

VOLVO XC70

DRIVING DYNAMICS

ENGINES

There are two powerful, five-cylinder engines available for the XC70, a petrol and a diesel. Both are turbocharged and offer the flexibility of high levels of torque at lower engine speeds.

Volvo's refined, all aluminium, 20 valve, common rail turbo diesel, available with a six-speed manual or five-speed Geartronic transmissions, is currently the more popular choice, accounting for just over 80 per cent of annual sales in 2003.

The 2.5T petrol engine boasts four valves per cylinder with a light pressure turbo and dual continuously variable valve timing to provide stirring performance with excellent mid-range torque.

Strong mid-range urge and refinement are also some of the characteristics of Volvo's common rail turbodiesel.

At the heart of the Volvo XC70 are two five-cylinder, turbocharged engines that both deliver an impressive combination of performance and flexibility:

- 2.5T petrol: 210bhp, 320Nm of torque from 1,500rpm to 4,500 rpm, a max speed of 130mph, with 0-62mph in 8.1 seconds and emissions of 244 g/km
- D5 diesel: 163bhp, 340Nm of torque from 1,750rpm to 3,000rpm, a max speed of 124mph, 0-62mph in 10.5 seconds and emissions of 199 g/km

| Engine | Size | Bhp | Torque Nm@rpm | co2 g/km | Comp ratio | Bore x stroke, mm | Top Speed mph | 0-62 mph sec | Kerb* weight Kg | Ins grp | MPG Urban/Extra urban/Comb |
|--------|--------|-----|---------------|----------|------------|-------------------|---------------|--------------|-----------------|---------|----------------------------|
| 2.5T | 2521cc | 210 | 320@1500 | 244 | 9.0:1 | 83 x 93 | 130 | 8.1 | 1679 | 15E | 20.0/35.8/27.7 |
| D5 | 2401cc | 163 | 340@1750 | 199 | 18.0:1 | 81 x 93 | 124 | 10.5 | 1748 | 13E | 28.5/46.3/37.7 |

* minimum kerbweight. (Actual kerbweight dependent on spec)

| | |
|-----------------------------------|--|
| Steering/tyres | Rack and pinion with 205 (16in) section tyres. |
| Turning circle, m (ft) | 11.9 (39ft) |
| Transmission | 5 speed manual (2.5T) 6 speed manual (D5) Auto: 5 speed Geartronic |
| Brakes: Front discs Rear discs | 16in – 305mm 16in – 288mm |
| Fuel Tank litres (gallons) | 68 (15.0) |
| Load capacity: litres (cu ft) | |
| Rear seats up | 485 (17.1) |
| Rear seats down | 745 (26.3) |
| Rear seats down (load to | 1641 (58.0) |

| | |
|-------------------------------|----------------------|
| roof) | 1077mm |
| Load length: rear seats up | 1848mm |
| Load length: rear seats down | |
| <u>Dimensions:</u> (mm) | |
| Length | 4733 |
| Width (excluding mirrors) | 1860 |
| Unladen height | 1562 |
| Wheelbase | 2763 |
| Front track width | 1611 |
| Rear track width | 1548 |
| <u>Ground clearance:</u> (mm) | |
| Standard height | 209 |
| With 2 persons | 193 |
| Max towing weight braked (kg) | 1800 (all models) |
| Max total weight (kg) | 2220 (all models) |
| Max payload (kg) | 541 (2.5T); 472 (D5) |
| Max roof load (kg) | 100 |
| Max trailer 'noseweight' | 90 |

(Full technical data, prices and options information available on separate file/section, or www.media.volvocars.co.uk)

2.5T

The 2.5T belongs to the RN range of five-cylinder, all-aluminium, in-line petrol engines. It features four valves per cylinder, a twin cam head, centrally mounted spark plugs and dual continuously variable valve timing (CVVT). The latter operates on both the exhaust and inlet cam and helps to minimise emissions, especially when the engine is cold, and maximise torque at low engine speeds.

Boasting a capacity of 2521cc, the 2.5T develops 210bhp and 320Nm of torque from as low as 1,500rpm up to 4,500rpm, and provides impressive mid-range flexibility.

Against the stopwatch, the manual Volvo XC70 2.5T records 0-62mph in 8.1 seconds and a maximum of 130mph. It is capable of 27.7mpg on the official Combined cycle with emissions of 244 g/km. The figures for the Geartronic (auto) version are 8.5sec, 130mph, 25.4mpg and 266 g/km, respectively.

