

Land-Rover

Salesman's Manual

**Compiled and produced by
Sales and Product Training, Land Rover Ltd.,
2 Eaton Road, Coventry, England
in conjunction with ESL Bristol**

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INTRODUCTION

In the fast growing four-wheel-drive market, the Land-Rover still stands supreme because of:

- the range of configurations
- the engineering strength and long life
- the cross country capability
- the ability to drive additional equipment.


The combination of these features produces a vehicle with a versatility which is unchallenged and an ability to do the job which is unsurpassed.

The Land-Rover customer is also rather special as his main reason for buying will be whether the particular model can do the job of work for which it is intended with reliability and economy. Features, advantages and the related benefits should all be demonstrated to the prospective purchaser by the salesman in a professional manner.

To carry this out successfully requires an extremely thorough understanding of Land-Rover and its competing vehicles, allied to a comprehensive knowledge of the additional equipment and specialist bodywork available. This manual has been produced to help you acquire this knowledge.

Each aspect of the Land-Rover is explained in full, and the benefits to the customer are summarised. There are sections dealing with power take-offs and the additional equipment, enabling the salesman to use the manual as a point of reference. We hope that you will use this information to good advantage.

Good luck and good selling!

A handwritten signature in black ink, reading "J.B. Reardan". The signature is written in a cursive style with a long, sweeping underline that extends to the right.

J.B. Reardan — Director, Sales and Marketing
Land Rover Ltd.

THE LAND-ROVER—A SUMMARY

The Land-Rover owes its success to its adaptable basic design, developed during more than thirty years of experience of four-wheel-drive, off-road vehicles — adaptability which derives both from the ability of any individual vehicle to perform well in a wide variety of situations, and from the large range of options and special equipment that is available.

Every Land-Rover is built on a strong and durable chassis which supports the engine and transmission and allows the imposition of many different body styles. The chassis ladder construction allows production in two lengths, giving both short- and long-wheelbase vehicles.

The great variety of body configurations all incorporate the light, corrosion-free aluminium panels which make such a valuable contribution to the Land-Rover's longevity.

A range of engines is available, further increasing the Land-Rover's versatility, all developing high torque at low revs which improves the vehicle's overall performance for off-road work while at the same time prolonging engine life.

The transmission system delivers drive to either two or four-wheels, and at the same time provides power for a range of take-off units. Four-wheel drive can be engaged on the move, giving greatly increased traction. The power take-off points may be used to drive a variety of equipment from hydraulic pumps to power trailers.

The conventional four-speed gearbox combines with a two-ratio transfer gearbox to provide a total of eight forward and two reverse gears, enhancing the vehicle's capacity to cross all kinds of terrain and tackle all kinds of jobs.

The suspension and steering are designed to take the rough with the smooth, and are built to last. Beam axles incorporating fully-floating axle shafts, leaf springs and a double-acting damper give a strong suspension able to withstand very rough usage. The steering system will absorb severe road shocks, while the steering box is well-protected from accidental damage.

Reliable drum brakes are fitted to all wheels, and the handbrake, which acts directly on the transmission, is positioned to avoid accidental damage.

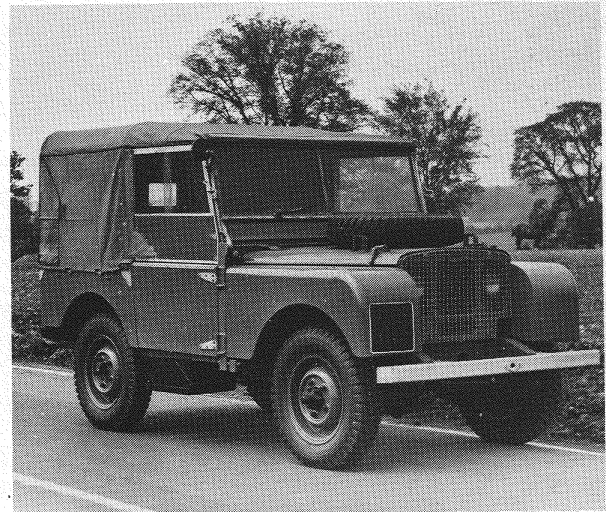
The combination of these features gives a basic vehicle which is ideally suited to a wide variety of tasks. However, this is just the beginning, as the Land-Rover has a tremendous range of optional fittings, special equipment and accessories which greatly extend its capabilities and broaden the range of activities which can be undertaken by this multi-purpose, 'go-anywhere', working vehicle.

1: THE DEVELOPMENT OF THE LAND-ROVER AND ITS PRESENT MARKET POSITION

1

The spectacularly successful group of vehicles which now comprise the Land-Rover range developed from interesting, though tentative, beginnings.

The usefulness of lightweight, four-wheel-drive, cross-country vehicles such as the Willys Jeep had been demonstrated during World War II, and early Land-Rovers, which were intended for farm use, tried to emulate this capability. The subsequent development of the original concept resulted in a genuine all-purpose vehicle satisfying the need for versatility both on- and off-road which had not previously existed.



With their straightforward appearance and no-nonsense design, these vehicles were immensely strong and durable — qualities shared by today's Land-Rovers. Selectable four-wheel drive, high ground clearance and strong construction gave a 'go-anywhere' ability, and the power take-off facilities provided an important additional feature for driving such things as pumps, winches and crop-spraying equipment.



Although the Land-Rover was initially thought of as a short-term project, the vehicle proved immensely popular, and it was not long before its exceptional qualities attracted interest from such diverse groups as building contractors, the military, motoring organisations, the Post Office and expedition leaders. Land-Rovers have carried scientists and

Less spectacular, but nonetheless vital, activities include delivering mail and essential supplies through conditions impassable to other vehicles, providing breakdown and accident recovery services, transporting the Armed Services of Britain and many other countries, and providing a basic working vehicle for many agencies of the United Nations.



explorers through jungle and desert, swamp and snow, demonstrating great endurance and reliability. Notable early exploits were the Oxford and Cambridge Universities' expeditions to remote corners of the world. More recently, Land-Rovers have played a major part in the British Trans-Globe Expedition, circumnavigating the world through both poles.

Long-wheelbase, hard-top Land-Rover donated to UNICEF during the Year of the Child by the children of Coventry

Military use by Britain and many other countries throughout the world has played an important role in the development and testing of Land-Rover vehicles. The British Army adopted the Land-Rover as its standard, lightweight, four-wheel-drive vehicle in 1956 after testing it thoroughly under a variety of gruelling conditions. The fact that the Army has continued to use it ever since, in the face of growing competition, proves a great deal about the Land-Rover's durability under very testing circumstances.

A number of interesting special vehicles have been developed by Land-Rover for the Army's use, from the formidable '101 inch' forward-control vehicle, to the stripped down 'half-tonne' designed for air-lifting to the battle zone.

The Army has also tested standard vehicles to their limits, for example, on expeditions such as the Trans-Americas, travelling from Anchorage in Alaska to the Southernmost tip of Argentina. Although most of this trip was carried out in Range Rovers, a Land-Rover was specially flown in to act as a pathfinder for the most difficult section, crossing the roadless swamp and jungle of the Darien Gap between Panama and Colombia.



A Land-Rover 'half-tonne' being lifted by a Wessex helicopter of the British Royal Air Force

The formation of Land Rover Ltd, as an autonomous company in 1978 signalled the manufacturers' confidence in Land-Rover's position at the top of the world's four-wheel-drive market. By this time well over a million Land-Rovers had been successfully produced and sold and the Company wished to build on past successes, while at the same time laying plans for future developments. A significant investment plan has been initiated to achieve this by enabling substantial increases in production to occur, along with a programme of vehicle development. Stage I of the plan culminated in the launch of the new V8 Land-Rover in 1979.

Stage II, now in progress, will rationalise and greatly extend production facilities in order to meet continuing world-wide demand.

As mentioned earlier, a vehicle as successful as the Land-Rover will inevitably attract competition. This, coupled with increased production, presents a challenge to every Land-Rover salesman. The product knowledge contained in this book will help you to meet this challenge successfully and enable you to demonstrate to your customers exactly why the Land-Rover can still claim to be **'the most versatile vehicle in the world'**.



Present Market Position

The Land-Rover has established itself world-wide and has an enviable reputation in a market which has grown considerably in recent years. The traditional strengths of the vehicle, which are described in detail in this book, have always ensured a high level of demand, and many other manufacturers have now followed Land-Rover's lead and entered the four-wheel-drive market.

The range of products offered in this market has also expanded, to the extent that not all compete directly with the Land-Rover. This is particularly true at the top end, where luxury vehicles such as the Range Rover are now available, and at the bottom end, where the customers' only requirement is for a cheap, short-lived runabout. However,

the bulk of the Land-Rover market still lies with established four-wheel-drive users who require a vehicle tough enough and flexible enough to withstand virtually any operating conditions. They are just as likely to be fleet customers operating many vehicles as private individuals who require a vehicle that will provide good service over a number of years.

In assessing the direct competition to Land-Rover you must consider any four-wheel-drive vehicles which could satisfy some of these customers needs. Examples of the many different competitive ranges offered are included for your guidance in Section 13 but you should remember that no competitor can offer such a wide range of vehicles, nor such precise tailoring to individual needs, as Land-Rover.

2

2: CHASSIS

FEATURES	BENEFITS
1. Separate chassis	<ul style="list-style-type: none">– Strength– Rigidity– Protection to occupants, engine and transmission– Body sections removed or replaced more easily
2. Welded box-section members	<ul style="list-style-type: none">– Additional strength and rigidity over monocoque or open-channel section– Reduce number of mud traps– Provide stable base for power take-off equipment
3. Low centre of gravity	<ul style="list-style-type: none">– Stability and handling improved over rough terrain
4. Corrosion protection	<ul style="list-style-type: none">– Extends working life by retarding rust– Improves residual value
5. Good ground clearance	<ul style="list-style-type: none">– Improves cross-country potential– Improves manoeuvring capability– Damage to components avoided– Wading assisted– Easier access for repairs and servicing
6. Choice of chassis lengths	<ul style="list-style-type: none">– Flexibility of choice to satisfy customer needs

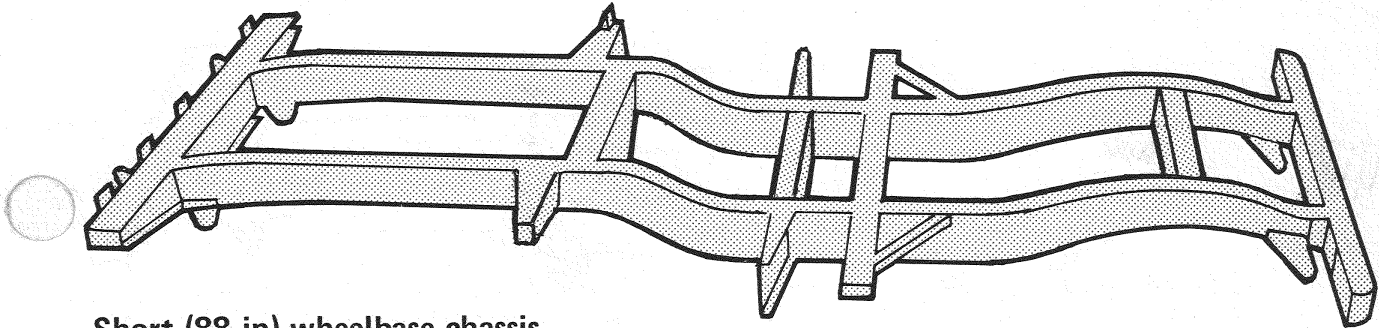
'An important virtue is the Land-Rover's virtual indestructability.'

What Car?

'The experience, acquired over many years, that goes into all Land-Rovers, cannot be bought cheaply by its competitors . . . and none match its long life potential given by sensible box-section chassis members and aluminium bodywork.'

Autocar

The separate chassis, used in almost all cross-country and heavy-duty vehicles, has a number of advantages over the monocoque construction found in all volume production cars. Its strength is important for towing and cross-country work, as well as contributing to the vehicle's load-carrying capabilities and provides protection from impact damage.

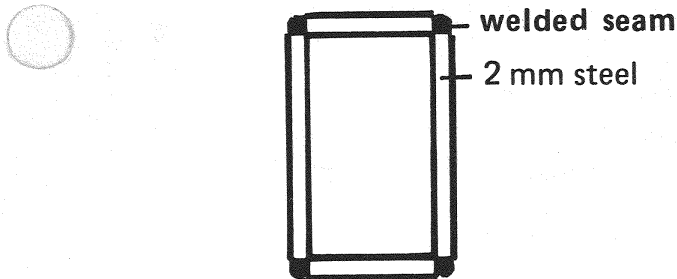


Short (88 in) wheelbase chassis

The chassis frame is a ladder construction consisting of parallel side-members joined by cross-members with out-riggers. All the members are made from 2 mm metric gauge (14 gauge) steel welded throughout into box-sections. These are stronger than the open-channel sections used by many competitors, and provide rigidity against the twisting (torsional) and bending (flexing) stresses encountered in rough or off-road conditions.

There are two chassis lengths:
SHORT WHEELBASE 2.24 m (88 in), with six cross-members
LONG WHEELBASE 2.77 m (109 in), with eight cross-members

The front bumper forms the first cross-member of the chassis. The rear cross-member is strengthened for towing and has suitable bolt holes for attachment of towing fixtures or a rear power take-off gearbox as required.



Cross-section of short (88 in) wheelbase Land-Rover chassis-member

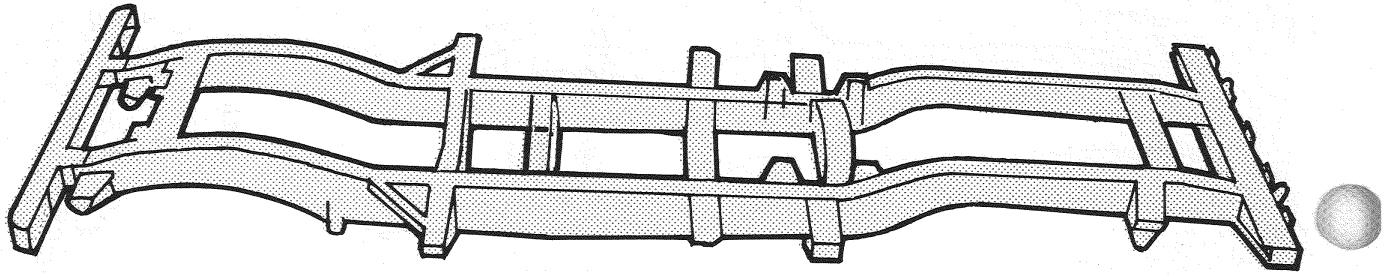


Cross-section of typical competitive vehicle chassis-member.

The open channel is less resistant to twisting or bending stresses, and can accumulate mud and water, accelerating corrosion

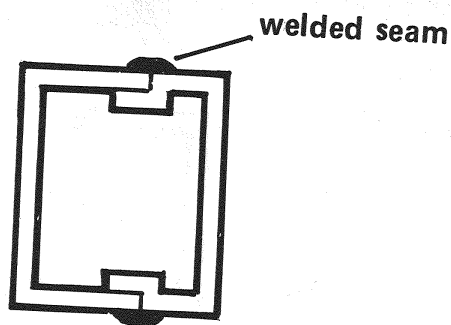
The open-ladder construction allows ready access to other components, thus reducing the expenditure of time and effort on repairs or modifications.

The separate chassis contributes to the versatility of the Land-Rover range by allowing the mounting of many different bodies.



Long (109 in) wheelbase chassis

The body of the vehicle is supported on the chassis by brackets welded to the frame. Where these or any other chassis fittings are attached, the box-section is either tubed or fitted with an internal scroll to give local stiffness.



Cross-section of long wheelbase chassis-member

The long-wheelbase chassis-members are made by welding two 'U' sections to give the same box shape and strength as the short-wheelbase chassis.

The design of the Land-Rover chassis ensures good ground clearance which is vital for off-road work. Under-chassis clearance in the short-wheelbase version is 280 mm (11 in) with a minimum of 178 mm (7 in) under the differentials. For the long-wheelbase version the figures are 324 mm (12.75 in) and 209 mm (8.25 in) respectively.



The strong, steel construction of the chassis makes it heavy in relation to the body, much of which is aluminium. This results in a low centre of gravity and hence greatly improved stability essential when climbing, descending or travelling across steep or uneven slopes.

In any all-weather working vehicle, good corrosion protection is vital for safety as well as long life. The Land-Rover chassis is well protected by its paint process, consisting of an etch-priming operation followed by an electrophoretic paint dip. In this latter part of the process, the chassis is positively charged and the paint negatively charged. Electrical attraction ensures that every surface is thoroughly coated. Penetration to inner surfaces is assisted by specially drilled holes.

SELL THE BENEFITS OF:

- Minimal stressing and flexing of chassis due to ladder construction
- Chassis damage minimised by design and inherent strength
- Easier repair of accidental damage
- Chassis stiffened at location of 'bolt-on' fitments
- Labour times reduced due to ease of access of components
- Off-road mobility aided by good ground clearance
- Safety and stability improved by low centre of gravity
- Corrosion retarded by paint protection

3: BODYWORK

3

FEATURES	BENEFITS
1. Aluminium alloy body panels	– No deterioration due to corrosion
2. Lightweight body reduces kerb weight	– Payload capacity enhanced – Stability improved due to good weight distribution
3. Bolt-on panels	– Replacement labour time/cost minimised
4. Wide choice of body configurations	– Most customers' needs satisfied by production vehicles
5. Galvanised steel fitments	– Additional strength where required – Corrosion minimised

'A remarkably civilised working vehicle'

Truck

Bodywork Construction

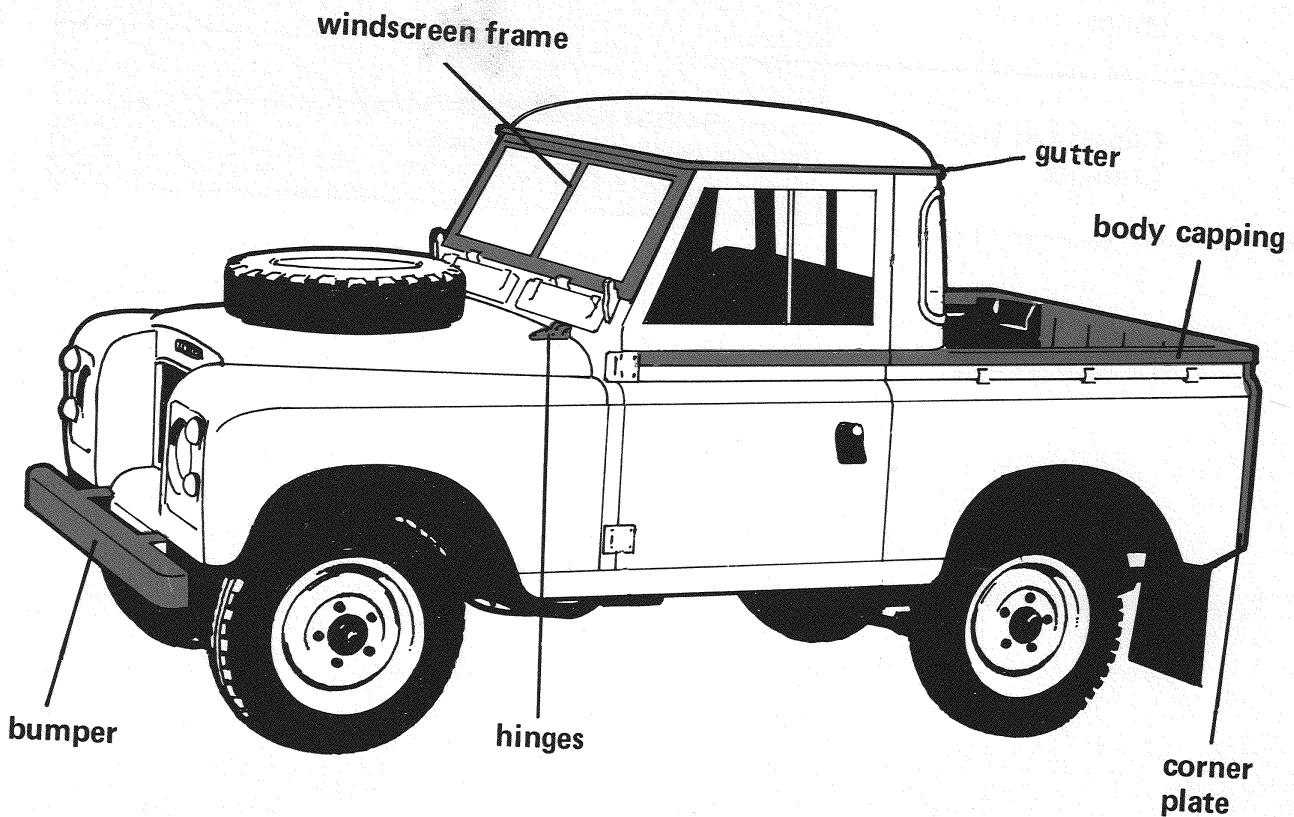
Land-Rovers have a great variety of body styles which share many common features in use of materials and construction techniques.

The body is made predominantly from an aluminium alloy known as 'Birma-bright' used exclusively by Land-Rover Ltd. Initially developed for aircraft, it is tougher and structurally stronger than pure aluminium and shows considerable resistance to corrosion in any conditions of use throughout the world. Body life is therefore increased, and depreciation retarded – a feature appreciated by all fleet users. Steel is employed where strength is vital, as in windscreen frames, body cappings and bumpers. These are heavily galvanised to provide a complete protective barrier. Other panels are dipped and sprayed with two coats of paint. (A list of the composition and finish of all major body components is provided on page 12/9.

The lightness of the body aids stability by contributing to the vehicle's low centre of gravity and maximises the payload capacity for the size of the vehicle. It also affects performance and helps to reduce fuel consumption.

Production methods are simple and straightforward. Panels are shaped and built into sub-assemblies which are bolted to each other or to the chassis as appropriate. This form of construction allows a wide variation of body arrangements to be produced.

The bolt-on construction process has a number of other advantages. Repairs are easier, as the damaged sections may be readily replaced; suitable base vehicles can be supplied to specialist coach builders for conversion; and the vehicles can be supplied in KD (knocked down) form for assembly overseas. The piece-by-piece construction from basic components also allows some parts to be manufactured locally, to meet local-content regulations.



SELL THE BENEFITS OF:

- Enhanced body life and reduce depreciation from corrosion
- Repair labour costs reduced by body construction
- Model derivation to meet customer needs and load-carrying requirements
- Minimised conversion costs incurred to meet local requirements
- Low centre of gravity
- Kerb weight reduced by materials used to give increased payload

The Range of Bodywork Configurations

The variety of bodywork and equipment available on the Land-Rover chassis is vast — over 1500 different versions at the last count! Clearly, no one can hope to know about each one in detail, but in order to help your customers to choose the vehicle which will best suit their needs, you must make sure that you have a thorough knowledge of the major features of the vehicle range, and of the benefits they can offer to the customer.

Body configurations are classified as follows:

Standard — two standard body styles are available on each wheelbase.

Optional — many other body variations can also be supplied by Land Rover Ltd.

Special Conversions — conversions for particular applications are supplied by coachbuilders.

In this section we first describe the four **standard** models:

- a) Short wheelbase with full canvas tilt (also known as short-wheelbase **basic** model).
- b) Long wheelbase with truck cab (also known as long-wheelbase **basic** model).
- c) Short-wheelbase station wagon.
- d) Long-wheelbase station wagon.

This is followed by a summary of all the optional bodywork available from Land Rover Ltd. Special conversions, produced by other companies, are listed in Section 9.

Standard Bodywork

a) 2.24 m (88 in) Short Wheelbase with Full Canvas Tilt (Basic Model)



The basic model on this chassis has a full tilt (hood) covering the driving compartment and the rear body. The tilt, which is removable, is carried on a galvanised tubular frame bolted to the body. It is made from heavy cotton canvas which is 0.9 mm (0.035 in) thick, and has considerable rip strength, reducing, for example, the danger of intrusion by branches when travelling in forested areas. The cotton is treated with wax which makes it rainproof but still allow the material to 'breathe', so preventing the build-up of condensation — a common problem when synthetic materials are used.

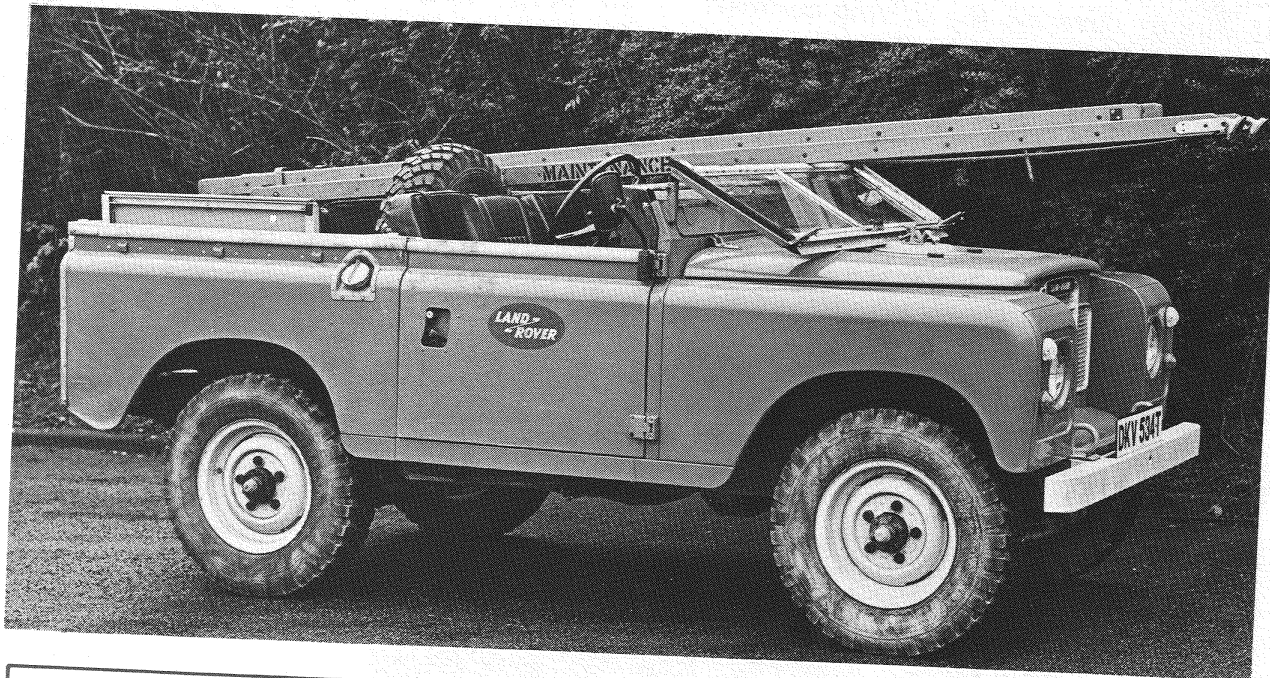
The tilt is available in khaki brown or air-force blue, and is treated with a fungicide to ensure rot-resistance. It is secured by straps to the frame and by ropes to rope-hooks welded to the body. The side panels can be rolled up and secured by straps, as can the back panel which has a flexible window. For export markets, the tilt can be supplied with side windows.



A completely open vehicle may be produced by removing the canvas tilt, then taking off the upper, glazed sections of the side windows by undoing two nuts. The divided windscreen can be folded down onto the bonnet, levelling the vehicle off at the waistline, to assist in carrying awkward loads.

The rear body section contains full-length, rectangular wheel-boxes, seats for which are available as an option, see page 8/1. The rear tailgate, normally checked by chains, can be dropped right down for easier loading, or can be detached completely.

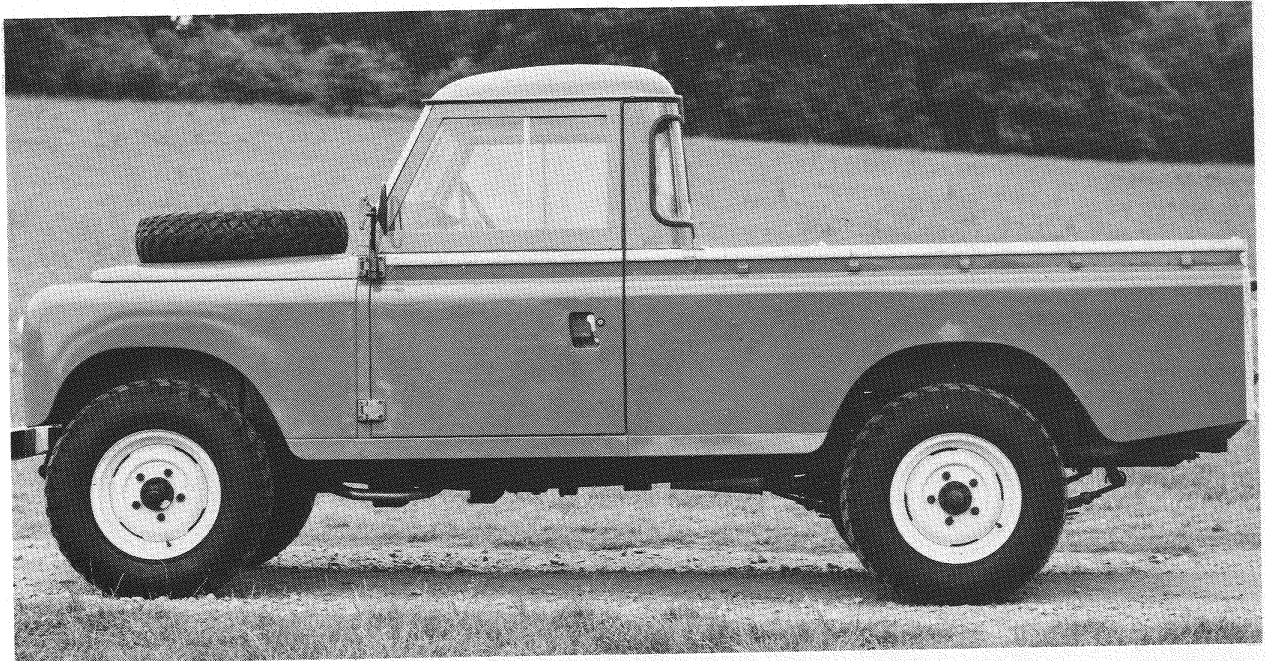
The spare wheel is mounted behind the seat bulkhead. Front seats consist of a non-adjustable driving seat and two passenger seats, which are covered in hard-wearing and easy-to-clean black vinyl. The seat squabs may be removed for cleaning and to give access to the tool box beneath the passenger seat.



