

The new Discovery 4 – the most capable Land Rover ever

- Discovery 4 – new generation of this celebrated Land Rover introduces new powertrain, improved dynamics and fresh design
- Refined and highly efficient new LR-TDV6 3.0 twin turbo diesel, with class-leading 600Nm of torque and 245PS
 - Fuel consumption improved by 9 per cent*, delivering 30.4mpg * (9.3 l/100km*) on combined EU cycle
 - CO2 emissions reduced by 10 per cent* to 244 g/km*
 - EU5 compliant (when Diesel Particulate Filter (DPF) fitted)
- On-road dynamics transformed by comprehensive chassis system developments and a new super-smooth 6-speed adaptive transmission
- Updates to Land Rover's award-winning Terrain Response™ system reinforce best-in-class all-terrain performance
- Fresh exterior design includes smoother new front end and revised lights, including LEDs
- All-new interior design delivers a more premium and functional space with up to seven seats
- User-friendly new features include Surround Camera system, Gradient Release Control, Towing Assist, Automatic High Beam Assist, and available Keyless Entry, Push Button start

The new, fourth generation of Land Rover's supremely versatile seven-seat vehicle gains a new name – Discovery 4 – to go with its powerful and highly efficient new TDV6 diesel engine, fresh exterior identity and more premium cabin. The class-leading breadth of capability is extended even further with dynamic improvements for both road and off-road driving, and Land Rover has added a battery of user-friendly new technologies and features.

“The outgoing Discovery 3 has well over 100 international awards to its name. But we've found ways to improve virtually every aspect of the vehicle's design and engineering – some subtle, some major. New design signals comprehensive engineering change under the skin, and now gives us the Discovery 4,” says Phil Popham, managing director.

Star billing on the Discovery 4 goes to the highly efficient and refined new LR-TDV6 3.0 twin turbo diesel engine. This delivers a 9 percent* fuel economy improvement (EU combined cycle) and ten percent* less CO2 emissions, at the same time as increasing power by 29%, all compared with the existing 2.7-litre engine. Torque increases even more, up 36% to 600Nm - believed to be the highest torque output of any 6-cylinder, production diesel, passenger vehicle engine in the world

The power and torque are both accessible across the entire rev range, to deliver immediate throttle response and effortless cruising ability. The results include a 0-60mph time of 9.0 seconds, (0-100 km/h in 9.6 seconds), a 24 percent improvement over the 2.7-litre.

Land Rover's engineers have also transformed the on-road ride and handling for the new generation Discovery 4, and even improved on the near-legendary off-road capabilities of its predecessor. The comprehensive changes include new suspension components, revised steering, larger brakes, improved traction control, and enhancements to the award winning Terrain Response™ system, which helps optimise the vehicle for virtually all on-road or off-road driving situations.

The iconic exterior design has been updated, most obviously with smoother and simpler surfaces at the front, including a new, more aerodynamic bumper. The sportier new lights help give the vehicle new character, and include LED technology front and rear. The sophisticated new front headlights include High Beam Assist, switching on or off, as conditions require.

The interior is completely redesigned, with a transformed dash and centre console, new seats and an array of new, user friendly features.

"The new interior not only has a much more premium look and feel, it's also gained improvement to its functionality. The new console inclines towards the driver, the switchgear and controls fall more readily to hand, and new LED Interior Mood Lighting on HSE models helps make the cabin a more pleasant and more easily used space after dark. We've made the interior environment more premium too, with smoother surfaces, softer materials

*Manufacturer's estimates

and close attention to critical details such as stitching," says Gerry McGovern, Design Director.

New features available for the Discovery 4 include a Portable Audio Interface, DAB radio, a new five-camera 'surround' system, for easier parking and towing, and a new key system which offers Keyless Entry and Push Button Start.

"The changes and upgrades for Discovery 4 transform many aspects of the previous generation, at the same time as enhancing the flexibility and versatility for which Discovery is famous. It can carry huge loads in its spacious interior, climb mountains, cruise across continents, haul trailers of up to 3.5 tonnes, or transport seven family and friends in comfort. I can't think of a more versatile vehicle anywhere," says Phil Popham.

e-Terrain technologies boost economy and lower CO₂ emissions

The new Discovery is packed with features aimed at reducing fuel consumption and reducing CO₂ emissions. The new LR-TDV6 3.0 Sequential Turbo Diesel engine was designed from the outset to deliver class-leading fuel economy and improved low-end torque.

