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LIVING WITH YOUR LAND ROVER DISCOVERY

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004 Introduction

The Discovery was introduced to the UK market in late 1989, in three-door body style, with both petrol and diesel engines. The 200 TDi Diesel engine is unique to the Discovery, and has not been used in any other Land Rover vehicles.

In Autumn 1990, a five-door version became available, and in June 1993, a Commercial ('Van') model was introduced, based on the three-door version with the rear side windows deleted.

For 1994 model year, the 3.5 litre V8 engine was replaced by a larger 3.9 litre unit.

In the Spring of 1994, the Discovery range was facelifted, and at the same time, the 300 TDi diesel engine was introduced. Based on the previous 200 TDi engine, a number of improvements were made, including an Electronic Diesel Control (EDC) system for certain markets. The most notable feature of the EDC system is that a 'drive-by-wire' accelerator control system is used, with no mechanical link (accelerator cable) between the accelerator pedal and the fuel injection pump.

The V8 petrol engine is the famous all-alloy 'Rover V8' engine, with chain-driven camshaft, overhead valves and hydraulic tappets. Early

models had twin SU carburettors, which were superseded by Lucas fuel injection after 1990.

The diesel engines fitted to the Discovery are of pushrod overhead-valve design, and the cylinder block-mounted camshaft is driven from the crankshaft via a toothed belt. The engines use direct fuel injection.

Models are available with a five-speed manual, or four-speed automatic, transmission. The drive from the transmission is picked up by a transfer gearbox, which provides permanent four-wheel-drive to the front and rear axles, via propeller shafts.

A wide range of standard and optional equipment is available within the Discovery range to suit most tastes, including central locking, electric windows, electric sunroof, anti-lock braking system, and air bags.

Due to the rugged construction of the vehicle, the number of items requiring regular maintenance (mainly the need for regular lubrication checks) is higher than that found on many smaller vehicles, but the Discovery is a straightforward vehicle to maintain, and most of the items requiring frequent attention are easily accessible.



Land Rover Discovery 3-door (1989 model)



Land Rover Discovery 5-door (1997 model)

Your Discovery manual

The aim of this manual is to help you get the best value from your vehicle. It can do so in several ways. It can help you decide what work must be done (even should you choose to get it done by a garage). It will also provide information on routine maintenance and servicing, and give a logical course of action and diagnosis when random faults occur. However, it is hoped that you will use the manual by tackling the work yourself. On simpler jobs it may even be quicker than booking the vehicle into a garage and going there twice, to leave and collect it. Perhaps most important, a lot of money can be saved by avoiding the costs a garage must charge to cover its labour and overheads.

The manual has drawings and descriptions to show the function of the various components so that their layout can be understood. Tasks are described and photographed in a clear step-by-step sequence. The illustrations are numbered by the Section number and paragraph number to which they relate - if there is more than one illustration per paragraph, the sequence is denoted alphabetically.

References to the 'left' or 'right' of the vehicle are in the sense of a person in the driver's seat, facing forwards.

Acknowledgements

Thanks are due to Draper Tools Limited, who provided some of the workshop tools, and to all those people at Sparkford who helped in the production of this manual.

We take great pride in the accuracy of information given in this manual, but vehicle manufacturers make alterations and design changes during the production run of a particular vehicle of which they do not inform us. No liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in, or omissions from, the information given.

Working on your car can be dangerous. This page shows just some of the potential risks and hazards, with the aim of creating a safety-conscious attitude.

General hazards

Scalding

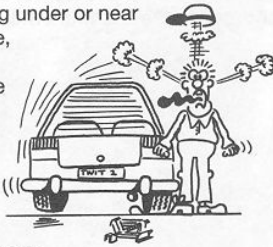
- Don't remove the radiator or expansion tank cap while the engine is hot.
- Engine oil, automatic transmission fluid or power steering fluid may also be dangerously hot if the engine has recently been running.

Burning

- Beware of burns from the exhaust system and from any part of the engine. Brake discs and drums can also be extremely hot immediately after use.

Crushing

- When working under or near a raised vehicle, always supplement the jack with axle stands, or use drive-on ramps.



Never venture under a car which is only supported by a jack.

- Take care if loosening or tightening high-torque nuts when the vehicle is on stands. Initial loosening and final tightening should be done with the wheels on the ground.

Fire

- Fuel is highly flammable; fuel vapour is explosive.
- Don't let fuel spill onto a hot engine.
- Do not smoke or allow naked lights (including pilot lights) anywhere near a vehicle being worked on. Also beware of creating sparks (electrically or by use of tools).
- Fuel vapour is heavier than air, so don't work on the fuel system with the vehicle over an inspection pit.
- Another cause of fire is an electrical overload or short-circuit. Take care when repairing or modifying the vehicle wiring.
- Keep a fire extinguisher handy, of a type suitable for use on fuel and electrical fires.

Electric shock

- Ignition HT voltage can be dangerous, especially to people with heart problems or a pacemaker. Don't work on or near the ignition system with the engine running or the ignition switched on.



- Mains voltage is also dangerous. Make sure that any mains-operated equipment is correctly earthed. Mains power points should be protected by a residual current device (RCD) circuit breaker.

Fume or gas intoxication

- Exhaust fumes are poisonous; they often contain carbon monoxide, which is rapidly fatal if inhaled. Never run the engine in a confined space such as a garage with the doors shut.
- Fuel vapour is also poisonous, as are the vapours from some cleaning solvents and paint thinners.



Poisonous or irritant substances

- Avoid skin contact with battery acid and with any fuel, fluid or lubricant, especially antifreeze, brake hydraulic fluid and Diesel fuel. Don't syphon them by mouth. If such a substance is swallowed or gets into the eyes, seek medical advice.
- Prolonged contact with used engine oil can cause skin cancer. Wear gloves or use a barrier cream if necessary. Change out of oil-soaked clothes and do not keep oily rags in your pocket.
- Air conditioning refrigerant forms a poisonous gas if exposed to a naked flame (including a cigarette). It can also cause skin burns on contact.

Asbestos

- Asbestos dust can cause cancer if inhaled or swallowed. Asbestos may be found in gaskets and in brake and clutch linings. When dealing with such components it is safest to assume that they contain asbestos.

Special hazards

Hydrofluoric acid

- This extremely corrosive acid is formed when certain types of synthetic rubber, found in some O-rings, oil seals, fuel hoses etc, are exposed to temperatures above 400°C. The rubber changes into a charred or sticky substance containing the acid. *Once formed, the acid remains dangerous for years. If it gets onto the skin, it may be necessary to amputate the limb concerned.*

- When dealing with a vehicle which has suffered a fire, or with components salvaged from such a vehicle, wear protective gloves and discard them after use.

The battery

- Batteries contain sulphuric acid, which attacks clothing, eyes and skin. Take care when topping-up or carrying the battery.
- The hydrogen gas given off by the battery is highly explosive. Never cause a spark or allow a naked light nearby. Be careful when connecting and disconnecting battery chargers or jump leads.

Air bags

- Air bags can cause injury if they go off accidentally. Take care when removing the steering wheel and/or facia. Special storage instructions may apply.

Diesel injection equipment

- Diesel injection pumps supply fuel at very high pressure. Take care when working on the fuel injectors and fuel pipes.



Warning: Never expose the hands, face or any other part of the body to injector spray; the fuel can penetrate the skin with potentially fatal results.

Remember...

DO

- Do use eye protection when using power tools, and when working under the vehicle.
- Do wear gloves or use barrier cream to protect your hands when necessary.
- Do get someone to check periodically that all is well when working alone on the vehicle.
- Do keep loose clothing and long hair well out of the way of moving mechanical parts.
- Do remove rings, wristwatch etc, before working on the vehicle – especially the electrical system.
- Do ensure that any lifting or jacking equipment has a safe working load rating adequate for the job.