SELL THE BENEFITS OF:

- Capability to carry awkward loads
- Versatility of passenger/load-carrying capacity
- Ease of conversion from closed to open vehicle
- Enhanced life-expectancy of rot-proofed tilt

**b) 2.77 m (109 in) Long Wheelbase with
Truck Cab (Basic Model)**



The basic model on this chassis is a truck cab with an open, pick-up style back. (The photograph above shows the optional wheel bonnet mounting.) The driving compartment is completely enclosed by a metal cab which insulates driver and passengers from the rear load area, and from the elements. It also enables the driving compartment to be securely locked.

A driver's seat and two passenger seats are fitted in the cab which has a sliding, lockable rear window and fixed rear quarter-lights. The rear section has full-length wheel-boxes to which seats may be fitted as an option. The left-hand wheel-box holds the tool-kit, and the spare wheel is housed in the wheel-box immediately behind the driver.



SELL THE BENEFITS OF:

- Driver/passenger protection
- Driving compartment security
- Driver/passenger all-round visibility

c) 2.24 m (88 in) Short-wheelbase Station Wagon



The station wagons represent the passenger-carrying aspect of the Land-Rover range, and have many extra features.

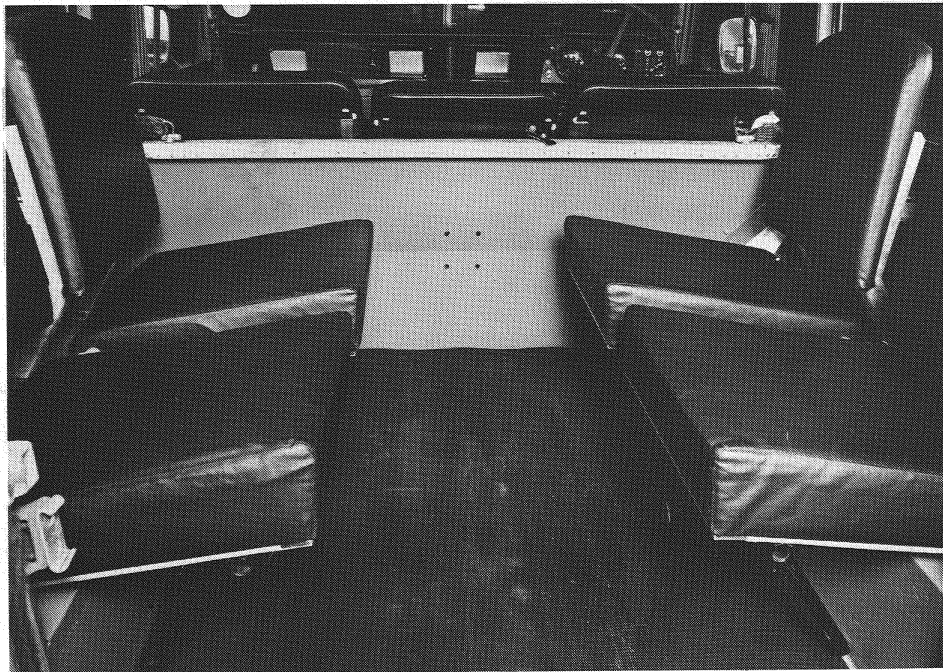
The short-wheelbase version is a fully enclosed seven-seater. The front section has three individual seats with standard upholstery which are contoured to support the body comfortably, and finished in practical black vinyl. The two outer seats are adjustable fore and aft. Four more passengers are accommodated in the rear section on individual, inward-facing seats. When not required for passengers use, these seats may be folded up to increase load-space.



The rear door is side-hinged giving easy access. A bracket on the outside of the door carries the spare wheel, thus maximising the space inside the vehicle. Excellent all-round visibility is provided by sliding side windows, rear windows and alpine roof lights.

A tropical roof, located over the main roof panel, insulates the interior from the heat of direct sunlight. Improved air flow is provided by the sliding windows and four hinged roof ventilators, in addition to the standard twin ventilators in the dash.

Interior trim includes a padded head rail around the roof line; full-length roof lining; rubber floor mats throughout; a transmission tunnel cover and trim panels on the door, the lower dash and the body above the waistline. These features all contribute to improving ride comfort and reducing noise.



SELL THE BENEFITS OF:

- Passenger/load-carrying capability
- Passenger comfort
- Good driver/passenger visibility
- Ease of access to rear compartment

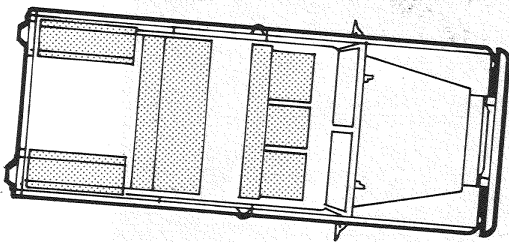
d) 2.77 m (109 in) Long-wheelbase Station Wagons

The long-wheelbase station wagon has five doors and ten seats in the standard version. An optional twelve-seater version is also available.

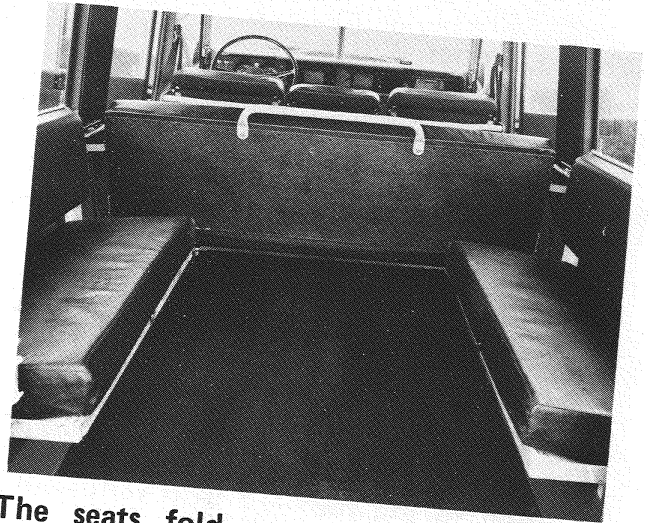


The windows, tropical roof, ventilation and trim are the same as the short-wheelbase station wagon.

In the ten-seater station wagon, a forward-facing bench seat, taking three passengers, is fitted behind the three individual seats of the driving compartment. Two inward-facing bench seats in the rear of the vehicle accommodate a further four passengers.

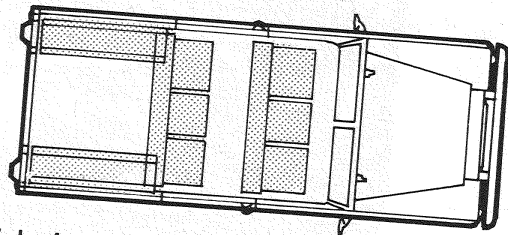


The long-wheelbase station wagon seats ten passengers in comfort



The seats fold up readily to provide maximum load-carrying space

The twelve-seater version has three tip-up seats behind the front seats allowing easy access to the rear of the vehicles via the side doors. In the rear, the inward-facing seats are extended to take three people each. Both ten- and twelve-seater versions have the spare wheel mounted on the rear door or, as an optional extra, on the bonnet. A spring-loaded, folding rear step gives easy access to the rear passenger space. On twelve-seater models a similar step is also provided below each side door.



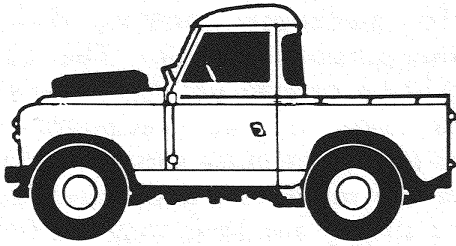
Legislation and taxation requirements may affect the classification of station wagons in different countries. The salesman should therefore familiarise himself with any relevant local regulations.

SELL THE BENEFITS OF:

- 10/12 seating capacity
- Improved passenger access from five doors and (12-seater only) tipping seats
- Flexible passenger/load configurations
- Driver/passenger comfort and all-round visibility

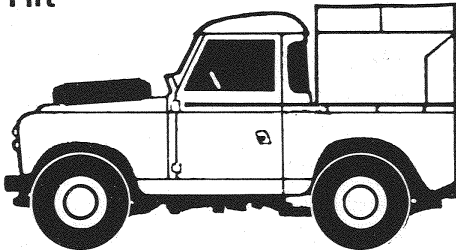
Optional Bodywork

a) Short-wheelbase Truck Cab



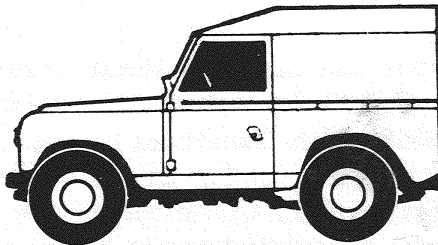
This truck cab is the same as the standard fitting on long-wheelbase models and provides a completely enclosed weather-proof top with an open back for easy loading

b) Short-wheelbase Three-quarter Canvas Tilt

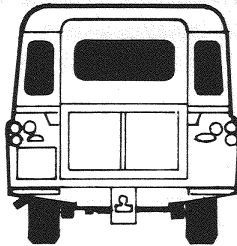


The canvas tilt gives weather protection to the rear load area, but is easily removed for the carriage of bulky items. It can be fitted with windows for export markets

c) Short-wheelbase Hard Top with Tailgate



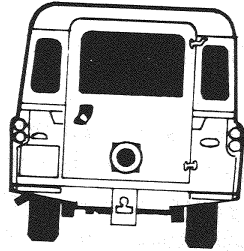
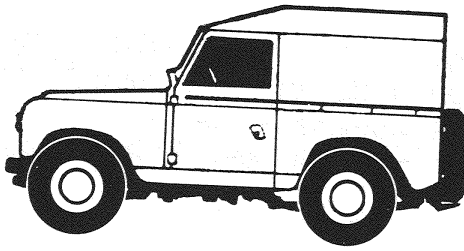
The rigid, detachable, light alloy top extends the full length of the vehicle giving complete weather protection and added security. The tailboard is complemented with a top-hinged rear flap. Rear windows are standard. Fixed or sliding side windows can be fitted to export vehicles



SELL THE BENEFITS OF:

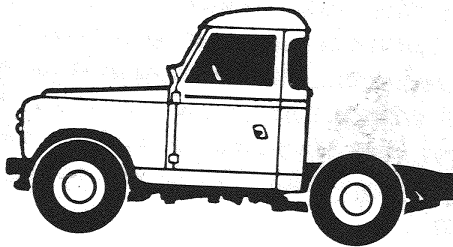
- Driver/passenger protection
- Flexibility of load-carrying
- Weather protection for load carried (except truck cab)
- Driving compartment security (and full vehicle security with hard top)

d) Short-wheelbase Hard Top with Side hinged Door



The side-hinged rear door gives easy access for passengers, making this an ideal dual-purpose vehicle. The spare wheel may be carried on the outside of the back door to give maximum load space, or inside for extra security, and to maintain the maximum departure angle. Fixed or sliding windows may be fitted to export models

e) Short-wheelbase Chassis Cab



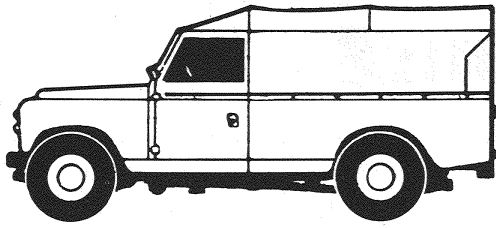
The chassis cab model is made available for conversions by approved specialists. (Conversions other than those by approved specialists would render any Land-Rover warranties invalid.) Compressor units and lightweight articulated trucks are popular short-wheelbase conversions

SELL THE BENEFITS OF:

- Ease of access to the rear
- Security of load
- Carriage of awkward loads
- Weather protection
- Life expectancy of hard top over tilt
- Complete flexibility of Land Rover Ltd. authorised conversions without loss of warranty

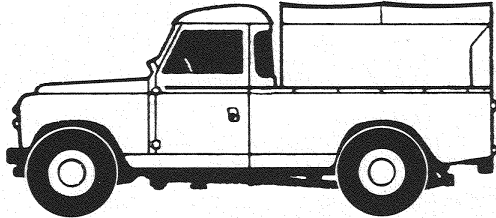
Hard top only

f) Long-wheelbase, Full Canvas Tilt



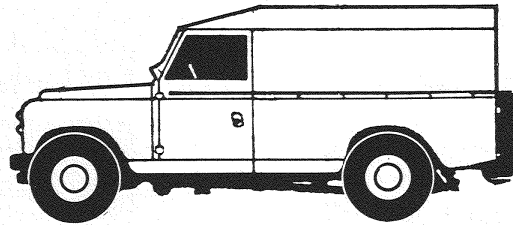
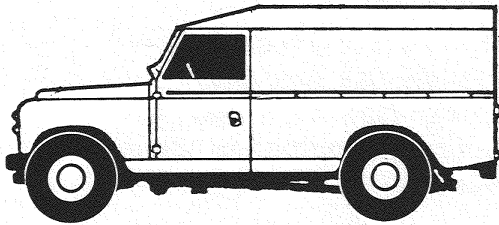
The full canvas tilt fitted in lieu of the standard truck cab is the same as that fitted to the basic short-wheelbase model. It makes a popular military vehicle. As on short-wheelbase versions, windows may be fitted in any export vehicle

g) Long-wheelbase, Three-quarters Canvas Tilt

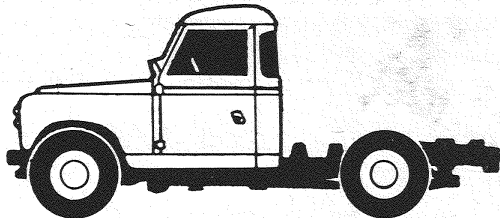


An ideal vehicle for the farmer requiring to carry livestock and other loads

h) Long-wheelbase Hard Tops



i) Long-wheelbase Chassis Cab



Fire tenders, mobile welding units and motor caravans may all be built on this base

SELL THE BENEFITS OF:

- Increased load-carrying space/capacity
- Flexibility of load space
- Protection of loads carried (except chassis cab)
- Driving compartment security (and full vehicle security with hard top)
- Ease of access to rear (when rear door fitted to hard top)
- Complete flexibility of Land Rover Ltd. authorised conversions without loss of warranty

4

4: ENGINES AND AUXILIARIES

FEATURES	BENEFITS
1. Choice of engines	<ul style="list-style-type: none">- Most cost-effective unit to meet customers' requirements- Longer life diesel engine
2. High torque at low revs	<ul style="list-style-type: none">- Enhances engine life and reduces driver fatigue due to less gear changing- Good acceleration/speed on road- Prolongs stationary running for power take-off applications
3. Three power take-off points	<ul style="list-style-type: none">- Wide range of auxiliary equipment can be driven by the same vehicle- More than one piece of equipment can be coupled simultaneously
4. Diesel compression-ignition	<ul style="list-style-type: none">- Less susceptible to saturation, and more efficient use of fuel
5. Sealed carburation and lubrication systems	<ul style="list-style-type: none">- Ability to operate in adverse climatic conditions and vehicle attitudes

All engines have certain features in common and are designed to give the flexibility required to satisfy the different conditions under which Land-Rovers operate.

The engines develop high torque at low revs which means that considerable pulling power is generated without excessive engine revs or gear changing, an essential characteristic for off-road duties.

All rotating and reciprocating engine components are individually balanced before assembly to ensure smooth running and long life. After assembly, all engines are bench-tested under power for at least an hour, during which time various loads are placed on the engine to simulate operating conditions.



The lubrication and carburation systems are sealed to allow the vehicle to work on slopes as steep as 45° . The vehicle can also ford water up to 64 cm (18 in) deep without further modifications. Efficient filters protect the engine from damage while operating in very dusty or sandy conditions.

As part of an international vehicle, a Land-Rover engine must be able to function well in many different conditions of climate and terrain. Both petrol and diesel engines will start at temperatures as low as -30°C and will still deliver full torque output in temperatures as high as 40°C . An oil cooler is available for hot climate usage, where it is particularly recommended for stationary running.

Antifreeze is added to the cooling system of all vehicles at the factory because of its additional property of preventing corrosion, which could be caused by water impurities in some countries.



An important additional function of Land-Rover engines is the supply of power to run auxiliary equipment such as air compressors and generators. One power take-off is via the engine crankshaft, as described on page 9/6, the others are from the transfer gearbox. Stationary running places great demand on an engine, largely because of the reduced effectiveness of the cooling system, compared with a moving vehicle. Land-Rover engines are designed to overcome this problem and to drive power take-off equipment efficiently.

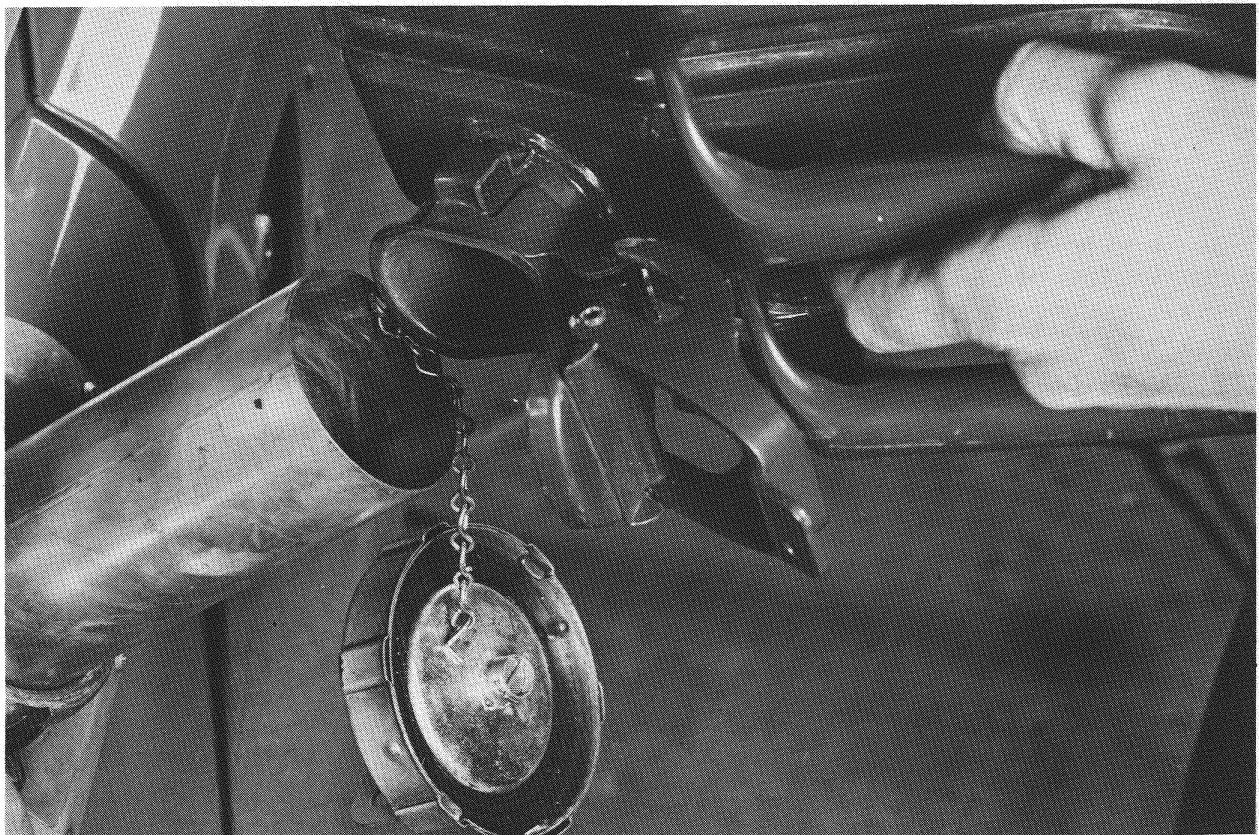
The electrical system is also designed with world-wide applications in mind. All the wiring is PVC insulated, making it impervious to oil and petrol, proof against fungal attack and suitable for use in tropical climates.

The lighting system will suit the particular needs, and meet the regulations, of any other market in the world.

Fuel tanks are made in heavy-gauge steel to resist knocks. They are coated inside and out with lead/tin for corrosion protection. An electric float-level unit registers the fuel level on the instrument panel. On diesel models a low fuel warning light is fitted.

On short-wheelbase vehicles, the fuel tank, holding 45 litres (10 gal), is positioned below the right-hand front seat and protected by chassis outriggers. On long-wheelbase models, the 68 litre (15 gal) tank, mounted at the rear of the vehicle between the chassis members, is well protected from accidental damage.

Supplementary fuel tanks are available, and are described in the option section (page 8/3). In all cases, the changeover tap is positioned within the driver's reach and the fuel gauge automatically registers the level of whichever tank is in operation.

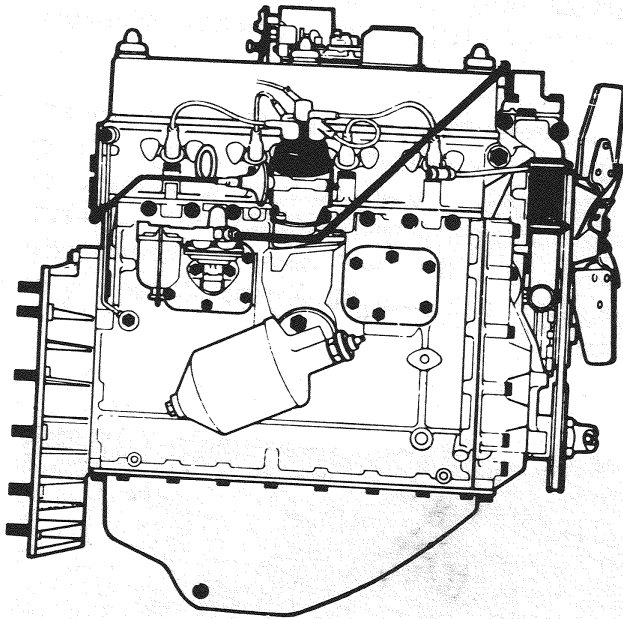


All fuel tanks have a telescopic extension containing a filter to assist refuelling from jerricans

Engine Power Output

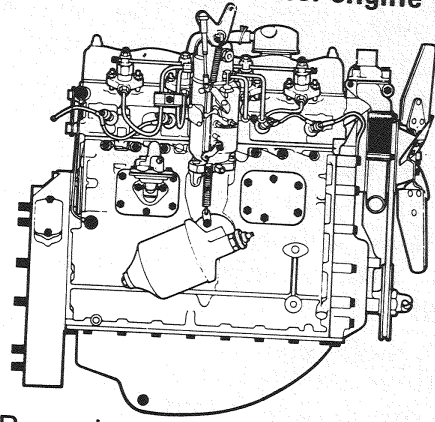
A brief summary of the well-proven engines available from Land-Rover is given below. It includes the torque, as the most useful single figure relating to engine performance, and the fuel requirements, as these are liable to limit choice in some markets. Full technical specifications of the engines are given in the Technical Data section.

2.25-litre, 4-cylinder petrol engine



Two versions are available, with compression ratios of 8:1 and 7:1. The higher compression engine develops its maximum torque of 159 N m (117.2 lbf ft) at the low engine speed of 2000 r/min. It uses 90 octane fuel and gives excellent, all-round performance with vehicles of either wheel-base. The lower compression engine develops slightly less torque but, with the ignition suitably retarded, will run on fuel down to 75 octane.

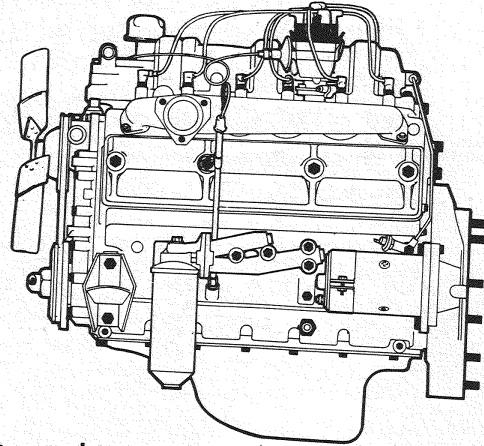
2.25-litre, 4-cylinder diesel engine



Land-Rover has been using diesel engines for many years, and has evolved a well-proven and hard-working unit. It has a speed-range closely matching that of the petrol engine, so that the same transmission ratios can be used.

This engine develops its maximum torque of 137.3 N m (101 lbf ft) at very low engine speed — 1800 r/min. This, together with its reliability, makes it ideally suited for special applications, particularly power take-off.

2.6-litre, 6-cylinder petrol engine



This engine was introduced to provide more power for heavy load-carrying and greater smoothness for passenger transport.

Like the 2.25-litre petrol engine it is available in two versions, with 7.8:1 and 7:1 compression ratios. The former gives maximum torque of 164.8 N m (121.5 lbf ft) at 2000 r/min, and runs on 90 octane fuel. The lower compression engine develops slightly less torque but, with the ignition suitably retarded, will run on fuel down to 80 octane.

Petrol Engines, Advantages and Applications

All petrol engines give **improved performance on-road** over the diesel engine, producing **better acceleration** and a **higher top speed**, useful when a substantial mileage is to be covered on roads or when speed is essential, such as in rescue vehicles.



HCB – Angus Firestrike Light Fire Appliance

Petrol engines make a better choice for passenger-carrying by being relatively quieter and smoother-running than their diesel counter parts. Again, these qualities improve with engine size.

The **higher power output** of the larger six-cylinder engine is necessary for rapid transport of substantial loads, or for working at high altitudes.

Diesel Engines, Advantages and Applications

Diesel-engined Land-Rovers offer particular advantages to fleet operators. Although initially more expensive to purchase, a diesel engine has a **longer life**, provided it is properly serviced. It is also less susceptible to driver abuse because of its low rev range and engine speed governor.

In the majority of areas diesel engines are more **economical to run**. Their very high compression ratio (23:1) makes them much more efficient, so they use up to 30% less fuel than the equivalent petrol engine.

The built-in hand throttle fitted to diesel engines can be set to **maintain constant engine speed regardless of the load** placed on it. This makes it ideally suited for power take-off applications.



The absence of an ignition system means that the vehicle is **less susceptible to swamping** when fording deep water and that it **can safely operate in high fire risk areas**.



Cost Comparison Chart: Petrol v Diesel

For the purpose of this exercise, figures applicable to a 109 in standard truck cab averaging 35,000 miles (56,000 km) per year have been used.

FUEL COSTS PER YEAR

	Petrol Engine	Diesel Engine
mpg	19	26
average annual miles	35,000	35,000
number of gallons used	1842	1346
fuel cost, per gallon	£1.25	£1.30
annual fuel cost	£2302	£1750
annual saving (A)	—	£552

INITIAL COSTS

	Petrol Engine	Diesel Engine
price of vehicle	£6129	£6854
initial saving (B)	£725	—

BREAK-EVEN TIME

$$\text{Recovery period of higher initial cost of diesel engine} = \frac{B}{A} = \frac{725}{552} = 1.3 \text{ years}$$

Therefore, after 1.3 years the owner of the diesel-engined vehicle will have recovered the additional cost of the diesel engine, namely £725. The saving thereafter will be £552 per annum during the life of the vehicle.

Note: For the purpose of this exercise, hypothetical figures have been used. Be a professional — produce a similar chart using prices applicable to your market. This will enable you to discuss more credibly the advantages of a particular engine with transport managers, fleet operators, etc. where price can be a major objection. Remember, after the recovery period, findings should be expressed as an annual saving throughout the period of ownership.

SELL THE BENEFITS OF:

- Minimised engine and transmission wear by use of lower revs
- Driver fatigue minimised by reduced gear changing
- Engine life enhanced by balanced components
- Operating capability up to a vehicle attitude of 45°
- Stationary engine capability to drive auxiliary equipment
- Increased vehicle range or operating time by addition of supplementary fuel tanks
- Fuel cost saving from use of lower grade petrol
- Performance and acceleration of petrol engine
- Lower operating costs of diesel engine
- Diesel engine speed controlled by governor giving longer life
- Diesel engine less susceptible to swamping

5: TRANSMISSION & FINAL DRIVE

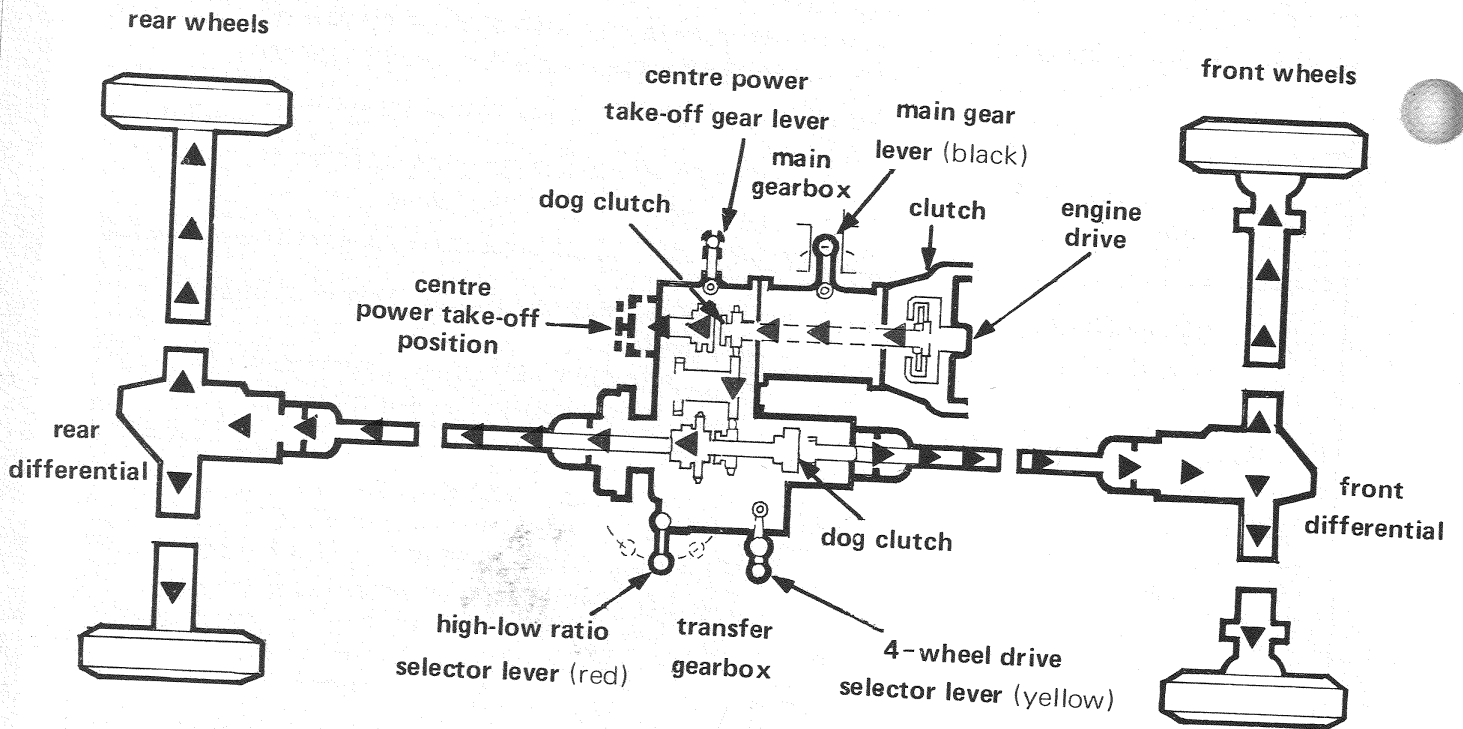
5

FEATURES	BENEFITS
1. Transfer gearbox	– High and low ratios give a choice of eight forward and two reverse gears
2. Power take-off units	– Ancillary equipment driven from three points including crankshaft
3. Selectable four-wheel drive	– Go anywhere capability with improved traction – Engine braking on all four wheels – Reduces drag and wear by disengaging drive to front wheels on road
4. Gear range	– Minimises driver fatigue – Right gear for every situation and application
5. Fully-floating axle shafts	– Easier replacement – Additional axle load-carrying capacity – Minimises stress on axle shaft

The Land-Rover transmission system is extremely versatile, being able to provide the appropriate drive for a great variety of applications.

