. (See Engine Tuning Data/Procedure) using suitable electronic equipment.

**FUEL SYSTEM**

Check all hose connections for leaks and hose deterioration, fit new hoses or tighten hose clamps as necessary.

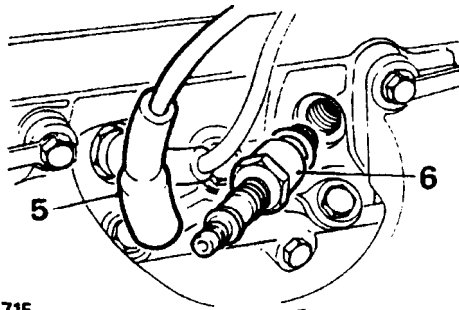
## IGNITION

### Spark plugs

1. Take great care when fitting spark plugs not to cross-thread the plug, otherwise costly damage to the cylinder head will result.
2. Check or replace the spark plugs as applicable.
3. It is important that only the correct type of spark plugs are used for replacements.
4. Incorrect grades of plugs may lead to piston overheating and engine failure.

To remove spark plugs proceed as follows:

5. Disconnect the battery negative lead and remove the leads from the spark plugs.
6. Remove the plugs and washers.

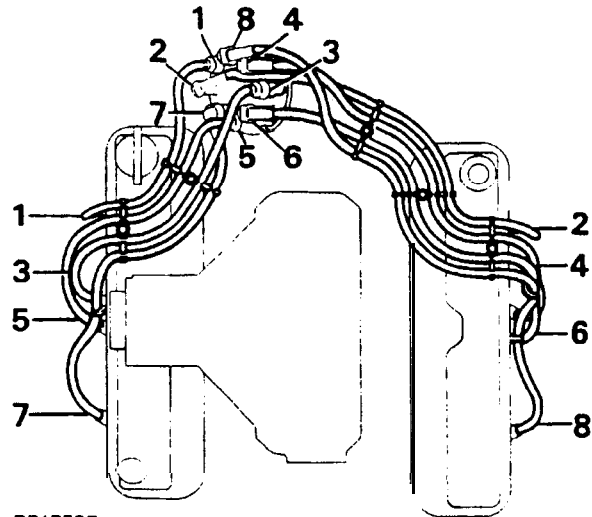


RR2171E

7. Set the electrode gap to the recommended clearance.
8. When pushing the leads onto the plugs, ensure that the shrouds are firmly seated on the plugs.

### Fitting H.T. leads

9. Ensure that replacement H.T. leads are refitted in their spacing cleats in accordance with the correct layout illustrated. Failure to observe this instruction may result in cross-firing between two closely fitted leads which are consecutive in the firing order.



RR1876E

### DISTRIBUTOR-LUCAS 35DLM8

The electronic ignition employs a Lucas 35DLM8 distributor.

The internal operating parts of the distributor are pre-set at the factory and should not normally require resetting.

Adjustments should only be made, if the unit is known to be faulty or damaged. Maintenance of the distributor consists of the following items.

1. Clean outer surfaces of distributor cap to remove dirt, grease etc.
2. Unclip the cap, check cap for signs of cracking.
3. Wipe inside cap with a lint free cloth.
4. Check rotor arm, cap and flash shield for signs of tracking.
5. Apply a spot of clean engine oil into the rotor spindle after the rotor arm has been removed.

**DO NOT DISTURB** the clear plastic insulating cover (flash shield) which protects the magnetic pick-up module.

## CHECK AIR CONDITIONING SYSTEM

**WARNING:** Adjustments or rectification operations should be carried out by a Range Rover dealer or a trained automotive air conditioning specialist. Under no circumstances should non-qualified personnel attempt repair or servicing of air conditioning equipment.

The following items should be checked:

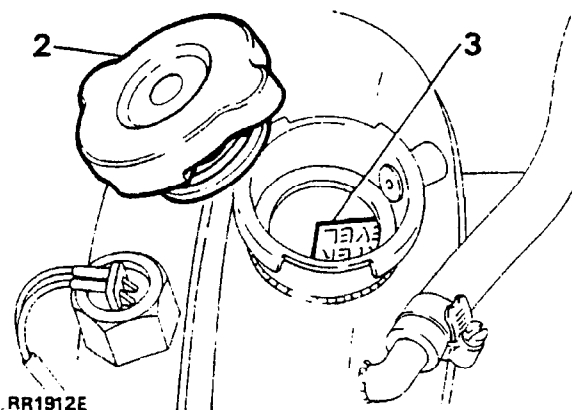
1. **Condenser:** Clean the exterior of the condenser matrix using a water hose or compressed air-line.
2. Check pipe connections for signs of fluid leakage.
3. **Evaporator:** Examine the pipe connections for signs of fluid leakage.
4. **Receiver/drier sight glass:** After running the engine for five minutes with the air conditioning system in operation, examine the sight glass, there should be no sign of bubbles.
5. Check pipe connections for signs of fluid leakage.
6. **Compressor:** Check the pipe connections for fluid leakage and the hoses for swellings.

## CHECK/TOP UP COOLING SYSTEM

1. To prevent corrosion of the aluminium alloy engine parts it is imperative that the cooling system is filled with a solution of water and phosphate free anti-freeze, winter or summer. Never fill or top up with plain water.

**WARNING:** Do not remove the filler cap when engine is hot because the cooling system is pressurized and personal scalding could result.

2. When removing the filler cap, first turn it counter-clockwise a quarter of a turn and allow all pressure to escape, before turning further in the same direction to lift it off.

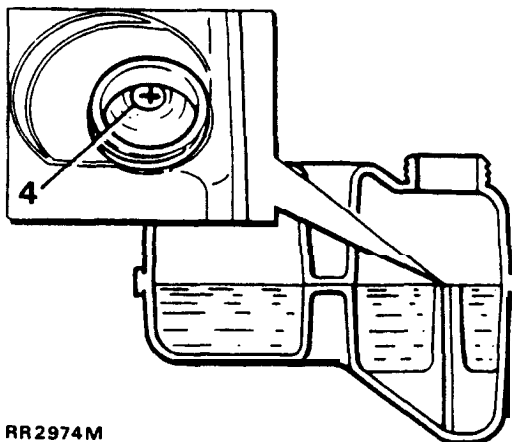


RR1912E

3. With a cold engine, the correct coolant level should be up to the 'Water Level' plate situated inside the expansion tank below the filler neck.

**NOTE:** The water level plate on later models has been deleted from the expansion tank, therefore the coolant should be filled to the top of the sensor float which is approximately 1.00 inch (25 mm) below the filler neck.

