BASIC OFF-ROAD TECHNIQUES

These basic driving techniques are an introduction to the art of off-road driving and do not necessarily provide the information needed to successfully cope with every single off-road situation, including off-road recovery techniques.

We strongly recommend that owners who intend to drive off-road frequently should seek as much additional information and practical experience as possible.

Before driving off-road it is important that you check the condition of the wheels and tires and that the tire pressures are correct. Worn or incorrectly inflated tires will adversely affect the performance, stability and safety of the vehicle.

Note: *If the vehicle is equipped with a compact spare wheel* and you need to fit it while driving off-road, then you must proceed with extra caution.*

It is good practice to anticipate possible problems and be prepared for them. Extra equipment should include, at the very least, a shovel, a tow rope, local maps and a flashlight. Personal safety considerations should suggest good maps.

WARNING

Off-road driving can be hazardous!

- **DO NOT take unnecessary risks and be prepared for emergencies at all times.**
- **Your LR3 has a higher ground clearance and hence a higher center of gravity than an ordinary passenger car. An abrupt manoeuver at an inappropriate speed or on an unstable surface could cause the vehicle to go out of control or roll over.**
- **Familiarise yourself with the recommended driving techniques in order to minimise risks to yourself, your vehicle AND your passengers.**

WARNING

- **Always ensure that seat belts are worn for personal protection while driving on-road or off-road.**
- **DO NOT drive off-road alone or without letting someone know where you are going and when you plan to return.**

Safety Tips

- Always wear a seat belt for personal protection in all driving situations.
- Keep all windows closed during off-road driving to prevent ingress of dirt and water and to prevent tree branches from injuring occupants.
- DO NOT drive if the fuel level is low - undulating ground and steep inclines could cause fuel starvation to the engine and consequent damage to the catalytic converter and fuel pump.
- Always check the oil level prior to going off-road. Top up if necessary.
- As a precaution against accidental loss, remove the front and rear towing eye cover panels before driving off-road (see **TOWING EYES, 214**).
- To prevent damage, and improve departure angles, remove and stow any towing equipment fitted to the vehicle. See **Towing, 206** .
- Where maximum ground clearance is required and the vehicle is fitted with a full-size spare wheel, remove the wheel from its underbody mounting position and stow it in the loadspace area. the wheel MUST be secured in the loadspace area to prevent it from flying forward during a collision or sudden braking. See **CHANGING A WHEEL, 280**.

Gear selection

Setting the selector lever set at 'D', the gearbox automatically provides the correct gear for the appropriate gear range selected (HIGH or LOW). For greater vehicle control through gear selection, manual CommandShift mode is recommended.

HIGH range gears should be used whenever possible - only change to LOW range when ground conditions become very difficult.

Braking

As far as possible, vehicle speed should be controlled through correct gear selection and the use of Hill Descent Control (HDC). Application of the brake pedal should be kept to a minimum. In fact, if the correct gear and HDC have been selected, braking will be largely unnecessary.

If the brake pedal is depressed when HDC is active, HDC is overridden and the brakes will perform as normal. If the brake pedal is then released, HDC will recommence operating, at reduced speed as long as there is wheel rotation.

Use of engine for braking

Before descending steep slopes, stop the vehicle at least its length before the descent, engage LOW range and then select HDC. Use of manual CommandShift gear selection to limit the transmission to lower gears will also increase engine braking. Select '1' or '2' LOW range, depending on the severity of the descent.

While descending a slope (either forwards or in 'R' - reverse) it should be remembered that HDC and the engine will aim to provide sufficient braking effort to control the rate of descent, and that the brakes should not normally need to be applied.

Accelerating

Use the accelerator with care - any sudden surge of power may induce wheel spin and, therefore, invoke unnecessary operation of traction control, or in extreme conditions could lead to loss of control of the vehicle.