However, market research indicates that many Land-Rover owners are not really familiar with the operation of the transmission so cannot make full use of its versatility. Salesmen should therefore ensure that they discuss its operation, as well as its features and benefits, with their customers.

The drive from the engine is transferred via the hydraulic clutch to the main gearbox. The clutch is self-adjusting to reduce the need for maintenance, and is of the diaphragm-spring type giving light operation and ease of control.



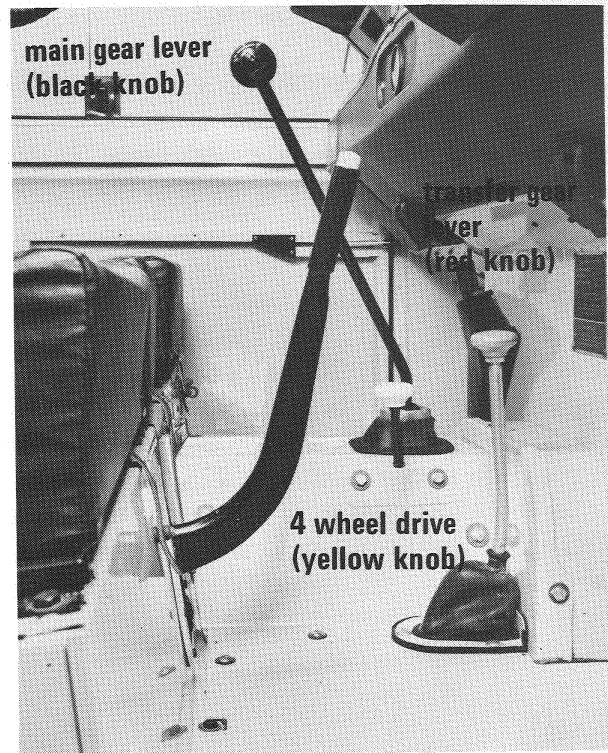
Diagrammatic summary of transmission system

- ◀ selectively engaged transmission
- ◀ permanently engaged transmission

The heavy-duty, **main gearbox** has a light alloy housing which reduces weight and aids heat dissipation. It has the conventional arrangement of four forward gears with synchromesh for smooth, easy, gear changing and a reverse gear. Selection is made using the gear lever with the **black knob**.

The output shaft from the main gearbox transmits the drive to the **transfer gearbox**. This has two gears – high and low ratio, as well as a neutral position. Selection is by means of the gear lever with the **red knob**. Provision is made on the transfer box for the addition of power take-off drive units in two positions with separate dog clutches and selector controls.

The main gearbox and the transfer gearbox acting together provide four forward and one reverse gear in both ratios i.e. a range of eight forward and two reverse gears.



OVERALL GEAR RATIOS

Main Gearbox	Transfer Gearbox	
	Low Ratio	High Ratio
First	41.24 : 1	
Second	24.60 : 1	
First		20.14 : 1
Third	16.50 : 1	
Second		12.00 : 1
Fourth	11.10 : 1	
Third		8.05 : 1
Fourth		5.40 : 1
Reverse	42.93 : 1	21.01 : 1

You can see from the table that the difference in drive applied to the wheels in first gear, low ratio is $7\frac{1}{2}$ times that applied in top gear, high ratio. This

compares with a difference of about $3\frac{1}{2}$ times in an average saloon car, showing the impressive range of gear ratios available to the Land-Rover driver.

Low gearing is essential for many operations involving heavy loads or difficult conditions. For example, manoeuvring a heavy trailer cross-country, or descending a steep or slippery slope without needing to use the brakes and hence risk skidding.

The lowest of the Land-Rover's eight gears — first gear, low ratio, has a ratio of 41.24:1, 2½ times lower than the lowest gear on a typical saloon car. The transfer gear between low and high ratio is a simple, non-synchromesh, dog clutch. **It is therefore essential that changes into low ratio are only made when the vehicle is stationary, to avoid the dangers of over revving.**



A Land-Rover can 'walk' down a steep slope quite safely by relying entirely on the engine to control the wheel speed

On the other hand, for road use and many take-off applications, **high gearing** is needed so that reasonable speed can be delivered. The Land-Rover's highest gear — fourth gear, high ratio, 5.40:1, is comparable with a saloon car's highest gear.

Changes into high ratio may be made on the move, in fact, it is necessary to do so in some towing situations. A description of the technique is given on page 10/5, although it is best learned from an experienced driver.



Rear wheel drive is permanently linked, but drive to the front wheels is engaged by a dog clutch housed in the transfer box. This clutch automatically engages four-wheel drive when the low ratio gear is selected. Alternatively, with the transfer box in high ratio, **four-wheel drive** may be engaged manually by pushing down the lever with the **yellow knob**.

To sum up: The lever with the black knob controls the main gearbox. The lever with the red knob controls high or low ratio, through the transfer gearbox. The lever with the yellow knob controls the four-wheel-drive facility in high ratio.

Four-wheel drive is engaged to increase the vehicle's traction on difficult surfaces and the effectiveness of the engine as a braking device.

In order to maintain forward momentum, **four-wheel drive can be engaged in high ratio when on the move** simply by pushing down on the yellow-knobbed lever. (If the transfer gear is in low ratio, four-wheel drive will have been engaged automatically.)

Once good ground is attained, drive to the front wheels should be disengaged to prevent transmission 'wind-up'. This develops because the front and rear wheels follow arcs of slightly different radii when cornering, and these differences can feed back through the drive shafts to the transmission system. Wind-up is not a problem on rough or slippery ground because natural wheel slippage compensates for any difference in travel. On firm surfaces however it can result in strain on the transmission system, excessive tyre wear, and steering difficulties.

Four-wheel drive should only be disengaged when the vehicle is stationary. To change out of four-wheel drive, high ratio: stop the vehicle; move the red-knobbed lever backwards i.e. into low ratio, then forward again. This change from low to high ratio automatically disengages four-wheel drive.

Further information about driving Land-Rovers off-road is given on pages 10/1 to 10/4.

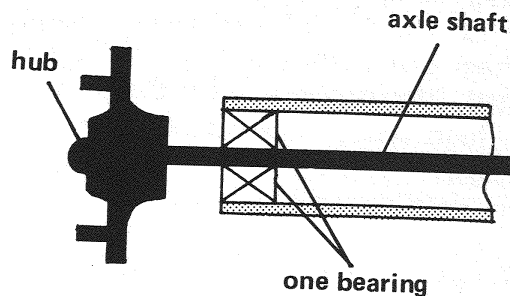


Final Drive

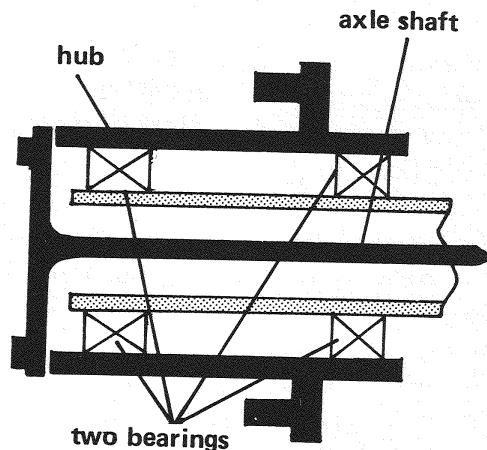
On the short-wheelbase Land-Rover, the front and rear differentials are identical; both being the hypoid spiral-bevel type with a ratio of 4.7:1. Their interchangeability reduces the number of spares needed on expeditions, and in fleet operation.

The front axle differential on long-wheelbase versions is also the same as the short wheelbase, but the rear axle is a special heavy-duty version. Both differentials on long-wheelbase vehicles incorporate hypoid spiral-bevel gears, but they are **not** interchangeable.

Power is transmitted from the differentials to the road wheels through fully-floating axle shafts, a system normally associated with larger, commercial vehicles where torque and axle loads are greater. The term 'fully-floating' means that the weight of the vehicle is taken directly on the wheel hubs, not by the axle shafts. This relieves the axle shafts of all shear or compression stresses, so that they need only withstand the torsional stress of transmitting the final drive to the wheels. The main advantage of this system is that it allows the suspension to support much more weight. It also improves the reliability and life of the final drive components. An added advantage is that the shafts can be withdrawn quickly and easily in service.



Semi-floating axle shaft



Fully-floating axle shaft

SELL THE BENEFITS OF:

- Go anywhere capability afforded by number of gears available
- Minimum driver effort required to change gear
- Minimal engine/transmission stress due to wide range of gear selection
- Additional weight support of fully-floating axles
- Power take-off capability
- Convenience/safety of two- or four-wheel drive
- Interchangeability of differentials on short wheel-base reduces spares stocking
- Ability to engage four-wheel drive without loss of momentum

6

6: SUSPENSION

FEATURES	BENEFITS
1. Beam axle	– Improves ground clearance
2. Leaf springs design	– Safety in the event of breakage
3. Rear axle check straps	– Prevent propeller shaft operating at incorrect angle
4. Double-acting damper	– Enhances ride comfort
5. Dual-rate springs (long wheelbase rear only)	– Increases load-carrying capacity

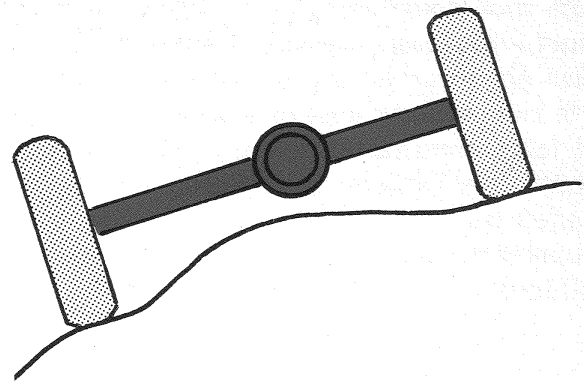
The Land-Rover suspension is strong, safe and reliable, and consists of beam axles, leaf springs and double-acting dampers.

This combination is preferred to independent suspension because of its simpler construction, better ground clearance and serviceability.

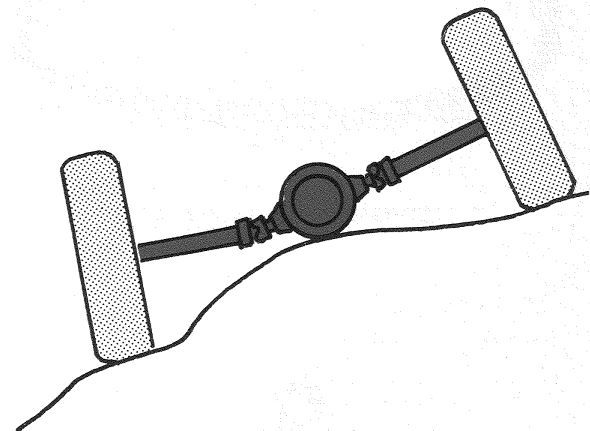
The front axle's swivel housings are chromium-plated on the oil-seal bearing surface for long life and are detachable for maintenance or replacement; a distinctive feature not shared by competitors.

Semi-elliptical, multi-leaf springs are mounted below both front and rear axles. The ends of the second leaf are wound round the eye of the main spring to support the vehicle should the main spring fail — an unusual safety feature.

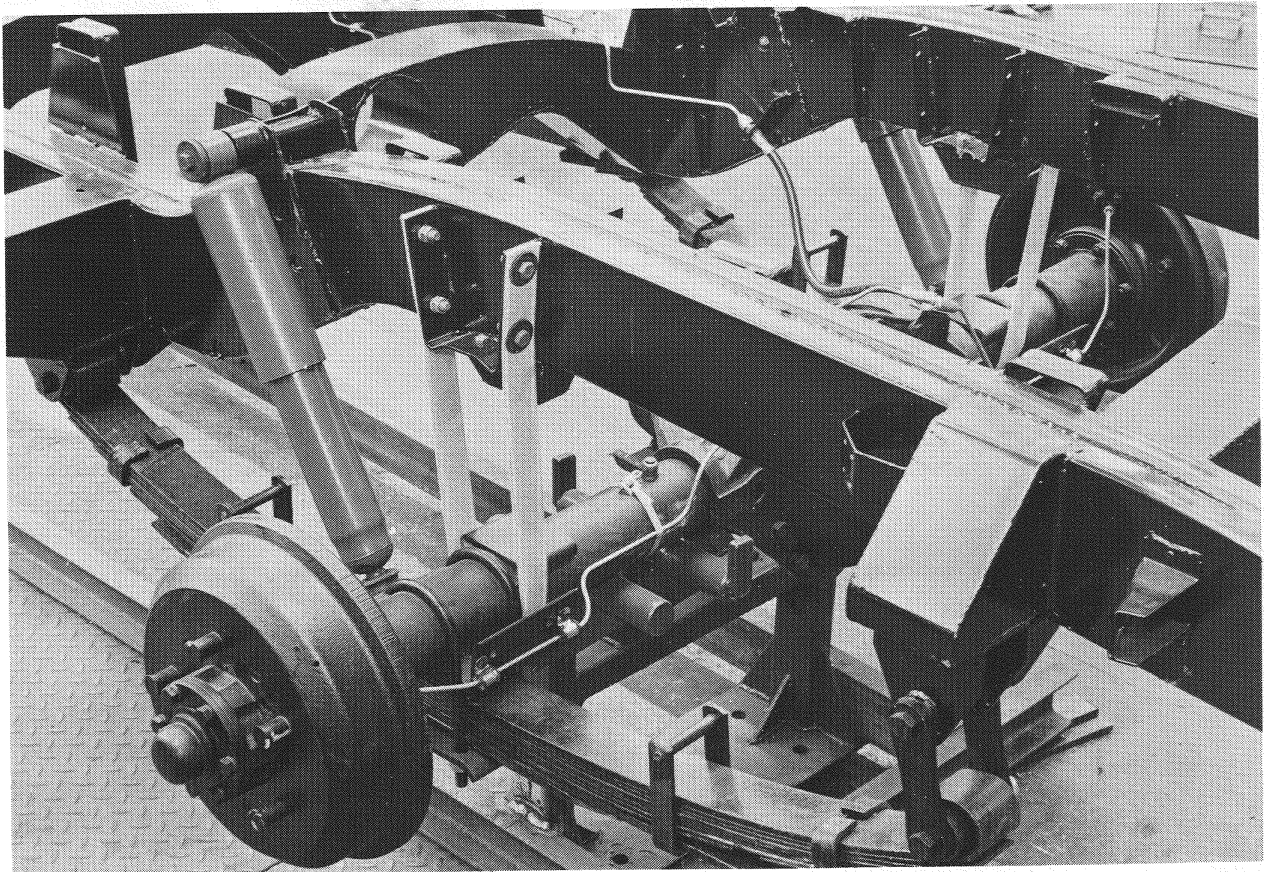
Rubber bushes are used on the spring eyes and shackle pivots, thus eliminating the need for lubrication. The bushes also absorb part of the suspension load, and reduce shocks from hard surfaces.



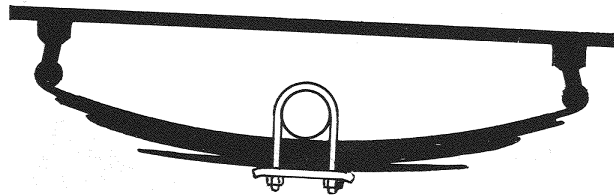
Beam Axle



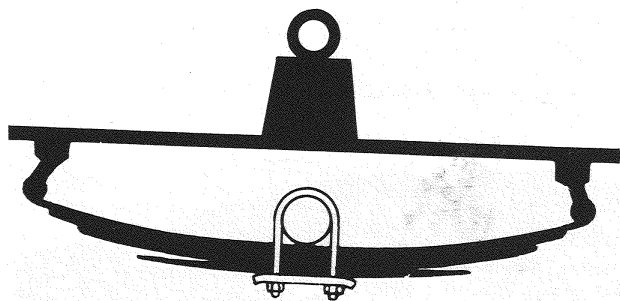
Independent Suspension



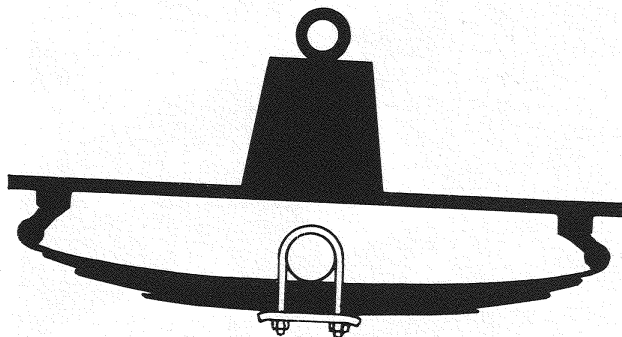
Long-wheelbase Land-Rovers have about 50% more load-carrying capacity than the short-wheelbase version and therefore have an uprated suspension system. Dual-rate rear springs ensure a good ride under all load conditions, preventing harshness when the vehicle is unladen or lightly loaded but ensuring sufficient suspension movement and support when carrying a full load.



Unladen – no deflection



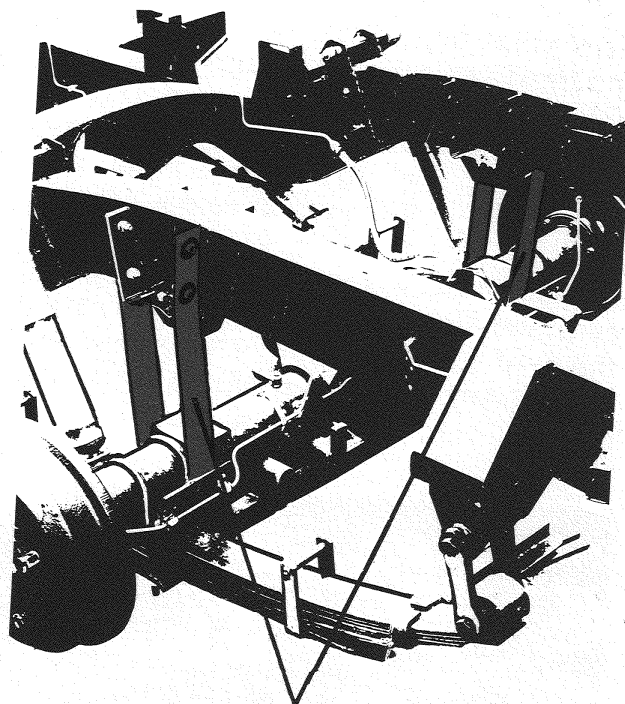
Lightly laden – slight deflection of lower-rate springs



Heavily laden – lower-rate springs prevented from excessive deflection by high-rate spring below them

In all Land-Rovers, the hydraulic shock absorbers are telescopic and have a two-stage action. They provide soft resistance to light shocks and movement on normal surfaces, but the more violent movements encountered in cross-country work meet with high resistance, so preventing the build up of oscillations.

To prevent the rear shock absorbers from reaching their full extension, and to protect the propeller shaft from operating at too great an angle, strong check straps are fitted around the rear axle and bolted to the chassis.



check straps

For special operating conditions, such as permanent off-road work under heavy loads, heavy-duty suspension is available as an option. This has higher rate rear springs and higher resistance shock absorbers.

Where petrol models are permanently loaded on the front axle, (for example, by a winch), the higher rate front springs normally fitted to diesel-engined vehicles are recommended.

SELL THE BENEFITS OF:

- Improved ground clearance of beam axle
- Additional safety from leaf spring design in the event of main spring failure
- Reduces service required due to the use of rubber bushes
- Smoothness of ride from double-acting dampers and on long-wheelbase dual-rate rear springs

7

7: STEERING & BRAKING SYSTEM

FEATURES	BENEFITS
1. Steering relay	– Prevents driver fatigue by diminishing transmitted road shocks
2. Recirculating ball steering box	– Minimises wear – Gives precise steering
3. Sealed ball joints	– Obviates need for lubrication or service adjustment
4. Steering box mounting	– Driver safety on impact
5. Servo-assisted brakes	– Reduces driver effort/fatigue Less susceptibility to fade
6. Transmission handbrake	– Safety of four-wheel braking – Effective braking on slopes up to 45° – Improves cross-country capability
7. Split circuit brakes	– Safety

A major requirement of a steering system is that it should remain precise while absorbing a considerable proportion of wheel shocks and preventing their transmission to the driver. The Land-Rover steering gear achieves this in two ways.

Firstly, the steering relay is oil-damped and has torque-adjusted friction bushes made of synthetic materials with a high friction coefficient.

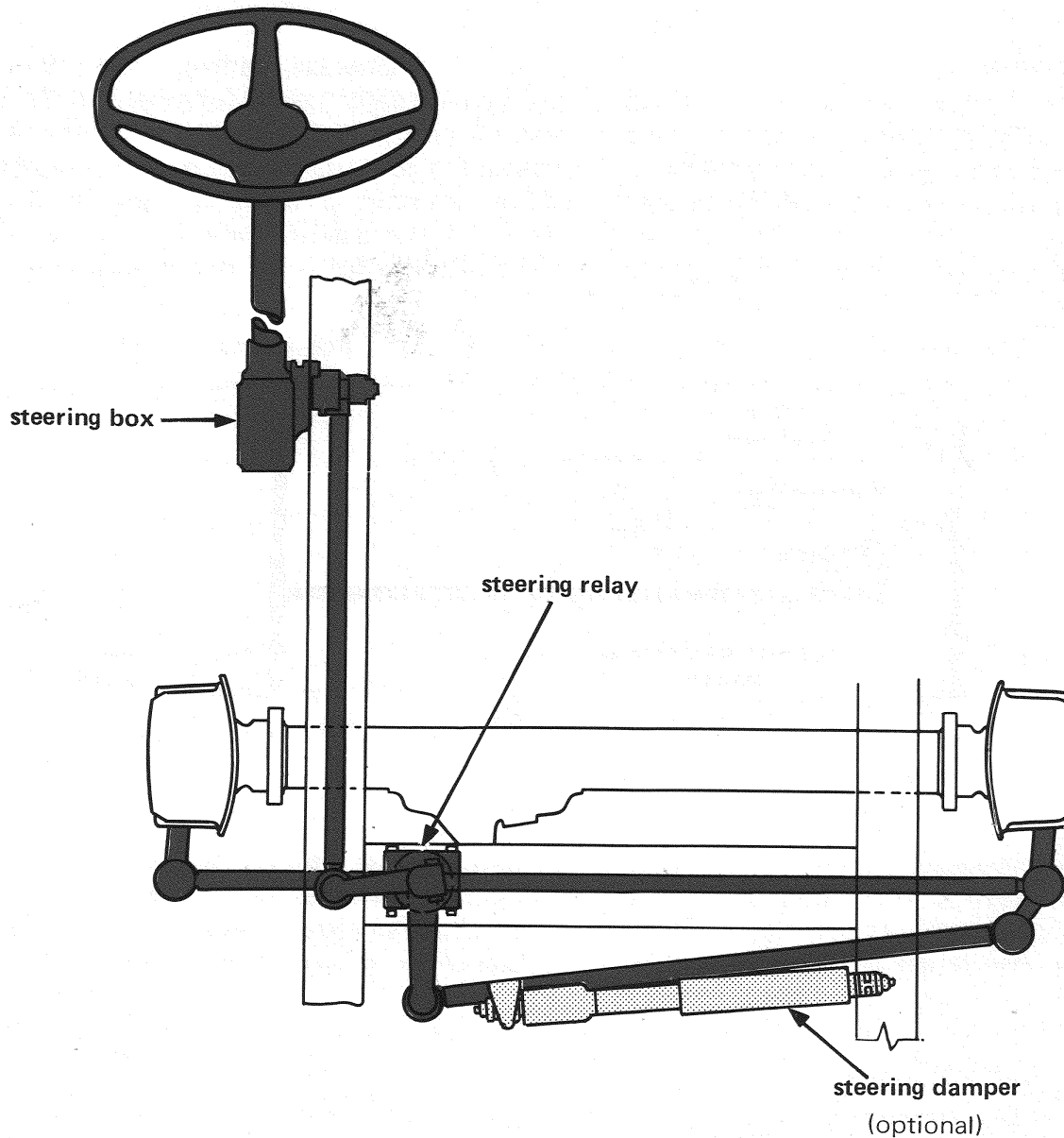
Secondly, the steering box itself is of the recirculating ball, worm and nut type which reduces steering 'kick' far more effectively than a rack and pinion system. The steering box is mounted high up in front of the bulkhead. It is therefore protected by the chassis from accidental damage. Moreover, in the event of a

serious impact, the possibility of the steering box being hit, and forcing the steering column up into the driving compartment is minimal.

To reduce maintenance, the tubular drag link, track and longitudinal rods have sealed ball-joints which do not require adjustment or lubrication.

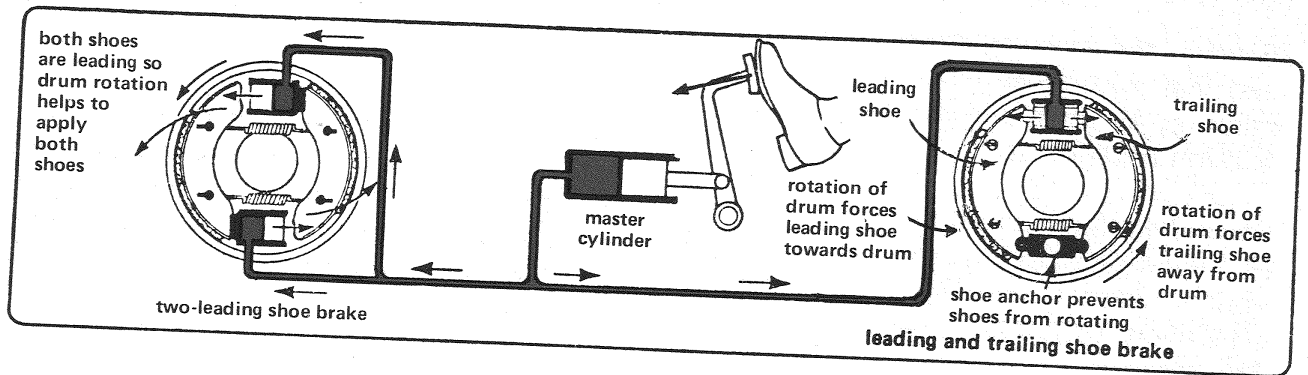
In certain territories with poor road conditions, an additional steering damper is fitted as standard to further absorb serious wheel shocks. In other markets it is available as an option.

The turning circle of the short-wheelbase models is 11.60 m (38 ft), and for the long-wheelbase models 14.3 m (47 ft). Both have 3.5 turns lock-to-lock.



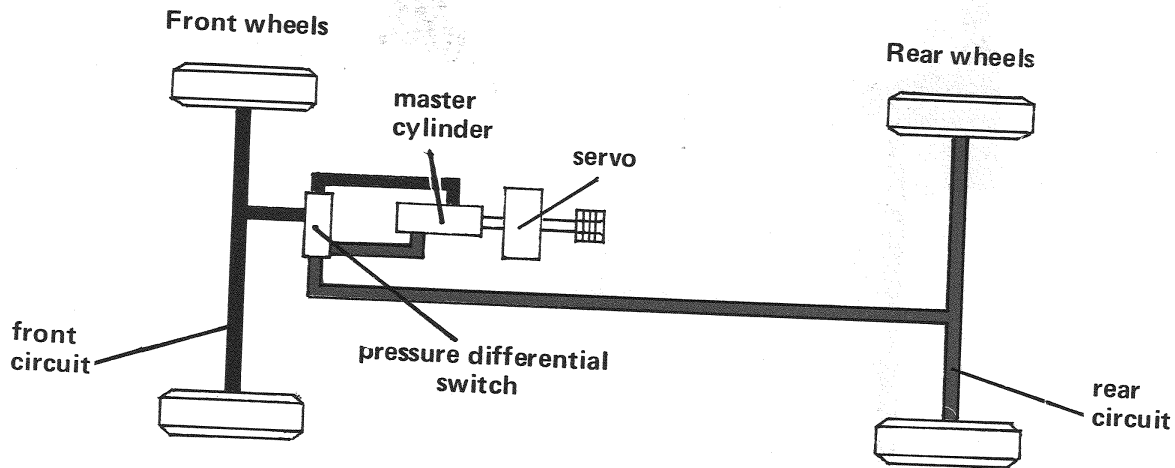
All Land-Rovers are fitted with large drum brakes — 254 mm (10 in) in short vehicles, and 279.4 mm (11 in) in long vehicles. They give good braking efficiency, and are extremely reliable.

Split-circuit brake systems are standard throughout the EEC and in some other areas, or they may be fitted as an option. Should there be loss of hydraulic pressure in part of the system, for example as a



On short-wheelbase models, front and rear brakes have a leading and a trailing shoe. On long-wheelbase models the rear brakes are the same but the front brakes, taking two-thirds of the braking power, have two leading shoes. These twin leading shoes give better response to

result of accidental damage, the other circuit will continue to function, so that braking power is retained at all times. A pressure-differential switch is incorporated which operates a warning light in the centre of the dash if there is any loss of hydraulic pressure in the brake lines.