4. From 1990 model year, the expansion tank coolant should be level with the top of the indicator post, visible inside the tank through the filler hole.



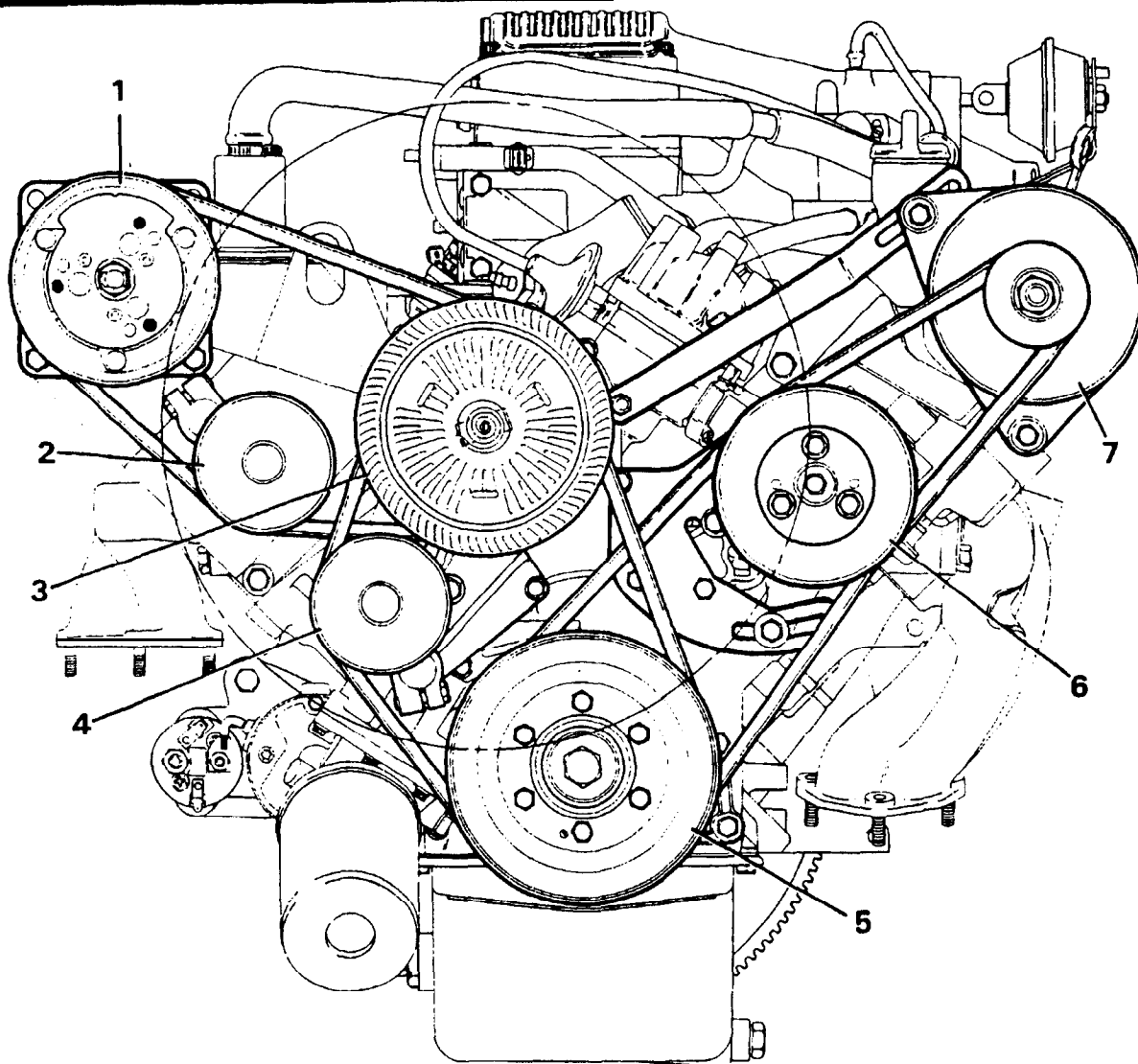
RR2974M

5. If necessary, top up the cooling system with premixed coolant. Use soft water whenever possible, if local water supply is hard, rainwater should be used.
6. When replacing the filler cap it is important that it is tightened down fully. Failure to tighten the filler cap properly may result in water loss, with possible damage to the engine through over-heating.

**Check cooling/heater systems for leaks and hoses for security and condition.**

Cooling system hoses should be changed at the first signs of deterioration.

The cooling system should be drained and flushed at 2 year intervals or at the onset of the second winter. Refer to Coolant Requirements in Section 26 • Cooling System.



**RR1769E**

1. Air conditioning compressor.
2. Idler pulley
3. Viscous fan-water pump unit.
4. Idler pulley
5. Crankshaft.
6. Power steering pump.
7. Alternator

WARNING: DISCONNECT THE BATTERY NEGATIVE TERMINAL BEFORE ADJUSTING DRIVE BELTS TO AVOID THE POSSIBILITY OF THE VEHICLE BEING STARTED.

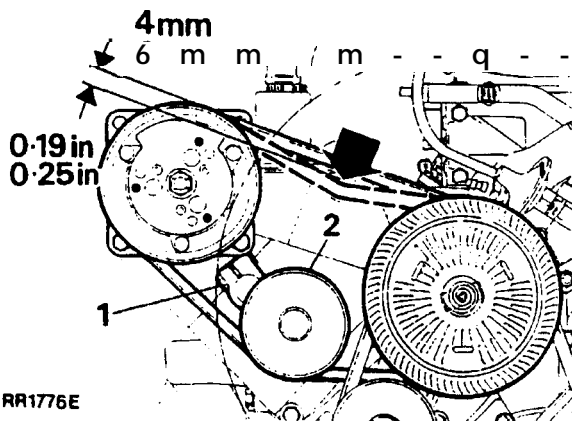
DRIVE BELTS-adjust or fit new belts

## COMPRESSOR DRIVE BELT

The belt must be tight with not more than 4 to 6mm (0.19 to 0.25 in) total deflection when checked by hand midway between the pulleys on the longest run.

Where a belt has stretched beyond the limits, a noisy whine or knock will often be evident during operating, if necessary adjust as follows:

1. Loosen the idler pulley securing bolt.
2. Adjust the position of the idler pulley until the correct tension is obtained.
3. Tighten the securing bolt and recheck the belt tension.



Check driving belts, adjust or fit new belts as necessary.