DON'T

- Don't attempt to lift a heavy component which may be beyond your capability – get assistance.
- Don't rush to finish a job, or take unverified short cuts.
- Don't use ill-fitting tools which may slip and cause injury.
- Don't leave tools or parts lying around where someone can trip over them. Mop up oil and fuel spills at once.
- Don't allow children or pets to play in or near a vehicle being worked on.

006 Roadside repairs

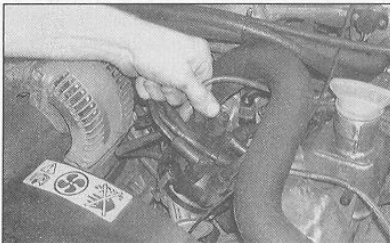
The following pages are intended to help in dealing with common roadside emergencies and breakdowns. You will find more detailed fault finding information at the back of the manual, and repair information in the main chapters.

If your car won't start and the starter motor doesn't turn

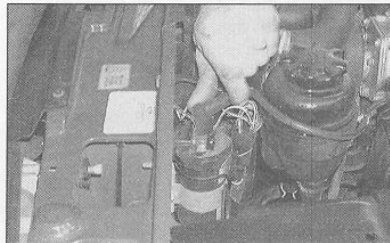
- If it's a model with automatic transmission, make sure the selector is in 'P' or 'N'.
- Open the bonnet and make sure that the battery terminals are clean and tight.
- Switch on the headlights and try to start the engine. If the headlights go very dim when you're trying to start, the battery is probably flat. Get out of trouble by jump starting (see next page) using a friend's car.

If your car won't start even though the starter motor turns as normal

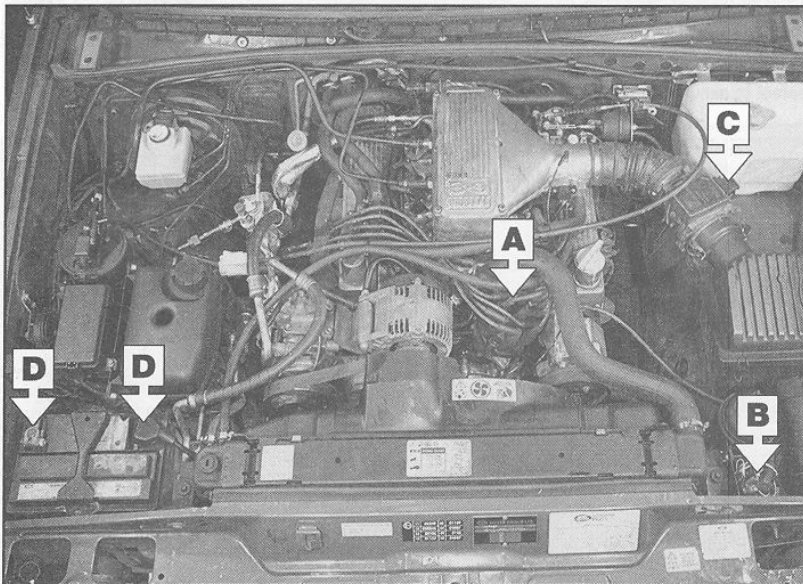
- Is there fuel in the tank?
- Is there moisture on electrical components under the bonnet? Switch off the ignition, then wipe off any obvious dampness with a dry cloth. Spray a water-repellent aerosol product (WD-40 or equivalent) on ignition and fuel system electrical connectors like those shown in the photos. On petrol models, pay special attention to the ignition coil wiring connector and HT leads. Diesel engines are not generally as susceptible to damp problems, but all accessible wiring and connectors should still be checked.



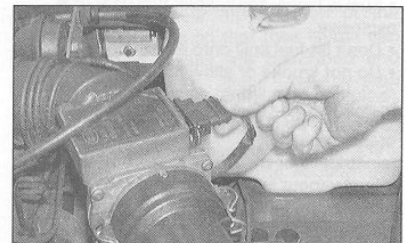
A On petrol models, check that the HT leads are securely connected to the distributor, and that the cap is clean and properly fitted.



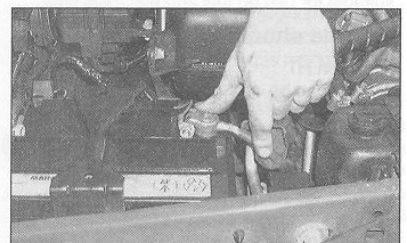
B On petrol models, check that the HT lead and wiring connections are securely connected to the ignition coil.



Check that electrical connections are secure (with the ignition switched off) and spray them with a water-dispersant spray like WD-40 if you suspect a problem due to damp.



C Check all fuel system wiring and connectors for security.



D Check the security and condition of the battery terminals.

HAYNES
HINT

Jump starting will get you out of trouble, but you must correct whatever made the battery go flat in the first place. There are three possibilities:

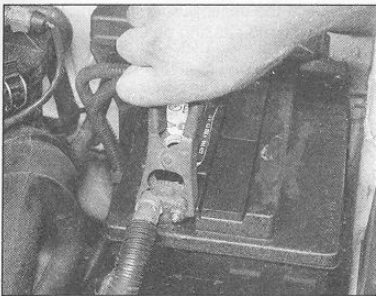
- 1** *The battery has been drained by repeated attempts to start, or by leaving the lights on.*
- 2** *The charging system is not working properly (alternator drivebelt slack or broken, alternator wiring fault or alternator itself faulty).*
- 3** *The battery itself is at fault (electrolyte low, or battery worn out).*

When jump-starting a car using a booster battery, observe the following precautions:

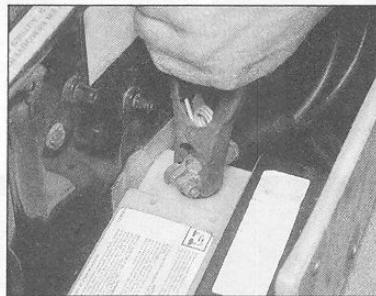
- ✓ Before connecting the booster battery, make sure that the ignition is switched off.
- ✓ Ensure that all electrical equipment (lights, heater, wipers, etc) is switched off.
- ✓ Take note of any special precautions printed on the battery case.

Jump starting

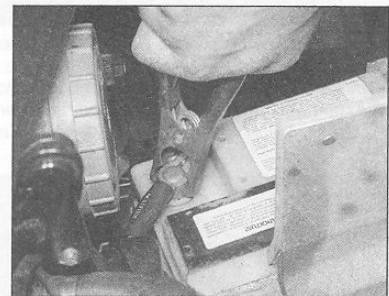
- ✓ Make sure that the booster battery is the same voltage as the discharged one in the vehicle.
- ✓ If the battery is being jump-started from the battery in another vehicle, the two vehicles **MUST NOT TOUCH** each other.
- ✓ Make sure that the transmission is in neutral (or PARK, in the case of automatic transmission).