Split circuit layout

pedal action because of their self-applying action, so meeting the demands of the heavier, long-wheelbase vehicles. Their brakes are also larger in diameter and in section.

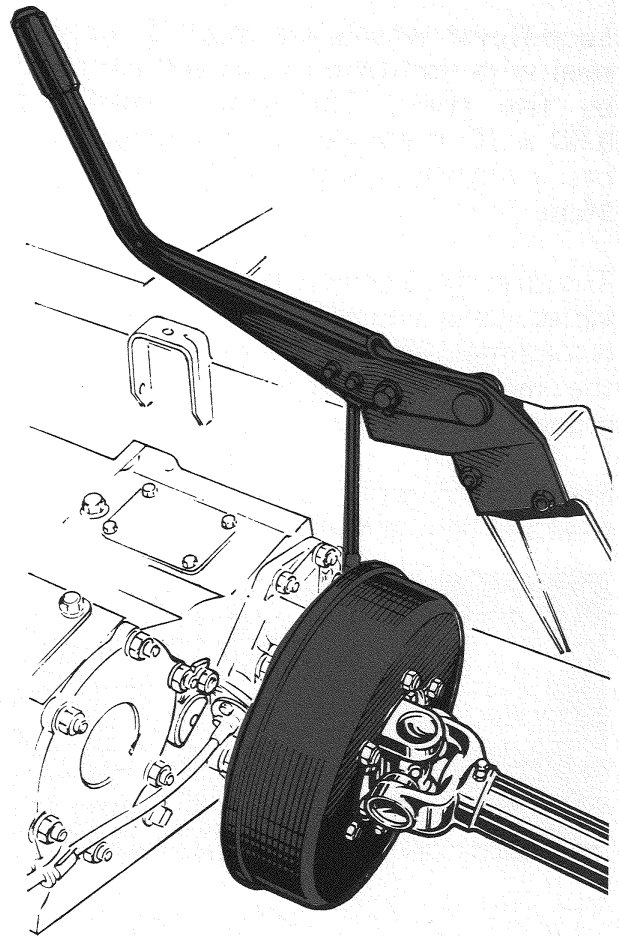
Long-wheelbase station wagons and all six-cylinder vehicles have servo-assistance as standard, to reduce pedal effort. Servo-assistance is optional on other models.

The Land-Rover handbrake has a number of interesting features, largely associated with the vehicle's cross-country role. The brake does not operate directly on the wheels but on the transmission, and is situated just behind the transfer gearbox on the rear propeller shaft.

The handbrake holds all four wheels when the vehicle is in four-wheel drive on slopes up to 45°, and its effectiveness is increased by the gear ratios in the axle differentials.

The short, simple linkage is less prone to failure than that of a handbrake operating on the wheels and is less liable to damage as it is protected by the chassis. Its high position also enables quick and easy adjustment from the driver's cab.

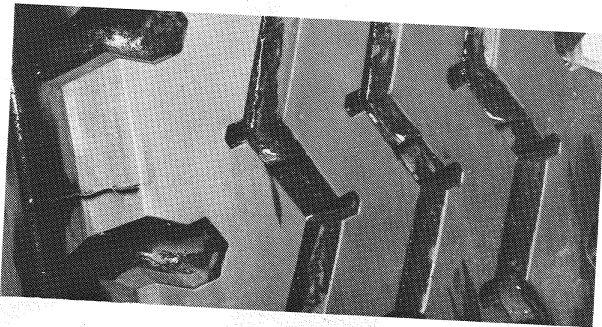
The handbrake must not be operated when the vehicle is in motion (except in an emergency) otherwise the transmission will be damaged.



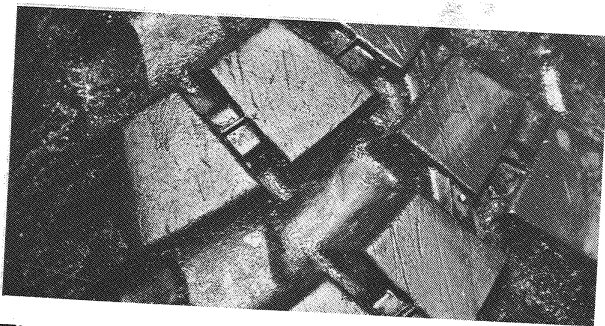
Land-Rover wheels are made of pressed steel with ventilation slots, and are fixed by five studs. The short model has 5.00 x 16 in wheels, and the long model has a slightly wider section at 5.50 x 16 in.

The use of correct tyres to suit the varied tasks undertaken by Land-Rovers is essential, since performance relies on the maintenance of adhesion between ground and tyre.

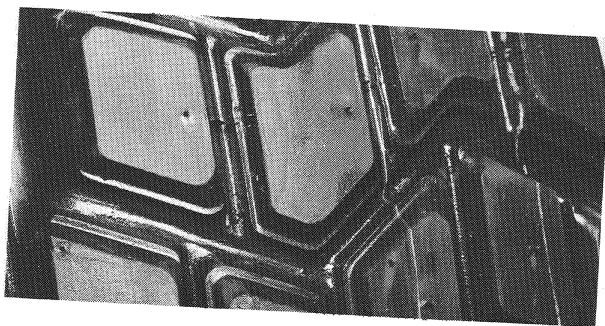
Standard cross-ply tyres are suitable for road and light cross-country use.



The Michelin XZY radial (above) and the Dunlop T29A (below) which are recommended as off-road tyres are also suitable for light road use.



The Michelin XS (below) is recommended for sand and soft conditions and may also be used on-road.



Land-Rover may be fitted with a variety of tyres to suit all applications.

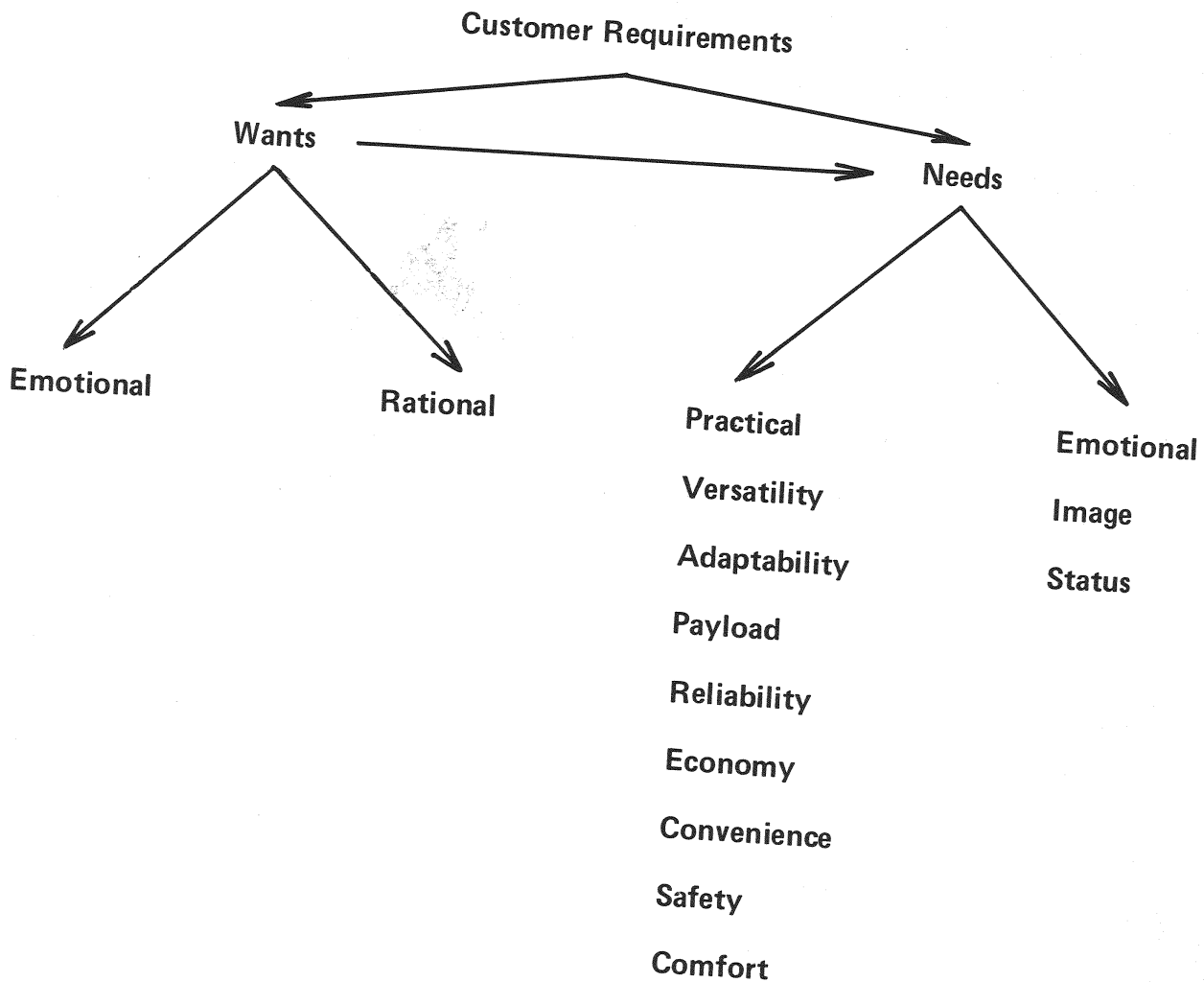
SELL THE BENEFITS OF:

- Brake safety from split circuit system incorporating brake-pressure failure warning light
- Reduced driver effort required by use of servo-assistance
- Reduced driver effort due to lack of steering kick-back
- Safety design of steering
- Safety and convenience of transmission handbrake

Meeting the Customer's Requirements

Whatever the product, the basic selling skills required by the salesman are the same, but it is where the product becomes more diverse that the expertise and professionalism of the salesman has to be at the highest level. In most cases the user is well acquainted with the requirements of a particular job for which the Land-Rover is being sold and of the various competing vehicles. He is looking therefore for re-affirmation that the Land-Rover is the only vehicle to satisfy his needs and wants.

Meeting the customer's requirements can be broken down by a natural process of elimination detailed below. Moreover, at the time of purchasing a vehicle the customer is receptive to the idea of the extras he may later need. These extras mean additional profit in the deal and could save the customer inconvenience at a later date.



- Versatility**
 - Ability of the vehicle to carry out more than one function successfully.
 - On- or off-road capability (two- or four-wheel drive).
 - Conversion for specialised work.
 - Choice of high and low ratio gears.
- Adaptability**
 - Provision for three power take-off points allowing use of a variety of equipment.
 - Passenger- or load-carrying capacity.
 - Towing and winching capability.
- Payload**
 - Alternative chassis lengths.
 - Optional body configuration.
 - Strength of chassis and beam axles.
- Economy**
 - Choice of petrol or diesel engine.
 - Overall running costs.
 - Ability to fulfil more than one function.
- Reliability**
 - Well-proven engines.
 - High torque at low revs.
 - Fully-floating axle shafts.
 - Designed for cross-country and wading use.
- Convenience**
 - Three or five doors.
 - Up to twelve seating capacity.
 - Ability to carry out more than one function.
- Safety**
 - Four-wheel drive option.
 - Ability for load-carrying.
- Comfort**
 - On-road use.

8

8: OPTIONAL FITTINGS & ACCESSORIES

Fittings

A wide range of optional equipment is available to Land-Rover owners who wish to increase the comfort and convenience of their vehicle, or to extend its capabilities.

Specialist equipment, such as power take-off drives and winches, is detailed in the next section (pages 9/1 to 9/14). Fittings of a more general nature are described here, under six headings:

- A. Internal Bodywork Fittings, page 8/1.
- B. External Bodywork Fittings, page 8/2.
- C. Engine, Electrics and Fuel System, page 8/2.
- D. Steering, Suspension, Brakes and Wheels, page 8/4.
- E. Protective Devices, page 8/4.
- F. Tyres, page 8/5.

All items can be ordered with the vehicle, and fitted at the factory, a course which is strongly recommended in many cases as being the simplest and most economical. However, any item can be supplied for local fitment, so salesmen should investigate the availability of fitting services in their own areas.

A. INTERNAL BODYWORK FITTINGS

Air-conditioning, refer to Special Equipment, page 9/7.

Fire Extinguisher, with fixing brackets, capacity 1.1 litres (2 pints).

Heater and Demister, a two-speed fresh-air unit which is fitted as standard in some territories.

Seat Belts, Static, may be fitted to all seats if not supplied as standard. Inertia reel seat belts may also be fitted to the outer front seats.

Seats, Deluxe Front, have shaped cushions and backrests providing lateral support and extra comfort. They are finished in practical black vinyl, and the outer seats are adjustable fore and aft.

Seats, Rear, are standard in station wagons and optional on all other vehicles.

Speedometers, marked in mph or km/h and specially adapted for use with large tyres.

Trim, Deluxe, comprising door, floor and roof trim, may be specified for all models. It is standard on station wagons.

Trim, Insulation, for the seat base, is available on all models to give protection in cold climates.

B. EXTERNAL BODYWORK FITTINGS

Horn, second tone.

Mirrors, of various designs may be installed on either side of the vehicle. A 'snap-stem' safety mirror may be fitted in place of the standard interior mirror.

Security Catches, for doors and windows are standard on all long-wheelbase models and station wagons, and can be fitted to other short-wheelbase models. They consist of an internally operated catch for each passenger side door, with external keys for the driver's door, and lift-up rear flap (where fitted). All sliding windows are also given internal catches.

Security Provision, may also be made for other parts of the vehicle by specifying the fitment of hasps to take a padlock. These are available to secure the bonnet and petrol filler cap. A locking device is available for the bonnet-mounted spare wheel carrier.

Spare Wheel Carrier, Bonnet-mounted, fitted to a special recessed bonnet. A heavy duty bonnet is required when a spare heavy duty wheel and tyre are to be carried in this way.

Spare Wheel Carrier, Rear Door-mounted, standard on station wagons, may be fitted to other hard tops with a side-hinged rear door. It cannot be used in conjunction with a towing hook.

Towing Equipment, see Specialist Equipment, pages 9/8 and 9/9.

Tropical Roof, standard on station wagons, may be fitted to all other hard tops and truck cabs. It consists of a light alloy panel positioned above the main roof. With a tropical roof it is also possible to fit roof ventilators to the hard top.

Windscreens, Laminated, in place of the standard toughened glass windscreens.

C. ENGINE, ELECTRICS AND FUEL SYSTEM

Alternator, 18 ACR, with an output of 43 amps, can replace the standard 16 ACR unit (output 34 amps), when heavy loads are placed on the electrical system, for example, by an electric winch.

Batteries, Heavy Duty, required, for example, when an electric winch is fitted.

Batteries, Dry Charged, for transportation to export countries.

Cooling System, Hot Climate, comprising a 4-bladed fan 420 mm (16.5 in) in diameter and a special cowl to draw the maximum amount of air through the radiator. (Must be fitted when an oil cooler is installed.)

Engine Speed Governor, is available for the 4-cylinder petrol engine. It will maintain a constant engine speed, regardless of load, and is therefore useful for power take-off work.

Fuel Filter, Additional, for diesel engines, is normally fitted to export vehicles, and is recommended for use where fuel oil may become contaminated.

Fuel Tank, Extra, has a capacity of 45 litres (10 gal) and may be fitted to all vehicles under one of the front seats.

On long-wheelbase models (except V8 and diesel), it is possible to have two additional fuel tanks mounted below the seat box. This gives a total fuel capacity of 159 litres (35gal).

Fuel Tank, Rear Power Take-off, replaces the standard rear tank on long-wheelbase vehicles, to allow room for the rear power take-off drive unit. Its capacity is 50 litres (11 gal).

Hand Throttle, for petrol engines, acts in a similar fashion to the standard fitment on diesel engines, to override the accelerator pedal linkage and set the throttle (see page 9/7).

Hazard Warning System, flashes all indicators simultaneously. (Standard for EEC countries.)

Oil Cooler, recommended for use in very hot climates or for continuous stationary running. An auxiliary instrument panel is included to house an oil temperature gauge.

Overdrive Unit, refer to Special Equipment, page 9/8.

Radio Interference Suppressor should be fitted to the electrical system of the vehicle when radio receiving equipment is to be operated in the vehicle, or its immediate vicinity.

Split Charge Facility, for use in conjunction with the 18 ACR alternator, (see page 8/2). It enables a second battery to be charged independently of the vehicle battery. It is recommended that this arrangement is used to power ancillary equipment like winches, or floodlights, so avoiding the risk of draining the main battery.

Thermostat, 82°C for diesel engines, allows the engine to reach operating temperature more quickly in cold climates.

D. STEERING, SUSPENSION, BRAKES AND WHEELS

Brakes, Power Assisted, standard on some models and in some markets, and may be fitted as an option in all other cases. A warning light is fitted to the dash to indicate loss of servo vacuum. Note: In this event the normal hydraulic system will continue to function.

Brakes, Split Circuit, are standard in some territories, and have been fully described on page 7/3.

Lifting Jack, heavy duty version.

Spare Wheel Carrier, see page 8/2

Steering Damper, standard in many export territories, is fully described on page 7/2 .

Suspension, Heavy Duty, available on long- or short-wheelbase models for special conditions of operation. It does not increase the payload capacity. Heavy duty suspension consists of higher rate rear springs and higher resistance front and rear shock-absorbers. The front springs remain unchanged, but if a petrol-engined vehicle is to be permanently loaded at the front, it can be fitted with diesel-rate front springs.

Heavy duty suspension is recommended for short-wheelbase models when the vehicle is used for prolonged work on very rough surfaces with a payload in excess of 250 kg (500 lb) or when a heavy two-wheeled trailer is towed extensively. It should only be fitted on long-wheelbase vehicles when a permanent payload in excess of 750 kg (1500 lb) is carried.

Wheels, 5.50F x 16 must be specified on short-wheelbase models in place of the standard 5.00 x 16 wheels, when tyres larger than 7.00 x 16 are to be fitted (also refer to speedometer note page 8/5).

E. PROTECTIVE DEVICES

When climatic or operating conditions are likely to cause special hazards, there are a number of items of equipment which can be fitted to give extra protection.

Astrolan application sprayed behind dash panel to prevent corrosion, especially by sea air, standard on export vehicles.

Radiator Chaff Guard, a fine wire mesh grille, fitted over the radiator air intake grille to prevent it becoming clogged by foreign matter. (Jerrican holders cannot be fitted when this guard is used.)

Raised Air Intake, suitable for 2.25-litre petrol vehicles, enables more effective air filtering for very dusty or sandy conditions and aids deep water wading.

Universal Joint Covers prevent long grass from becoming wound round the propeller shaft universal joints.

F. TYRES

In order to employ the cross-country capabilities of the Land-Rover to the fullest extent, it is very important that suitable tyres are fitted. The table below summarises the characteristics and application of all the tyres recommended by Land Rover Ltd.

A star in the vehicle application column indicates that, in order to use that particular tyre on short-wheelbase vehicles, larger wheel rims must be fitted and the speedometer head replaced by a specially calibrated unit.

Standard Tyres, fitted according to availability

Tyre	Size	Application (wheelbase)	Comments
Avon Ranger	6.00 x 16	short	6 ply tyre, good all-purpose tyre for on-road use with occasional off-road requirement.
	7.50 x 16	*both	
Dunlop RK3A	6.00 x 16	short	General purpose tyre, on-/off-road, coarse tread pattern on outside edge of tyre.
	7.50 x 16	*both	
Goodyear Hi Miler	6.00 x 16	short	General purpose on-/off-road tyre, high heat dissipation, reasonable on-road life. Radial ply.
	7.50 x 16	*both	

Optional Tyres, fitted as ordered.

Tyre	Size	Application	Comments
Avon TM	6.00 x 16	short	Rapid heat dissipation on-/off-road. Recommended by manufacturer where vehicle is used for towing.
Dunlop T29A	6.50 x 16	short	Tyre is suitable for predominantly cross-country use, very good off-road grip. High wear rate on road.
	7.50 x 16	*both	

Tyre	Size	Application	Comments
Goodyear All Service	7.50 x 16	long	Military use only. A general purpose tyre for vehicles operating on all types of roads, and cross-country, all the year round. Equal traction in forward and reverse.
Michelin XYZ (radial)	7.50 x 16	*both	General on-/off-road tyre, good wear characteristics, reduction in pressure improves traction in difficult off-road conditions. Designed to run at low pressures if necessary.
Michelin XS (radial)	7.50 x 16	*both	High flotation, block tread, for use on sand and similar conditions. Can withstand heavy loads at low pressure, reasonable on-road tyre life.
Michelin XC4 (radial)	7.50 x 16	*both	Deep, well-defined block tread, multiple gripping edges, good traction in winter conditions.

Reference should be made to the Land-Rover Owner's Manual for appropriate tyre pressures for different conditions.

Accessories

Ammeter, to show the rate of charge or discharge of the battery, fitted to an auxiliary instrument panel on the lower dash.

Ashtray.

Brushguard, a heavy steel angle and strip guard mounted on the front bumper and braced to the chassis. It provides a sturdy, full-width protection for the front of the vehicle.

Bumperettes, fit on the outer edge of the front bumper as protective over-riders.

Free-wheeling Hubs allow the front wheels to rotate independently of the drive shaft, so reducing drag or tyre wear. Before four-wheel drive is engaged they must be locked.

Front Lifting and Towing Rings, of galvanised steel, can be fitted above the front bumper where it is attached to the chassis frame. (Cannot be used with jerrican holders.)

Ground Anchors are convenient metal wheel chocks used to ensure that the vehicle remains stationary when the winch is in use.

Helper Springs (Aeon rubbers) improve the ride and handling characteristics of the vehicle when it is fully laden. These rubber mouldings simply bolt on to the chassis, reducing rear spring deflection under heavy loads. (They do not increase payload capacity.)

Jerricans, will hold 20 litres (4.5 gal) of liquid. Two are supplied, with brackets, for mounting in the radiator recess. (The fitment is not recommended for 6-cylinder or diesel models used in hot climates.)

Lamp Guards of galvanised steel mesh, to protect front or rear lights from damage in cross-country conditions.

Leather Gaiters, of soft leather, cover the front axle swivel housings and protect the polished chrome bearing surfaces from damage by abrasive sand or dust.

Mats, Heavy Duty Rubber to fit front and rear compartments.

Mud Flaps, supplied with full fixing kit.

Oil Pressure Gauge, can be fitted to an auxiliary instrument panel on the lower dash, and is marked in kilopascals (kPa) or lb/in².

Pedal Pads, of large area, designed for easy operation by muddy boots.

Pulley Block, for wire rope, used when the load required to move a vehicle or object exceeds the line pull capacity of the winch in use. One pulley block doubles the effective line pull of the winch. Can also be used when an angled pull is required.

Roof Rack, dimensions 1.22 m x 1.22 m (4 ft x 4 ft).

Roof Rack Extension, dimensions 1.22 m x 0.61 m (4 ft x 2 ft).

Shackle and Hook, of galvanised steel. Shackle pin diameter 15.9 mm (0.625 in) safe working load 1016 kg (1 ton). Hook is non-swivelling.

Steps, Folding, are spring-loaded for easy retraction when not in use. They are available for side or rear door use as appropriate.

Sun Visor, Exterior, made of aluminium.

Sun Visors, Interior, safety, padded design, with full fixing kit.

Trailer Lighting can be provided via a seven-pin socket and leads supplied as a kit, which includes a warning light and heavy duty flasher unit.

Tyre Pump, Heavy Duty.

Winch, Capstan.

Winch, Hydraulic Drum .

Note: Further information about these and other winches is given under Specialist Equipment, pages 9/9 and 9/10.

Winch Ropes, 45 m, (150 ft) wire rope 8 mm (0.3 in) diameter with swaged-type eye.
30 m, (100 ft) wire rope 9.5 mm (0.4 in) diameter with swaged-type eye.
15 m, (50 ft) polypropylene rope, 25 mm (1 in) diameter with hook.
23 m, (75 ft) wire extension rope, with eye and hook end.

9

9: POWER TAKE-OFF DRIVES, OTHER SPECIALIST EQUIPMENT & SPECIAL CONVERSIONS

Power Take-off Drives

Introduction

The Land-Rover can provide a static or mobile power source for a wide range of ancillary equipment. This power is available at three basic positions on the vehicle — two on the transfer gearbox and the third at the front of the vehicle, where a coupling may be made to the engine crankshaft.

The transfer gear drive unit consists of a centre and bottom power take-off which can be obtained as optional equipment. They form the basic drive for several variations for power take-off layouts, summarised as follows:

- | | |
|-----------------------|------------------------------------------------------|
| Centre Power take-off | — 'V' belt drive |
| | — hydraulic drive |
| | — mechanical drive |
| Rear Power take-off | — mechanical drive |
| | — flat belt drive |
| | — 'V' belt drive unit |
| | — with propeller shaft for trailer-mounted equipment |
| Bottom Power take-off | — hydraulic drive |
| | — mechanical drive |

Note: The rear power take-off is powered from the centre take-off point.

For stationary operation the transfer gearbox is placed in neutral to disconnect the drive to the wheels, and then, the centre and bottom drive units can operate independently.

In this condition any of the four forward gears may be used to provide a wide range of speed.

It is recommended that fourth gear should be used wherever possible as it provides a 1 : 1 ratio therefore preventing excessive loading of the transmission. The intermediate gears can be used when lower speeds are required, but their use should be restricted to light loads and duties of an intermittent nature.

When the vehicle is moving, the centre and bottom drive units will operate at a speed which is in direct proportion to the road speed of the vehicle and in the ratio of the transfer gear selected.

An engine crankshaft drive is available. When driving equipment from this point there is the advantage of having a power supply which is not dependent on road speed and gear selection and will be uninterrupted during either stationary or mobile operation. This drive position is restricted by space and should be confined to units having a low rotary inertia.

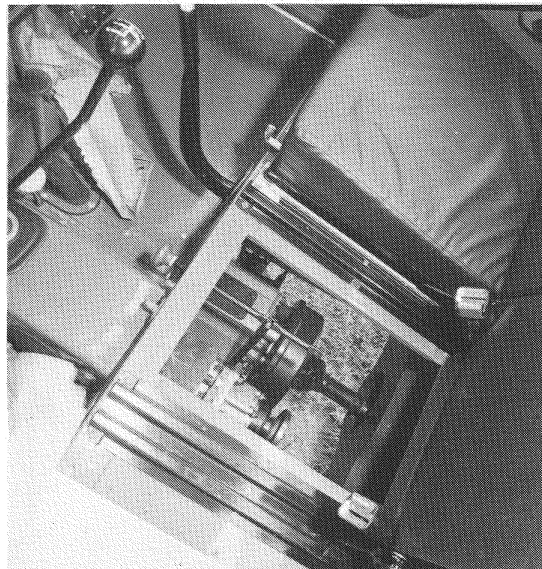
Note: Power take-off facilities are restricted with the 2.6-litre engine and any proposed take-off application should be submitted to Land-Rover Special Projects Dept. for scrutiny.

The following section gives details of the basic units available as optional equipment with suggestions as to how these may be used in various drive arrangements to suit different machinery installations.

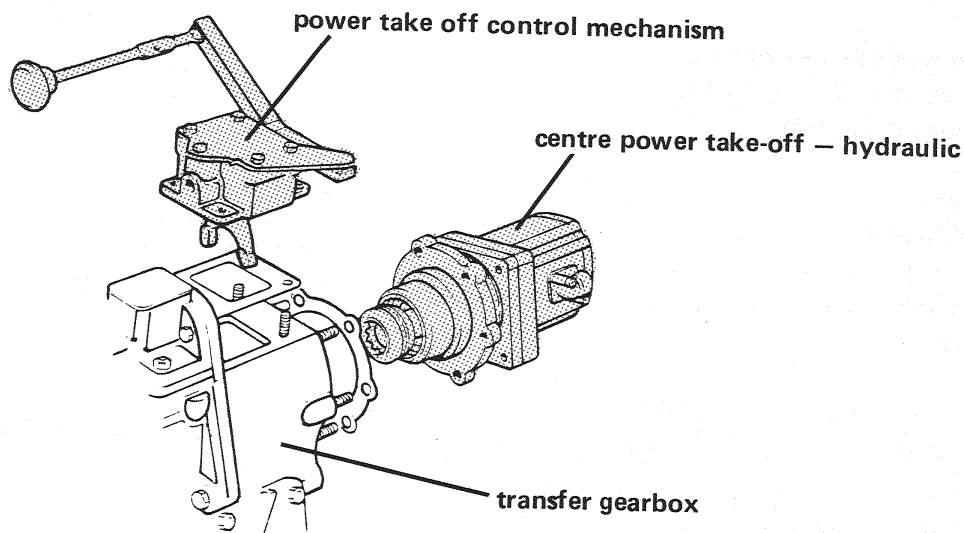
Centre Power Take-off

From the centre power take-off, fitted to the rear of the transfer gearbox, ancillary equipment can be operated using either hydraulic or mechanical drive. The latter being via a 'V' belt and pulley or a propeller shaft. The power take-off can be operated in any gear, but to prevent gearbox over-heating, fourth gear should be used if continuous operation is required. For stationary operation the transfer gearbox lever must be in the neutral position.

The **mechanical drive unit** is mounted on the rear of the transfer gearbox terminating in a Hardy Spicer 1300 Series Flange.



The **hydraulic drive unit** has an integral hydraulic pump with a capacity of 29.5 litres/min (6.5 gal/min) and a maximum pressure of 141 kg/cm² (3000 lb/in²). Complete installations using this or alternative pump sizes can be provided by specialist manufacturers. A hydraulic winch can be installed by Land Rover Ltd.



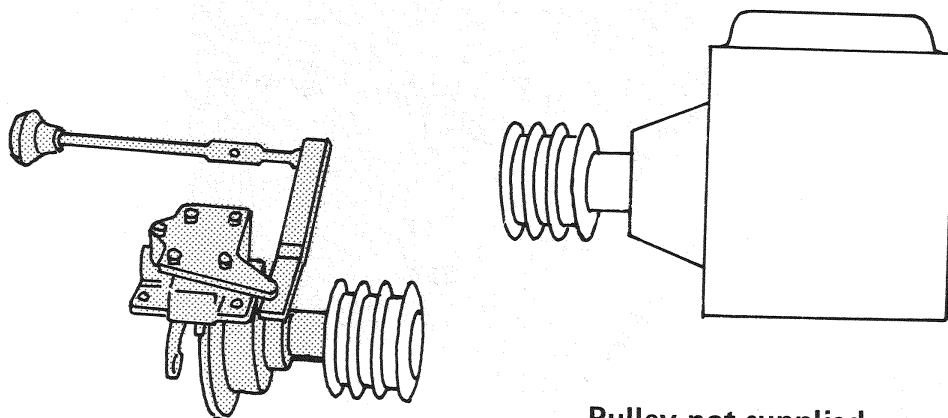
Centre Power Take-off Extensions and Rear Power Take-off

The mechanical drive from the centre power take-off can be linked directly to a belt or propeller shaft, or can be directed through a rear power take-off gearbox mounted on the rear cross-member giving a wide variety of drive applications.

a) Centre power take-off with direct 'V' belt drive.