1. Examine the following belts for wear and condition and fit new belts if necessary:
  - (A) Crankshaft-idler pulley-Water Pump
  - (B) Crankshaft-Steering Pump
  - (C) Steering Pump-Alternator

ILLUSTRATION A

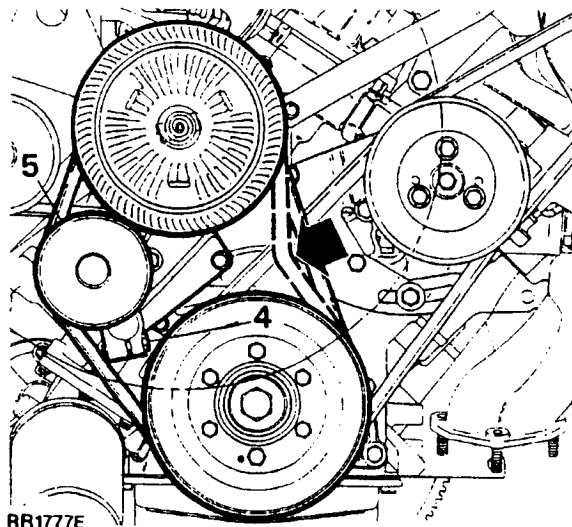


ILLUSTRATION B

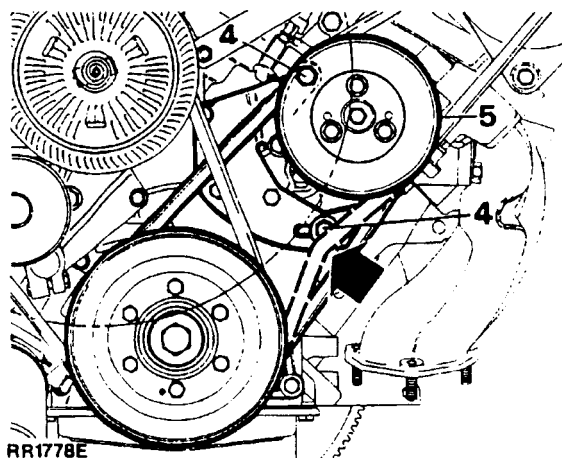
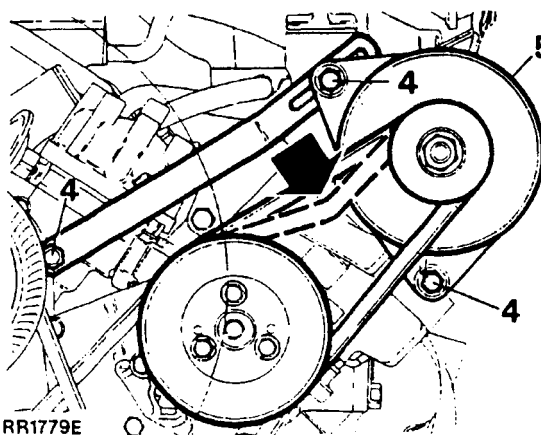


ILLUSTRATION C



Continued

2. Each belt should be sufficiently tight to drive the appropriate auxiliary without undue load on the bearings.
3. Loosen the bolts securing the unit to its mounting bracket.
4. Loosen the appropriate pivot bolt or idler pulley and the fixing at the adjustment link where applicable.
5. Pivot the unit inwards or outwards as necessary and adjust until the correct belt tension is obtained.

**CAUTION:** When tensioning the power steering pump drive belt **DO NOT** use the pump casing as a point of leverage. Failure to comply may result in damage to the pump casing and distortion to the seal face causing fluid leakage.

6. Belt deflection should be approximately 4 to 6mm (0.19 to 0.25 in) at the points denoted by the bold arrows.
7. Tighten all unit adjusting bolts. Check adjustment again.

**CAUTION:** When fitting a new drive belt, tension the belt as described above. Reconnect the battery and start and run the engine for 3 to 5 minutes at fast idle, after which time the belt must be re-checked, re-tension the belt if necessary.

## STEERING AND SUSPENSION

Check condition and security of steering unit, joints, relays and boots.

Check steering box for oil/fluid leaks.

Check shock absorbers for fluid leaks.

Check power steering system for leaks, hydraulic pipes and unions for chafing and corrosion.

## CHECK STEERING BALL JOINTS

Ball joints are lubricated for the normal life of ball joints during manufacture and require no further lubrication. This applies only if the rubber boot has not become dislodged or damaged. The joints should be checked at the specified mileage intervals but more frequently if the vehicle is used under arduous conditions.

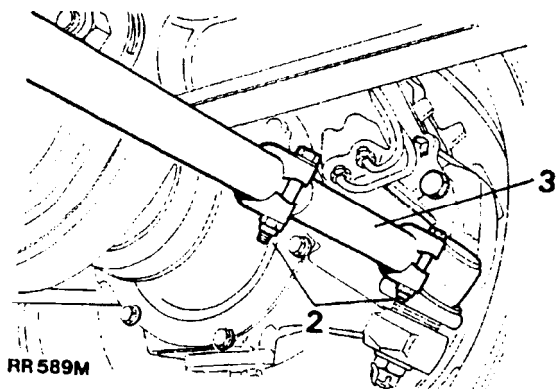
1. Check for wear in the joints by moving the ball joint up and down vigorously. If free movement is apparent fit a new joint assembly.

## Check/adjust front wheel alignment

Use recognised wheel alignment equipment to perform this check and adjustment. See 'General Specification' section for the correct alignment.

### To adjust

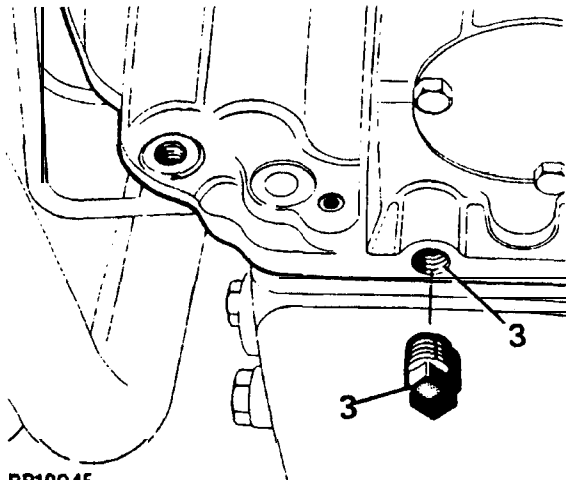
1. Set the vehicle on level ground, with the road wheels in the straight ahead position, and push it forward a short distance.
2. Loosen the clamps securing the adjusting shaft to the track rod.
3. Turn the adjusting shaft to decrease or increase the effective length of the track rod, as necessary, until the toe-out is correct.



4. Retighten the clamps.
5. Push the vehicle rear-wards, turning the steering wheel from side to side to settle the ball joints. Then with the road wheels in the straight ahead position, push the vehicle forward a short distance.
6. Recheck the toe-out. If necessary carry out further adjustment.