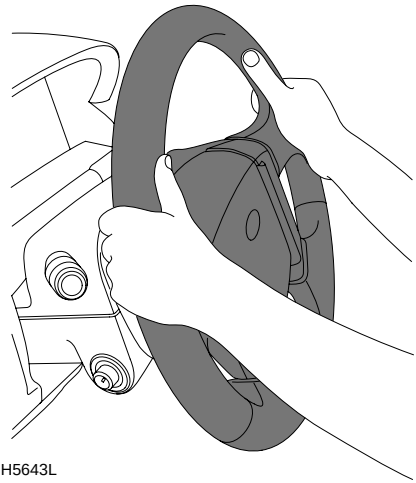
Survey the ground before driving

Before negotiating difficult terrain, it is wise to carry out a preliminary survey on foot. This will minimise the risk of your vehicle getting into difficulty through a previously unnoticed hazard.

Caution: Do not attempt to drive the vehicle continuously at angles greater than 35^{o} nose up or down. It is acceptable to drive up or down at angles between 35^{o} and 45^{o} but only temporarily.

Failure to follow these instructions will result in damage to the engine.

Steering



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WARNING

DO NOT hold the steering wheel with your thumbs inside the rim - a sudden 'Kick' of the wheel as the vehicle negotiates a rut or boulder could seriously injure them. ALWAYS grip the wheel on the outside of the rim (as shown) when traversing uneven ground.

Ground clearance

Don't forget to allow for ground clearance beneath the vehicle suspension components and under the front and rear bumpers. Note also that there are other parts of the vehicle which may come into contact with the ground - take care not to ground the vehicle.

Ground clearance is particularly important at the bottom of steep slopes, or where wheel ruts are unusually deep and where sudden changes in the slope of the ground are experienced.

ALWAYS attempt to avoid obstacles that may foul the vehicle.

Electronic air suspension

Select 'Off-road height', to increase approach/departure angles and ground clearance (see **AIR SUSPENSION, 193**).

Loss of traction

If the vehicle is immobilised due to loss of wheel grip, the following hints could be of value:

- Remove obstacles rather than forcing the vehicle to cross them.
- Clear clogged tire treads.
- Reverse as far as possible, then attempt an increased speed approach - additional momentum may overcome the obstacle.
- Brushwood, sacking or any similar material placed in front of the tires may improve tire grip.

CD Autochanger

Playing CDs while negotiating arduous off-road terrain is not recommended. Severe jolting of the vehicle may disturb the operation of the autochanger, causing the disc to 'jump' or 'skip'.

AFTER DRIVING OFF-ROAD

Before rejoining the public highway, or driving at speeds above 40 km/h (24 mph), consideration should be given to the following:

- Wheels and tires must be cleaned of mud and inspected for damage.
- If wheels and tires are not cleaned properly, damage to the wheels, tires, braking system and suspension components could occur.
- Brake discs and calipers should be examined and any stones or grit removed that may affect braking or parkbrake efficiency.
- Inspect the drive belts and pulleys at the front of the engine for damage.
- The underside of the vehicle should be checked for damage, especially the suspension air springs, dampers and drive-shaft boots.
- If a full-size spare wheel has been stowed in the loadspace area, it should be repositioned in its original location under the vehicle, see **CHANGING A WHEEL, 280**.
- Any damage to paint or protective coatings, should be rectified by a Land Rover Retailer as soon as possible.

If you have any doubt whether the vehicle has been damaged, have the vehicle inspected by a Land Rover Retailer.

If the vehicle is used regularly in arduous conditions - wading, deep mud, abrasive grit, slurry, etc. - the following checks should be made:

- Inspect, clean and adjust the park brake after 80 km (50 miles).
- Inspect the park brake pads for wear every 1500 km (1000 miles) or 100 hours.
- Check the road wheel speed sensors, brake pads and callipers for abrasive wear every 1500 km (1000 miles).

The air suspension* compressor inlet filter will need to be replaced more often.

If you have any doubts about the condition of any of the above items, consult your Land Rover Retailer.