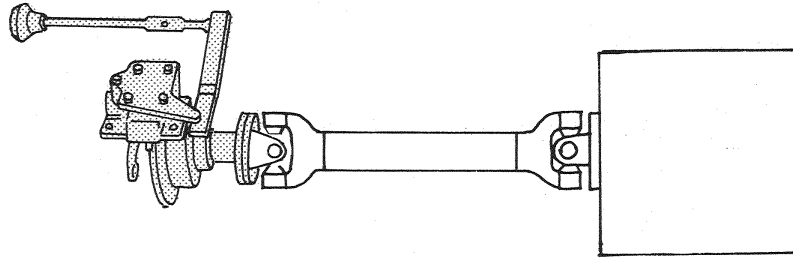
Power should be limited to approximately 11 kW (15 hp) to avoid interference from flexible gearbox mountings. (In some cases it is possible to use power up to 15 kW (20 hp) if the application has been approved by the Land-Rover 4 x 4 Special Projects Dept.) The 'V' belt drive can also incorporate a propeller shaft operating a rear power take-off. This enables more than one piece of equipment to be coupled to the same power take-off point. For example : the 'V' belt driving a compressor/generator mounted in the vehicle, and the propeller shaft providing power through the rear power take-off point for driving machinery.

One or more clutches are required to allow drive selections to the appropriate equipment — in the example above, an electrically-operated clutch could be used to disengage the drive to the compressor/generator while power was maintained to the rear power take-off.



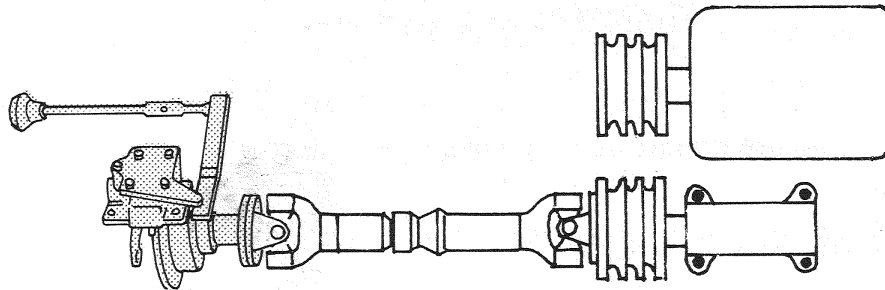
Pulley not supplied

- b) Centre power take-off propeller shaft to machinery mounted below floor of rear body.



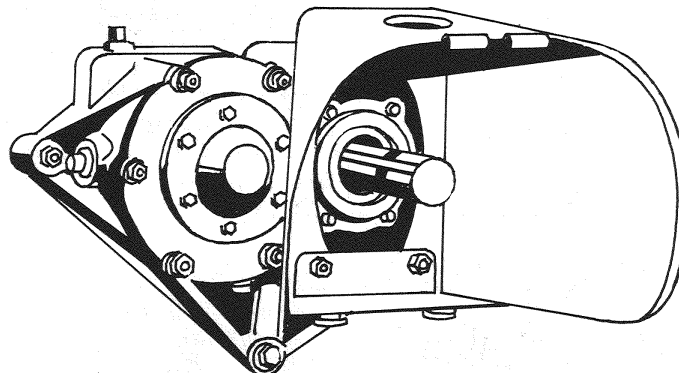
Propeller shaft not supplied

- c) Centre power take-off with propeller shaft drive to outrigger bearing mounted in chassis frame, then by 'V' belt to machinery mounted in rear body section. In the long-wheelbase version two propeller shafts, coupled through a centre bearing, are fitted.



Shaft, outrigger bearing and pulley not supplied

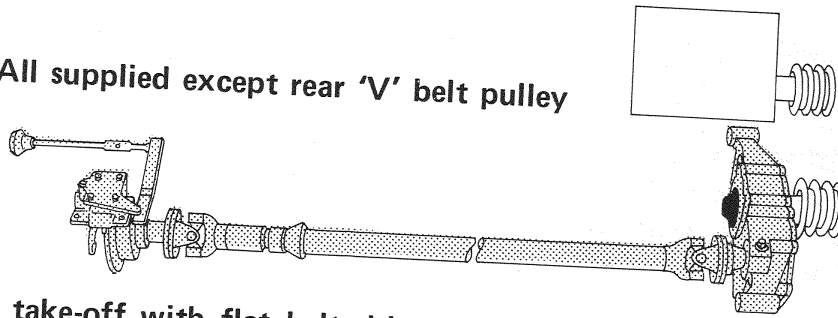
- d) Rear power take-off mounted on rear cross-member driven by propeller shaft from centre power take-off. Standard 0.720 step up ratio in power take-off gearbox capable of being reversed to give 1.378 step down ratio.



Complete unit supplied

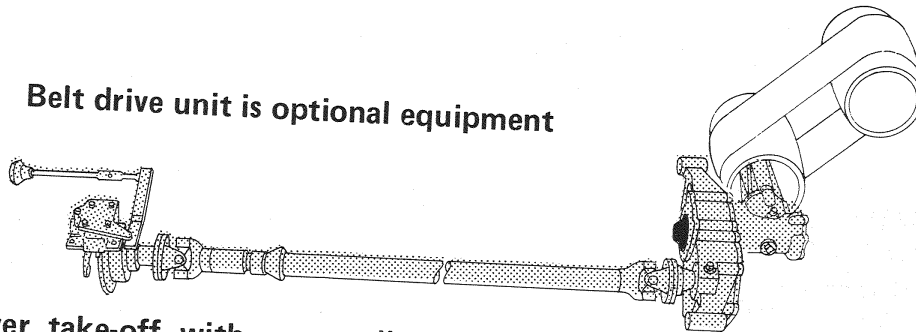
e) Rear power take-off with 'V' belt drive to machines mounted on rear of vehicle.

All supplied except rear 'V' belt pulley



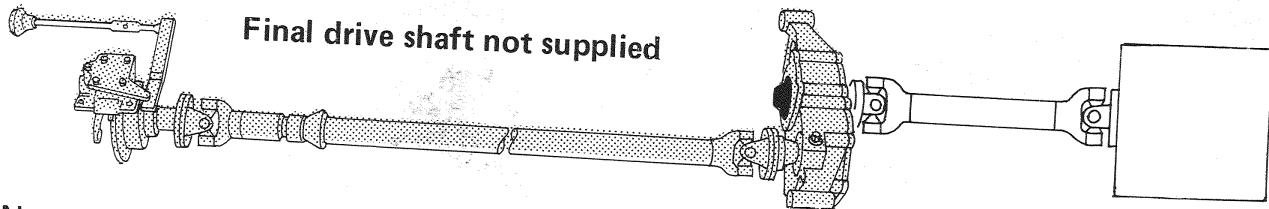
f) Rear power take-off with flat belt drive unit added for driving remote stationary machinery usually of an agricultural nature.

Belt drive unit is optional equipment

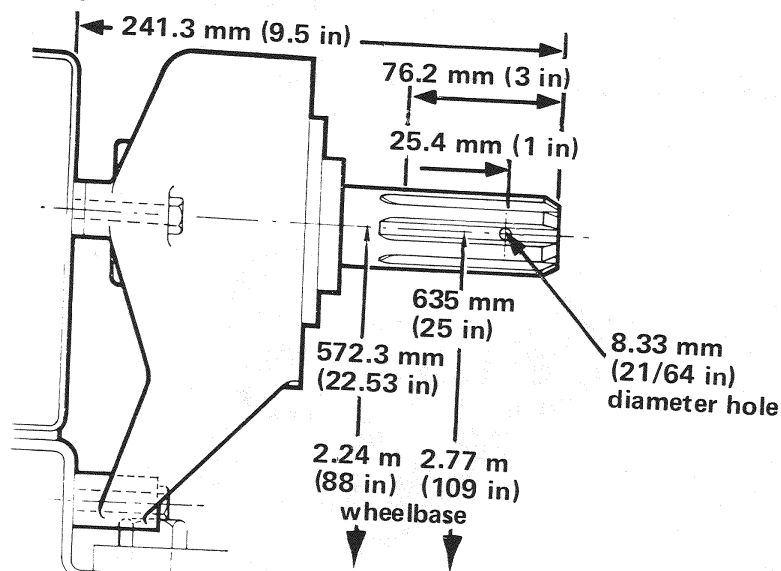


g) Rear power take-off with a propeller shaft attached to splined output shaft (see diagram below). The drive is applied usually for trailer-mounted equipment. It can also be used for driving remote stationary machinery.

Final drive shaft not supplied



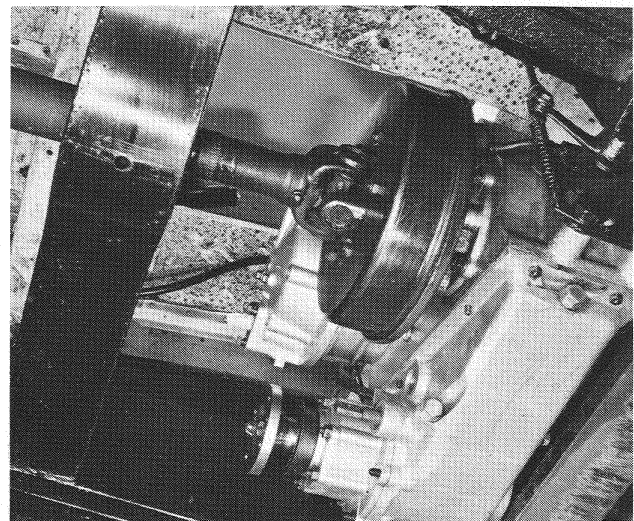
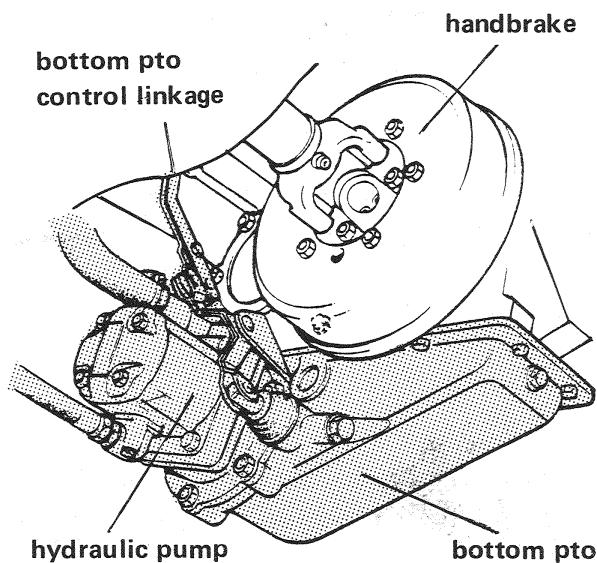
Note: All these drives may be applied to any Land-Rover model, except that e), f) and g) above cannot be fitted to long-wheelbase station wagons. Also, when a rear power take-off drive shaft is fitted to any long-wheelbase Land-Rover, a special 11 gal (50 litre) fuel tank is installed to one side of the shaft in place of the ordinary tank.



Bottom Power Take-off

This is an auxiliary gearbox attached at the base of the transfer gearbox to which can be added the same mechanical or hydraulic drive units used at the centre power take-off. However, as the direction of rotation of the bottom power take-off is reversed, when a hydraulic unit is fitted, the operating pump must have the reverse direction of rotation. A particular application of the bottom power take-off is to enable a hydraulic winch to be fitted when the centre power take-off is required for other purposes. Care must be taken with the mechanical arrangement that ground clearance of the driven machinery is sufficient.

Engagement of each drive is by a separate dog clutch which can be selected by a control knob in the driving compartment. Before engagement is made for stationary running, the transfer gearbox must be placed in the neutral position to disengage the drive to the wheels.



Engine Crankshaft Drive

A short drive shaft fitted to the engine crankshaft will provide mechanical drive. The following items of equipment are also necessary:

- i) Adaptor flange to couple drive shaft to engine.
- ii) Drive shaft with universal joints to compensate for misalignment.
- iii) Flexible coupling recommended where the machinery to be driven has a large rotary inertia and/or uneven driving torque.
- iv) Clutch, to uncouple driven unit when not in use.
- v) Torque limiter to provide protection in the event of the driven machinery seizing – this could simply be a shear pin.

Additional Equipment

The following optional equipment will be found useful in conjunction with power take-off equipment:

- a) **Petrol engine hand throttle** which can be mounted in the cab to override the accelerator pedal linkage and set the throttle. This is suitable for all installations where precise speed control is not required, and where the engine load is light or relatively constant.
- b) **Petrol engine governor** for 2.25-litre engine which can be supplied by Land Rover Ltd. to give automatic control of the throttle. This governor is suitable for all power take-off applications and will maintain a near constant driving speed under varying load conditions at any selected point in the power take-off speed range. Alteration of engine speed setting between the range 1500–3000 r/min is made by means of a hand control lever in the driving compartment.
- c) **Petrol engine governor** for 2.6-litre engine which can be supplied by Tooley Electro Mechanical Co. Ltd. See page 9/11.
- d) **Petrol engine rev counters and hour meters** which give accurate indication of operating speed and time. They can usually be supplied by local motor factors. Otherwise from Smiths Industries, see page 9/11.

Specialist Equipment available from Land Rover Ltd.

Air-conditioning

The roof-mounted Hubbard CT140 air-conditioning unit may be installed in all vehicles except soft tops. It has a number of features which make it suitable for use in Land-Rovers.

- Its system capacity is high by passenger car standards, being rated at 4103 W (14,000 Btu/h).
- The refrigeration cooling condenser is included in the roof unit, instead of in front of the radiator. The latter area is therefore free for the mounting of winches, etc.
- Accessibility for maintenance and servicing is good.
- Roof-mounted controls allow operation by passengers, and avoid congestion on dashboard.
- Roof-level entry of cool air provides even dispersion throughout vehicle.

Temperature control is by an adjustable thermostat, and air control is by a 3-speed fan-motor control switch with a positive 'off' position, and two adjustable air supply louvres.

The unit weighs 46 kg (100 lb) and brings the overall vehicle height to 2.06 m (81 in) for the short-wheelbase version, and 2.10 m (82.5 in) for the long-wheelbase version.

Overdrive

Engineered specially for Land-Rover vehicles, this overdrive unit saves fuel by reducing engine revs, and so wear. Fuel savings vary with speed and conditions of use, but an average figure of 10% can be expected for road work. When an overdrive unit is engaged, engine speed is reduced by 27.8% for the same road speed.

The unit fits onto the back of the transfer box and has full synchromesh. The gear change is mechanical, and is operated by a separate gear lever, requiring the use of the clutch. The overdrive unit is fitted at the centre power take-off point, so this cannot be used. However, the bottom power take-off is unaffected.

Note: It is recommended that overdrive is only engaged in third or fourth gear.

Towing Equipment

Information about towing weights, and loading and towing techniques is given in Section 10, pages 10/5 to 10/6. A list of the towing equipment available from Land Rover Ltd., is given here.

Adjustable Towing Brackets, bolts directly onto the rear cross-member and allows easy adjustment of the hitch point, thus allowing trailers with differing 'A' frame heights to be coupled.

Attachment Bracket for Towing Pintle, bolts to the rear cross-member and is drilled to accept any towing hitch with an 89 mm (3.5 in) centre fixing. It is used to reduce the height of the towing attachment. (This bracket is included on export vehicles with the light duty towing pintle, unless otherwise specified.)

Extension Plate for Towing Pintle, bolts to the rear power take-off towing-plate to accept the light duty towing pintle. It allows the towing of trailers when the rear power take-off is fitted, or can be used to obtain greater articulation between vehicle and trailer.

Front Towing and Lifting Rings, see Accessories.

Towing Ball, for use with caravans for example, has a diameter of 50 mm.

Towing Hook, Heavy Duty, military type with a spring-loaded safety catch. It is complete with an adaptor plate for fitting direct onto the rear cross-member. (Cannot be used with rear power take-off. Door-mounted spare wheels must be removed.)

Towing Jaws, Standard or Heavy Duty, are used in conjunction with the attachment bracket described above. (Cannot be used with rear power take-off.)

Towing Pintle, Heavy Duty, is fitted with a 32 mm (1.25 in) diameter pin, and will accept a towing eye up to 39 mm (1.5 in) ring thickness. It is mounted directly onto the rear cross-member. (Cannot be used with rear power take-off. Door-mounted spare wheels must be removed.)

Towing Pintle, Light Duty, designed for light trailers not exceeding 2032 kg (4480 lb) gross laden weight. Fitted with a 22 mm (0.875 in) diameter pin, it will accept a towing eye up to 39 mm (1.5 in) ring thickness. The pintle can be mounted directly onto the rear cross-member, or onto the extension plate, or the attachment bracket (see below).

(This pintle is supplied with all export vehicles unless another type is requested. Door-mounted spare wheels must be removed.)

Towing Bracket (Z Plate), supplied with a rear power take-off or separately, can be used in conjunction with pintle-fitted trailers, or as a base for securing the extension plate. (Cannot be used with rear steps.)

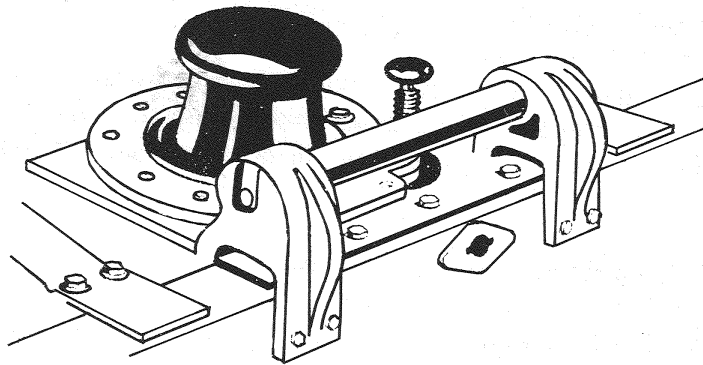
Trailer Lighting, see Accessories.

Winches

Many kinds of winch are suitable for fitment to Land-Rovers, and a description of the basic types is given here. Winches and accessories available from Land Rover Ltd, are listed in the Accessories section. Approved suppliers of other winches are listed on page 9/12.

Some information about winching techniques is given in Section 10.

Capstan Winch is well suited to self-recovery and straight hauling or pulling. It is driven mechanically by connection with the engine crankshaft. A shear-pin is incorporated in the drive line for overload protection.



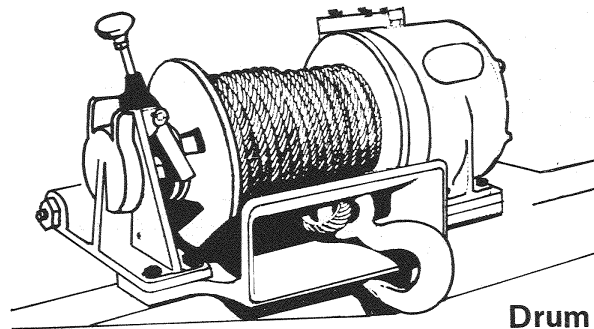
Capstan Winch

Only the recommended polypropylene rope should be used. When this is tightly coiled two or three times round the revolving capstan the friction generated gives a single line pull of up to 1360 kg (3000 lb).

Powerful capstan winches are available for specialised applications such as underground cable laying and removing.

Drum Winches are more powerful than the capstan winch, pulling up to 1814 kg (4000 lb) and have the advantage of being able to store the cable on the drum when not in use. These winches have a lifting as well as a pulling capacity.

An integral drum release control enables the cable to be reeled out, and there is a clutch mechanism for engaging and disengaging the power drive. The drum may be powered electrically, hydraulically or mechanically and can wind in one or both directions of rotation.



Drum Winch

Electric Drum Winches use the vehicle's 12 V battery or, with split charge facility, an auxiliary battery. Winch overload is prevented by a fuse in the power supply cable.

The winch is suitable for self-recovery and general winching duties. Single line pull is up to 2268 kg (5000 lb) and winching speeds vary according to load. A 4 m (12 ft) wander lead allows operation either from inside the cab, or alongside the item being winched.

Only wire rope should be used, which requires periodic cleaning and greasing. Otherwise the unit is maintenance free.

Hydraulic Drum Winch is powered from either the centre or bottom power take-off points, and is ideal for specialist operations as it provides an infinitely variable pulling effort from 0 – 2268 kg (5000 lb) either inwards or outwards.

The pack comes complete with hydraulic fluid tank, hydraulic power take-off, pipes, control unit and winch. The winch is controlled from the driver's seat.

Mechanical Drum Winch is driven by a propeller shaft from the centre power take-off. It is controlled via the vehicle clutch so does not have the precise control of the hydraulic winch. It has a pulling power of 2268 kg (5000 lb) inwards or outwards and is suited to rugged operations such as logging.

Note: Land Rover Ltd. Special Projects Dept. would be pleased to discuss with you any power take-off, winch or specialist conversion problem you may encounter.

Contact: 4 x 4 Special Projects
Land Rover Ltd,
Lode Lane,
Solihull ,
West Midlands,
B92 8NW,
England.
Telephone: 021-743-4242
Telex: 338641

Specialist Equipment and Special Conversions Available from Approved Suppliers

General

Engine Speed Governor (2.6-litre engine, long wheelbase)
Tooley Electro Mechanical Co. Ltd., Church St., Earl Shilton, Leics., England.
Telephone: 0455-49091.

Hydraulically Damped Bucket Seat (all models)
Bostrom Division Universal Oil Prod., Weedon Road Industrial Estate, Northampton,
England. Telephone: 0640-55521 Telex: 31346.

Independent Heater (all models)
Eberspacher (UK) Ltd., Fibbards Rd., Brockenhurst, Hants, England.
Telephone: 05902-2626 Telex: 47674.

Rev Counter (for use with power take-off applications except diesel)
Smiths Industries, 50 Oxgate Lane, Cricklewood, London NW2, England.
Telephone: 01-452-3333 Telex: 922981.

Roof Rack, Heavy Duty (long wheelbase only)
Rick Walker Fabrications, Kingsfield Way, Gladstone Rd., Northampton, England.
Telephone: 0604-582499.

Power Braking Systems

Compressed Air (all models)
Feeny & Johnson Ltd., Alperton Lane, Wembley, Middlesex, England.
Telephone: 01-998-4458.

Vacuum (except diesel)
Feeny & Johnson Ltd., Alperton Lane, Wembley, Middlesex, England.
Telephone: 01-998-4458.

Trailers

Articulated (all models)
B. Dixon - Bate Ltd., Bridge Works, Tarvin, Chester, England.
Telephone: 0244-24034 Telex: 61317.

Power Axle (long wheelbase only)
Scottorn Trailers Ltd., Chartridge, Chesham, Bucks., England.
Telephone: 02405-2631 Telex: 83132.

Towing Equipment (all models)
B. Dixon - Bate Ltd., Bridge Works, Tarvin, Chester, England.
Telephone: 0244-24034 Telex: 61317.

Winches

Auto Capstan (all models)

Plumett Ltd., Worthing Rd., West Grinstead, Horsham, Sussex, England.
Telephone: 08926-3000 Telex: 88891.

Capstan (all models)

Fairey Winches Ltd., South Station Yard, Whitchurch Rd., Tavistock, Devon, England.
Telephone: 0822-4101 Telex: 45324.

Drum (all models)

Fairey Winches Ltd., South Station Yard, Whitchurch Rd., Tavistock, Devon, England.
Telephone: 0822-4101 Telex: 45324.

Electric (all models)

Ryders Auto Service (GB) Ltd., Knowsley Rd., Bootle, Lancs., England.
Telephone: 051-922-7585.

Hydraulic Auto Capstan (all models)

Plumett Ltd., Worthing Rd., West Grinstead, Horsham, Sussex, England.
Telephone: 08926-3000 Telex: 88891.

Hydraulic Drum (all models)

Portobello Fabrications Ltd., Coleford Rd., Sheffield, England.
Telephone: 0742-42781 Telex: 54106.

Winch Fitting and Accessory Service (all models)

Spencer Abbot (Engineers) Ltd., 51 Tyburn Rd., Birmingham, England.
Telephone: 021-327-2711 Telex: 337217.

Conversions

Air Compressors (large compressors are only suitable for long-wheelbase diesel)

Airdrive Ltd., London Rd., High Wycombe, Bucks., England.
Telephone: 0494-30021 Telex: 83239.

Ambulances (all models)

Herbert Lomas Ltd., Handforth, Wilmslow, Cheshire, England.
Telephone: 0625-25258 Telex: 668913.

Pilcher-Greene Ltd., Victoria Gardens, Burgess Hill, England.
Telephone: 04446-5707 Telex: 87323.

Wadham Stringer (Coach Builders) Ltd., Hambleton Rd., Waterlooville, Hants., England.
Telephone: 07014-2661 Telex: 86224.

Armoured Patrol Vehicle and Armoured Personnel Carrier (long wheelbase, 6-cylinder model only)

Short Bros. and Harland Ltd., PO Box 241, Airport Rd., Belfast, Northern Ireland.
Telephone: 0232-58444 Telex: 74688.

Dropside Body, Aluminium (long wheelbase only)
P.D. Stevens & Sons Ltd., Adderley Rd., Market Drayton, Salop., England.
Telephone: 0630-2396

Expedition Consultants
K. & J. Slavin (Quest 80s) Ltd., Ashton Wold, Peterborough, England.
Telephone: 08322-2649.

Filming Unit, Cine (long-wheelbase station wagon only)
Cintec Ltd., Wandle Way, Mitcham, Surrey, England.
Telephone: 01-640-2241 Telex: 946117.

Filming Unit, Video (long-wheelbase station wagon only)
Cintec Ltd., Wandle Way, Mitcham, Surrey, England.
Telephone: 01-640-2241 Telex: 946117.

Fire Appliances (all models)
Carmichael Fire and Bulk Ltd., Gregory's Mill St., Worcester, England.
Telephone: 0905-21381 Telex: 338039.

HCB Angus Ltd., South Hampshire Industrial Park, Testwood, Southampton, England.
Telephone: 0703-86707 Telex: 477052.

Chubb Fire Security Ltd., Pyrene House, Sunbury-on-Thames, Middlesex, England.
Telephone: 09327-85588 Telex: 261402.

Generators (details from manufacturer)
Tooley Electro Mechanical Co. Ltd., Church St., Earl Shilton, Leicester, England.
Telephone: 0455-42091.

(long wheelbase only)
Allam Generators, Arterial Rd., Eastwood, Leigh-on-Sea, Essex, England.
Telephone: 0702-526551 Telex: 995127.

Hydraulic Platforms (long wheelbase only)
Simon Engineering Dudley Ltd., Dudley, West Midlands, England.
Telephone: 0354-70180 Telex: 338568.

Spencer and Sons (MH) Ltd., Great Bowden Rd., Market Harborough, Leicester, England. Telephone: 0858-63253 Telex: 341966.

Lubricating Workshop (long-wheelbase Truck Cab only)
Tecalemit (Engineering) Ltd., Plymouth, Devon, England.
Telephone: 0752-62844 Telex: 45561.

Mass Radiography Unit (long wheelbase only)
Anglo Coachbuilders Ltd., Station Rd., Batley, West Yorkshire, England.
Telephone: 0924-476421 Telex: 55220.

Motor Caravan (all models)

Carawagon Coachbuilders Ltd., Thames St., Sunbury-on-Thames, Middlesex, England.
Telephone: 09327-85205 Telex: 917170.

Mobile Cinemas

Cintec Ltd., Wandle Way, Mitcham, Surrey, England.
Telephone: 01-640-2241 Telex: 946117.

British Films Ltd., Carlyle House, 235 Vauxhall Bridge Rd., London SW1, England.
Telephone: 01-828-7965 Telex: 947165.

Mobile Radar (long wheelbase only)

Abbey Electronics Ltd., Charter Way, Hurdsfield Industrial Estate, Macclesfield, Cheshire, England. Telephone: 0625-29521 Telex: 667598.

Recovery Equipment (all models)

Harvey Frost and Co. Ltd., PO Box 16, Bishops Stortford, Herts., England.
Telephone: 0279-53208.

B. Dixon-Bate Ltd., Bridge Works, Tarvin, Chester, England.
Telephone: 0244-24034 Telex: 61317.

Refuse Collection (long wheelbase only)

Hestair-Eagle Ltd., The Saltisford, Warwick, England.
Telephone: 0926-44321 Telex: 31450.

Security Vehicles (long wheelbase only)

Glover Webb & Liversidge Ltd., Hamble Lane, Hamble, Hampshire, England.
Telephone: 042122-2811 Telex: 477527.

Snow Clearance (all models)

Atkinsons of Clitheroe Ltd., Kendal St., Clitheroe, Lancashire, England.
Telephone: 0200-22211 Telex: 63211.

James A. Cuthbertson Ltd., Biggar, ML12 6DQ, Scotland.
Telephone: 0899-20020 Telex: 778185.

Spraying Equipment (all models)

Evers and Wall Ltd., Lambourn Woodlands, Nr. Newbury, Berkshire, England.
Telephone: 0488-71444. Telex: 848658.

Stake-sided Body, Wooden (long wheelbase only)

P.D. Stevens & Sons Ltd., Adderley Rd., Market Drayton, Salop, England.
Telephone: 0630-2396.

Welders (all models)

Tooley Electro Mechanical Co. Ltd., Church St., Earl Shilton, Leicester, England.
Telephone: 0455-42091.

Workshops (long wheelbase only)

Tooley Electro Mechanical Co. Ltd., Church St., Earl Shilton, Leicester, England.
Telephone: 0455-42091.

10

10: OFF-ROAD DRIVING, TOWING & WINCHING

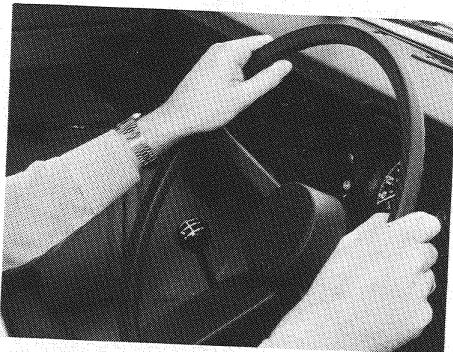
As a Land-Rover salesman, you will already appreciate that demonstrating the product's ability is an excellent aid to closing the sale. Demonstrations, however, must be planned and conducted in a professional manner. It is, therefore, essential that you be competent and confident in handling the vehicle.