**CONVERTER HOUSING WADING PLUG**

1. The converter housing can be completely sealed to exclude mud and water under severe wading conditions, by means of a plug fitted in the bottom of the housing.
2. The plug is stored in the vehicle tool kit and should only be fitted when the vehicle is expected to do wading or very muddy work.
3. When the plug is in use it must be removed periodically to check for possible oil seepage due to defective seals.

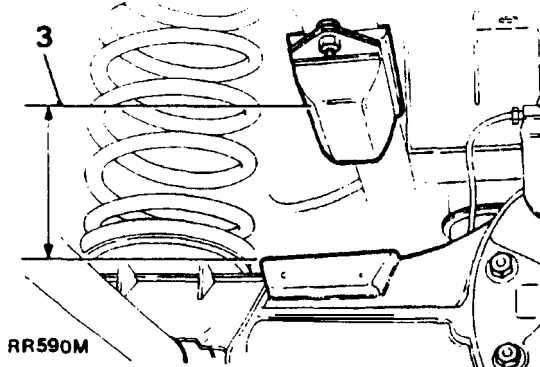


RR1904E

**CHECK ROAD SPRINGS**

Verify that the vehicle is being operated within the specified maximum loading capabilities. Drive the vehicle onto level ground and remove all loads. Should the vehicle lean to one side it indicates a fault with the springs or shock absorbers, not the self-levelling unit. If the levelling unit is believed to be at fault, the procedure below should be followed:

1. Check the levelling unit for excessive oil leakage and if present the unit must be changed. Slight oil seepage is permissible.
2. Remove any **excessive** mud deposits and loose items from the rear seat and load area.
3. Measure the clearance between the rear axle bump pad and the bump stop rubber at the front outer corner of the bump pad on both sides of the vehicle. The average clearance should be in excess of 67mm (2.8 in). If it is less than this figure remove the rear springs and check their free length against the 'Road Spring Data'. Replace any spring whose free length is more than 20mm (0.78 in) shorter than the figure given. If after replacing a spring the average bump clearance is still less than 67 mm (2.8 in), replace the levelling unit.



4. With the rear seat upright, load 450 kg (992 lb) into the rear of the vehicle, distributing the load evenly over the floor area. Check the bump stop clearance, with the driving seat occupied.
5. Drive the vehicle for approximately 5 km (3 miles) over undulating roads or graded tracks. Bring the vehicle to rest by light brake application so as not to disturb the vehicle loading. With the driving seat occupied, check the bump stop clearance again.
6. If the change in clearance is less than 20 mm (0.787 in) the levelling unit must be replaced.

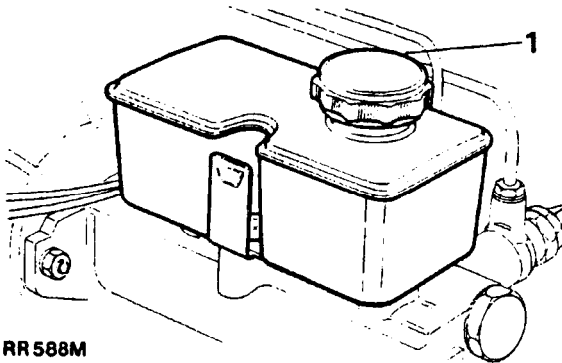
**BRAKES**

Check visually, hydraulic pipes and unions for chafing, leaks and corrosion.

Check/top up brake fluid reservoir • AP Type master cylinder and servo.

The tandem brake reservoir is integral with the servo unit and master cylinder.

1. Remove cap to check fluid level; top up if necessary until the fluid reaches the bottom of the filler neck. (See recommended Lubricants, Fluids and Capacities, Section 09). DO NOT OVERFILL.
2. If significant topping up is required check master cylinder, brake disc cylinders and brake pipes and connections for leakage; any leakage must be rectified immediately.



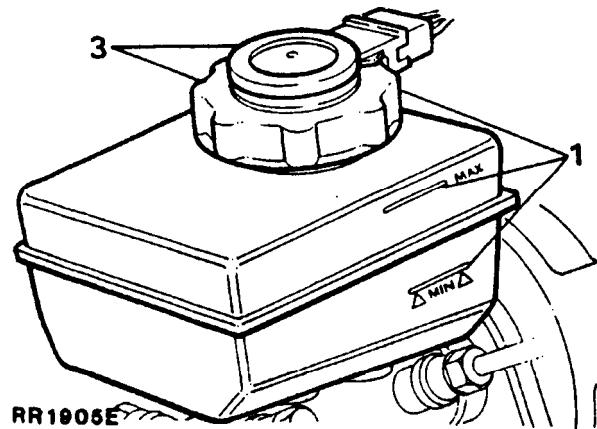
**RR588M**

**CAUTION :** When topping up the reservoir care should be taken to ensure that the brake fluid does not come into contact with any of the vehicle paintwork. Should this occur, wash the affected area **IMMEDIATELY** with a large quantity of water.

**CHECK AND TOP UP BRAKE FLUID RESERVOIR**  
-Lucas Girling master cylinder and servo

1. Visually check the brake fluid level against the 'MIN' and 'MAX' level markings on the side of the reservoir.
2. If necessary top up with the recommended grade of fluid (refer to section 09 lubricants, fluids and capacities). DO NOT OVERFILL.
3. Release the cap with combined fluid level switch by rotating counter- clockwise. Withdraw the cap and switch, top up the reservoir.

**CAUTION :** When topping up the reservoir care should be taken to ensure that the brake fluid does not come into contact with any of the vehicle paintwork. Should this occur, wash the affected area **IMMEDIATELY** with a large quantity of water.



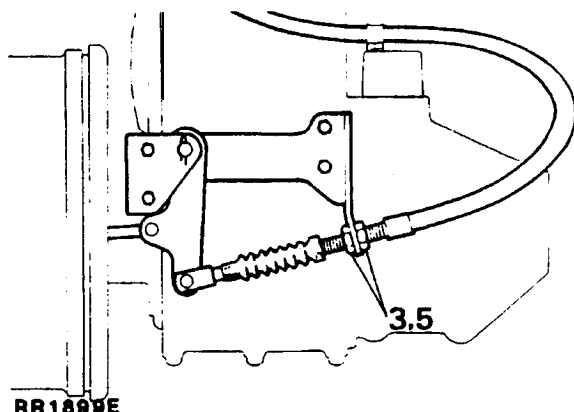
**RR1905E**

Continued

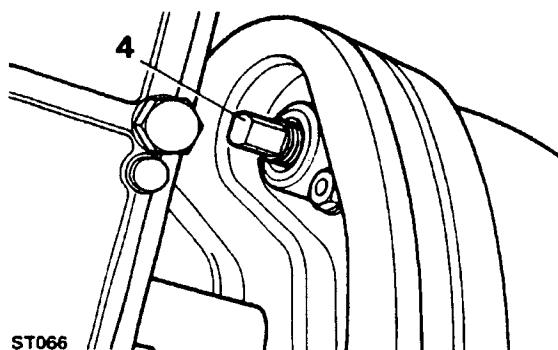
## ADJUST PARKING BRAKE

The parking brake lever acts on a brake drum at the rear of the transfer box.