The parallel sequential turbocharging system of the 3.0-litre diesel makes use of its larger, primary turbo most of the time. The smaller secondary turbo remains dormant when higher power is not required, reducing pumping losses and consequently, fuel consumption. A highly efficient, third generation common rail injection system with piezo injectors and fuel metering, also makes a substantial contribution to fuel economy.

The new engine has been also been optimised for low-end torque as well as economy, making it possible to activate the lock-up clutch of the ZF HP-28 automatic transmission at lower speed. This reduces 'slip' in the hydraulic torque

converter improving both fuel consumption and CO₂ emissions. The higher torque at lower rpm also enables longer gearing for more economical cruising.

The Discovery incorporates several other energy saving features too. At standstill, the idle speed of the V6 has been reduced from 750rpm to 710rpm, giving a fuel saving without compromising refinement. An Intelligent Power Management System includes Smart Regenerative Charging, so whenever possible the alternator charges the battery when it is most economical to do so, such as when the car is coasting rather than accelerating.

Aerodynamic changes to the front end, with the revised front lower chin spoiler and new front wheel deflectors, help to reduce drag by increasing underfloor airflow.

The new air conditioning pump is driven through a clutch which disengages when the air conditioning is not in use reducing parasitic losses and delivering improvements in fuel consumption and CO₂ emissions.

e-TERRAIN TECHNOLOGIES in summary:

- LR-TDV6 engine technology
- Engine calibration optimised
- Lower engine idle speed
- Reduced torque-converter slip
- Higher torque, allowing longer gearing
- Intelligent Power System Management (IPSM) including smart regenerative charging
- Clutched air conditioning pump to reduce parasitic losses
- Improved aerodynamics

New LR-TDV6 3.0 engine boosts performance and cuts emissions

“With immense torque delivered at low rpm, the new LR-TDV6 3.0 diesel is perfectly suited to the Discovery 4’s all-terrain capability. And on the road, the engine delivers huge refinement, as well as significantly better fuel consumption and lower CO2 emissions”

Murray Dietsch, Director, Engineering Programmes

LR-TDV6 3.0 in short

- 245PS and 600Nm torque
- 29 percent* more power, 36 percent* more torque than the existing 2.7-litre diesel
- 500Nm torque from idle in 500ms
- Meets EU5 (not due until 2011) when fitted with DPF with no additional exhaust aftertreatment, such as lean NOx catalysts
- Fuel consumption improved by 9 percent over 2.7 litre TDV6, delivering 30.4mpg (9.3 l/100km) on Combined EU cycle
- Unique, parallel sequential turbocharger system
- Minimised engine friction and low energy consumption fuel pump
- Third generation common rail fuel system.
- Low radiated engine noise
- 16,000 mile (25,000 km) service intervals

At the heart of the improvements introduced with Discovery 4 is an exceptional and highly efficient new diesel engine. The LR-TDV6 3.0 sequential turbodiesel is based on the existing LR-TDV6 2.7-litre engine, but radically redesigned to

deliver substantially higher performance, lower emissions and better fuel economy.

The 2.7-litre has won many admirers as one of the most refined diesels ever made. The new, twin turbocharger LR-TDV6 3.0 boasts substantial increases in both power - up 29 percent to 245PS - and torque, up 36 percent to 600Nm. The ability to deliver maximum torque at just 2,000rpm, combined with unparalleled throttle response, substantially enhances the Discovery's already acclaimed ability both on and off-road.

The new 3.0-litre diesel can significantly out perform its rivals by delivering 500Nm in only 500 milliseconds from idle. From the driver's perspective this means instantaneous access to 83 percent of maximum torque.

But despite this extra performance, engine emissions are dramatically reduced. When fitted with DPF, the new LR-TDV6 3.0 meets EU5 emissions requirements (not due to come into force until 2011) and with a CO₂ figure of 244g/km, it undercuts the existing 2.7-litre automatic by ten percent*. Fuel economy is also improved by 9 percent*, delivering 30.4mpg* (9.3 l/100km*) on the EU Combined cycle.