Your responsibilities do not end with the demonstration drive, especially if your customer is new to four-wheel drive vehicles. It is imperative that having purchased the vehicle, your customer understands its operation in all conditions, especially off-road driving, if he is to use its capabilities to the full. Here you can help him!

Off-road Driving

Driving Position

Adopt an upright, relaxed posture and ensure that the safety belts are correctly adjusted. When in motion, maintain a firm grip on the steering wheel, but do not wrap your thumbs round the spokes for if the wheel kicks back it may injure them. Do not attempt to fight violent steering movements, but allow the wheel to slip through your fingers. Your arms should be sufficiently relaxed to absorb shocks transmitted through the steering wheel.



Wrong!

10/1

General Procedure

- a) Consider each section of ground carefully before you cross it.
- b) Before a difficult section, select four-wheel drive, low range, and a suitable gear. Remain in this gear while crossing. For most purposes second or third gear will prove practical.
- c) Avoid sudden acceleration as it may cause wheel spin.
- d) Keep your foot off the clutch pedal. A sudden bump may cause you to de-clutch and lose control.
- e) Keep braking to an absolute minimum. Braking on wet or muddy sections can induce sliding and loss of control. In particular do not brake on steep downhill sections.
- f) Under most circumstances, a steep uphill or steep downhill slope should be taken straight up or straight down.

Ascending Step Slopes

Select an appropriate gear (second or third low range is usually adequate). If the slope is slippery, then the higher the gear the better, as maximum torque is reached before maximum revs. Make a steady approach, using minimum revs. If loss of forward momentum seems likely, traction will often be improved by lifting off the power.

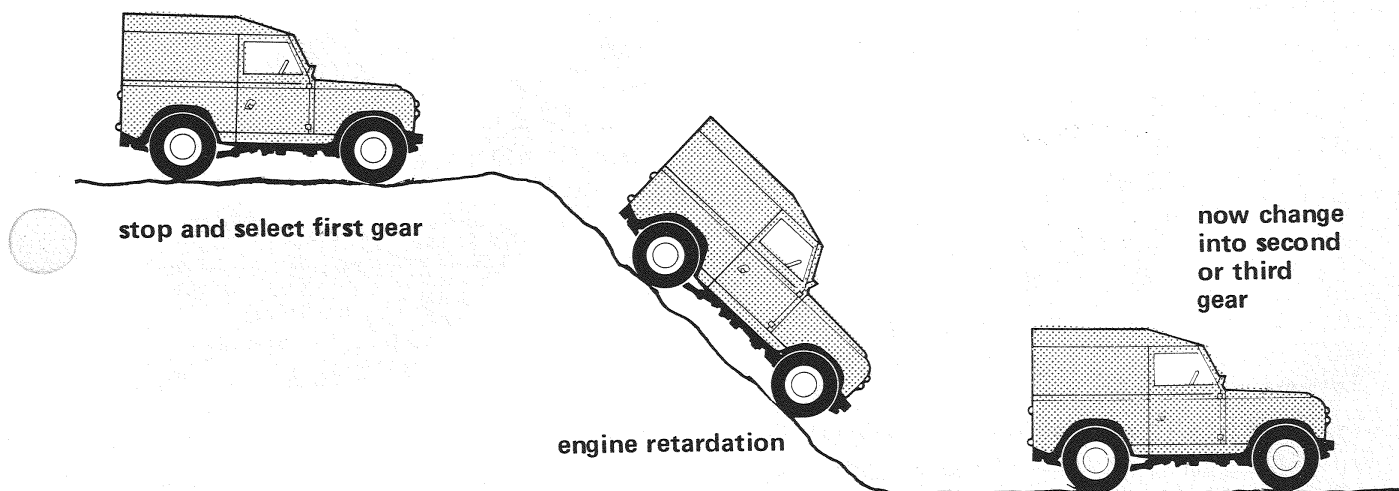


Correct! Note position of thumbs

Descending Steep Slopes

Stop the vehicle and engage first gear, low range, then move off. Do not touch the brake during the descent — the engine will limit the speed, and the vehicle will remain perfectly under control while the front wheels are turning.

the vehicle is being driven solo (i.e. not towing) normal high range can be used at conventional road speeds in four-wheel drive on snow, though this, of course, will depend on the road conditions.



Driving on Soft Ground

Where conditions are soft, i.e. marshy ground or sand, reduced tyre pressures will increase the area of contact between the tyres and the ground. This will help to improve traction and reduce the tendency to sink. (Tyre pressures should, of course, be brought back to standard pressure when such situations have passed.)

Select four-wheel drive, then engage a suitable gear and stay in it. Gear changing causes drag which can result in wheel spin, particularly on sand, so that the wheels sink and the vehicle becomes immobilised.

Ice and Snow

Land-Rovers are used extensively in snow and icy conditions. The driving techniques are generally the same as driving on mud or wet grass. Select as high a gear as possible using four-wheel drive and move off using as few revs as possible. Avoid violent movements of the steering wheel and keep braking to a minimum. When

Rough and Rocky Tracks

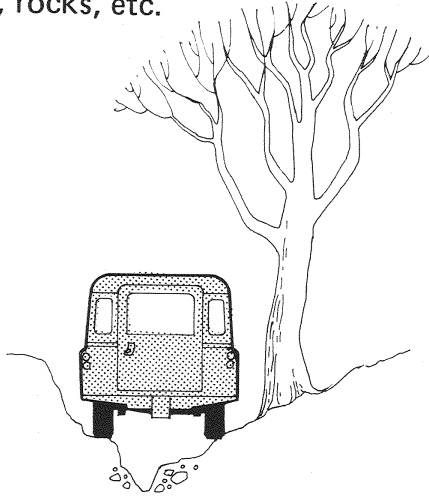
Although generally rough tracks can be negotiated in two-wheel drive, it is advisable to use four-wheel drive if there is likely to be excessive suspension movement that induces wheel spin. Low range may be necessary to avoid slipping the clutch.

Be aware of the need to maintain ground clearance under the chassis and a clear approach and departure angle. Avoid existing deep wheel ruts, sudden changes in slope and obstacles, etc. which may impact on the axle or chassis. Before venturing off-road, remove the spare wheel from the rear door when fitted as this affects the departure angle.

On deeply-rutted existing tracks the tendency is to oversteer the vehicle so that it is being driven on left or right hand lock in ruts. This should be avoided as it causes drag on the road wheels, and can be extremely dangerous as the vehicle may veer off the track when the front wheels reach level ground or find traction.

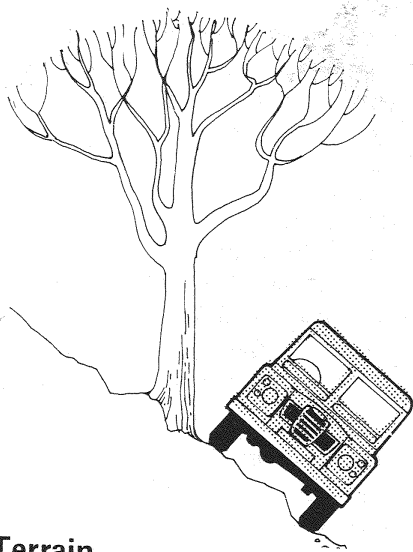
Negotiating a 'V' Shape Gully

This should be tackled with extreme caution as steering up or down the gully walls could lead to the vehicle becoming trapped on the bank or on obstacles such as trees, rocks, etc.



Traversing a Slope

Traversing a slope should be undertaken in the following way. Check that the ground is firm under all wheels and avoid situations where the uppermost wheels would climb over a rock or tree root. Either of these situations could result in the vehicle rolling onto its side.

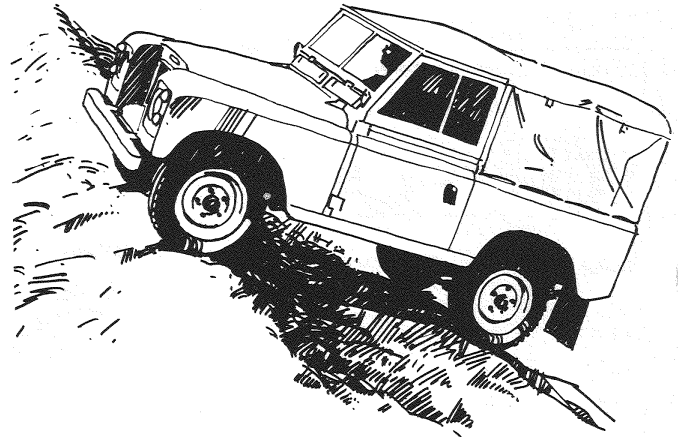


Uneven Terrain

When choosing a path across rough terrain, bear in mind the action of the differentials and select a path so that the condition under one wheel is similar to that under the opposite wheel of the same axle. This principle should be applied both in assessing the correct angle of approach to an obstacle so as to avoid wheels being lifted off the ground. For example:

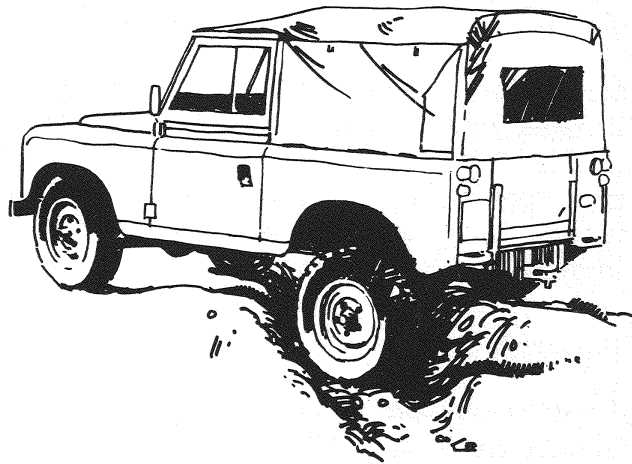
a) Crossing over a ridge

Approach the ridge at right angles so that both front wheels go over together. If approached at an angle, traction can be completely lost through diagonally opposite wheels leaving the ground.



b) Crossing a ditch

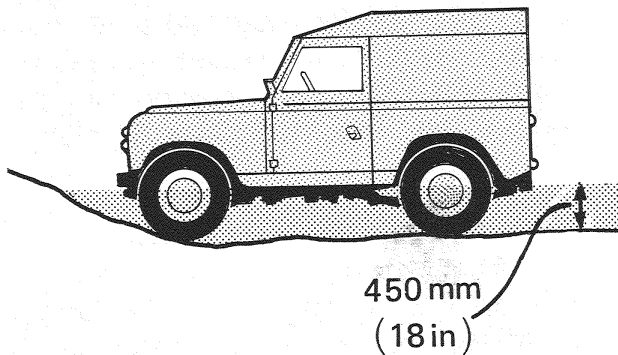
Here the opposite to the first example applies. Ditches should be crossed at an angle so that three wheels are kept in contact with solid ground. If approached at right angles the two front wheels drop into the ditch, effectively preventing forward or reverse movement.



Wading

The maximum advisable fording depth is 450 mm (18 in). Before fording, make sure the clutch-housing drain-plug is in position, and if the water is deep, slacken off the fan belt. Avoid over-speeding of the engine to prevent saturation of the electrical system and air intake. A low gear is desirable and sufficient throttle should be maintained at all times to avoid stalling if the exhaust pipe is under water.

When dry land is regained, make sure the brakes are dried out immediately so that they are fully effective when needed again. This can be accomplished by driving a short distance with the foot brake applied. Tighten the fan belt and remove the drain-plug.



Failure to Negotiate an Uphill Slope

- a) Hold the vehicle on the foot brake.
- b) Engage reverse gear, low range.
- c) Keeping feet off clutch, accelerator and brake, allow the vehicle to reverse down the slope, using the engine to provide retardation.
- d) If the engine has stalled, engage reverse gear, low range, remove foot from clutch and restart engine. The vehicle will then immediately start to move and will reverse down the slope.

If Immobilized

- a) Remove any obstacle, if this is possible.
- b) Do not spin the wheels, this makes things worse by deepening the ruts.
- c) Equalise load on front and rear axles.
- d) If the ground is very soft, reduce tyre pressure, if this has not previously been done. This will depend, of course, on the type of tyre. (For clarification refer to the Owner's Manual.)
- e) Clogged tyre treads should be cleared.
- f) Brushwood, sacking, or any similar 'mat' material placed in front of the tyres will help in producing tyre grip.
- g) If necessary, jack-up the vehicle and place material under the wheels.

These general guide-lines should help you to demonstrate Land-Rover's cross-country capability. Careful thought and practical experience will usually provide the solution to a problem, but good driving technique will in itself ensure that such instances are kept to a minimum or avoided completely.

Towing

The Land-Rover can tow loads over all types of terrain. Towing equipment, as recommended by the factory, is described on pages 9/8 and 9/9. Fittings are attached directly to the chassis, for strength and safety.

The torque range of Land-Rover engines allows maximum-weight loads to be driven smoothly from rest, and reduces gear changing on hills, or rough terrain. A smooth start will be achieved with trailers over 2000 kg (4400 lb) by moving off in low range, then changing to high range while on the move (see note 2). It is impossible to do this in many competing vehicles.

The suspension is designed to cope with a heavy trailer load without upsetting the balance or feel of the vehicle. Details of gross maximum trailer weights are listed below.

When preparing the vehicle and trailer combination, careful attention must be paid to the trailer manufacturer's recommendations. An outline of the correct procedure is given here:

- a) Adjust tyre pressures on the towing vehicle, as recommended in the Land-Rover Owner's Manual.
- b) Adjust tyre pressures on trailer, as

recommended by the manufacturer.

- c) Balance the trailer and the vehicle, both unladen, so that the trailer drawbar and the hitch point on the vehicle are at the same height. Adjust the height of the hitch point if necessary.
- d) Check operation of trailer brakes and lights.
- e) Load the trailer and check the weight on the hitch point (called the drawbar loading weight, or nose weight), in accordance with the manufacturer's recommendations.
- f) The recommended nose weight limit is 75 kg (165 lb) and under no circumstances must it exceed 300 kg (660 lb). The nose weight plus the load area and/or rear seats of the vehicle must never exceed the maximum rear axle load or gross vehicle weight (see Technical Data Section).

Notes:

1. Since towing regulations vary from country to country, it is important to refer to the relevant national motoring organisations for the laws relating to towing weights and speed limits.
2. When changing from low to high range on the move, this procedure is

	On-road		Off-road	
	kg	lb	kg	lb
Unbraked trailers	500	1100	500	1100
Trailers with overrun brakes	2000	4400	1000	2200
Trailers with driver-operated brakes	4000	8800	1000	2200
	3000 (Diesel)	6600		

Note: These weights may, in a few cases, exceed national regulations, which must, of course, be followed.

recommended, to avoid damage to the gearbox:

- i) Move off in second or third gear, low range and increase speed to 25–30 km/h (15–20 mph).
 - ii) Move the transfer lever from low ratio through the neutral position to high ratio, double de-clutching through both movements, and allowing the engine revs to drop completely.
 - iii) The vehicle will now be in two-wheel drive. If four-wheel drive, high ratio is required, simply push down the yellow knob.
3. A table giving details of maximum tractive effort, and drawbar pull, for all Land-Rovers, is given on page 12/10. Charts showing the maximum gradients which may be climbed, under different load and trailer weight conditions, are given on pages 12/12 and 12/13.

Winching

Land-Rovers may be fitted with a variety of winches, suited to different functions. Details are given under Power Take-off Drives, pages 9/9 to 9/10, and under Specialist Equipment, page 9/12.

Winch Use

A winch may be used for self-recovery, for recovering other vehicles and for a wide variety of haulage jobs. When hauling with the vehicle stationary, ground anchors may be used to advantage. (See Accessories, page 8/7.)

If a winch is mounted over the front axle of a petrol-engined Land-Rover, it is recommended that heavy duty front springs are fitted.

Winch Operation

Winches vary considerably in their mode of operation, and the customer should

be referred to the manufacturer's instructions for his own model. The following is a general outline:

- a) Apply handbrake.
- b) If recovering a motor vehicle or hauling another object, position ground anchors.
- c) Prepare winch for operation and attach wire or fibre rope according to manufacturer's instructions.
- d) Start car engine as necessary, maintain revs required by instructions, and begin winching.
- e) After winching, spool wire or rope onto drum winches. Remove rope from capstan winches for storage elsewhere.

Do's and Don'ts

Safety is the most important consideration; ropes, and particularly wire ropes, will react with great force if they part, and can cause very severe injury.

- a) Never stand near a rope under tension, and in particular never stand astride it.
- b) Wear gloves when handling wire rope to protect your hands in case of a broken strand.
- c) Never allow wire rope to kink, coil or overwrap loose coils.
- d) Do not attempt to continue winching if the winch has stalled through overload.
- e) If brass shear-pins are fitted, do not replace them with steel ones — if the pins don't shear, some other part of the winch may.
- f) Never operate an electric winch without the correct fuse in the system.
- g) After use, wire ropes must be cleaned and greased — hold a greasy or oily rag in your gloved hand and allow wire to pass through it. Synthetic rope should be cleaned and dried.

11: COMPETITION

Introduction

Four-wheel-drive vehicles, by definition, are working vehicles and therefore complex with many variations of chassis and bodywork. Because of other manufacturers' marketing policies throughout the UK, Europe and rest of the world, pricing structures play an important role in deciding who are the direct competitors to each of the Land-Rover models.

The following charts show a broad outline of the competitive vehicles with a brief description of their specifications and strengths or weaknesses. This format can be used for a more detailed 'on territory' study by individual salesmen so that they are able to draw comparisons during sales' presentations.

MAKE/MODEL	
Derivative/Model No.	
Wheelbase	
Body Variants	— soft top — hard top — pick-up — station wagon
Seat capacity	
Payload	
Engine	— petrol — diesel
Torque output	— petrol — diesel
Gearbox	— manual — auto
Transfer	— high/low ratio — two-/four-wheel drive
Suspension	
Brakes	
Product Advantage	
Product Disadvantages	

TOYOTA LAND-CRUISER				
FJ40 (BJ40)	FJ43 (BJ43)	HJ45 (BJ45)	FJ55	
2,285 m 90 in	2,430 m 96 in	2,950 m 116 in	2,700 m 106 in	
✓				
	✓	✓		
2-4	2-3	2-3	12	✓
600 kg 1323 lb	725 kg 1598 lb	1200 kg 2646 lb	710 kg 1565 lb	
4.2-litre 6-cylinder	4.2-litre 6-cylinder	4.2-litre 6-cylinder	4.2-litre 6-cylinder	
3.0-litre	3.0-litre	3.0-litre		
200 lbf ft 271.2 Nm @1800 r/min	200 lbf ft 271.2 Nm @1800 r/min	200 lbf ft 271.2 Nm @1800 r/min	200 lbf ft 271.2 Nm @1800 r/min	
✓	✓	✓	✓	
✓	✓	✓	✓	
✓	✓	✓	✓	
Beam axles front and rear, underslung leaf springs				
Disc front, drum rear. Transmission handbrake				
Competitively priced High standard of initial equipment Simple, uncomplicated vehicle — easy to service Powerful engines — good torque and power output Smooth precise operation of gearbox Good braking with servo assistance				
Only one power take-off position, at front Poor fuel consumption Steering dangerously exposed at front Excessive overhang — poor approach and departure angles All-steel body liable to corrosion Poor selection of low gear ratios affecting cross-country performance				

TOYOTA HI-LUX	
HI-LUX	
2,800 m 110 in	
✓	
2-3	
1085 kg 2392 lb	
2.0-litre 4-cylinder	
122 lbf ft 165.4 Nm @2400 r/min	
✓	
✓	
✓	
Beam axles front and rear, overslung leaf springs	
Disc front, drum rear. Conventional handbrake	
Competitively priced with high level of initial equipment Good performance on- and off-road, with excellent ground clearance Good payload and carrying capacity 2-litre engine develops good torque at low engine speed	
A centre power take-off is offered, but no equipment available as yet All-steel body liable to corrosion Handbrake is operated on rear wheel by conventional cables Pick-up is only version available, and has very high load platform Semi-floating axle shafts	

MAKE/MODEL	
Derivative/Model No.	
Wheelbase	
Body Variants	— soft top — hard top — pick-up — station wagon
Seating capacity	
Payload	
Engine	— petrol — diesel
Torque output	— petrol — diesel
Gearbox	— manual — auto
Transfer	— high/low ratio — two-/four-wheel drive
Suspension	
Brakes	
Product Advantages	
Product Disadvantages	

NISSAN PATROL			
(L) 60 (L) K60	(L) G60 (L) KG 60 (L) WG60	622 (L) G60H	
2,200 m 86 in	2,500 m 98 in	2,800 m 110 in	
✓	✓		
✓	✓	✓	
	✓		
6	6-9	2-3	
510 kg 1124 lb	440 kg 970 lb	1110 kg 2447 lb	
4.0-litre 6-cylinder	4.0-litre 6-cylinder	4.0-litre 6-cylinder	
217 lbf ft 294.3 Nm @1600 r/min	217 lbf ft 294.3 Nm @1600 r/min	217 obf ft 294.3 Nm @1600 r/min	
✓ (3-speed)	✓ (3-speed)	✓ (3-speed)	
✓	✓	✓	
✓	✓	✓	
Beam axles front and rear, semi-elliptic leaf springs			
Drum brakes all round. Transmission handbrake			
Range of chassis lengths with variety of body options Good on-road performance and manoeuvrability Ease of service Centre and front power take-off			
3-speed gearbox, no synchronesh on first, with poor reliability reputation Poor service back-up in Europe Excessive front and rear overhang, giving poor approach and departure angles All-steel body liable to corrosion Off-road steering poor			

SUZUKI	
LJ80	LJ80V
1,930 m 76 in	1,930 m 76 in
✓	✓
2	2
400 kg 882 lb	350 kg 772 lb
797 cc 4-cylinder	797 cc 4-cylinder
44.1 lbf ft 59.8 Nm @3500	44.1 lbf ft 59.8 Nm @3500
✓	✓
✓	✓
✓	✓
Live axle front and rear with semi-elliptical springs	
Drum brakes all round	
Lightweight vehicle giving good economy Competitively priced	
Small payload No power take-off facilities Uncomfortable ride when unladen All-steel panels galvanized, but still liable to corrosion	

MAKE/MODEL	
Derivative/Model No.	
Wheelbase	2,025 m 80 in
Body Variants	— soft top — hard top — pick-up — station wagon
Seat capacity	4
Payload	385 kg 849 lb
Engine	— petrol — diesel
Torque output	— petrol — diesel
Gearbox	— manual — auto
Transfer	— high/low ratio — two-/four-wheel drive
Suspension	
Brakes	
Product Advantage	
Product Disadvantages	

DAIHATSU			
F20 series Short body		F50 series Long body	
2,025 m 80 in		2,025 m 80 in	
✓		✓	
✓		✓	
4		4	
385 kg 849 lb		400 kg 881 lb	
1587 cc 4-cylinder		1587 cc 4-cylinder	
2530 cc 4-cylinder		2530 cc 4-cylinder	
84 lbf ft (80.3 EEC) 113.9 Nm (108.9) @3000 (@3400)		84 lbf ft (80.3 EEC) 113.9 Nm (108.9) @3300 (@3400)	
115 lbf ft (107 EEC) 155.9 Nm (145.1) @2200 (@2400)		115 lbf ft (107 EEC) 115.9 Nm (145.1) @2200 (@2400)	
✓		✓	
✓		✓	
✓		✓	
Beam axles with semi-elliptical springs			
Drum brakes all round. Transmission handbrake			
Lightweight vehicle with two body lengths Good power-to-weight ratio Good manoeuvrability Precise gearbox control Optional front winch Range of body versions and options			
Small payload Noisy on-road, with harsh suspension giving very bumpy ride Poor steering locks No power take-off facilities All-steel panels, some galvanized, but still liable to corrosion Poor carrying capacity			

AMERICAN MOTORS JEEP				
CJ5	CJ6	CJ7	J10	
2.21 m 84 in	2.63 m 104 in	2.37 m 94 in	3.01 m 118 in	
✓	✓	✓	✓	
✓	✓	✓	✓	
2-4	2-4	2-4	3	
637 kg 1404 lb	637 kg 1404 lb	637 kg 1404 lb	1083 kg 2388 lb	
4.2-litre 6-cylinder	4.2-litre 6-cylinder	4.2-litre 6-cylinder	4.2-litre 6-cylinder	
(V8 petrol engine as option)				
186.6 lbf ft 253 Nm @1600 r/min	186.6 lbf ft 253 Nm @1600 r/min	186 lbf ft 253 Nm @1600 r/min	191 lbf ft 258.9 Nm @2000 r/min	
3-speed ✓	3-speed ✓		3-speed ✓	
(4-speed manual option)				
✓	✓	✓ *	✓	
✓	✓	✓ *	✓	
Beam axles front and rear, leaf springs				
Disks front, drums rear				
* Permanent four-wheel drive optional on CJ7 Powerful engines — good performance on- and off-road Good image for leisure and 'fun' market Robust bodywork and chassis Many options and colours available for leisure market Good towing and payload				
Petrol engines too powerful — high fuel consumption Poorly appointed interior on basic versions Heavy manual steering — poor handling on- and off-road Power steering (option) too light — total absence of road feel Only one power take-off — limited commercial application				

MAKE/MODEL	230 G	240 GD	280 GE	300 GD
Derivative/Model No.	(Model Nos. denote engine sizes)			
Wheelbase	2,400 m 2,850 m	2,400 m 2,850 m	2,400 m 2,850 m	2,400m 2,850 m
Body Variants	— soft top	— hard top	— pick-up	— station wagon
Seating capacity	2-5	5-10	5-10	5-10
Payload	Short wheelbase Long wheelbase	605 kg (1334 lb) 820 kg (1808 lb)	2.8-litre 6-cylinder	3.0-litre 5-cylinder
Engine	— petrol	— diesel	— petrol	— diesel
Torque output	— petrol	— diesel	123 lbf ft 167 Nm @2500 r/min	130 lbf ft 176 Nm @2400 r/min
Gearbox	— manual	— auto	— high/low ratio	— two-/four-wheel drive
Transfer	— high/low ratio	— two-/four-wheel drive		
Suspension				
Brakes				
Product Advantages	Well engineered chassis and suspension — very similar to Range Rover Comfortable ride, good on- and off-road traction Good visibility and driving position World-wide dealer network Most component parts from proven commercial			
Product Disadvantages	Untried! No pick-up on long wheelbase, severely limiting commercial usage and convertibility Only one power take-off for front winch Design and layout of steering suggest vulnerability during cross-country use Low initial rates of production			

MERCEDES BENZ EXPLORER				
230 G	240 GD	280 GE	300 GD	
(Model Nos. denote engine sizes)				
2,400 m	2,400 m 2,850 m	2,400 m 2,850 m	2,400m 2,850 m	
✓	✓ (van)	✓	✓	✓
✓ (van)	✓ (van)	✓ (van)	✓ (van)	✓ (van)
✓ (2-door)	✓ (2-/4-door)	✓	✓	✓
2-5	5-10	5-10	5-10	5-10
Short wheelbase 605 kg (1334 lb) Long wheelbase 820 kg (1808 lb)				
2.3-litre 4-cylinder	2.4-litre 4-cylinder	2.8-litre 6-cylinder	3.0-litre 5-cylinder	
123 lbf ft 167 Nm @2500 r/min		N/A		
✓	✓	✓	✓	✓
(automatic available at a later date)				
✓	✓	✓	✓	✓
Beam axles, coil springs and dampers				
Discs front, drums rear. Handbrake operates on rear wheels.				
Well engineered chassis and suspension — very similar to Range Rover Comfortable ride, good on- and off-road traction Good visibility and driving position World-wide dealer network Most component parts from proven commercial				
Untried! No pick-up on long wheelbase, severely limiting commercial usage and convertibility Only one power take-off for front winch Design and layout of steering suggest vulnerability during cross-country use Low initial rates of production				

FIAT CAMPAGNOLA				
Torpedo	Torpedo long body	Hard top	Hard top long body	
2,300 m 90.5 in	2,300 m 90.5 in	2,300 m 90.5 in	2,300 m 90.5 in	2,300 m 90.5 in
✓	✓	✓	✓	✓
7	9	7	9	9
500 kg 1102 lb	650 kg 1433 lb	500 kg 1102 lb	650 kg 1433 lb	650 kg 1433 lb
2.0-litre 4-cylinder	2.0-litre 4-cylinder	2.0-litre 4-cylinder	2.0-litre 4-cylinder	2.0-litre 4-cylinder
(Diesel available at a later date)				
113.4 lbf ft 151 Nm @2800 r/min	113.4 lbf ft 151 Nm @2800 r/min	113.4 lbf ft 151 Nm @2800 r/min	113.4 lbf ft 151 Nm @2800 r/min	113.4 lbf ft 151 Nm @2800 r/min
✓	✓	✓	✓	✓
Independent suspension all round, half-shafts with double universal joints.				
Drums brakes all round. Handbrake operates on rear wheels				
The new Campagnola gives a very comfortable ride with excellent visibility Front and centre power take-off positions Based on a well-proven Army spec. vehicle				
Limitations regarding one wheelbase and only two body styles Complicated suspension system — increases service costs The vehicle has no separate chassis All-steel body liable to corrosion Relatively unproven outside Europe				

Short-wheelbase Land-Rover

Engine 2.25-litre (Petrol)

Type: 4-cylinder petrol
 Bore: 90.47 mm (3.56 in)
 Stroke: 88.9 mm (3.5 in)
 Capacity: 2286 cc
 Compression Ratio: 7:1 8:1
 Maximum Power: 47.8 kW (64 bhp) 51.5 kW (69 bhp)
 at 4000 r/min
 Maximum Torque: 154 N m (113.5 lbf ft) 159 N m (117.2 lbf ft)
 at 2000 r/min
 Firing Order: 1,3,4,2

Engine 2.25-litre (Diesel)

Type: 4-cylinder diesel
 Bore: 90.47 mm (3.56 in)
 Stroke: 88.9 mm (3.5 in)
 Capacity: 2286 cc
 Compression Ratio: 23.1
 Maximum Power: 41.9 kW (56.2 bhp) at 4000 r/min
 Maximum Torque: 137.3 N m (101.3 lbf ft) at 1800 r/min

Lubrication

Nominal Pressure: Engine warm at 2000 r/min
 2.46–4.57 kgf/cm² (35–65 lbf/in²)
 Oil filters internal: Gauze pump-intake filter
 external: Full flow oil filter

Fuel System (Petrol)