1. Set the vehicle on level ground and select 'P' in main gearbox. Disconnect the battery negative lead.
2. Fully release the parking brake.
3. From underneath the vehicle loosen the two locknuts securing the parking brake outer cable to the mounting bracket, to enable the brake drum to be adjusted without putting any tension on the parking brake outer cable.



4. Rotate the adjuster on the brake drum back plate clockwise, until the brake shoes are fully expanded against the drum.



5. Rotate the two outer cable locknuts until contact is made with the mounting bracket, tighten the two nuts consecutively to prevent any movement occurring on the outer cable.
6. Loosen the adjuster on the back of the brake drum until the parking brake lever becomes fully operational on the second or third notch of the parking brake ratchet,
7. Lightly grease the parking brake linkage with a general purpose grease.

**CAUTION:** DO NOT overadjust the parking brake, the drum must be free to rotate when the parking brake is released, otherwise serious damage will result.

## CHECK SERVICE BRAKE OPERATION

If the service brake pedal is 'spongy' bleed the brake system (refer to Brakes - section 70). Check all hoses and pipes for security, fractures and leaks. Fit new hoses and pipes as necessary.

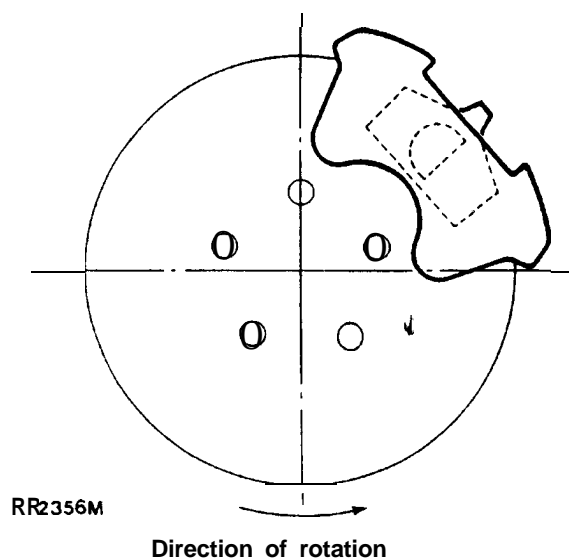
## FRONT AND REAR BRAKE PADS (Service Brakes)

Brake pad wear is indicated by a pad wear warning light incorporated in the instrument binnacle. The warning lamp is illuminated when pad wear is reduced to approximately 3.0mm (0.118 in). The system is operated by an electrical sensor incorporated into both the front right and rear left hand side inboard brake pads, on early models. Later models have the rear pad wear sensor located in the inboard pad of the rear right hand caliper. When pad wear is sufficient in either front or rear pads the sensor within the pads will complete a circuit to ground through the disc, thus illuminating the warning lamp in the instrument binnacle.

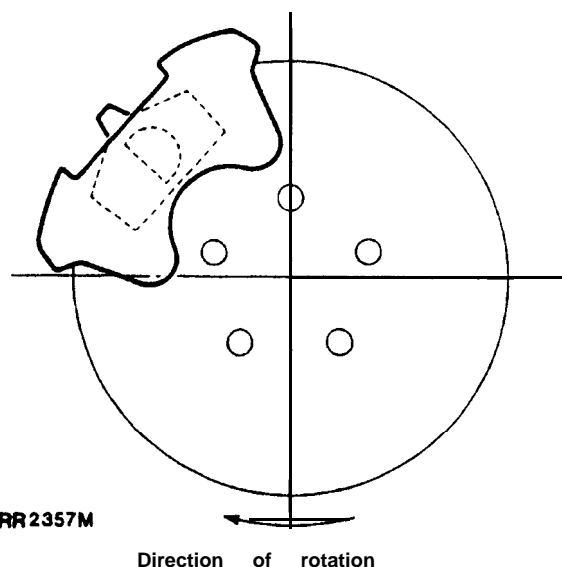
## Brake pad identification

From the side of the vehicle, looking through the disc and caliper at the inboard pad, the 'D' shaped material on the rear of the inboard pad should face the direction of forward rotation of the road wheel so that the curved part of the 'D' is always at the trailing end of the caliper.

## Brake pad wear sensed at left rear wheel



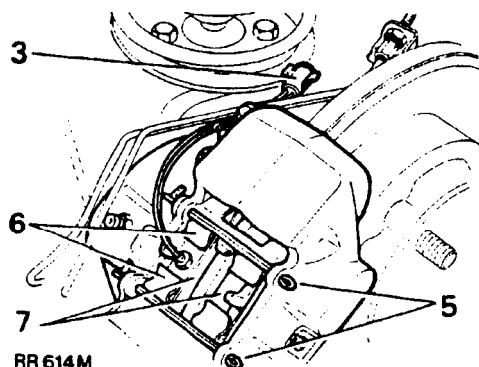
Brake pad wear sensed at right rear wheel



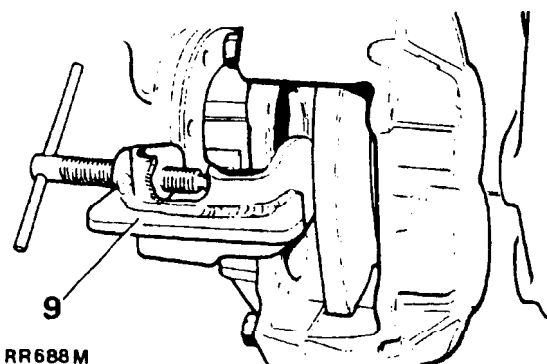
Fit new front brake pads

**NOTE:** Ensure 'P' is selected in main gearbox, differential lock is engaged and that the parking brake is applied.

1. Loosen the wheel nuts on both front wheels, raise the front of the vehicle and lower onto axle stands, and remove the front road wheels.
2. Disconnect the battery negative terminal.
3. Disconnect the two-pin electrical plug at the rear of the disc mudshield (front right hand side only).
4. Clean the exterior of the calipers.
5. Remove the cotter pins from the brake caliper.
6. Remove the retaining springs.
7. Withdraw the brake pads.