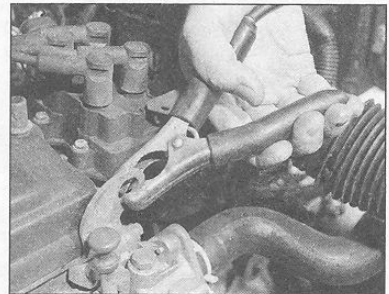
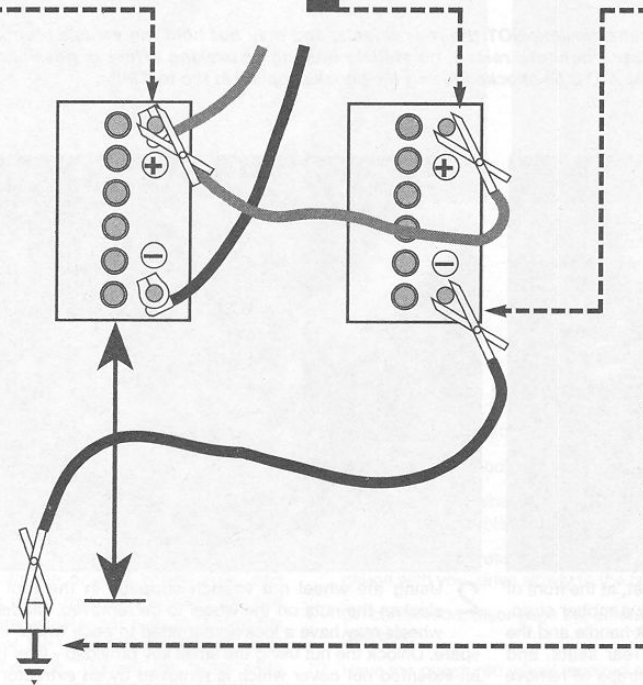
1 Connect one end of the red jump lead to the positive (+) terminal of the flat battery



2 Connect the other end of the red lead to the positive (+) terminal of the booster battery.



3 Connect one end of the black jump lead to the negative (-) terminal of the booster battery



4 Connect the other end of the black jump lead to a bolt or bracket on the engine block, well away from the battery, on the vehicle to be started.

5 Make sure that the jump leads will not come into contact with the fan, drivebelts or other moving parts of the engine.

6 Start the engine using the booster battery and run it at idle speed. Switch on the lights, rear window demister and heater blower motor, then disconnect the jump leads in the reverse order of connection. Turn off the lights etc.

Wheel changing



Warning: Do not change a wheel in a situation where you risk being hit by another vehicle. On busy roads, try to stop in a lay-by or a gateway. Be wary of passing traffic while changing the wheel - it is easy to become distracted by the job in hand.

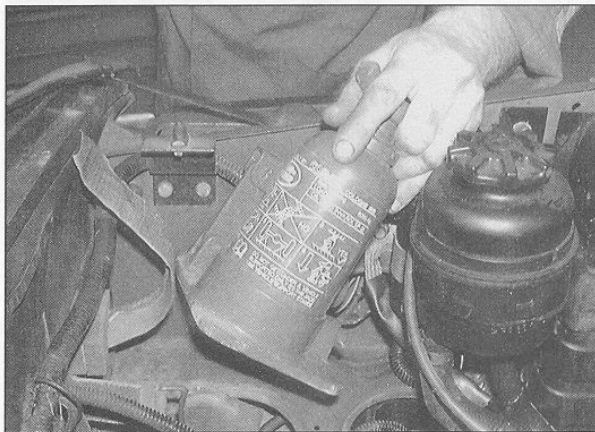
Preparation

- When a puncture occurs, stop as soon as it is safe to do so.
- Park on firm level ground, if possible, and well out of the way of other traffic.
- Use hazard warning lights if necessary.
- If you have one, use a warning triangle to alert other drivers of your presence.
- Apply the handbrake and engage first or reverse gear (or Park on models with automatic transmission).
- Select 'Low' range in the transfer gearbox, and engage the differential lock.
- Chock the wheel opposite the one being removed - a chock is supplied in the vehicle tool kit.
- If the ground is soft, use a flat piece of wood to spread the load under the jack.
- If the vehicle is coupled to a trailer, disconnect the trailer from the vehicle before commencing jacking. This is to prevent the trailer pulling the vehicle off the jack and causing personal injury.

Changing the wheel



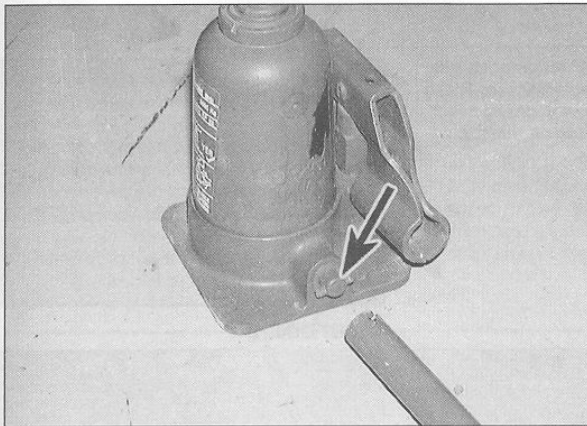
Warning: The handbrake acts on the transmission, NOT the rear wheels, and may not hold the vehicle stationary when jacking. If one front wheel AND one rear wheel are raised, no vehicle holding or braking effect is possible using the handbrake. Therefore, the wheels must ALWAYS be chocked (using the chock supplied in the tool kit).



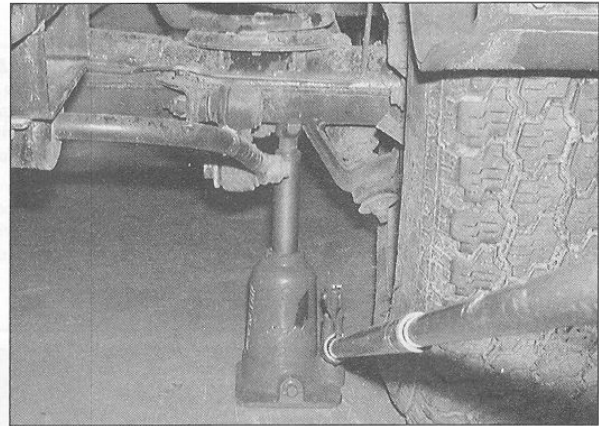
1 The jack and the wheel chock are under the bonnet, at the front of the engine compartment. The jack is retained by a rubber strap, and the chock is secured by a wing nut. The jack handle and the wheel nut wrench are located in a bag under the rear seats, and secured by straps. Raise the seats and release the straps to remove the bag.



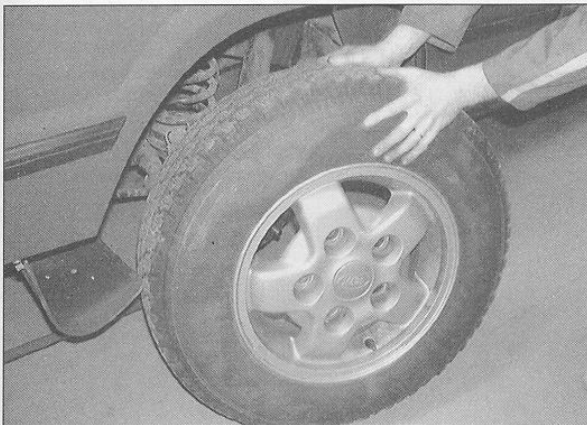
2 Using the wheel nut wrench supplied in the tool kit, initially slacken the nuts on the wheel to be removed. Models with alloy wheels may have a locking nut fitted to each wheel, including the spare. Unlock the nut using the small key provided - later models have an indented nut cover which is removed by an extractor tool, and a special socket which then fits onto the nut.



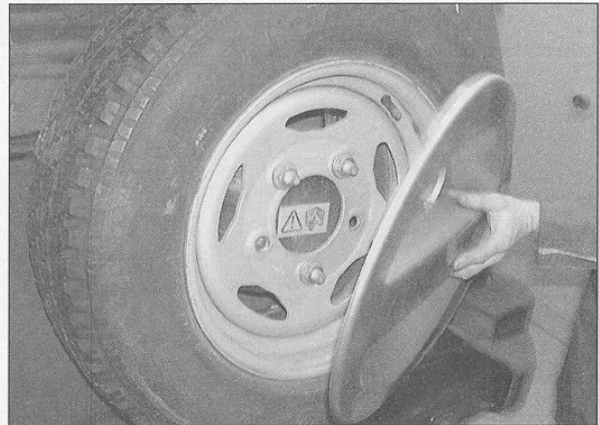
3 Assemble the two-piece jack operating lever, ensuring that the locking clip engages fully with the corresponding slot. Check that the release valve at the bottom of the jack body is closed (turned fully clockwise).