The new 3.0-litre engine has been developed by a joint Jaguar Land Rover team, with base characteristics designed from the outset with the requirements of both brands in mind. High levels of torque and fast response from low revs perfectly suits both Jaguar and Land Rover DNA. The Jaguar version, the AJ-V6D Gen III S, was recently launched in the new XF.

The LR-TDV6 engine has a deeper sump than its Jaguar sibling, to ensure the efficiency of the lubrication system is not compromised when venturing off-road. The oil scavenge system of the turbochargers has been enhanced for a similar reason, ensuring no oil collects in the turbochargers at extreme angles in off-road conditions.

For the Land Rover version, belt drives are waterproofed, as are the alternator, air conditioning compressor, power steering pump and starter motor. The engine is also tuned specifically to allow for the greater demands made on the Discovery 4, particularly for towing and all-terrain driving.

*Manufacturer's estimates

Twin-turbos – immensely efficient, highly responsive

A key feature of the new LR-TDV6 3.0 is the unique, parallel sequential turbocharger system, the first of its type to be fitted to a V-engine anywhere in the world. Delivering high torque throughout the entire engine-rev range, improved throttle response and low CO₂ emissions, the twin-turbochargers work sequentially to provide unrivalled response and best-in-class torque at low engine speeds, while also packing a huge punch at higher speeds.

Driving a turbocharger requires pressure from the exhaust, creating pumping losses in the engine and increasing fuel consumption. Under the control of the engine management system, valves isolate the secondary turbocharger both from the exhaust stream and the engine inlet tract when it is not required. A balance pipe connecting the two manifolds allows the gas from both manifolds to feed through the primary turbocharger.

The new 3.0-litre diesel can significantly out perform its rivals by delivering 500Nm in only 500 milliseconds from idle, unlike many diesels which can suffer turbo-lag at very low revs. From the driver's perspective this means instantaneous access to 84 percent of maximum torque.

Parallel sequential turbocharging - summary of advantages:

- Most of the time only one turbocharger is in use (up to motorway cruising speeds and average acceleration). Because it is a medium, rather than large-sized turbo with variable geometry, response is excellent with no discernable lag.
- Packaging is excellent, one turbo and manifold below each bank of cylinders.

- The combination of two turbochargers makes it possible to optimise efficiency and performance at all times.
- Because one turbocharger is in use most of the time, pumping losses are reduced.
- More efficient than series turbocharger systems, whose smaller primary turbocharger increases pumping losses and fuel consumption through raised exhaust back pressure.

Third generation common rail

A new common rail fuel-injection system delivers up to five injections on each cycle at a pressure of 2000bar. Each injector tip is perforated by seven holes through which finely atomised fuel is sprayed into the cylinders. The high-pressure injection increases power, improves economy and reduces both CO₂ and particulate emissions. New, high-speed piezo injectors are designed to keep injection noise to a minimum.

Piezo crystal 'packs' operate each injector by expanding when an electric current is passed through them. They react virtually instantaneously but make a distinctive click when fired, which can add to diesel engine noise at idle. The crystals in Land Rover's new injectors are fitted nearer the tip meaning they are mounted deeper inside the engine providing better sound insulation and quieter operation.

Also new to the third-generation fuel-injection system is 'metering mode'. Traditional diesel common rail fuel pumps oversupply the injectors, with the surplus being returned to the fuel tank. During this process, fuel temperature increases and cooling it again consumes considerable amounts of energy. In

metering mode, the pump delivers fuel to the injectors only at the rate required. Consequentially, there is no rise in fuel temperature and no wasted energy.

Rugged yet lightweight

The two cylinder heads, with four valves per cylinder, are made from aluminium and the cylinder block is made from compact graphite iron (CGI) as before. The higher tensile strength of CGI makes it possible to cast a smaller block some 80mm shorter than a conventional 'grey' cast iron equivalent.