8. Clean the exposed parts of the pistons, using new brake fluid.
9. Using piston clamp 18G672 press each piston back into its bore, while ensuring that the displaced brake fluid does not overflow from the reservoir.



10. Coat the faces of the pistons with Lockheed disc brake lubricant taking care not to let any reach the lining material.
11. Insert the new brake pads.
12. Place the brake pad retaining springs in position, fit new cotter pins and spread the ends.
13. Apply the service brake pedal several times to locate the pads.
14. Check the fluid reservoir and top up if necessary.
15. Fit the road wheels, and secure them in position with the wheel nuts, do not fully tighten the wheel nuts at this stage, lower the vehicle and finally tighten the wheel nuts to the specified torque value.

Fit new rear brake pads

Jacking up the rear of the vehicle, follow the procedure as for front pads.

1. Early vehicles • The two-pin electrical plug for rear brake pad wear indication is located on the left hand rear caliper inboard pad.  
later vehicles • The two pin electrical plug for rear brake pad wear indication is located on the right hand rear caliper inboard pad.

CHECK BRAKE SERVO HOSE(S)

Visually inspect all servo hoses and connections for condition and security.

**BRAKE FLUID**

Brake fluid absorbs water and in time the boiling point of the fluid will be lowered sufficiently to cause the fluid to be vapourised by the heat generated when the vehicle brakes are applied.

This will result in loss of braking efficiency or in extreme cases brake failure.

Therefore, all fluid in the brake system should be changed at the service intervals quoted in the recommended maintenance schedules.

Fluid should also be changed before touring in mountainous areas if not changed in the previous nine months.

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 as 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.

**BATTERY**

**WARNING:** Hydrogen and oxygen gases are produced during normal battery operation. This gas mixture can explode if flames, sparks or lighted tobacco are brought near the battery. When charging or using a battery in an enclosed space, always provide ventilation and shield your eyes.

Keep out of reach of children. Batteries contain sulphuric acid. Avoid contact with skin, eyes, or clothing. Also, shield your eyes when working near the battery to protect against possible splashing of the acid solution. In case of acid contact with skin, eyes, or clothing, flush immediately with water for a minimum of fifteen minutes. If acid is swallowed, drink large quantities of milk or water, followed by milk of magnesia, a beaten egg, or vegetable oil.

**SEEK MEDICAL AID IMMEDIATELY.**

A low maintenance battery is installed in the vehicle. Dependent upon climate conditions the electrolyte levels should be checked as follows:

Temperate climates every three years.

Hot climates every year.

The exterior of the battery should be occasionally wiped clean to remove any dirt or grease.

Periodically remove the battery terminals to clean and coat with petroleum jelly.

**NOTE:** If a new battery is fitted to the vehicle it should be the same type as fitted to the vehicle when new. Alternative batteries may vary in size and terminal positions and this could be a possible fire hazard if the terminals or leads come into contact with the battery clamp assembly. When fitting a new battery ensure that the terminals and leads are clear of the battery clamp assembly.

# RESET EMISSION MAINTENANCE REMINDER

The emission maintenance reminder is designed to activate at 52,500 and 105,000 miles respectively and will illuminate a 'Check Engine' red warning light in the auxiliary switch panel.

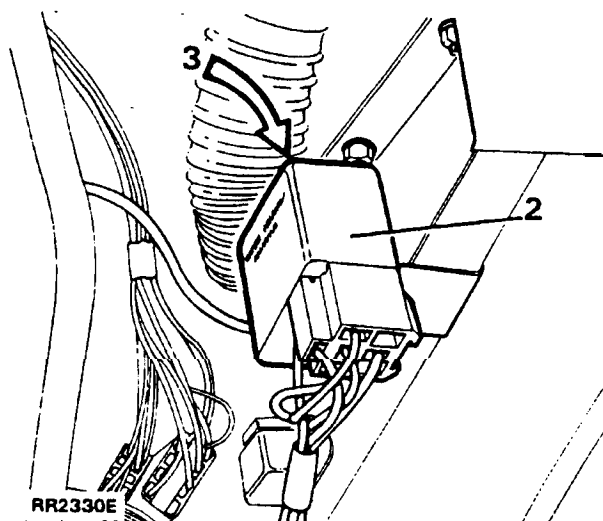
The control unit is located behind the lower dash panel and is attached to the side of the steering column support bracket above the relays. Access to the unit is gained by removing the lower dash panel.

The control unit colour is brown, mounted on a brown plug, 'EMISSION MAINTENANCE REMINDER' is embossed in white on the side of the unit. A tamper-proof label is attached to the top of the unit.

The emission maintenance reminder must be reset after the required maintenance has been carried out and a new tamperproof label fitted by a Range Rover of North America dealer. This Emission maintenance reminder is part of the Emission Control System, refer to section 17.

The unit can be reset as follows:

1. Remove the fixings and lower the lower dash panel.
2. Identify the control unit and remove it from the plug.
3. Remove the tamperproof label to reveal the access hole for resetting.

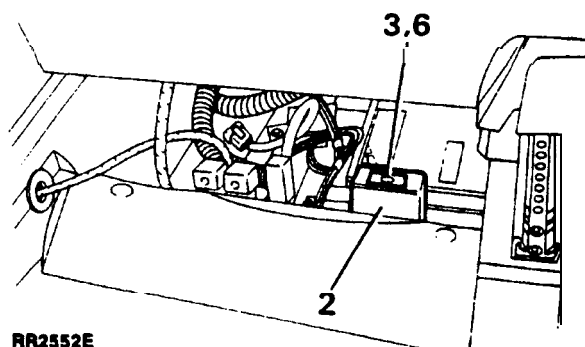


4. Using a small thin metallic probe, place the probe into the access hole and momentarily electrically short between the reset pins within the unit.
5. Refit the control unit to the plug, switch on the ignition, the 'CHECK ENGINE' warning light in the auxiliary switch panel will initially light up as part of the unit's **inbuilt** check feature, if the unit has been reset correctly the warning light will go out after a few seconds. Should the warning light remain illuminated, repeat the resetting procedure.
6. Fit a new tamperproof label.
7. Endorse the Passport to service.

## EMISSION MAINTENANCE REMINDER • 1989 MODEL YEAR

The mileage intervals for 88 Model year also apply to 89 Model year.