Carburettor: Single Zenith 361V
 Petrol Pump: Mechanical with priming lever and sediment bowl

Fuel System (Diesel)

Injectors: CAV Pintaux
 Fuel Pump: Mechanical with priming lever
 Injector Pump: Self-governing D.P.A. distributor type

Cooling System

Type: Pressurised with pump, fan, thermostat and expansion tank
 Working Pressure: 0.63 kgf/cm² (9 lbf/in²)
 Thermostat: 82°C

Transmission

Clutch: Diaphragm spring, single dry plate
 Diameter: 241 mm (9.5 in)
 Main Gearbox: 4-speed and reverse
 Synchronmesh on forward gears
 Transfer Gearbox: 2-speed reduction on main gearbox output.
 Two-/four-wheel-drive control on transfer box output

GEARBOX RATIOS

Main Gearbox: fourth 1:1
 third 1.50:1
 second 2.22:1
 first 3.68:1
 reverse 3.887:1
 Transfer Gearbox: high 1.15:1
 low 2.35:1

OVERALL RATIOS: Final Drive

High Ratio: top 5.40:1
 third 8.05:1
 second 12.00:1
 first 20.14:1
 reverse 21.01:1
 Low Ratio: top 11.10:1
 third 16.50:1
 second 24.60:1
 first 41.24:1
 reverse 42.93:1

Differential Ratios: Both Axles 4.7:1

Front Axle: Hypoid spiral-bevel, with fully-floating shafts and enclosed universal joints

Rear Axle: Hypoid spiral-bevel, with full-floating shafts

Propeller Shafts: Open type 50.8 mm (2.0 in)

Steering

Type: Recirculating ball, worm and nut
 Lock-to-lock: 3.5 turns
 Steering Damper: **Optional** – fitted to drag link (standard for certain export markets)
 Turning Circle: 11.60 m (38 ft)

Wheels

Type: Steel-ventilated disc
 Fixing: 5 stud
 Size: 5.00F x 16 in
 Tyre Size: 6.00 x 16 in

Brakes

Type: Hydraulic drum
 Drum Diameter: 254 mm (10 in)
 Brake Shoe Width: 38 mm (1.50 in) front and rear
 Handbrake: Mechanical – on transfer box output
 Drum Diameter: 228.6 mm (9.00 in)
 Brake Shoe Width: 44.5 mm (1.75 in)

Electrical – Petrol Type: 12-volt negative earth
Battery: 58 amps/hour
Ignition: Coil
Alternator: 16 ACR – 34 amp output
Starter Motor: Inertia type

Electrical – Diesel Type: 12-volt negative earth
Battery: 95 amps/hour
Ignition: Compression ignition
Alternator: 16 ACR – 34 amp output
Starter Motor: Pre-engaged type

Capacities

Cooling System (petrol):	8.1 litres (14.25 pt)
(diesel):	7.8 litres (13.75 pt)
Engine Oil (including filter):	6.85 litres (11.5 pt)
Main Gearbox:	1.5 litres (2.5 pt)
Transfer Gearbox:	2.5 litres (4.5 pt)
Rear Differential } Front Differential }	1.75 litres (3 pt)
Fuel Tank:	45 litres (10 gal)

Short-wheelbase weights and dimensions

	Full Length Canvas Hood		Truck Cab				Hard Top				Station Wagon																																					
	Petrol		Diesel		Petrol		Diesel		Petrol		Diesel		Petrol		Diesel																																	
	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb																																
UNLADEN WEIGHT																																																
Front axle	718	1583	747	1647	725	1599	754	1663	713	1572	742	1636	705	1555	734	1619																																
Rear axle	580	1279	589	1299	582	1283	591	1303	625	1378	634	1398	713	1572	722	1592																																
Total	1298	2862	1336	2946	1307	2882	1345	2966	1338	2950	1376	3034	1418	3127	1456	3211																																
EEC KERB WEIGHT																																																
Front axle	756	1667	786	1733	763	1682	793	1749	751	1656	781	1722	743	1638	773	1705																																
Rear axle	650	1433	661	1457	652	1438	663	1462	695	1532	706	1557	783	1727	794	1751																																
Total	1406	3100	1447	3190	1415	3120	1456	3211	1446	3188	1487	3279	1526	3365	1567	3456																																
GROSS VEHICLE WEIGHT																																																
Front axle	930	2051	930	2051	930	2051	930	2051	930	2050	930	2050	930	2050	930	2050																																
Rear axle	1190	2624	1190	2624	1190	2624	1190	2624	1190	2624	1190	2624	1190	2624	1190	2624																																
Total	2120	4675	2120	4675	2120	4675	2120	4675	2120	4674	2120	4674	2120	4674	2120	4674																																
Overall length	3.62 m	142.56 in	3.62 m	142.56 in	3.62 m	142.56 in	3.62 m	142.56 in	3.62 m	142.56 in	3.62 m	142.56 in	3.62 m	142.56 in	3.62 m	142.56 in																																
Overall width (excluding mirrors)	1.69 m	66.54 in	1.69 m	66.54 in	1.69 m	66.54 in	1.69 m	66.54 in	1.69 m	66.54 in	1.69 m	66.54 in	1.69 m	66.54 in	1.69 m	66.54 in																																
Overall height	1.97 m	77.50 in	1.97 m	77.50 in	1.91 m	75.00 in	1.91 m	75.00 in	1.91 m	75.00 in	1.91 m	75.00 in	1.94 m	76.50 in	1.94 m	76.50 in																																
Wheelbase	2.23 m	88.00 in	2.23 m	88.00 in	2.23 m	88.00 in	2.23 m	88.00 in	2.23 m	88.00 in	2.23 m	88.00 in	2.23 m	88.00 in	2.23 m	88.00 in																																
Ground clearance	178 mm	7.00 in	178 mm	7.00 in	178 mm	7.00 in	178 mm	7.00 in	178 mm	7.00 in	178 mm	7.00 in	178 mm	7.00 in	178 mm	7.00 in																																
Turning circle	11.60 m	38.00 ft	11.60 m	38.00 ft	11.60 m	38.00 ft	11.60 m	38.00 ft	11.60 m	38.00 ft	11.60 m	38.00 ft	11.60 m	38.00 ft	11.60 m	38.00 ft																																
<p>Note: Unladen weight is the minimum vehicle specification — excluding fuel and driver. EEC kerb weight is the minimum vehicle specification — plus full fuel tank and 75 kg (165 lb) driver. Gross vehicle weight is the maximum all-up weight including driver, passengers, payload and equipment.</p>																																																
<p>Note: The weights detailed above do not authorise use outside the legislation enforced by the territory in which the vehicle and trailer combination is being operated.</p>																																																
<p>Maximum Permissible Towed Weights</p> <table border="1"> <thead> <tr> <th colspan="2">On-road</th> <th colspan="2">Off-road</th> </tr> <tr> <th>kg</th> <th>lb</th> <th>kg</th> <th>lb</th> </tr> </thead> <tbody> <tr> <td>500</td> <td>1100</td> <td>500</td> <td>1100</td> </tr> <tr> <td>2000</td> <td>4400</td> <td>1000</td> <td>2200</td> </tr> <tr> <td>4000</td> <td>8800</td> <td></td> <td></td> </tr> <tr> <td>(Petrol)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3000</td> <td>6600</td> <td>1000</td> <td>2200</td> </tr> <tr> <td>(Diesel)</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Trailers without brakes Trailers with overrun brakes 4-wheel trailers with continuous or semi-continuous brakes i.e. coupled brakes</p>																	On-road		Off-road		kg	lb	kg	lb	500	1100	500	1100	2000	4400	1000	2200	4000	8800			(Petrol)				3000	6600	1000	2200	(Diesel)			
On-road		Off-road																																														
kg	lb	kg	lb																																													
500	1100	500	1100																																													
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(Petrol)																																																
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(Diesel)																																																

Long-wheelbase Land-Rover

Engine 2.25-litre (Petrol)	Type:	4-cylinder
	Bore:	90.47 mm (3.56 in)
	Stroke:	88.9 mm (3.5 in)
	Capacity:	2286 cc
	Compression Ratio:	7:1 8:1
	Maximum Power:	47.8 kW (64 bhp) 51.5 kW (69 bhp) at 4000 r/min
	Maximum Torque:	154 N m (113.5 lbf ft) 159 N m (117.2 lbf ft) at 2000 r/min
	Firing Order:	1,3,4,2
Engine 2.6-litre (Petrol)	Type:	6-cylinder
	Bore:	77.8 mm (3.06 in)
	Stroke:	92.07 mm (3.62 in)
	Capacity:	2625 cc
	Compression Ratio:	7:1 7.8:1
	Maximum Power:	53.7 kW (72 bhp) 57.4 kW (76.9 bhp) at 4200 r/min at 4500 r/min
Maximum Torque:	160.9 N m (118.6 lbf ft) 164.8 N m (121.5 lbf ft) at 2000 r/min	
Firing Order:	1,5,3,6,2,4	
Engine 2.25-litre (Diesel)	Type:	4-cylinder
	Bore:	90.47 mm (3.56 in)
	Stroke:	88.9 mm (3.5 in)
	Capacity:	2286 cc
	Compression Ratio:	23:1
	Maximum Power:	41.9 kW (56.2 bhp) at 4000 r/min
Maximum Torque:	137.3 N m (101.3 lbf ft) at 1800 r/min	
Firing Order:	1,3,4,2	
Lubrication	Nominal Pressure:	Engine warm at 2000 r/min
	2.25-litre engine:	2.46–4.57 kgf/cm ² (35–65 lbf/in ²)
	2.6-litre engine:	2.81–3.51 kgf/cm ² (40–50 lbf/in ²)
	Oil filters internal: external:	Gauze pump-intake filter Full flow oil filter
Fuel System 2.25-litre (Petrol)	Carburettor:	Single Zenith 361V
	Petrol Pump:	Mechanical with priming lever and sediment bowl
Fuel System 2.25-litre (Diesel)	Injectors:	CAV Pintaux
	Fuel Pump:	Mechanical with priming lever
	Injector Pump:	Self-governing DPA distributor type
Fuel System 2.6 litre (Petrol)	Carburettor:	Single Zenith 175-CD2S
	Petrol Pump:	Electric dual inlet
Cooling System	Type:	Pressurised with pump, fan, thermostat and expansion tank
	Working Pressure:	0.63 kgf/cm ² (9 lbf/in ²)
	Thermostat:	2.25-litre engine 82°C 2.6-litre engine 78°C

Transmission	Clutch:	Diaphragm spring, single dry plate	
	Diameter:	241 mm (9.5 in)	
	Main Gearbox:	4-speed and reverse – synchromesh on forward gears	
	Transfer Gearbox:	2-speed reduction on main gearbox output Two- / four-wheel-drive control on transfer box output	
	GEARBOX RATIOS		
	Main Gearbox:	fourth	1:1
		third	1.50:1
		second	2.22:1
		first	3.68:1
		reverse	3.887:1
Transfer Gearbox:	high	1.15:1	
	low	2.35:1	
High Ratio:	fourth	5.40:1	
	third	8.05:1	
	second	12.00:1	
	first	20.14:1	
	reverse	21.01:1	
Low Ratio:	fourth	11.10:1	
	third	16.50:1	
	second	24.60:1	
	first	41.24:1	
	reverse	42.93:1	
Differential Ratios:	Both Axles	4.7:1	
Front Axle:	Hypoid spiral-bevel, with fully-floating shafts and enclosed universal joints		
Rear Axle:	Hypoid spiral-bevel, with fully-floating shafts		
Propeller Shafts:	Open type 50.8 mm (2.0 in)		
Steering	Type:	Recirculating ball, worm and nut	
	Lock-to-lock:	3.5 turns	
	Steering Damper:	Optional – fitted to drag link (standard for certain export markets)	
	Turning Circle:	14.3 m (47 ft)	
Wheels	Type:	Steel-ventilated disc	
	Fixing:	5 stud	
	Size:	5.50F x 16 in	
	Tyre Size:	7.50 x 16 in	
Brakes	Type:	Hydraulic drum	
	Drum Diameter:	279.4 mm (11 in)	
	Brake Shoe Width:		
	4-cylinder models:	57.15 mm (2.25 in)	
	6-cylinder models:	Front	76.2 mm (3 in)
		Rear	57.15 mm (2.25 in)
	Handbrake:	Mechanical – on transfer box output	
	Drum Diameter:	228.6 mm (9.00 in)	
Brake Shoe Width:	44.5 mm (1.75 in)		

Electrical – Petrol Type: 12-volt negative earth
Battery: 58 amps/hour
Ignition: Coil
Alternator: 16 ACR – 34 amp output
Starter Motor: Inertia type

Electrical – Diesel Type: 12-volt negative earth
Battery: 95 amps/hour
Ignition: Coil
Alternator: 16 ACR – 34 amp output
Starter Motor: Pre-engaged type

Capacities

Cooling System (2.25-litre petrol):	8.1 litres (14.25 pt)
(2.25-litre diesel):	7.8 litres (13.75 pt)
(2.6-litre petrol):	11.2 litres (20 pt)
Engine oil 2.25-litre engine:	6.85 litres (11.5 pt)
(including filter) 2.6-litre engine:	7.3 litres (13 pt)
Main Gearbox:	1.5 litres (2.5 pt)
Transfer Gearbox:	2.5 litres (4.5 pt)
Rear Differential:	2.5 litres (4.5 pt)
Front Differential:	1.75 litres (3 pt)
Fuel Tank:	68 litres (15 gal)

Long-wheelbase weights and dimensions

	Full Length Canvas Hood						Truck Cab						Hard Top						12-seater Station Wagon						
	4-cylinder Petrol		6-cylinder Petrol		4-cylinder Diesel		4-cylinder Petrol		6-cylinder Petrol		4-cylinder Diesel		4-cylinder Petrol		6-cylinder Petrol		4-cylinder Diesel		4-cylinder Petrol		6-cylinder Petrol		4-cylinder Diesel		
	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	
UNLADEN WEIGHT																									
Front axle	785	1733	805	1775	814	1795	794	1751	814	1795	823	1815	786	1733	806	1777	815	1797	788	1797	811	1788	819	1806	
Rear axle	700	1544	710	1566	712	1570	694	1530	704	1552	706	1557	744	1641	754	1663	756	1667	789	1750	802	1769	819	1819	
Total	1485	3277	1515	3341	1526	3365	1488	3281	1518	3347	1529	3372	1530	3374	1560	3440	1571	3464	1679	3702	1713	3777	1709	3768	
EEC KERB WEIGHT																									
Front axle	811	1788	831	1832	839	1850	820	1808	840	1852	848	1870	812	1790	832	1834	840	1852	814	1795	837	1845	844	1861	
Rear axle	798	1760	808	1782	819	1806	792	1746	802	1768	813	1793	842	1857	852	1879	863	1903	989	2181	1000	2205	997	2198	
Total	1609	3548	1639	3614	1658	3656	1612	3554	1642	3620	1661	3663	1654	3647	1684	3713	1703	3755	1803	3976	1837	4051	1841	4059	
GROSS VEHICLE WEIGHT																									
Front axle			1000	2205					1000	2205					1000	2205					1000	2205			
Rear axle			1710	3771					1710	3771					1710	3771					1710	3771			
Total			2710	5976					2710	5976					2710	5976					2710	5976			
Overall length			4.445 m	175.00 in					4.445 m	175.00 in					4.445 m	175.00 in					4.445 m	175.00 in			
Overall width (excluding mirrors)			1.690 m	66.54 in					1.690 m	66.54 in					1.690 m	66.54 in					1.690 m	66.54 in			
Overall height			1.980 m	78.00 in					1.920 m	75.50 in					1.975 m	77.75 in					2.010 m	79.00 in			
Ground clearance			209 mm	8.25 in					209 mm	8.25 in					209 mm	8.25 in					209 mm	8.25 in			
Wheelbase			2.768 m	109.00 in					2.768 m	109.00 in					2.768 m	109.00 in					2.768 m	109.00 in			
Turning circle			14.3 m	47 ft					14.3 m	47 ft					14.3 m	47 ft					14.3 m	47 ft			

Note: Unladen weight is the minimum vehicle specification — excluding fuel and driver.
 EEC kerb weight is the minimum vehicle specification — plus full fuel tank and 75 kg (165 lb) driver.
 Gross vehicle weight is the maximum all up weight including driver, passenger, payload and equipment.

Maximum Permissible Towed Weights		On-road		Off-road	
		kg	lb	kg	lb
Trailers without brakes		500	1100	500	1100
Trailers with overrun brakes		2000	4400	1000	2200
4-wheel trailers with continuous or semi-continuous brakes, i.e. coupled brakes (Petrol)		4000	8800		
(Diesel)		3000	6600	1000	2200

Note: The weights above do not authorise use outside the legislation enforced by the territory in which the vehicle and trailer combination is being operated.

Major Body Components Finishes

As described on page 3/2, a large proportion of body components are made from corrosion-resistant aluminium which is painted for extra protection. Steel, used where strength is essential, is protected by paint or, where liable to abrasion or other damage, by heavy galvanising, as detailed in the table below:

Component	Material	Finish
Grille	ABS Plastic	Paint
Dash	Steel	Paint
Radiator grille panel	Steel	Paint
Door cappings	Steel	Galvanised
Bumper	Steel	Galvanised
Body cappings and corner plates	Steel	Galvanised
Hinges and fasteners (excluding doors)	Steel	Galvanised
Rubbing strips	Steel	Galvanised
Lifting handles	Steel	Galvanised
Windscreen frame	Steel	Galvanised
Tailboard (inner panel)	Steel	Galvanised
Seat base	Aluminium	Paint
Cab floor	Aluminium	Paint
Rear body section	Aluminium	Paint
Tailboard (outer panel)	Aluminium	Paint
Door panels	Aluminium	Paint
Front wings	Aluminium	Paint
Bonnet	Aluminium	Paint
Valances	Aluminium	Paint
Cab roof	Aluminium	Paint
Cab back panel	Aluminium	Paint
Cab base panel	Aluminium	Paint
Hardtop roof	Aluminium	Paint
Tropical roof	Aluminium	Paint
Hardtop sides	Aluminium	Paint
Rear top hinged flap	Aluminium	Paint

Maximum Speed and Fuel Consumption

Fuel consumption will vary according to how the Land-Rover is driven and these figures can only be used as a guide.

Wheelbase	Engine	Maximum Speed		Fuel Consumption	
		km/h	mph	litres/100 km	mpg
Short	2.25 Petrol	105-113	65-70	14.2-15.7	18-20
Short	2.25 Diesel	97-105	60-65	8.9-10.1	28-32
Long	2.25 Petrol	105-113	65-70	14.2-16.7	17-20
Long	2.6 Petrol	113-121	70-75		
Long	2.25 Diesel	97-105	60-65	8.9-10.1	28-32

Maximum Tractive Effort and Drawbar Pull

Wheelbase	Engine	First Gear Low Ratio		First Gear High Ratio					
		Gross Tractive Effort		Drawbar Pull		Gross Tractive Effort		Drawbar Pull	
		kg	lb	kg	lb	kg	lb	kg	lb
88 in Regular	2.25 Diesel	1635	3600	1355	2980	800	1760	655	1440
	2.25 Petrol	1820	4000	1530	3360	900	1980	740	1630
	2.25 Diesel	1455	3200	1180	2600	714	1570	560	1230
109 in Long	2.25 Petrol	1635	3600	1345	2960	805	1770	640	1410
	2.6 Petrol	1865	4100	1535	3380	915	2010	736	1620

Gradient Charts

The charts on the next two pages show the maximum gradient which can be climbed by the various engine and wheel-base configurations assuming that they are fully laden, and by these various models when pulling a trailer, both laden to maximum permissible weights.

Allowances have been made for actual operating conditions to make the tables more useful. Even so, conditions can vary over wide extremes, so the figures can be no more than a guide. Improvement is possible under the most favourable circumstances and, of course, at loads less than the maximum. Similarly, performance will be less under poor ground conditions.

The figures are calculated on the following assumptions:

- The Land-Rover is in good condition and the engine giving its designed power
- The tyres are suitable for the ground surface, are in good condition and at correct pressures
- Ground conditions are able to support the vehicle weight without excessive sinkage
- Wheel slip does not occur
- The Land-Rover is in all cases fully laden to either its road or cross-country maximum weight.

The maximum weight of trailer recommended for each Land-Rover, for road and cross-country use, is added to that of the fully laden Land-Rover weight to determine the gross vehicle and trailer weight under each condition.

Refer to pages 12/4 and 12/8.

You will notice in the second chart that a steeper maximum gradient is quoted for cross-country use than for road use. This is, of course, because the Land-Rover is less heavily laden and is pulling a much lighter trailer.

Maximum Gradient Climable at Maximum Vehicle Weight

Engine		2.25-litre Diesel				2.25-litre Petrol				2.6-litre Petrol			
										7.0:1 compression ratio		7.8:1 compression ratio	
Wheelbase		88 in		109 in		88 in		109 in		109 in			
Conditions		On-road	Off-road	On-road	Off-road	On-road	Off-road	On-road	Off-road	On-road	Off-road	On-road	Off-road
Land-Rover Gross Weight	kg	2160	2070	2760	2670	2020	1930	2680	2590	2680	2590	2680	2590
	lb	4765	4565	6085	5885	4453	4253	5905	5705	5905	5705	5905	5705
1st Gear High Ratio	Gradient in Degrees	17.6	15.7	11.7	9.4	21.5	19.6	13.8	11.6	15.4	13.3	16.0	13.8
	Percentage Gradient	32%	28%	21%	17%	39%	36%	25%	21%	28%	24%	29%	25%
	Tangent Gradient 1 in	3.2	3.6	4.8	6.0	2.5	2.8	4.1	4.9	3.6	4.2	3.5	4.1
1st Gear Low Ratio	Gradient in Degrees	38.9	37.4	25.3	23.3	49.0	47.9	30.0	28.2	33.7	31.9	34.9	33.1
	Percentage Gradient	81%	76%	47%	43%	115%	111%	58%	54%	67%	62%	70%	65%
	Tangent Gradient 1 in	1.2	1.3	2.1	2.3	0.9	0.9	1.7	1.9	1.5	1.6	1.4	1.5

Maximum Gradient Climable at Maximum Vehicle and Trailer Weight

Engine		2.25-litre Diesel				2.25-litre Petrol				2.6-litre Petrol			
										7.0:1 compression ratio		7.8:1 compression ratio	
Wheelbase		88in		109 in		88 in		109 in		109 in			
Conditions		On-road	Off-road	On-road	Off-road	On-road	Off-road	On-road	Off-road	On-road	Off-road	On-road	Off-road
Land-Rover and Trailer Gross Weight	kg	5214	3090	5813	3689	6090	2948	6748	3607	6748	3607	6748	3607
	lb	11485	6805	12805	8125	13413	6493	14865	7945	14865	7945	14865	7945
1st Gear High Ratio	Gradient in Degrees	6.4	9.1	4.9	5.7	6.1	11.4	4.7	7.2	5.3	8.4	5.5	8.7
	Percentage Gradient	11%	16%	9%	10%	11%	20%	8%	13%	9%	15%	10%	15%
	Tangent Gradient 1 in.	8.9	6.2	11.6	10.0	9.3	4.9	12.2	7.9	10.8	6.8	10.4	6.5
1st Gear Low Ratio	Gradient in Degrees	14.3	22.6	11.1	15.6	13.6	27.6	10.7	18.7	12.0	21.2	12.4	22.0
	Percentage Gradient	25%	42%	20%	28%	24%	53%	19%	34%	21%	39%	22%	40%
	Tangent Gradient 1 in.	3.9	2.4	5.1	3.6	4.1	1.9	5.3	3.0	4.7	2.6	4.6	2.5

V8 SUPPLEMENT

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Off-road Driving and Towing	V8/13
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Note on using this supplement

The information in this supplement should be read in conjunction with the relevant sections of the Land-Rover Salesman's Manual, in which many features and benefits common to all Land-Rovers are described. It should also be referred to for detailed information about options, special equipment, off-road driving techniques and towing.

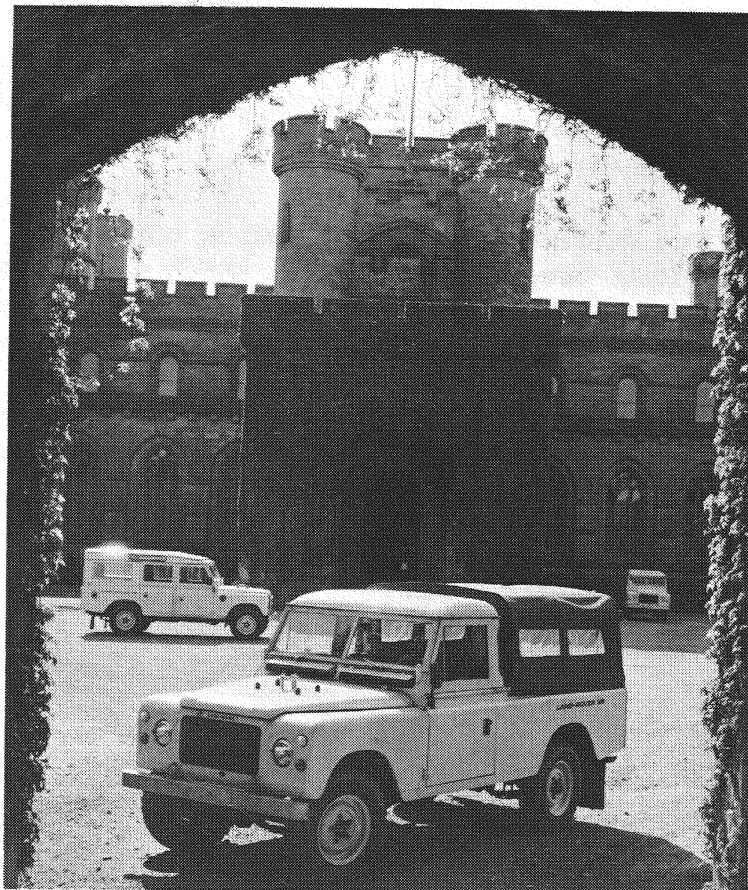
The V8 vehicle, of course, has a number of benefits not shared by other Land-Rovers. These are summarised at the end of each section.

INTRODUCTION

In recent years the demand for four-wheel-drive vehicles has increased considerably, and while the basic ability to handle the most arduous off-road conditions remains a major requirement, the precise needs of the market have gradually evolved towards vehicles with more power for on-road use. This demand, which has been particularly marked in areas with rapidly improving road networks such as the Middle East, is being magnificently met by a new vehicle from Land-Rover, the **Land-Rover V8**.

V8 Land-Rovers mark the beginning of a programme to produce a new kind of Land-Rover; one which will have many of the high-performance attributes of the Range Rover, while retaining all the characteristics of long life and off-road toughness associated with Land-Rover. The new V8 vehicles share many features with current long-wheelbase Land-Rovers — the robust chassis, the range of body styles with corrosion-free aluminium panels, the tough and reliable suspension — and of course Land-Rover's many years of experience in producing successful four-wheel-drive vehicles. However, they also have many new features, of which the V8 engine and the permanent four-wheel-drive transmission are the most outstanding. The 3.5-litre, V8 engine from the Range Rover has been modified to produce peak torque at exceptionally low engine speed giving good performance off-road and when towing. It can, nevertheless, produce the necessary power for comfortable high-speed travel on-road. The new transmission, also from Range Rover, incorporates permanent four-wheel-drive for improved traction and handling.

Initially, the V8 Land-Rover will only be marketed in selected territories but it will gradually become available throughout the world as production facilities resulting from recent investment programmes come into operation.



CHASSIS & BODYWORK

Features and benefits are as in standard Land-Rovers, but with the addition of:

Features	Benefits
Restyled front	<ul style="list-style-type: none"> — Modern appearance — Easier engine accessibility
Bonnet lock	<ul style="list-style-type: none"> — Security

Chassis

All V8-engined models are built on the long-wheelbase chassis, full details of which are given in Section 2 of the Land Rover Salesman's Manual, pages 2/3

Bodywork

A notable feature of V8 Land-Rovers is the restyling of the front bodywork to accommodate a larger engine and ensure

easy access for servicing. A bonnet lock is included as standard, and the new Land-Rover badge over the radiator grille is complemented by 'Land-Rover V8' decals over the rear wheel arches and a 'V8' decal at the rear.

Otherwise the body of the V8 Land-Rover is constructed from the same components and by the same techniques as all other long-wheelbase Land-Rovers.

A new range of colours has been introduced for the V8. They are standard on station wagons and optional on truck cab models. Current standard Land-Rover colours are available on either model.

New colours for V8

Masai Red
Java Green
Inca Yellow
Pageant Blue

Standard colours

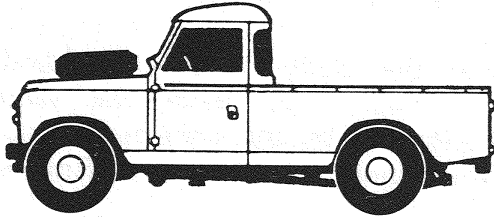
Bronze Green
Sand (export only)
Light Green
Marine Blue
Limestone
Mid-grey



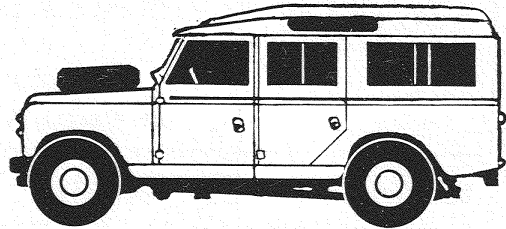
Bodywork Configurations

This page summarises the bodywork configurations available with the V8 engine.