The new, water-cooled, exhaust gas recirculation system (EGR), important for reducing pumping losses and emissions of NO_x in a diesel engine, is more efficient and consumes less power than its predecessor, with the valves allowing exhaust gas into the system being located on the 'hot side' of the engine nearest the exhaust manifolds. These valves never cool while the engine is running, so there is no condensation of combustion deposits which occurs on engines fitted with 'cold side' valves, hence the EGR system always works at maximum efficiency. Since the EGR cooling is so effective, exhaust gasses can bypass the system and return to the exhaust pipes, allowing faster engine warm-up from start-up and reducing emissions still further.

EU 5 emissions regulations have been achieved using conventional diesel oxidation catalysts and diesel particulate filters (DPFs). NO_x levels are reduced sufficiently at source through the combustion system design, the addition of the new common rail injection system and the new EGR system with by-pass. As a result, specialised NO_x exhaust after-treatment is unnecessary, avoiding a potential cost and the need to use additional precious metals in the exhaust system.

Increased refinement

The CGI cylinder block and new piezo injector design reduce combustion noise in the new engine. Multiple, precise injections of fuel on the combustion stroke also reduce combustion noise and all engine covers including camshaft covers, front covers and the sump have been optimised to subdue radiated noise.

The new diesel underwent analysis using the latest computer aided engineering techniques, followed by exhaustive rig testing. All the engine enclosures have been ribbed to minimise radiated noise.

Internal friction, a major contributor to unnecessary fuel consumption, has been addressed by careful optimisation of the crankshaft, valves and pistons. All these features combine to make the new LR-TDV6 3.0 Sequential Turbo Diesel one of the quietest premium diesels on the market today with increased service intervals of 16,000 miles.

Levels of refinement on the new LR-TDV6 engine are such that Land Rover's patented device for the diesel fuel filler neck, to reduce the risk of inadvertent fuelling with petrol, is fitted to the new Discovery 4.

Responsive new transmission

The LR-TDV6 3.0 is mated to the revised and super-smooth ZF HP28 6-speed automatic transmission. Its characteristics have been optimised by Land Rover engineers to provide class-leading response, with rapid and refined shifts. The dramatic enhancement of both power and torque low down the rev range on the new engine have made it possible to actuate the transmission's lock-up clutches much earlier in each gear, reducing slip through the hydraulic torque converter, so helping with the improvements in both fuel consumption and CO₂ emissions.

Dynamics transformed

Major dynamic advances introduced for the Discovery 4 include revised suspension architecture, improved steering, larger brakes and enhanced versions of Land Rover's award-winning Terrain Response™ and Hill Descent Control systems.

The list of changes starts with new suspension knuckles, designed to reduce the separation between the suspension roll centre and the vehicle's centre of gravity (reduction of 42mm at the front and 62mm at the rear). This dramatically reduces the vehicle's natural body movements when cornering. These roll rates are further controlled by a stiffer and larger anti-roll bar.

In addition, new bushes and new front and rear dampers enhance ride quality.

The variable ratio steering rack is revised, complementing the improved ride quality by reducing 'twitchiness' around the centre line at high speed cruising and slightly increasing sensitivity at higher lock angles. This enhances the sense of driver involvement in high-speed manoeuvres, and also increases precision for low speed control and off-roading.

The redesigned front bumper also helps improve steering feel, as its new anti-drag lips help reduce aerodynamic lift at the front of the vehicle by up to 50% at higher speeds.

Increased stopping power

A new, larger brake system has been introduced along with the new engines, to cater for the Discovery 4's enhanced performance and to improve braking feel.

This new system is derived from the four-piston, opposed-calliper performance system used on the Range Rover Sport. It employs a 360mm ventilated front disc with a new, cast iron twin-piston sliding calliper – which serves to reduce the size of the front brake package while preserving its stiffness, which in turn helps achieve excellent pedal feel.

At the rear, a single piston sliding calliper operates on a 350mm ventilated disc, now manufactured in aluminium to help reduce vehicle weight.

An additional advance to the braking system is the new emergency brake light function. When the vehicle undertakes severe or emergency braking, the brake lights flash, to reduce the risk of rear end collisions.

More control in the bends

A refinement to the understeer control system helps automatically slow the vehicle if taking a bend too fast, enhancing driver control.