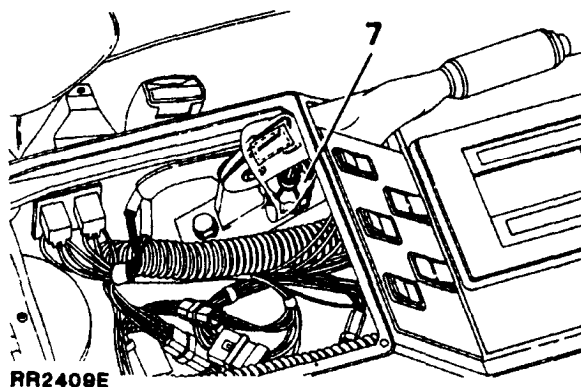
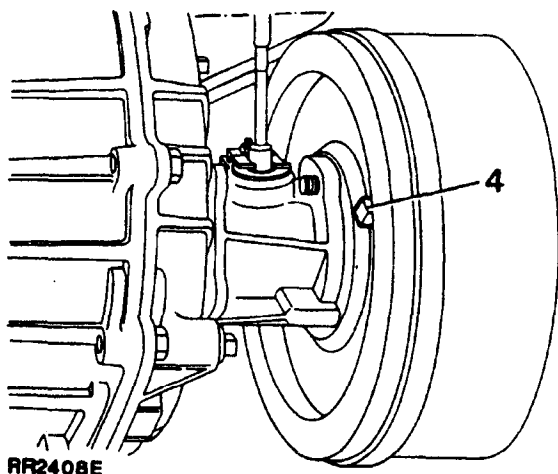
The control unit is now located under the rear of the right hand front seat.



Follow instructions 2. to 7. to reset the unit.

## ADJUST PARKING BRAKE

1. Set the vehicle on level ground and select 'P' in automatic gearbox or neutral in manual gearbox. Disconnect the battery negative terminal.
2. Chock the road wheels.
3. Fully release the parking brake lever.
4. From underneath the vehicle, rotate the adjuster on the brake drum back plate clockwise until the brake shoes are fully expanded against the brake drum.



8. Operate the parkbrake once or twice to settle the brake shoes, recheck that the parkbrake is fully operational on the third notch of the ratchet. Readjust as necessary.
9. Refit the glove box liner.
10. Reconnect the battery and remove the wheel chocks.

5. Back off the adjuster until the drum is free to rotate.
6. Release the four screws and remove the glove box liner.
7. Rotate the adjustment thumbwheel below the parkbrake lever until the parkbrake is fully operational on the third notch of the ratchet.

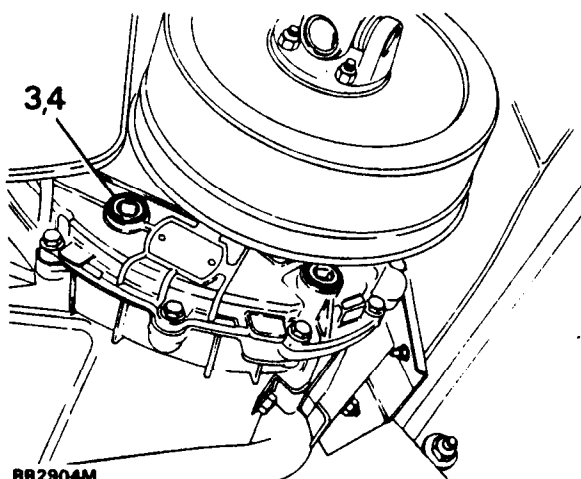
**NOTE:** The parking brake adjustment thumbwheel must only be used for initial setting and to compensate for cable stretch, it must not be used to take up brake shoe wear, which must continue to be adjusted at the brake drum.

# TOP UP TRANSFER GEARBOX OIL

• Borg Warner gearbox

**NOTE:** The existing maintenance intervals for the LT230 are also applicable to the Borg Warner transfer gearbox.

1. Before topping up the oil ensure that the vehicle is level, either on a hoist or on the ground.
2. Disconnect the battery negative terminal.
3. Clean the immediate area around the filler/level plug.
4. Remove the plug and fill the gearbox with the recommended grade of oil, until oil starts to seep from the filler/level hole.
5. Clean any previously applied sealant from the filler/level plug.
6. Apply Hylomar sealant to the threads of the plug and refit the plug. Tighten to the specified torque.



7. Wipe away any surplus oil.
8. Reconnect the battery.

# RENEW TRANSFER GEARBOX OIL

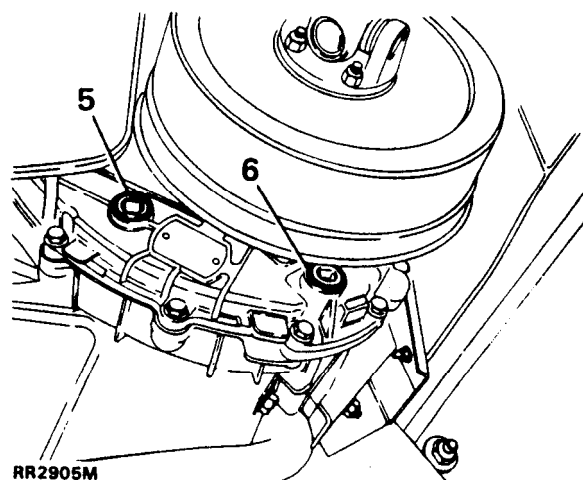
• Borg Warner gearbox

**NOTE:** The existing maintenance intervals for the LT230 are also applicable to the Borg Warner transfer gearbox.

1. Before renewing the oil ensure that the vehicle is level, either on a hoist or on the ground.
2. Disconnect the battery negative terminal.
3. Clean the immediate area around the filler/level and drain plugs.

**WARNING:** When draining the gearbox care should be taken to ensure that the oil is not hot as personal scalding could result.

4. Place a container under the gearbox to drain the oil into.
5. Remove the filler/level plug to vent the gearbox and assist draining.
6. Remove the drain plug and allow the oil to drain.