Servicing Requirements

Vehicles operated in arduous conditions, particularly on dusty, muddy or wet terrain, and vehicles undergoing frequent or deep wading conditions will require more frequent servicing. Contact a Land Rover Retailer for advice.

After wading in salt water or driving on sandy beaches, use a hose to wash the underbody components and any exposed body panels with fresh water. This will help to protect the vehicle's cosmetic appearance and prevent impairment of park brake efficiency.

BEFORE YOU DRIVE

Before venturing off-road, it is **absolutely essential** that inexperienced drivers become fully familiar with the vehicle's controls, in particular the transfer gear switch, CommandShift, Hill Descent Control (HDC) and the Terrain Response system*, and also study the off-road driving techniques described on this and the following pages.

Driving on Soft Surfaces & Soft Sand

The ideal technique for driving on soft surfaces (dry sand for example) requires the vehicle to be kept moving at all times - soft sand causes excessive drag on the wheels resulting in a rapid loss of motion once driving momentum is lost. For this reason, gear changing should be avoided.

For vehicles without Terrain Response*, it is generally advisable to deactivate DSC (see **DYNAMIC STABILITY CONTROL (DSC), 188**), then select the highest practical gear (using CommandShift) to reduce the risk of wheelspin and remain in that gear until a firm surface is reached. It is generally advisable to use LOW range, as this will enable you to accelerate through worsening conditions without the risk of being unable to restart.

On vehicles fitted with a Terrain Response* system, use the appropriate Special Program. Land Rover recommend that DSC is operational in all normal driving conditions. In some conditions, to maximise traction, it may be beneficial to deactivate DSC, see **DYNAMIC STABILITY CONTROL (DSC), 188**.

Stopping on a soft or sloping surface

If you do stop the vehicle, remember:

- In vehicles fitted with Terrain Response, engage the Sand special program and ensure that the gearshift is in 'D'.
- In CommandShift 'automatic', select the highest practical gear.
- To avoid wheelspin, use the MINIMUM throttle necessary to get the vehicle moving.
- Starting on an incline or in soft ground or sand may be difficult. Always park on a firm level area, or with the vehicle facing downhill.
- If forward motion is lost, avoid excessive use of the throttle - this may dig the vehicle into the sand. Clear sand from around the tires and ensure that the vehicle underside is not bearing on the sand before again attempting to move.
- If the wheels have sunk, use an air bag lifting device to raise the vehicle, and then build up sand under the tires so that the vehicle is again on level ground. If a restart is still not possible, place sand mats or ladders beneath the tires.

Driving on Slippery Surfaces

- Drive away using the MINIMUM throttle possible
- In CommandShift 'automatic', select the highest practical gear.
- Use the appropriate Special Program on vehicles fitted with a Terrain Response system*.
- Drive slowly at all times, keeping braking to a minimum and avoiding violent movements of the steering wheel.

Driving on Rough Tracks

Although rough tracks can sometimes be negotiated in HIGH range, on very rough tracks, engage LOW range to enable a steady, low speed to be maintained without constant use of the brake pedal.

Use the appropriate Special Program on vehicles fitted with a Terrain Response system*.

Climbing Steep Slopes

ALWAYS follow the fall line of the slope - travelling diagonally could encourage the vehicle to slide broadside down the slope.

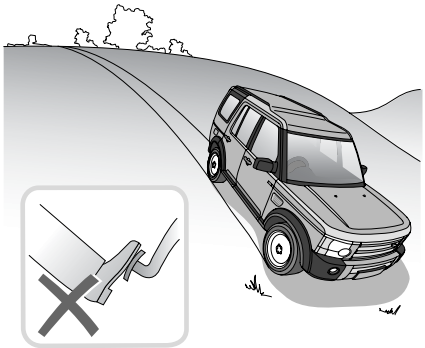
Caution: Do not attempt to drive the vehicle continuously at angles greater than 35^{o} nose up or down. It is acceptable to drive up or down at angles between 35^{o} and 45^{o} but only temporarily.