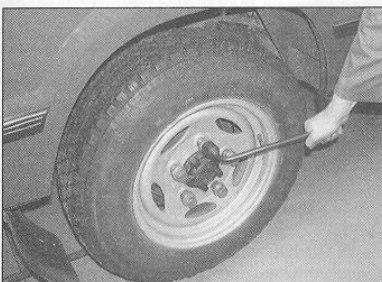
4 The jack head must now be located under the correct part of the front or rear axle, adjacent to the wheel to be changed - refer to *Jacking and vehicle support* at the end of this manual for more information. Engage the operating lever with the jack, then pump the lever up and down to raise the vehicle.



5 Once the wheel is clear of the ground, remove the wheel nuts, and lift off the wheel.



6 Again using the wheel nut wrench, remove the nuts securing the plastic spare wheel cover, then unscrew the three nuts securing the spare wheel to the carrier, and lift off the wheel. Take care not to mix up the spare wheel cover nuts and spare wheel nuts.



7 Locate the spare wheel on the studs, then refit the original wheel nuts, and tighten firmly using the wrench. **Do not** use the spare wheel cover nuts to secure the wheel. Lower the vehicle to the ground, and withdraw the jack. Tighten the wheel nuts using the wrench, with hand pressure only.

Finally...

- Remove the wheel chock.
- Stow the jack, chock and tools in their correct locations.
- Fit the removed wheel to the spare wheel carrier, and where applicable, refit the cover (it may not be possible to fit the cover to certain alloy wheels).
- Check the tyre pressure on the tyre just fitted. If it is low, or if you don't have a pressure gauge with you, drive slowly to the next garage and inflate the tyre to the correct pressure.
- On completion, disengage the differential lock and select the 'High' range in the transfer gearbox.
- Have the punctured wheel repaired as soon as possible, or another puncture will leave you stranded.

Identifying leaks

Puddles on the garage floor or drive, or obvious wetness under the bonnet or underneath the car, suggest a leak that needs investigating. It can sometimes be difficult to decide where the leak is coming from, especially if the engine bay is very dirty already. Leaking oil or fluid can also be blown rearwards by the passage of air under the car, giving a false impression of where the problem lies.



Warning: Most automotive oils and fluids are poisonous. Wash them off skin, and change out of contaminated clothing, without delay.

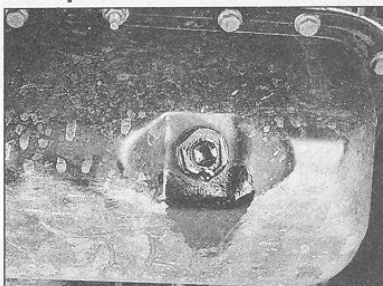
**HAYNES
HINT**

The smell of a fluid leaking from the car may provide a clue to what's leaking. Some fluids are distinctively coloured.

It may help to clean the car carefully and to park it over some clean paper overnight as an aid to locating the source of the leak.

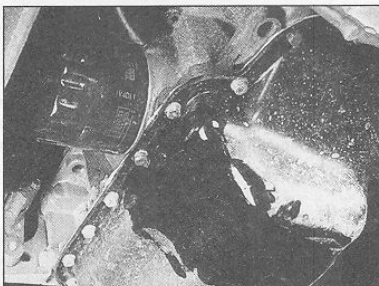
Remember that some leaks may only occur while the engine is running.

Sump oil



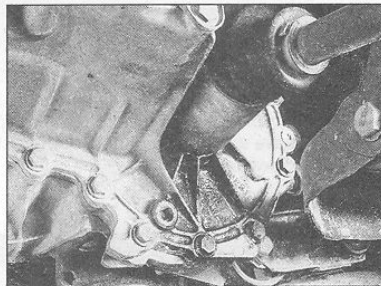
Engine oil may leak from the drain plug...

Oil from filter



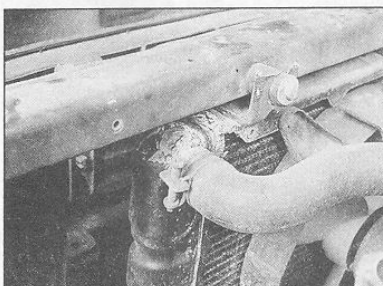
...or from the base of the oil filter.

Gearbox oil



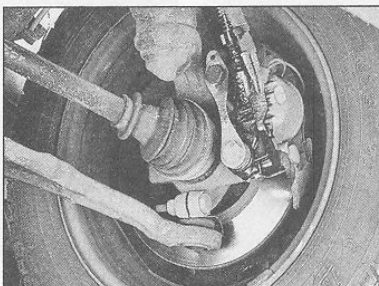
Gearbox oil can leak from the seals at the inboard ends of the driveshafts.

Antifreeze



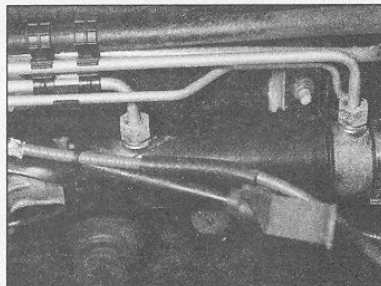
Leaking antifreeze often leaves a crystalline deposit like this.

Brake fluid



A leak occurring at a wheel is almost certainly brake fluid.

Power steering fluid



Power steering fluid may leak from the pipe connectors on the steering rack.

Towing

When all else fails, you may find yourself having to get a tow home – or of course you may be helping somebody else. Long-distance recovery should only be done by a garage or breakdown service. For shorter distances, DIY towing using another car is easy enough, but observe the following points:

Land Rover Discovery models must not be towed with either the front or the rear wheels raised (suspended tow). The car should ideally be transported on a trailer, with all four wheels off the ground - this approach should particularly be used if a transmission problem is suspected.

Use a proper tow-rope – they are not expensive. The vehicle being towed must

display an ON TOW sign in its rear window.

Always turn the ignition key to the 'on' position when the vehicle is being towed, so that the steering lock is released, and that the direction indicator and brake lights will work.

A single towing eye is provided below the front bumper, and two are provided at the rear. Two lashing rings are also provided at the front of the car - these must **not** be used for towing.

Before being towed, release the handbrake and select neutral. Also select neutral on the transfer gearbox, and ensure that the differential lock is in the unlocked position, or the transmission may be damaged - if in doubt, seek professional assistance.

Note that greater-than-usual pedal pressure will be required to operate the brakes, since the vacuum servo unit is only operational with the engine running. Similarly, greater-than-usual steering effort will also be required.

The driver of the car being towed must keep the tow-rope taut at all times to avoid snatching.

Make sure that both drivers know the route before setting off.

Only drive at moderate speeds and keep the distance towed to a minimum. Drive smoothly and allow plenty of time for slowing down at junctions.

Introduction

There are some very simple checks which need only take a few minutes to carry out, but which could save you a lot of inconvenience and expense.

These Weekly checks require no great skill or special tools, and the small amount of time they take to perform could prove to be very well spent, for example;

□ Keeping an eye on tyre condition and pressures, will not only help to stop them wearing out prematurely, but could also save your life.

□ Many breakdowns are caused by electrical problems. Battery-related faults are particularly common, and a quick check on a regular basis will often prevent the majority of these.