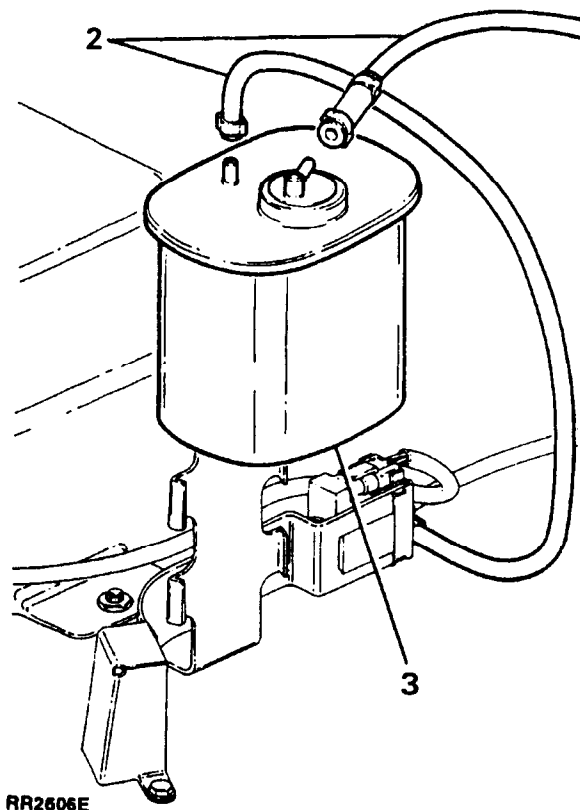
7. Thoroughly clean the drain plug threads prior to applying fresh 'Hylomar' sealant. Fit and tighten the plug to the specified torque.
8. Fill the gearbox with the correct quantity and grade of oil until oil seeps from the filler level hole. Wipe away any surplus oil.
9. Thoroughly clean the filler/level plug threads prior to applying fresh 'Hylomar' sealant. Fit and tighten the plug to the specified torque.
10. Reconnect the battery.

# Charcoal canister

## Remove and refit

### Removing

1. Disconnect battery negative lead.
2. Disconnect both purge lines.
3. Release canister from its mounting bracket.



### Refitting

4. Reverse the removal procedure, ensuring that the canister is securely located in its mounting bracket and both purge lines are fitted correctly to the canister.

## DYNAMOMETER TESTING OF PERMANENT FOUR WHEEL DRIVE VEHICLES

NOTE: THIS INFORMATION APPLIES TO VEHICLES **FITTED** WITH BORG WARNER TRANSFER GEARBOX WITH VISCOUS COUPLING

These vehicles are identified by the absence of the diff-lock position on the transfer gearbox lever.

### Viscous coupling

The front and rear axles cannot be driven independently due to the viscous coupling. This eliminates the need for the differential lock by progressively locking the centre differential automatically if any slip occurs at any wheel.

**WARNING:** DO NOT attempt to drive individual wheels with the vehicle supported on floor jacks or stands.

### Four wheel dynamometers

Provided that the front and rear dynamometer rollers are rotating at identical speeds and that normal workshop safety standards are applied, there is no speed restriction during testing except for any that may apply to the tyres.

### Two wheel dynamometers

**IMPORTANT:** Use a four wheel dynamometer for brake testing if possible.

If brake testing on a single axle rig is necessary it must be carried out with the drive shaft to the rear axle removed, AND neutral selected in BOTH main gearbox and transfer gearbox. When checking brakes, run engine at idle speed to maintain servo vacuum.

If checking engine performance, the transfer box must be in high range and the drive shaft to the stationary axle must be removed.

### TOWING

Note the towing procedure (Section 10, page 7) for previous models applies to vehicles fitted with Borg Warner transfer gearbox. The main gearbox and transfer gearbox must be in neutral when the vehicle is being towed.

**DYNAMOMETER TESTING OF PERMANENT FOUR  
WHEEL DRIVE VEHICLES**

**NOTE:** THIS INFORMATION APPLIES TO  
VEHICLES **FITTED** WITH ANTI-LOCK BRAKE  
SYSTEM

**WARNING:** DO NOT ATTEMPT TO TEST ABS  
FUNCTION ON A DYNAMOMETER

**Four wheel dynamometers**

**NOTE:** Before testing the vehicle on a four wheel  
dynamometer disconnect the valve relay • see  
Section 70 Brakes, page 54. The ABS function will  
not work, the ABS warning light will illuminate.  
Normal braking will be available.

Provided that the front and rear rollers are rotating  
at identical speeds and that normal workshop safety  
standards are applied, there is no speed restriction  
during testing except for any that may apply to the  
tyres.

**Two wheel dynamometers**

**IMPORTANT:** Use a four wheel dynamometer for  
brake testing if possible.

**NOTE:** ABS will not function on a two wheel  
dynamometer. The ABS light will illuminate  
during testing. Normal braking will be available.

If brake testing on a single rig is necessary it must  
be carried out with the drive shaft to the rear axle  
removed, AND neutral selected in BOTH main  
gearbox and transfer gearbox.

If checking engine performance, the transfer box  
must be in high range and the drive shaft to the  
stationary axle must be removed.

**ABS BRAKE FLUID RESERVOIR**

**Check/top up fluid level**

1. Park the vehicle on level ground.
2. Turn ignition ON, to activate hydraulic pump.  
If pump does not activate depress brake pedal  
several times until it is heard to operate.
3. When the pump stops, check that the level is  
between the 'MIN' and 'MAX' marks.
4. If the level is below the 'MIN' mark on  
reservoir, using the correct fluid, • see Section  
09, Lubricants and Fluids.

**WARNING:** Clean reservoir body and filler cap  
before removing the cap. Use only fluid from a  
sealed container.

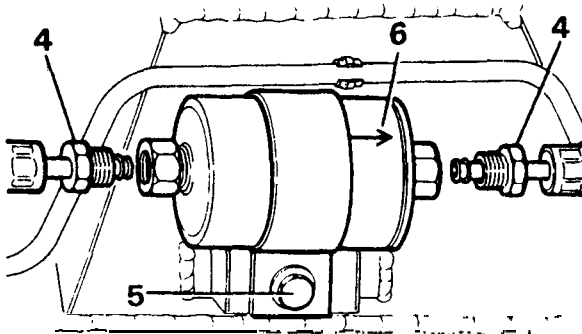
**FUEL FILTER - 1991 MODEL YEAR**
**Remove and refit**

**WARNING:** Ensure that the fuel handling precautions given in Section 01 - Introduction regarding fuel handling are strictly adhered to when carrying out the following instructions.

**WARNING:** The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.

**Removing**

1. Depressurise the fuel system.
2. The fuel filter is located on the right-hand chassis side member forward of the fuel tank filler neck. Access to the filter is gained through the right-hand rear wheel arch.
3. Clamp the inlet and outlet hoses to prevent the minimum of fuel spillage when disconnecting the hoses.
4. Loosen the two fuel unions and remove the hoses from the filter canister.
5. Release the single nut and bolt securing the filter and clamp and remove the filter.



RR2966E

**Refitting**

6. Fit a new filter observing the direction of flow arrow on the canister.
7. Tighten the single nut and bolt.
8. Fit the inlet and outlet hoses. Tighten the unions to a torque of 20-25 ft lb(27-34Nm).
9. Refit the fuel pump relay. Reconnect the battery and recode the radio.
10. Start the engine and inspect for fuel leaks around the hose connections.