- On vehicles fitted with Terrain Response, use an appropriate special program depending upon the type of surface.
- Steep climbs will usually require LOW gear range and the highest practical gear, selected with CommandShift in automatic vehicles.
- If a Terrain Response special program has been selected, then the transmission can be left in 'D'.
- Select HDC, if not already selected, in case there is a need to reverse down the slope.
- Use sufficient speed in the highest practical gear to take advantage of the vehicle's momentum. However. too high a speed over a bumpy surface may result in a wheel lifting, causing the vehicle to lose traction and stability. In this case, try a slower approach.
- Traction can also be improved by easing off the accelerator just before loss of forward motion

If the vehicle is unable to complete the climb, do not attempt to turn it around while on the slope. Instead, adopt the following procedure to reverse downhill to the foot of the slope.

1. Hold the vehicle stationary using the foot brake.
2. Select 'N' (neutral) and restart the engine if necessary.
3. Select LOW range, if not already selected, then select 'R' (reverse).
4. Slowly release the foot brake and allow the vehicle to reverse down the slope using engine braking and HDC to control the rate of descent.
5. Unless it is necessary to stop the vehicle in order to negotiate obstructions, DO NOT touch the brake pedal during the descent.
6. If the vehicle begins to slide, the limits of adhesion have been reached, and it may be impossible to maintain the minimum speed. Gently press the accelerator pedal to allow the tires to regain grip, then gently release the accelerator pedal

Descending Steep Slopes



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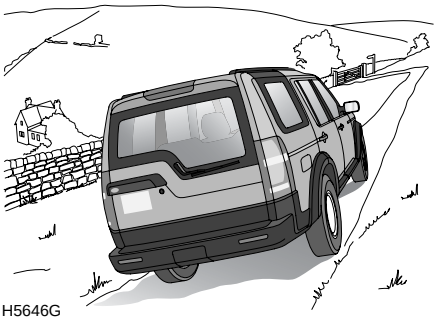
WARNING

Failure to follow these instructions may result in personal injury due to a vehicle rollover.

- Bring the vehicle to a stop at least one vehicle's length before the start of the slope.
- On vehicles fitted with Terrain Response, use an appropriate special program depending upon the type of surface.
- Select either '1' or '2' (CommandShift), depending on the severity of the slope. If a Terrain Response special program has been selected, then the transmission can be left in 'D'. If the slope is slippery, CommandShift '1' or '2' should be considered.
- Ensure that HDC is selected and drive forward as slowly as possible.
- Unless it is necessary to stop the vehicle in order to negotiate obstructions, **DO NOT** touch the brake pedal during the descent - the engine braking and HDC will limit the speed.
- If the vehicle begins to slide, the limits of adhesion have been reached, and it may be impossible to maintain the minimum speed. Gently press the accelerator pedal to allow the tires to regain grip, then gently release the accelerator pedal
- Once level ground is reached, higher gears or 'D' can be selected as required.

Caution: Do not attempt to drive the vehicle continuously at angles greater than 35^{o} nose up or down. It is acceptable to drive up or down at angles between 35^{o} and 45^{o} but only temporarily.

Traversing a Slope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WARNING

Failure to follow these instructions may result in personal injury due to a vehicle rollover.

Before crossing a slope ALWAYS observe the following precautions:

- Check that the ground is firm and not slippery.
- Check that the wheels on the downhill side of the vehicle are not likely to drop into depressions in the ground and that the 'uphill' wheels will not run over rocks, tree roots, or similar obstacles that could suddenly increase the angle of tilt.
- Ensure that passenger weight is evenly distributed, that all roof rack luggage is removed and that all other luggage is properly secured and stowed as low as possible. Always remember; any sudden movement of the load could cause the vehicle to overturn.
- Rear seat passengers should sit on the uphill side of the vehicle or, in extreme conditions, should vacate the vehicle until the sloping ground has been safely negotiated.

Negotiating a 'V' Shaped Gully

Observe extreme caution! Steering up either of the gully walls could cause the side of the vehicle to be trapped against the opposite gully wall.