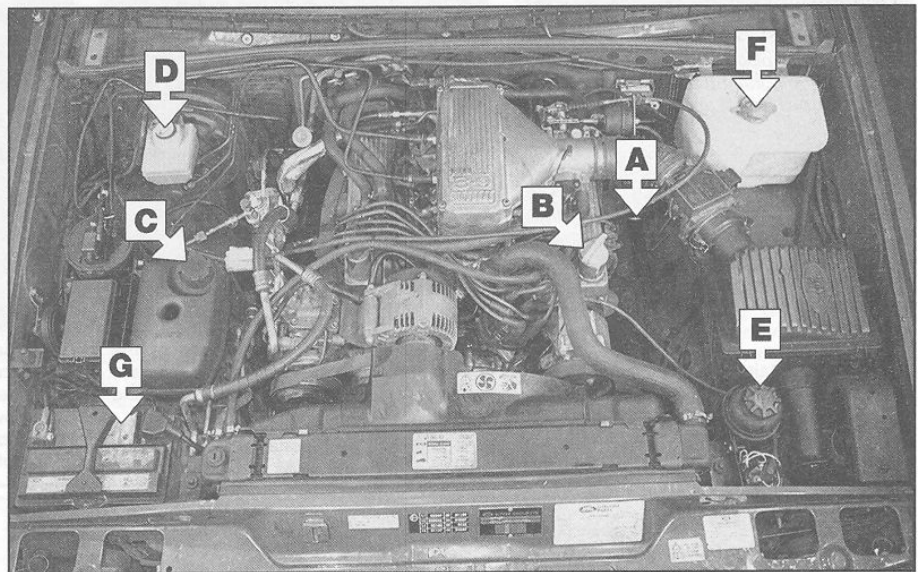
□ If your car develops a brake fluid leak, the first time you might know about it is when your brakes don't work properly. Checking the level regularly will give advance warning of this kind of problem.

□ If the oil or coolant levels run low, the cost of repairing any engine damage will be far greater than fixing the leak, for example.

Underbonnet check points

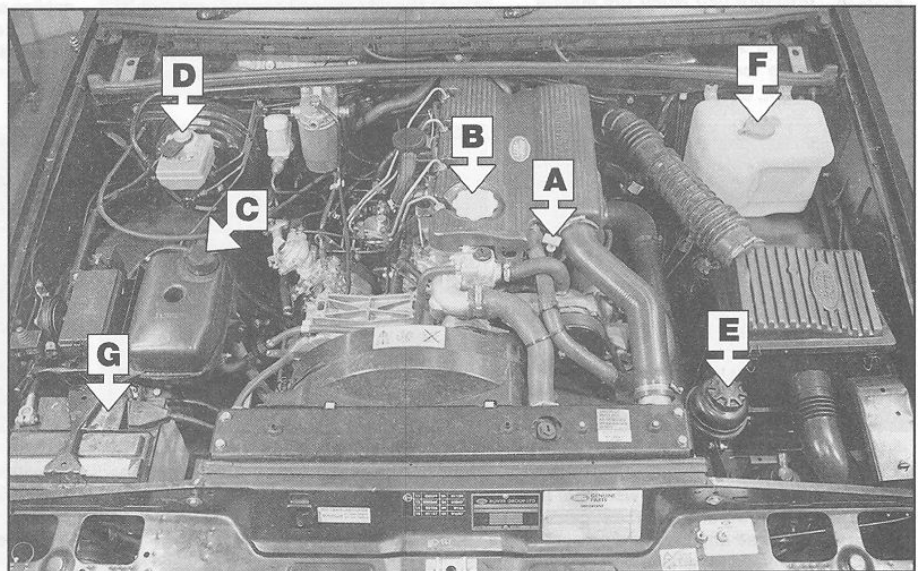
3.9 litre petrol (3.5 litre similar) ▶

- A** Engine oil level dipstick
- B** Engine oil filler cap
- C** Coolant expansion tank
- D** Brake fluid reservoir
- E** Power steering fluid reservoir
- F** Screen washer fluid reservoir
- G** Battery



300 TDi diesel (200 TDi similar) ▶

- A** Engine oil level dipstick
- B** Engine oil filler cap
- C** Coolant expansion tank
- D** Brake fluid reservoir
- E** Power steering fluid reservoir
- F** Screen washer fluid reservoir
- G** Battery



Engine oil level

Before you start

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



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

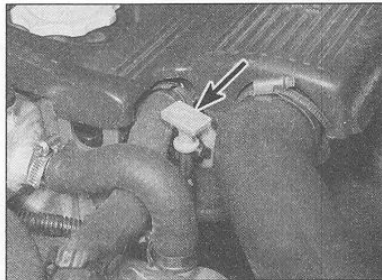
The correct oil

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

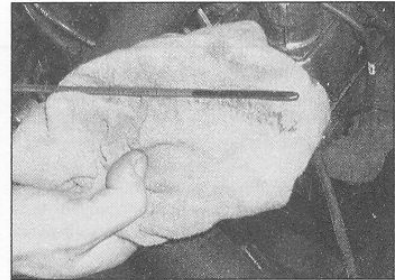
Car Care

● If you have to add oil frequently, you should check whether you have any oil leaks. Place some clean paper under the car overnight, and check for stains in the morning. If there are no leaks, the engine may be burning oil, or the oil may only be leaking when the engine is running.

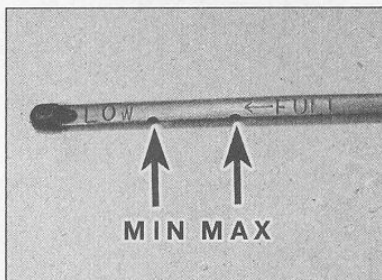
● Always maintain the level between the upper and lower dipstick marks. If the level is too low severe engine damage may occur. Oil seal failure may result if the engine is significantly overfilled by adding too much oil.



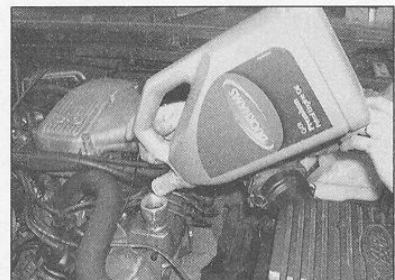
1 On some engines, the dipstick is brightly coloured for easy identification (see *Underbonnet check points* on page 0•11 for exact location). Withdraw the dipstick.



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



3 Note the oil level on the end of the dipstick, which should be between the upper (MAX, HIGH, or FULL) mark and lower (MIN, LOW or ADD OIL) mark.



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

Coolant level

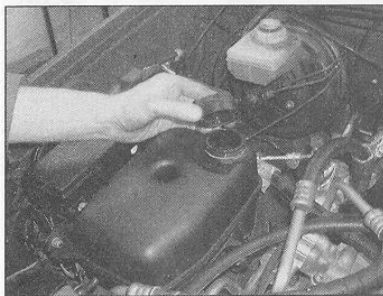


Warning: DO NOT attempt to remove the expansion tank pressure cap when the engine is hot, as there is a very great risk of scalding. Do not leave open containers of coolant about, as it is poisonous.

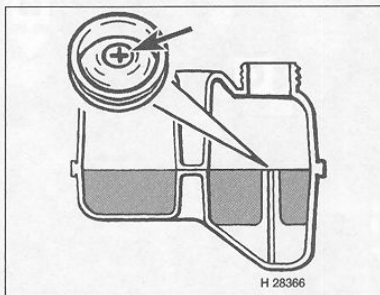
Car Care

● With a sealed-type cooling system, adding coolant should not be necessary on a regular basis. If frequent topping-up is required, it is likely there is a leak. Check the radiator, all hoses and joint faces for signs of staining or wetness, and rectify as necessary.

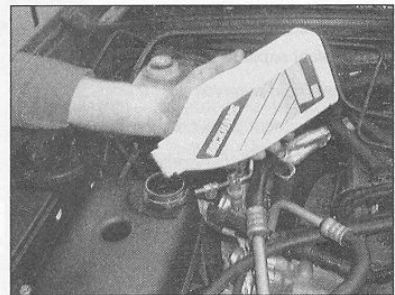
● It is important that antifreeze is used in the cooling system all year round, not just during the winter months. Don't top-up with water alone, as the antifreeze will become too diluted.