The system operates according to steering inputs from the driver. In extreme cases, automatic braking intervenes to reduce the vehicle speed, with the braking pressure level applied according to the steering inputs. Automatic braking up to 'emergency stop' may be applied, if the inputs demand.

Updates for award-winning Terrain Response™ and Hill Descent Control

For Discovery 4, Land Rover's award-winning Terrain Response™ system gains new features and refinements, further extending the vehicle's all-terrain capability. Terrain Response™ optimises the vehicle set-up for virtually all on-road or off-road driving situations, with five different settings to suit different terrains:

- General driving
- Grass/gravel/snow
- Sand
- Mud and ruts
- Rock crawl

For soft sand – one of the most power-hungry surfaces – 'sand launch control' has now been introduced, which makes for noticeably easier drive-away. New,

speed-dependent wheel-slip targets for the traction control system permit only very limited initial wheel-slip, helping to prevent the wheels digging down into the sand.

When picking a drive route through boulders, severe articulations can lead to the vehicle leaning in an undesirable direction, calling for simultaneous brake and accelerator engagement. New for Discovery 4, revisions to the rock crawl program improve brake and traction control response times, helping to reduce the vehicle's tendency to roll when traversing boulders and giving a more composed drive through rocky terrain.

Land Rover's much-acclaimed Hill Descent Control system is enhanced on Discovery 4 with the addition of Gradient Release Control. This inhibits the initial rate of acceleration when descending very steep inclines, to increase control and eliminate the potentially alarming lurch which can occur when braking is released at extreme angles.

The system operates automatically whenever Hill Descent Control is engaged, temporarily maintaining brake pressure after the driver releases the brake pedal. It then progressively eases braking pressure to control vehicle momentum and acceleration. Once the vehicle's target off-road speed is achieved, Hill Descent Control operates to take vehicle to the bottom of the slope in its customary composed manner.

A new face on a distinctive design

"Discovery 4 stays true to its clean, geometric, architecturally-inspired predecessors, while its new front bumper, lights and face with smoother lines and subtle curves, together with more colour-coding, combine to enhance the overall impression of premium quality."

Design Director, Gerry McGovern

The Land Rover Discovery has evolved a distinct design heritage over 20 years and four generations of iconic, instantly recognisable vehicles. Discovery 4 inherits the clean lines of the previous generation, but now subtly updated and given a more premium, more contemporary look.

Smoother, simpler surfaces are employed at the front, giving the vehicle its new character, emphasised by sportier looking front lights, with new LED position lamps configured in a unique, signature stepped profile around the main light units. New lights are also introduced at the rear of the vehicle, incorporating LED stop, tail and indicator technology.

The new front bumper has a larger cooling aperture to accommodate the new engine's greater power outputs. Cleverly, the larger bumper actually improves vehicle aerodynamics by reducing drag, thanks to its innovative anti-drag 'lips' that help smooth the airflow from the front bumper around the front wheels.

A new, twin seven-spoke 19" wheel design is introduced on the Discovery 4 to complement the existing 7-spoke 19" wheel and, for the first time, a new striking, 10-spoke 20" wheel is available as a factory-fit option.

Three new paint colours complete the exterior changes for Discovery 4 - Nara Bronze, Bali Blue and Ipanema Sand.

All-new interior

"The interior of Discovery 4 continues to offer the driver and passengers superb visibility and versatility. But the re-designed fascia and console architecture plus the use of premium materials, make the cabin a much more desirable place to be."

Gerry McGovern

The new interior for Discovery 4 combines smooth, flowing surfaces with significant reduction in the complexity and number of controls. It provides a much softer, more premium all-round interior ambience, but still in keeping with the signature Discovery architectural theme.

The new console is now inclined towards the driver, improving visibility and access to the controls. It looks more akin to that in the Range Rover Sport than the outgoing Discovery 3. The Terrain Response™ control is now more prominently located at the front of the centre console, making way for the cup-holder in a more accessible position, mid-way along the console.

All models feature a new steering wheel, with revised switch layout for driver information, remote audio controls, cruise control and heated steering wheel.