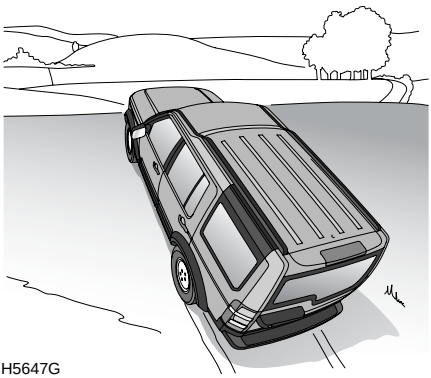
Driving in Existing Wheel Tracks

As far as possible allow the vehicle to steer itself along the bottom of the ruts and always keep a light hold of the steering wheel to prevent it from spinning free. Deactivation of DSC may help in deep ruts.

Particularly in wet conditions, if the steering wheel is allowed to spin free, the vehicle may appear to be driving straight ahead in the ruts, but in actual fact (due to the lack of traction caused by the wet ground) is unknowingly on full right or left lock. Then, when level ground is reached, or if a dry patch of ground is encountered, the wheels will find traction and cause the vehicle to suddenly veer to left or right.

The Terrain Response* system displays steering information while in LOW range and all programs except General.

Crossing a Ridge



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Approach at right angles so that both front wheels cross the ridge together - an angled approach could cause stability to be lost through diagonally opposite wheels lifting from the ground at the same time.

Crossing a Ditch

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Cross ditches at an angle so that three wheels always maintain contact with the ground. If a ditch is approached head on, both front wheels will drop into the ditch together, possibly resulting in the chassis and front bumper being trapped on opposite sides of the ditch. If the severity of terrain makes this inevitable, selecting 'Off-road' height with the Air Suspension* to increase clearance between the ground and the bottom of the vehicle may help.

Wading

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Caution: The maximum advisable wading depth is normally 600 mm (24 in.), but can be 700 mm (27 in.) where the vehicle is fitted with air suspension and operated at Off-road Height. Regularly wading at a depth greater than the maximum advisable wading depth is not recommended.

Severe electrical damage may occur if the vehicle remains stationary for any length of time when the water level is above the door sills.

Before wading, ensure the electronic air suspension* is set to off-road height.

If the water is likely to exceed the maximum wading depths given above, the following precautions should be observed:

- Fix a plastic sheet in front of the radiator grille to prevent water from soaking the engine and mud from blocking the radiator.
- Ensure that the silt bed beneath the water is free of obstacles and firm enough to support the vehicle's weight and provide sufficient traction.
- Ensure that the engine air intake (located on the front wings) is clear of the water level.
- Drive slowly into the water and accelerate to a speed which causes a bow wave to form; then maintain that speed.

At all times, keep all the doors fully closed.

Caution: Do not switch off the engine during wading. If the engine stalls during wading, restart it immediately and, as soon as possible, get the vehicle checked by a Land Rover Retailer.

If, during wading, it is thought that water may have entered the engine air intake, switch off the engine immediately, have the vehicle towed out and delivered to a Land Rover Retailer for checking.

Note: *If deep wading is to be carried out regularly, contact your Land Rover Retailer for advice.*

After wading

- Drive the vehicle a short distance and apply the foot brake to check that the brakes are fully effective.
- DO NOT rely on the handbrake to hold the vehicle stationary until the brakes have thoroughly dried out; in the meantime, leave the vehicle parked in 'P'.
- Remove any protective covering from in front of the radiator grille.
- If the water was particularly muddy, check any radiator matrix for debris (mud and leaves) to reduce the risk of overheating.
- If deep water is regularly negotiated, check all oils for signs of water contamination - contaminated oil can be identified through its 'milky' appearance. In addition, check the air filter element for water ingress and replace if wet - consult a Land Rover Retailer if necessary.
- If salt water is frequently negotiated, thoroughly wash the underbody components and exposed body panels with fresh water.