1 The coolant reservoir is located on the right-hand inner wing, behind the battery. To check the coolant level, wait until the engine is cold. Slowly unscrew the expansion tank cap, to release any pressure present in the cooling system, and remove it.



2 The coolant level should be up to the top of the level indicator visible inside the tank.



3 Add a suitable mixture of water and antifreeze to the expansion tank until the coolant is at the correct level (see Chapter 1A or 1B for antifreeze mixtures). Refit the cap and tighten it securely.

Brake fluid level



Warning:

- Brake fluid can harm your eyes and damage painted surfaces, so use extreme caution when handling and pouring it.

- Do not use fluid that has been standing open for some time, as it absorbs moisture from the air, which can cause a dangerous loss of braking effectiveness.



The fluid level in the reservoir will drop slightly as the brake pads wear down, but the fluid level must never be allowed to drop below the MIN mark.

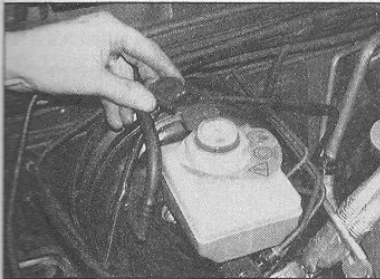
Safety First!

- If the reservoir requires repeated topping-up this is an indication of a fluid leak somewhere in the system, which should be investigated immediately.

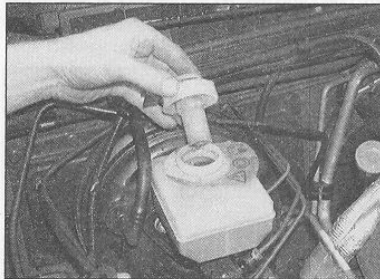
- If a leak is suspected, the car should not be driven until the braking system has been checked. Never take any risks where brakes are concerned.

Before you start

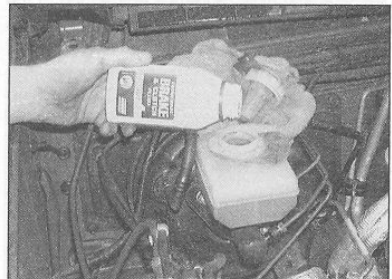
- Make sure that your car is on level ground.



1 The MAX and MIN marks are indicated on the reservoir. The fluid level must be kept between the marks at all times. If topping-up is necessary, disconnect the wiring plug from the filler cap.



2 Wipe clean the area around the filler cap to prevent dirt entering the hydraulic system. Unscrew the reservoir cap and carefully lift it out of position, taking care not to damage the level sender float. Place the cap on a clean piece of absorbent rag. Inspect the reservoir, if the fluid is dirty, the hydraulic system should be drained and refilled (see Chapter 1A or 1B).



3 Carefully add fluid, taking care not to spill it onto the surrounding components. Use only the specified fluid; mixing different types can cause damage to the system. After topping-up to the correct level, securely refit the cap and wipe off any spilt fluid. Refit the wiring plug.

Power steering fluid level

Before you start:

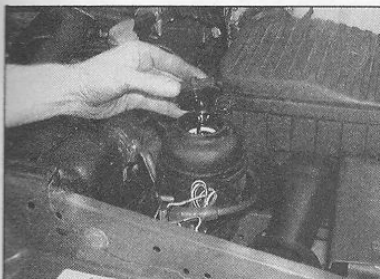
- ✓ Park the vehicle on level ground.
- ✓ Set the steering wheel straight-ahead.
- ✓ The engine must be cold (wait at least 2 hours after switching off).



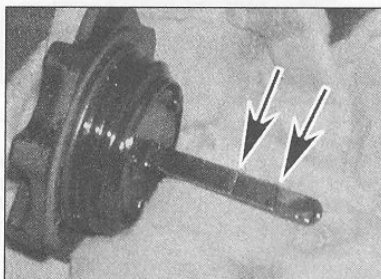
For the check to be accurate, the steering wheel must not be turned after switching the engine off.

Safety First!

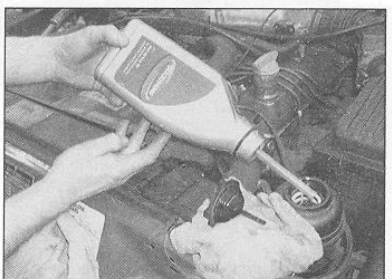
- The need for frequent topping-up indicates a leak, which should be investigated immediately.



1 The power steering fluid reservoir is located in the front left-hand corner of the engine compartment, mounted onto the side of the radiator. Unscrew the filler cap from the top of the reservoir, and wipe all fluid from the cap dipstick with a clean rag. Refit the filler cap fully, then remove it again.



2 Note the fluid level on the dipstick. When the engine is cold, the fluid level should be between the upper and lower marks on the dipstick. If the level is checked when the engine is at normal operating temperature, the fluid level should be up to the upper mark on the dipstick.



3 If necessary, top-up with the specified type of fluid, then refit the filler cap securely.

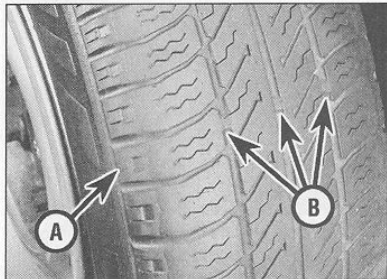
Tyre condition and pressure

It is very important that tyres are in good condition, and at the correct pressure - having a tyre failure at any speed is highly dangerous. Tyre wear is influenced by driving style - harsh braking and acceleration, or fast cornering, will all produce more rapid tyre wear. As a general rule, the front tyres wear out faster than the rears. Interchanging the tyres from front to rear ("rotating" the tyres) may result in more even wear. However, if this is completely effective, you may have the expense of replacing all four tyres at once! Remove any nails or stones embedded in the tread before they penetrate the tyre to cause deflation. If removal of a nail does reveal that

the tyre has been punctured, refit the nail so that its point of penetration is marked. Then immediately change the wheel, and have the tyre repaired by a tyre dealer.

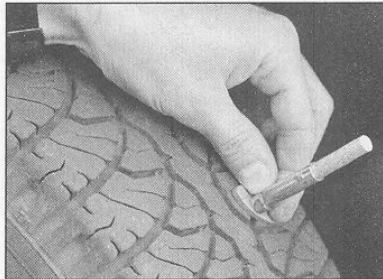
Regularly check the tyres for damage in the form of cuts or bulges, especially in the sidewalls. Periodically remove the wheels, and clean any dirt or mud from the inside and outside surfaces. Examine the wheel rims for signs of rusting, corrosion or other damage. Light alloy wheels are easily damaged by "kerbing" whilst parking; steel wheels may also become dented or buckled. A new wheel is very often the only way to overcome severe damage.

New tyres should be balanced when they are fitted, but it may become necessary to re-balance them as they wear, or if the balance weights fitted to the wheel rim should fall off. Unbalanced tyres will wear more quickly, as will the steering and suspension components. Wheel imbalance is normally signified by vibration, particularly at a certain speed (typically around 50 mph). If this vibration is felt only through the steering, then it is likely that just the front wheels need balancing. If, however, the vibration is felt through the whole car, the rear wheels could be out of balance. Wheel balancing should be carried out by a tyre dealer or garage.



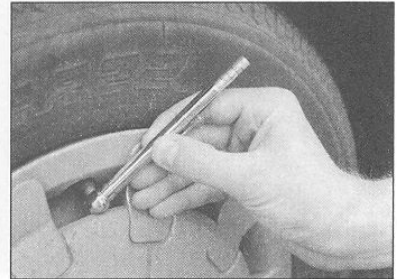
1 Tread Depth - visual check

The original tyres have tread wear safety bands (B), which will appear when the tread depth reaches approximately 1.6 mm. The band positions are indicated by a triangular mark on the tyre sidewall (A).