Standard Models

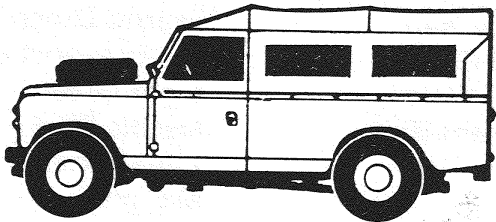


V8 Truck Cab

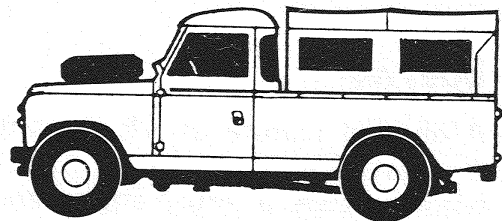


V8 Station Wagon

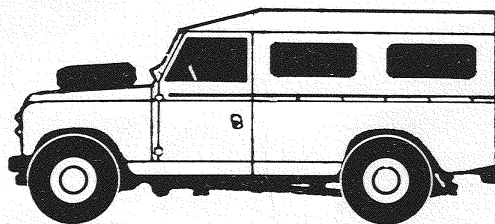
Optional Models



V8 Long Wheelbase with full hood



V8 Truck Cab
with three-quarters
canvas hood with
windows



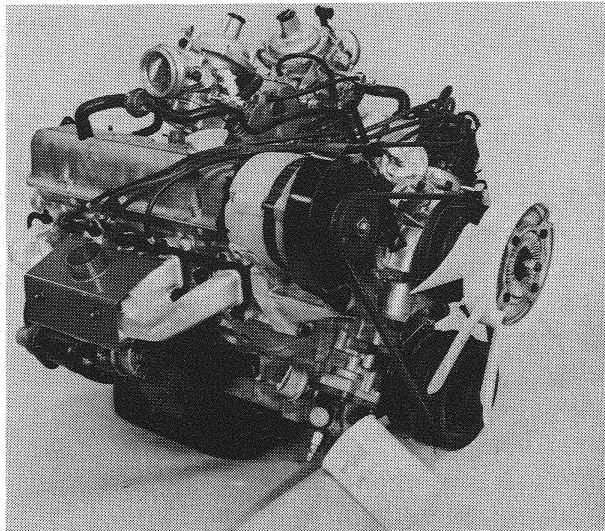
V8 Hard Top
with tailgate
or side-hinged
rear door

Suitable bases may also be supplied for conversion by approved specialists.

Full details of standard models are given on pages 3/4 to 3/10 of the Land-Rover Salesman's Manual, and optional models on pages 3/11 to 3/13

ENGINE

FEATURES	BENEFITS
Good power to weight ratio of V8 engine	<ul style="list-style-type: none">— Improves on-/off-road performance— Good acceleration— Enhances economy of operation— Smooth running
Aluminium engine	<ul style="list-style-type: none">— Reaches operating temperature quickly, reducing engine wear— Dissipates heat quicker in high ambient temperatures— Saves weight
High torque at low revs	<ul style="list-style-type: none">— Enhances towing ability— Reduces engine wear— Reduces frequency of gear changing
Compression ratio	<ul style="list-style-type: none">— Allows the use of fuel down to 85 octane
Carburation, lubrication and electrical system design	<ul style="list-style-type: none">— Ensures that the engine is never starved of petrol or oil during off-road manoeuvres— Prevents saturation when wading
Air intake filters	<ul style="list-style-type: none">— Prevents engine contamination from dust and sand



For the last ten years, the V8 engine has successfully powered Range Rovers all over the world. Built in aluminium alloy, it is light, powerful and very reliable. The engine weighs 60% less than a cast-iron version, resulting in a good power-to-weight ratio for the vehicle.

Aluminium is also a good conductor of heat, so the V8 reaches its operating temperature rapidly with resultant savings in fuel consumption and engine wear.

The engine has been modified to suit Land-Rover's requirements, and produces its maximum torque at very low revs. It generates 225 N m (166 lbf ft) at only 2000 r/min, compared with 251 N m (185 lbf ft) produced by the Range Rover version at 2500 r/min.

The production of high torque at low revs, resulting in the development of considerable pulling power without hard work by the engine, has many advantages. These are discussed fully in Section 4 of the Land-Rover Salesman's Manual. They include the ability to tow heavy loads without frequent gear changing and to cover long distances over arduous cross-country conditions without engine strain. These benefits are actually heightened by the use of the more powerful V8 engine when matched to Land-Rover specifications.

A major reason for installing the V8 engine in Land-Rovers was to improve road performance. The V8 engine is both smooth and powerful with good acceleration and pulling power, even when compared with larger-engined competitors.

Land-Rover V8

Top Gear Acceleration

mph	
20-40	9.3 sec
30-50	9.9 sec
40-60	12.3 sec
km/h	
30-60	8.9 sec
45-75	9.0 sec
60-90	10.7 sec

Acceleration through the gears

0-55 km/h	5.7 sec
0-79 km/h	9.0 sec
0-85 km/h	13.8 sec
0-100 km/h	21.5 sec

All figures shown above are on a 'computed' basis with the vehicle unladen.

The development of peak torque and power at low revs offers improved towing capability on-road as well as off.



The air intake system is specially designed to keep out harmful dust and sand whilst delivering optimum air flow to the carburettors. With the redesign of the engine compartment, all major servicing points are easily accessible and the ignition components – distributor, coil, etc. are positioned at the highest points to avoid saturation when wading.

The engine has a compression ratio of 8.13:1. so 90 octane fuel can safely be

used. The fuel tank capacity is 68.25 litres (15 gal). It is situated to the rear of the vehicle, and is well-protected by the chassis. An additional fuel tank of 45 litres (10 gal) can be fitted under the front left-hand seat-box.

The engine normally runs on 90 octane fuel, but this may be reduced to 85 by retarding the ignition.



SELL THE BENEFITS OF THE V8:

- Easier engine and service accessibility
- Improved performance both on- and off-road
- Ability to tow heavier loads
- Compatibility of engine spares with Range Rover
- Use of low grade fuel down to 85 octane
- Reduced engine wear

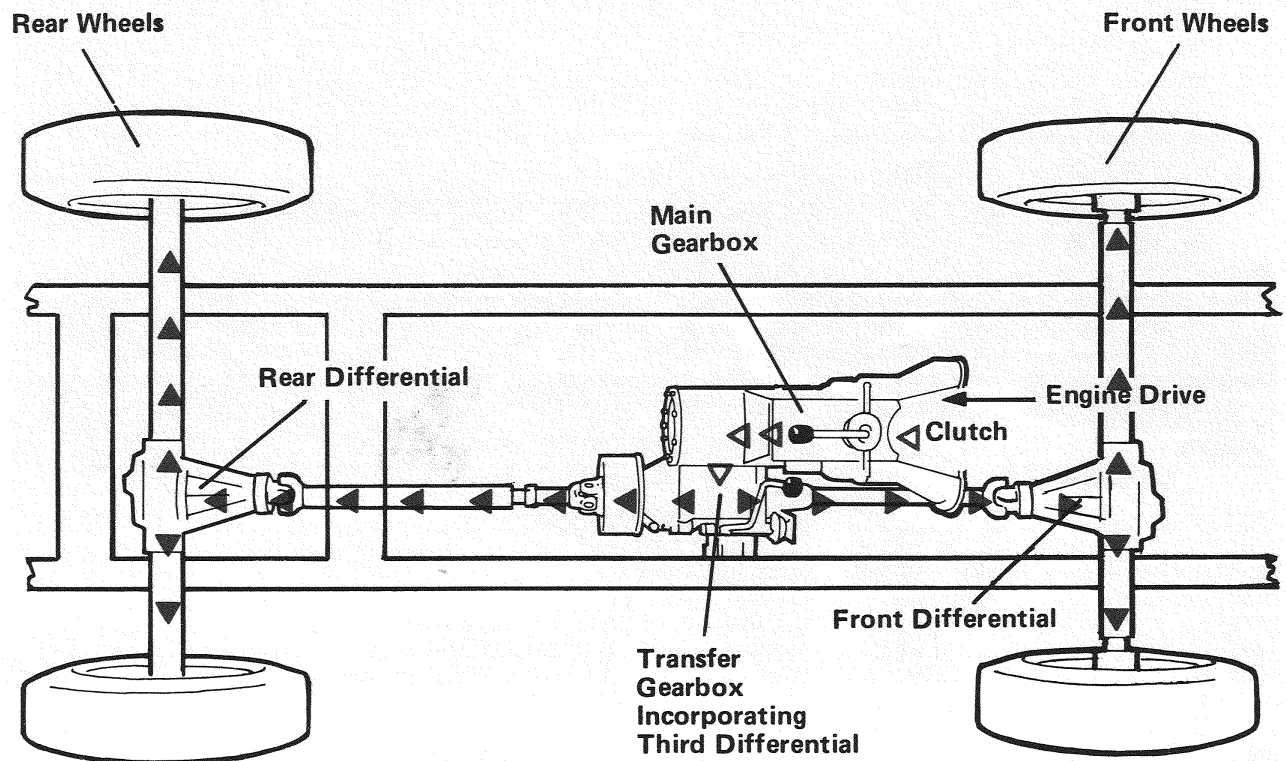
TRANSMISSION

FEATURES	BENEFITS
Permanent four-wheel drive	<ul style="list-style-type: none"> — Enhances both on- and off-road adhesion and traction — Improves steering and roadholding
Transfer gearbox	<ul style="list-style-type: none"> — Choice of high and low ratio giving eight forward and two reverse gears — Facility to choose correct gear ratio across wide spectrum
Third differential	<ul style="list-style-type: none"> — Improves cornering ability — Prevents 'wind-up' and damage to transmission — Reduces tyre wear
Third differential lock	<ul style="list-style-type: none"> — Can be engaged on the move — Enhances cross-country capability by splitting power evenly to front and rear — Improves traction on ice and snow — Ensures 50% of power directed to non-slipping axle in event of wheelspin
Heavy-duty gearbox	<ul style="list-style-type: none"> — Wide range gearbox — Low gear enhances load-carrying in off-road conditions — Contributes to efficient engine braking — High gear allows good road speed with minimum engine strain
Spiral-bevel differential	<ul style="list-style-type: none"> — Reduces transmission noise
Fully-floating axle shafts	<ul style="list-style-type: none"> — Allow greater weights to be carried — Give added strength to final drive — Reduce service labour/time and replacement
Constant velocity joints	<ul style="list-style-type: none"> — Smooth power transfer regardless of suspension or steering movement

In order to fully exploit the power output of the V8 engine for cross-country manoeuvres, the V8 Land-Rover incorporates the permanent four-wheel-drive transmission successfully employed in the Range Rover.

Like all other Land-Rovers, the drive from the engine passes through two gearboxes. The main gearbox and the transfer gearbox act together to produce

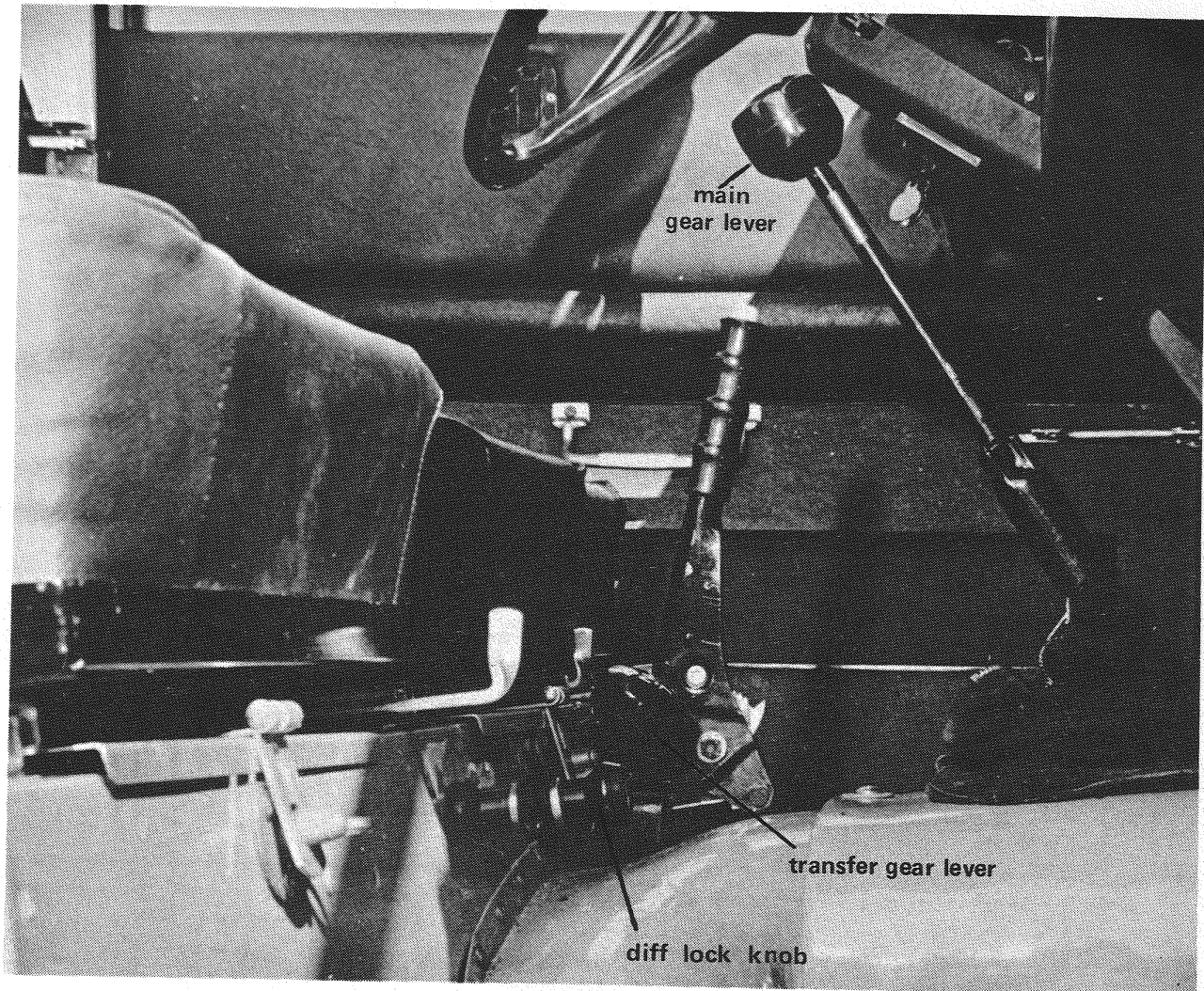
a range of eight forward and two reverse gears, through which power is ultimately delivered to all four wheels. By distributing power to all four wheels equally, very good traction is achieved, enabling the vehicle to cover loose, slippery or uneven terrain with ease. On the road, four-wheel drive gives positive steering feel, with neutral handling characteristics and exceptionally good road-holding.



- △ Permanently engaged transmission
- ▲ Permanently engaged transmission which may be locked to ensure transmission of drive through the centre differential

The main gearbox has the conventional arrangement of four forward gears with synchromesh for smooth, easy gear changing, and a reverse gear. Selection is made using the centrally-mounted gear lever.

down. Changes into high ratio may be made on the move, in fact it is necessary to do so in some towing situations. A description of the technique is given on page 10/6, although it is best learned from an experienced driver.



The output shaft from the main gearbox passes the drive to the transfer gearbox, which has two gears — high and low ratio, as well as a neutral position. Selection is by means of the gear lever mounted on the driver's heel board.

The transfer gear selection uses a simple dog clutch arrangement without synchromesh. Consequently it is essential that a change down from high to low ratio must only be made when the vehicle is stationary. This is a safeguard to avoid the dangers of over-revving the engine when making such a large ratio change.

In the transfer gearbox is also housed the third differential unit. A conventional car has a differential on the driven axle to allow the driven wheels to rotate at different speeds when cornering. A four-wheel-drive car will thus have two differentials, but in addition, allowance must be made for the front and rear wheels to follow different arcs through a corner. This requires a third differential between the axles to prevent overstressing of the transmission components and detrimental effects on fuel consumption and tyre wear.

However, a normal axle differential system has the disadvantage of allowing more power to be transmitted to the wheel which has least resistance. So, if a wheel experiences no resistance, as may be the case on very slippery ground or if it is suspended in the air, it will spin freely. With a centre differential this wheel could eventually take all the power resulting in a loss of traction. To prevent this, a third differential lock is fitted. When applied, this ensures that each axle receives 50% of the power so that even if the wheels on one axle spin, half the engine-power will still be available for traction on the other axle. The third differential lock is engaged by means of a vacuum-operated diaphragm, controlled by a pull switch mounted on the heel board and may be engaged on the move. It should be released as soon as good ground is reached to avoid the problems of transmission wind-up already described.

A warning light, situated on the fascia, indicates that the lock has been engaged and this may remain on for some distance after the differential has been unlocked because time may be needed for disengagement.

The continuous use of the differential lock is recommended when driving on ice, snow, sand or mud to give additional traction. Under these circumstances, normal wheel slippage will minimise the danger of transmission wind-up.

If the third differential lock is inadvertently left engaged for some time while driving on firm ground, it may prove impossible to unlock in the normal way. Under these circumstances, the vehicle must be reversed, with the lever pushed to the unlock position. This will 'unwind' the transmission, and disengage the lock.



Final Drive

The final drive is through hypoid spiral-bevel-type differentials with a ratio of 3.54:1 at both front and rear. This particular construction gives good meshing and transfer of power with quieter running.

Final drive design is the same as for standard Land-Rovers except that constant velocity joints are fitted to the front axles of the V8. This enables a smooth flow of power to be transmitted to the steering wheels regardless of suspension movement or the angle through which the wheels are turned.

The very wide range of gear ratios makes a major contribution to the adaptability of the V8 Land-Rover. Despite its impressive on-road performance it is still a versatile working vehicle, suitable for all off-road applications.

Low gearing is essential for many operations involving heavy loads or difficult conditions.

On the other hand, for road use high gearing is needed so that a reasonable speed can be delivered. The Land-Rover's highest gear, fourth gear, high ratio, results in a final drive ratio of 4.73:1, which is comparable with an average saloon car's highest ratio.

Final Drive Ratios

Low Ratio		High Ratio	
first	47.81:1		
second	28.76:1		
third	17.68:1	first	19.24:1
fourth	11.75:1	second	11.58:1
		third	7.12:1
		fourth	4.73:1
reverse	43.05:1	reverse	17.33:1

As can be seen from the table, the difference in drive applied to the wheels in first gear low ratio is 10 times that applied to the wheels in top gear high ratio. This compares with a difference of about 3½ times in an average saloon car, and shows the impressive range of gears available to the Land-Rover driver.

SELL THE BENEFITS OF THE V8:

- Improves traction both on- and off-road
- Reduces tyre and transmission wear
- Wide choice of gears for all situations
- Ensures vehicle is not immobilised in event of wheel spin
- Improves load-carrying capacity off-road
- Improves road speed
- Reduces wear
- Additional axle strength
- Enhances load-carrying capability
- Reduces service costs and time
- Smooth transfer of power through steering wheels

SUSPENSION, STEERING, BRAKES & SPECIAL FEATURES

These are the same on all Land-Rovers, and are fully described in Sections 5 and 6 of the Land-Rover Salesman's Manual, as are the features and benefits.

All V8 Land-Rovers incorporate a range of extra features to increase comfort, safety and convenience. These are:

- De-luxe seats
- Door and interior mirrors
- Interior sun visors
- Trip speedometer
- Lifting/towing rings, front and rear
- * Rear mud flaps
- Rubber pedal pads
- Servo assisted, dual-line brakes.

The station wagon has a number of additional features as standard:

- * Battery voltmeter
- Bonnet lock
- Hazard warning light
- Front mud flaps
- Reversing lamps
- Tinted glass

Other features which distinguish the V8 Land-Rover visually have already been described. These are:

- Restyled front end
- New colour range
- Distinctive badging



* Liable to variation from territory to territory.

OFF-ROAD DRIVING & TOWING

In most respects, towing and off-road driving techniques are similar in all Land-Rovers. You are therefore referred to the relevant sections in the main part of the Salesman's Manual. However, the V8 Land-Rover's larger engine and permanent four-wheel drive, incorporating a third differential lock, give the vehicle improved performance both on- and off-road, greater towing ability and better traction.

For off-road work, no decision needs to be made between two- and four-wheel drive — the vehicle is always in four-wheel drive. It is necessary however to decide when to engage the differential lock, (described on page V8/9), and its use is recommended in the following situations:

On soft or slippery ground
On steep downhill slopes
On ice and snow.

The information about towing given on pages 10/5 and 10/6 of the manual is also applicable to V8 Land-Rovers, except that a slightly different procedure is followed for changing from low to high ratio on the move.

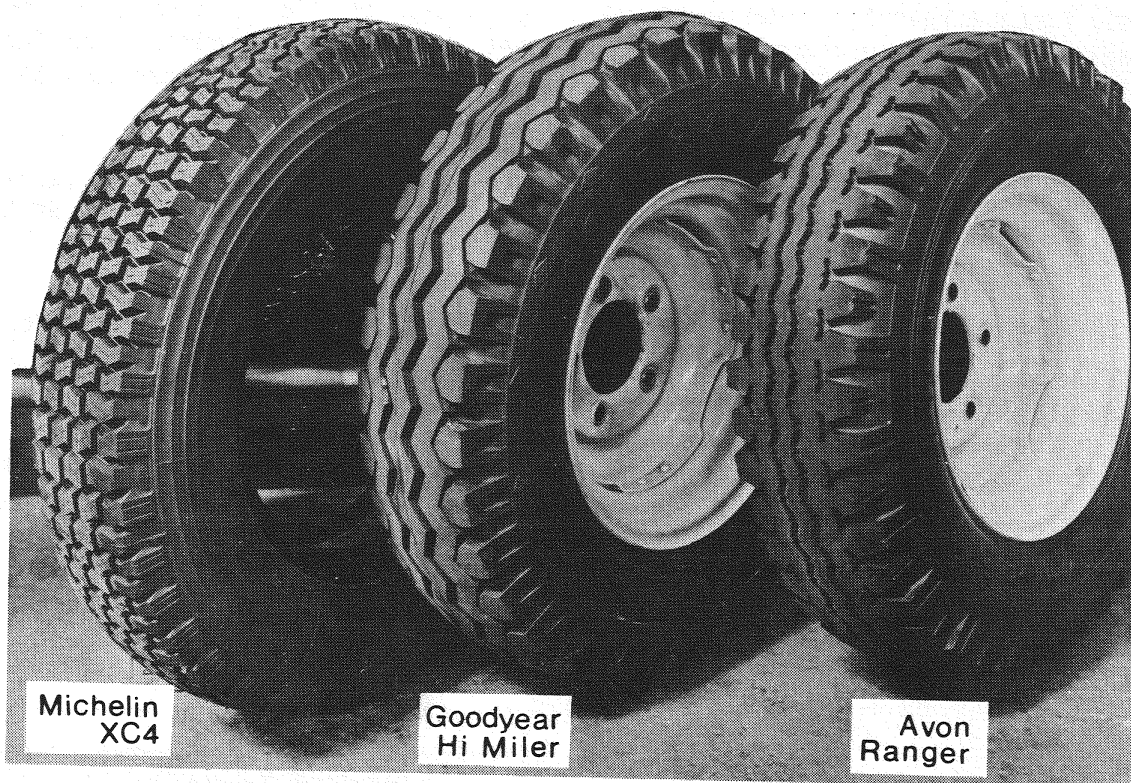
- i) Move off in second gear, low range, and increase speed to 30–40 km/h (20–25 mph).
- ii) Move main gear to neutral and allow revs to drop completely.
- iii) Move the transfer lever from low ratio through the neutral position to high ratio, double declutching through both movements.
- iv) Engage second or third main gear.



OPTIONAL EQUIPMENT

All Optional Equipment described in Section 8 of the Land-Rover Salesman's Manual can be fitted to V8 models. An exception to this is tyres, so a description of the tyres recommended for V8 vehicles is given here.

Most of the Specialist Equipment described in Section 9 is not applicable to V8 Land-Rovers. In particular it should be noted that they cannot, at present, be fitted with power take-off units.



Approved Tyres for V8 Land-Rovers

Standard tyres	Avon Ranger:	6-ply tyre, good all purpose tyre for road use with occasional off-road.
	Goodyear Hi Miler:	General purpose on-/off road tyre, high heat dissipation reasonable on-road life.
Optional tyres	Michelin XS (radial):	High flotation, block tread for use on sand and similar conditions. Can withstand heavy loads at low pressure, reasonable on-road tyre life.
	Michelin XC4:	Deep, well defined block tread, multiple gripping edges, good traction in winter conditions.

TECHNICAL DATA: V8 LAND-ROVER

Engine	Type:	o.h.v. all aluminium V8
	Bore:	88.9 mm (3.5 in)
	Stroke:	71.1 mm (2.8 in)
	Capacity:	3528 cc
	Compression Ratio:	8.13:1
	Maximum Power:	67.7 kW (90.7 bhp) at 3500 r/min
	Maximum Torque:	225.6 N m (166.4 lbf ft) at 2000 r/min
	Firing Order:	1, 8, 4, 3, 6, 5, 7, 2
Lubrication	Nominal Pressure:	Engine warm at 2400 r/min. 2.1–2.8 kgf/cm ² (30–40 lbf/in ²)
	Oil Filters Internal:	Gauze pump-intake filter
	External:	Full flow oil filter
Fuel System	Carburettors:	Twin Zenith Stromberg CD type
	Petrol Pump:	Facet electrical
	Air Filter:	European – AC Delco paper element Non-European – AC Delco Cyclone Type PC26 replaceable element.
Cooling System	Type:	Pressurised with pump, fan, thermostat and pressurised expansion tank.
	Working Pressure:	1.05 kgf/cm ² (15 lbf/in ²)
	Thermostat:	Detox engines 88°C Non-detox engines 82°C

Transmission

Clutch:	Diaphragm spring, single dry plate.
Diameter:	26.7 cm (10.5 in)
Main Gearbox:	4-speed and reverse — synchromesh on forward gears.
Transfer Gearbox:	2-speed reduction on main gearbox output. Front and rear drive permanently engaged via a third differential — locked by a vacuum control switch. Switch mounted on heelboard.

GEARBOX RATIOS

Main Gearbox:	fourth	Direct
	third	1.505:1
	second	2.448:1
	first	4.069:1
	reverse	3.664:1
Transfer Gearbox:	high	1.336:1
	low	3.320:1

OVERALL RATIOS: Final Drive

High Ratio:	fourth	4.73:1
	third	7.12:1
	second	11.58:1
	first	19.24:1
	reverse	17.33:1
Low Ratio:	fourth	11.75:1
	third	17.68:1
	second	28.76:1
	first	47.81:1
	reverse	43.05:1

Differential Ratios: both axles 3.54:1

Front Axle: Hypoid spiral-bevel with enclosed constant velocity joints.

Rear Axle: Hypoid spiral-bevel with fully-floating shafts — Salisbury 8HA

Propeller Shafts: Open type 50.8 mm (2.0 in), front propshaft with double Hooke's joint at gearbox end.

Steering

Type:	Recirculating ball, worm and nut
Lock-to-lock:	3.5 turns
Steering Damper:	Fitted to drag link
Turning Circle:	14.3 m (47 ft).

Wheels	Type:	Steel-ventilated disc
	Fixing:	5-stud
	Size:	5.50F x 16 in
	Tyre Size:	7.50 x 16 in
Brakes	Type:	Hydraulic drum
	Drum Diameter:	279.4 mm (11 in)
	Brake Shoe Width:	Front — 76.2 mm (3.00 in) Rear — 57.15 mm (2.25 in)
	Handbrake:	Mechanical duo-servo drum brake on transfer box rear-output shaft
	Drum Diameter:	184 mm (7.25 in)
	Brake Shoe Width:	76 mm (3.00 in)
Electrical	Type:	12-volt negative earth
	Battery:	58 amps/hour
	Ignition:	Ballasted coil
	Alternator:	18 ACR — 45 amp output
	Starter Motor:	Pre-engaged type
Capacities	Cooling System:	9.66 litres (17 pt)
	Engine Oil (including filter):	5.96 litres (10.5 pt)
	Main Gearbox:	2.6 litres (4.5 pt)
	Transfer Gearbox:	3.1 litres (5.5 pt)
	Rear Differential:	2.6 litres (4.5 pt)
	Front Differential:	1.53 litres (2.7 pt)
	Fuel Tank:	68.25 litres (15 gal)

Weights and Dimensions

Weights

		Full Length Canvas Hood		Truck Cab	
		kg	lb	kg	lb
Unladen Weight	Front axle	829	1828	838	1848
	Rear axle	703	1550	697	1537
	Total	1532	3378	1535	3385
EEC Kerb Weight	Front axle	855	1885	864	1905
	Rear axle	801	1766	795	1753
	Total	1656	3651	1659	3658
Gross Vehicle Weight	Front axle	1000	2205	1000	2205
	Rear axle	1710	3771	1710	3771
	Total	2710	5976	2710	5976

Dimensions

Dimensions	Full Length Canvas Hood		Truck Cab	
	m	in	m	in
Overall length	4.445 m	175.00 in	4.445 m	175.00 in
Overall width (excluding mirrors)	1.690 m	66.54 in	1.690 m	66.54 in
Overall height	1.980 m	78.00 in	1.920 m	75.50 in
Wheelbase	2.768 m	109.00 in	2.768 m	109.00 in
Ground clearance	209 mm	8.25 in	209 mm	8.25 in
Turning circle	14.3 m	47 ft	14.3 m	47 ft

Note: **Unladen Weight** is the minimum vehicle specification – excluding fuel and driver.
EEC Kerb Weight is the minimum vehicle specification – plus full fuel tank and 75 kg (165 lb) driver.
Gross Vehicle Weight is the maximum all up weight including driver, passengers, payload and equipment.

Weights		Hard Top		12-seater Station Wagon	
		kg	lb	kg	lb
Unladen Weight	Front axle	830	1830	821	1810
	Rear axle	747	1647	905	1996
	Total	1577	3477	1726	3806
EEC Kerb Weight	Front axle	856	1888	847	1868
	Rear axle	845	1863	1003	2212
	Total	1701	3751	1850	4080
Gross Vehicle Weight	Front axle	1000	2205	1000	2205
	Rear axle	1710	3771	1710	3771
	Total	2710	5976	2710	5976

Dimensions	Hard Top		12-seater	
	m	in	m	in
Overall length	4.445	175.00	4.445	175.00 (excluding spare wheel)
Overall width (excluding mirrors)	1.690	66.54	1.690	66.54
Overall height	1.975	77.75	2.010	79.00
Wheelbase	2.768	109.00	2.768	109.00
Ground clearance	209	8.25	209	8.25
Turning Circle	14.3	47	14.3	47

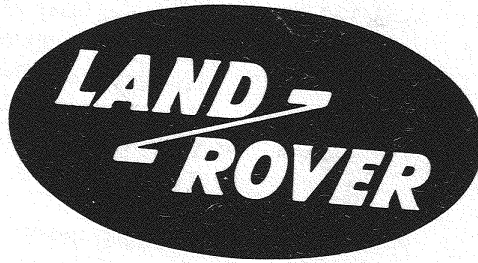
Maximum Permissible Towed Weights	On-road		Off-road	
	kg	lb	kg	lb
Trailer without brakes	500	1100	500	1100
Trailer with overrun brakes	2000	4400	1000	2200
4-wheel trailers with continuous or semi-continuous brakes, i.e. coupled brakes	4000	8800	1000	2200

Note: The weights detailed above do not authorise use outside the legislation enforced by the territory in which the vehicle and trailer combination is being operated.

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