A choice of natural-finish woods, along with stitched and wrapped facia, door casings and centre console, add to the crafted bespoke feel. There are also two new interior contrast colours, a mid-tone Nutmeg and a darker Arabica, complementing the existing Almond light interior colourway.

New seating is introduced for rows one and two, with a new, extended front seat cushion profile to improve support and seating comfort and, for the first time, the front seats feature height-adjustable head restraints in place of the traditional seat mounted grab handles. HSE vehicles specified with the Premium Leather pack also feature electrically adjustable side seat bolsters, allowing front occupants to tailor their seating's support.

For convenience, the electric seat memory controls are relocated to the door casing.

New Interior Mood Lighting adds the finishing touch to the interior, with the introduction of white LED's to cast subtle halos around the metal-plated interior door handles and pockets. The fascia and centre console area, complete with soft-stitching, and switchgear highlighted in "Noble" finishers, also benefit from the interior mood lighting when vehicle lights are on.

Technology made simple

The Discovery 4 is packed with easy-to-operate and useful features, not technology for technology's sake. The aim throughout is to simplify the operation, to help make journeys more relaxing and stress-free

Stuart Frith, Chief Programme Engineer

Inside and out, the Discovery 4 gains a raft of relevant new technology, to improve the driving experience.

The navigation system adopts an easy-to-use navigation structure which now also features 'towards guidance'. This supplements the junction map and icon-based information with details of the actual road signage viewed by the driver along the route.

The new Portable Audio Interface allows connectivity to an array of personal audio storage devices, USB sticks and MP3 players, enabling the various devices' functions to be accessed and controlled via the facia-mounted touch-screen system. One of the connectivity ports is a dedicated Apple i-Pod™ point made exclusively by Land Rover, for continued functionality in extreme driving conditions, by helping to prevent the device coming loose from the socket.

A new 5-inch Thin Film Transistor (TFT) driver information screen is also introduced with Discovery 4. Sitting within the re-designed instrument cluster, the message centre display ensures key information is communicated in a clean, simple and user-friendly manner.

And a purer, crisper radio sound is now available thanks to the introduction of Digital Audio Broadcasting (DAB) in most European and Asian markets, and HD radio in the US. Along with the fine listening experience, comes additional features such as news headlines, song title and artist information.

Cutting edge user-friendly technologies

Outside the vehicle, convenient and relevant new systems enhance safety and security.

The new front headlights incorporate high beam assist technology. This can automatically switch on high beam headlights where external light levels are below the system's threshold. Importantly, the system is also designed to detect preceding and approaching traffic, and in a split second will automatically switch back to low beam to avoid dazzling others.

The new remote entry key emits the signal required for passive entry into the vehicle, by the holder of the key simply touching the door handle, without using the 'unlock' button on the key fob. The new key also generates the signal required for the Push Button start of the vehicle. Sophisticated sensors recognise the presence of the key in the vehicle, confirm security credentials and then accept the 'start' command via the new fascia mounted start/stop push button.

No less than five digital cameras make up the new surround camera system, relaying to the touch-screen a near 360-degree view. The cameras function immediately the vehicle is started, and can be used at speeds up to 11mph, with options for selecting and zooming in to assist with close quarter parking and with towing.

The 'tow assist' function (selected from the touch screen menu) helps perform accurate towing manoeuvres. The wide field of views on the side cameras give a clear view of the reversing trailer: the images are electronically manipulated to provide an undistorted view, with guide lines overlaid on the rear camera image to illustrate both the vehicle and trailer's trajectory.

Specific characteristics such as type of trailer, number of axles and width guides can be fed into the system to enhance the system outputs.

Another towing aid, Trailer Stability Assist, detects trailer oscillations by monitoring key vehicle behaviours, such as uninvited steering movements and slight vehicle swing in response to trailer behaviour. In these circumstances, the system can initiate engine torque reduction and braking interventions to bring the towing back under control.

REMOTE PARK HEAT

To help engine warm-up in colder conditions, the LR-TDV6 3.0 litre can be pre-heated, either by using a one-day timer, programmable via the infotainment screen, or activated using the remote control key fob. Once the engine is up to temperature, any residual heat is channelled into the cabin for enhanced occupant comfort on entry into the vehicle.

ENDS