2 Tread Depth - manual check

Alternatively, tread wear can be monitored with a simple, inexpensive device known as a tread depth indicator gauge.



3 Tyre Pressure Check

Check the tyre pressures regularly with the tyres cold. Do not adjust the tyre pressures immediately after the vehicle has been used, or an inaccurate setting will result. Tyre pressures are shown on page 0•18.

Tyre tread wear patterns



Shoulder Wear

Underinflation (wear on both sides)

Under-inflation will cause overheating of the tyre, because the tyre will flex too much, and the tread will not sit correctly on the road surface. This will cause a loss of grip and excessive wear, not to mention the danger of sudden tyre failure due to heat build-up.

Check and adjust pressures

Incorrect wheel camber (wear on one side)

Repair or renew suspension parts

Hard cornering

Reduce speed!



Centre Wear

Overinflation

Over-inflation will cause rapid wear of the centre part of the tyre tread, coupled with reduced grip, harsher ride, and the danger of shock damage occurring in the tyre casing.

Check and adjust pressures

If you sometimes have to inflate your car's tyres to the higher pressures specified for maximum load or sustained high speed, don't forget to reduce the pressures to normal afterwards.



Uneven Wear

Front tyres may wear unevenly as a result of wheel misalignment. Most tyre dealers and garages can check and adjust the wheel alignment (or "tracking") for a modest charge.

Incorrect camber or castor

Repair or renew suspension parts

Malfunctioning suspension

Repair or renew suspension parts

Unbalanced wheel

Balance tyres

Incorrect toe setting

Adjust front wheel alignment

Note: The feathered edge of the tread which typifies toe wear is best checked by feel.

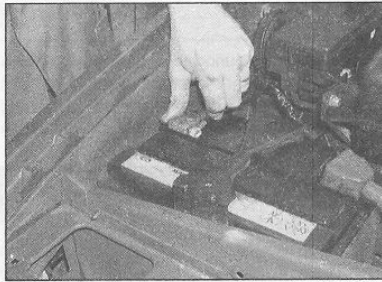
Battery

Caution: Before carrying out any work on the vehicle battery, read the precautions given in 'Safety first' at the start of this manual.

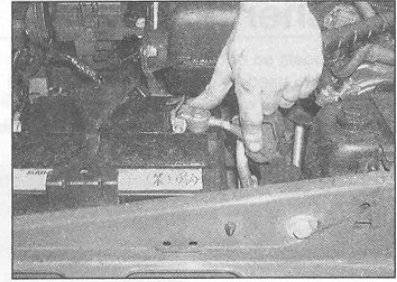
✓ Make sure that the battery tray is in good condition, and that the clamp is tight. Corrosion on the tray, retaining clamp and the battery itself can be removed with a solution of water and baking soda. Thoroughly rinse all cleaned areas with water. Any metal parts damaged by corrosion should be covered with a zinc-based primer, then painted.

✓ Periodically (approximately every three months), check the charge condition of the battery as described in Chapter 5A.

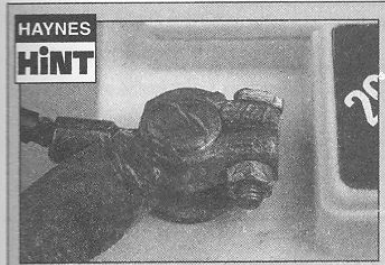
✓ If the battery is flat, and you need to jump start your vehicle, see *Roadside Repairs*.



1 The battery is located at the front of the engine compartment on the right-hand side - where necessary, unclip and remove the cover for access. The exterior of the battery should be inspected periodically for damage such as a cracked case or cover.



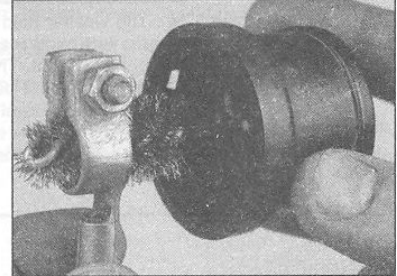
2 Check the tightness of battery clamps to ensure good electrical connections. You should not be able to move them. Also check each cable for cracks and frayed conductors.



Battery corrosion can be kept to a minimum by applying a layer of petroleum jelly to the clamps and terminals after they are reconnected.



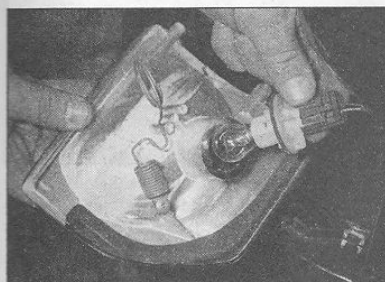
3 If corrosion (white, fluffy deposits) is evident, remove the cables from the battery terminals, clean them with a small wire brush, then refit them. Automotive stores sell a tool for cleaning the battery post . . .



4 . . . as well as the battery cable clamps

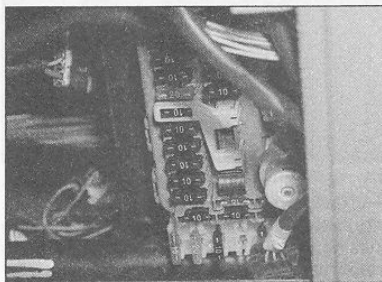
Bulbs and fuses

✓ Check all external lights and the horn. Refer to the appropriate Sections of Chapter 13 for details if any of the circuits are found to be inoperative.



1 If a single indicator light, stop-light or headlight has failed, it is likely that a bulb has blown and will need to be replaced. Refer to Chapter 13 for details. If both stop-lights have failed, it is possible that the switch is faulty (see Chapter 10).

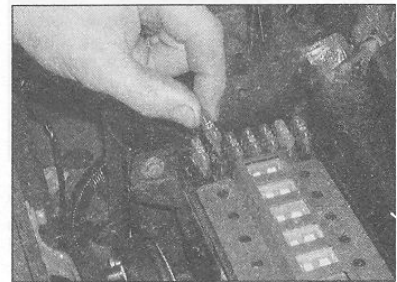
✓ Visually check all accessible wiring connectors, harnesses and retaining clips for security, and for signs of chafing or damage.



2 If more than one indicator light or headlight has failed, it is likely that either a fuse has blown or that there is a fault in the circuit (see Chapter 13). The main fuses are located in the fusebox situated behind a fascia panel on the driver's side, although other fuses may be found in a fusebox under the bonnet.

HAYNES HINT

If you need to check your brake lights and indicators unaided, back up to a wall or garage door and operate the lights. The reflected light should show if they are working properly.



3 To replace a blown fuse, make sure the ignition is switched off, then simply pull it out - use the plastic tweezers provided, where applicable. Fit a new fuse of the same rating (see Chapter 13). If the fuse blows again, it is important that you find out why - a complete checking procedure is given in Chapter 13.

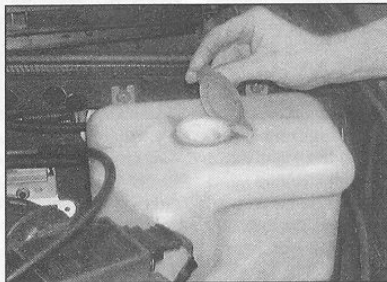
0•16 Weekly checks

Washer fluid level

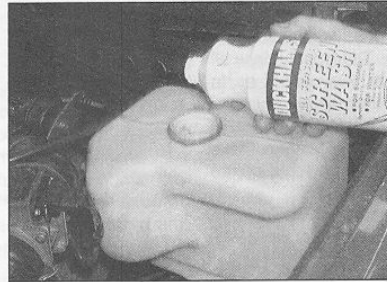
- On models so equipped, the screenwasher fluid is also used to clean the headlights and the tailgate rear window.
- Screenwash additives not only keep the

windscreen clean during foul weather, they also prevent the washer system freezing in cold weather - which is when you are likely to need it most. Don't top up using plain water as the

screenwash will become too diluted, and will freeze during cold weather. **On no account use coolant antifreeze in the washer system - this could discolour or damage paintwork.**



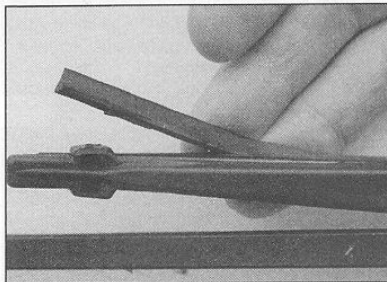
1 The washer fluid reservoir is located at the left-hand rear corner of the engine compartment. The washer level should be maintained just below the reservoir filler neck (the precise level is not critical).



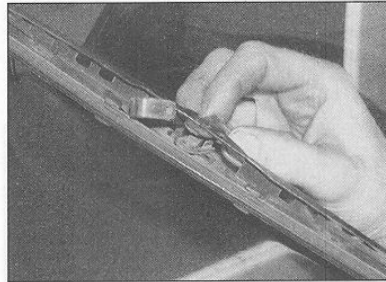
2 If topping-up is required, release the cap. When topping-up the reservoir, a screenwash additive should be added in the quantities recommended on the bottle.

Wiper blades

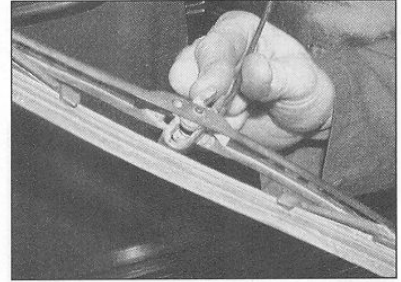
Note: Fitting details for wiper blades vary according to model, and according to whether genuine Land Rover wiper blades have been fitted. Use the procedures and illustrations shown as a guide for your vehicle.



1 Check the condition of the wiper blades; if they are cracked or show any signs of deterioration, or if the glass swept area is smeared, renew them. Wiper blades should be renewed annually.



2 To remove a wiper blade, pull the arm fully away from the glass until it locks. Swivel the blade through 90°, press the locking tab with your fingers, and slide the blade out of the arm's hooked end.



3 Don't forget to check the tailgate wiper blade as well - these are removed in the same way as the windscreen wiper blades.

Lubricants and fluids

Engine:

Petrol	Multigrade engine oil, viscosity SAE 5W/30 to 10W/40, to ACEA A2:96, API SH or better
Diesel	Multigrade engine oil, viscosity SAE 5W/30 to 15W/40, to ACEA B2:96, API CE or better
Cooling system	Ethylene glycol-based antifreeze
Manual transmission	Dexron IID type automatic transmission fluid (ATF)
Automatic transmission	Dexron IID type automatic transmission fluid (ATF)
Transfer gearbox	Hypoid gear oil, viscosity SAE 80EP or SAE 90EP to API GL4, MIL-L-2105, or better
Front and rear axles, swivel pin housings*	Hypoid gear oil, viscosity SAE 80EP or SAE 90EP to API GL4, MIL-L-2105, or better
Propeller shaft joints	Multi-purpose lithium-based grease to NLGI-2
Brake and clutch fluid reservoirs	Hydraulic fluid to FMVSS 116 DOT 4
Power steering fluid reservoir	Dexron IID type automatic transmission fluid (ATF)

***Note:** From approximately 1998 onwards, Land Rover (and their dealers) drain the oil and fill the swivel pin housing with a special grease, which then requires no further maintenance - consult a dealer for more information. This grease is available from Land Rover dealers, under part number FTC3435.

Choosing your engine oil

Engines need oil, not only to lubricate moving parts and minimise wear, but also to maximise power output and to improve fuel economy.

HOW ENGINE OIL WORKS

• Beating friction

Without oil, the moving surfaces inside your engine will rub together, heat up and melt, quickly causing the engine to seize. Engine oil creates a film which separates these moving parts, preventing wear and heat build-up.

• Cooling hot-spots

Temperatures inside the engine can exceed 1000° C. The engine oil circulates and acts as a coolant, transferring heat from the hot-spots to the sump.

• Cleaning the engine internally

Good quality engine oils clean the inside of your engine, collecting and dispersing combustion deposits and controlling them until they are trapped by the oil filter or flushed out at oil change.

OIL CARE - FOLLOW THE CODE

To handle and dispose of used engine oil safely, always:

- **Avoid skin contact with used engine oil. Repeated or prolonged contact can be harmful.**
- **Dispose of used oil and empty packs in a responsible manner in an authorised disposal site. Call 0800 663366 to find the one nearest to you. Never tip oil down drains or onto the ground.**



0800 66 33 66
www.oilbankline.org.uk

Tyre pressures (cold)

Note: Pressures apply only to original equipment tyres, and may vary if any other make of tyre is fitted; check with the tyre manufacturer or supplier for correct pressures if necessary.

Normal use

	Front	Rear
205 R 16 tyres	1.9 bars (28 psi)	2.6 bars (38 psi)
235/70 R 16 tyres	1.8 bars (26 psi)	2.3 bars (33 psi)

Off-road use*

All tyres	1.2 bars (17 psi)	1.8 bars (26 psi)
-----------------	-------------------	-------------------

*Vehicle speed must not exceed 25 mph (40 km/h) whilst off-road pressures are being used.

Advanced driving



Many people see the words 'advanced driving' and believe that it won't interest them or that it is a style of driving beyond their own abilities. Nothing could be further from the truth. Advanced driving is straightforward safe, sensible driving - the sort of driving we should all do every time we get behind the wheel.

An average of 10 people are killed every day on UK roads and 870 more are injured, some seriously. Lives are ruined daily, usually because somebody did something stupid. Something like 95% of all accidents are due to human error, mostly driver failure. Sometimes we make genuine mistakes - everyone does. Sometimes we have lapses of concentration. Sometimes we deliberately take risks:

For many people, the process of 'learning to drive' doesn't go much further than learning how to pass the driving test because of a common belief that good drivers are made by 'experience'.

Learning to drive by 'experience' teaches three driving skills:

- Quick reactions. (Whoops, that was close!)
- Good handling skills. (Horn, swerve, brake, horn).
- Reliance on vehicle technology. (Great stuff this ABS, stop in no distance even in the wet...)

Drivers whose skills are 'experience based' generally have a lot of near misses and the odd accident. The results can be seen every day in our courts and our hospital casualty departments.

Advanced drivers have learnt to control the risks by controlling the position and speed of their vehicle. They avoid accidents and near misses, even if the drivers around them make mistakes.

The key skills of advanced driving are **concentration**, effective all-round **observation**, **anticipation** and **planning**. When **good vehicle handling** is added to

these skills, all driving situations can be approached and negotiated in a safe, methodical way, leaving nothing to chance.

Concentration means applying your mind to safe driving, completely excluding anything that's not relevant. Driving is usually the most dangerous activity that most of us undertake in our daily routines. It deserves our full attention.

Observation means not just looking, but seeing and seeking out the information found in the driving environment.

Anticipation means asking yourself what is happening, what you can reasonably expect to happen and what could happen unexpectedly. (One of the commonest words used in compiling accident reports is 'suddenly'.)

Planning is the link between seeing something and taking the appropriate action. For many drivers, planning is the missing link.

If you want to become a safer and more skilful driver and you want to enjoy your driving more, contact the Institute of Advanced Motorists at www.iam.org.uk, phone 0208 996 9600, or write to IAM House, 510 Chiswick High Road, London W4 5RG for an information pack.