D5

The D5 turbodiesel variant has proved particularly popular since it was introduced for the 2003 model year and accounted for just over 80 per cent of XC70 sales in the UK in 2003, making it one of a minority of diesel, AWD estates on the market. It is available with either a six-speed manual transmission or Volvo's five-speed Geartronic adaptive automatic with manual mode.

The five-cylinder, 20 valve engine has the latest diesel technology with variable turbine geometry. A common rail system enables the fuel to be distributed under very high pressure

via a single 'common' fuel line or 'rail', and the combustion can be controlled precisely, reducing emissions and maximising performance, economy, flexibility and refinement.

The engine develops 163bhp at 4,000rpm and 340Nm of torque from 1,750-3,000rpm, which takes the XC70 with manual transmission from 0-62mph in 10.5 seconds, with a maximum of 124mph, emissions of 199g/km and 37.7mpg on the official Combined cycle. With the Geartronic transmission, the figures change slightly with acceleration to 62mph taking one second longer, with a maximum speed of 121mph, emissions of 223g/km and 33.6mpg on the Combined cycle.

CHASSIS

The all-wheel drive (AWD) Volvo XC70 combines the ability to traverse mixed terrain with a sophisticated load compensating suspension set-up and the on-road dynamics and high torsional rigidity of the Volvo V70.

An increase in the ground clearance by 69mm compared with the Volvo V70, together with all-wheel drive with the latest electronic Haldex coupling and chunky Pirelli Scorpion STR tyres mean the Volvo XC70 is surprisingly capable over rough terrain and poor surfaces.

More active drivers may be interested in the option of Volvo's 'Four-C' (Continuously Controlled Chassis Concept) active chassis available for the XC70.

With separate Sport and Comfort settings available at the touch of a button on the dashboard, the Four-C chassis continuously monitors the car and road conditions up to 500 times per second and simultaneously adjusts each Monroe-Öhlins shock absorber and interacts dynamically with the DSTC system, brakes and steering for optimised ride and handling. The system also actively adjusts dampers to reduce roll during cornering, dive during braking and squat during acceleration.

- AWD for all-terrain ability combined with impressive on-road performance
- 'Four-C' active chassis with Sport and Comfort settings available (optional)
- DSTC (Dynamic Stability and Traction Control) fitted as standard
- Electronic Haldex all-wheel drive system maximises traction between front and rear axles in all conditions
- Volvo's TRACS anti-spin system to distribute power across the axle
- High torsional rigidity benefits safety and chassis dynamics
- Wider front track than Volvo V70 for improved stability in all conditions

- Sophisticated multi-link rear suspension
- Load compensating suspension fitted as standard
- Lower centre of gravity and weight than an SUV
- 209mm Ground clearance (69mm more than V70, and 9mm less than XC90)

The strength of the Volvo XC70 concept is its ability to combine the on-road dynamics of the critically acclaimed Volvo V70 with the mixed-terrain ability of an SUV.

The sophisticated suspension set-up and high torsional rigidity are shared with the Volvo V70, but the front track is wider for enhanced stability in all conditions.

A high level of torsional rigidity is crucial to providing a consistent ride and handling balance, and it also enhances a vehicle's crash performance. Volvo's engineers met their rigidity targets through the extensive use of High Strength Steel (HSS) and the application of bonding techniques in place of the more usual spot welding. Bonding, unlike spot-welding, produces a continuous join that increases the rigidity of the structure and also steals less space in, for example, the luggage area. The technique clearly works, as the Volvo XC70 is 50 per cent stiffer than its predecessor.

Suspension

The Volvo XC70 shares its basic suspension set-up with the Volvo V70, but with modified geometry and an extra-wide track. The MacPherson strut front suspension employs dampers and coil springs that are combined in a single unit and are positioned asymmetrically in relation to the strut. Beneath the spring struts are triangular lower links, with an anti-roll bar attached directly to the bottom of the struts themselves. Anti-lift and anti-dive technology also enhances the car's stability in all conditions.

At the rear, the Volvo XC70 employs a sophisticated multi-link system, mounted in a chill-cast aluminium subframe. This is attached to the body at four points via insulating rubber bushes to keep noise and vibration to a minimum. The use of aluminium helps keep the weight down, while the compact design ensures that there's no encroachment on passenger or luggage space.

Four links on each side – hence multi-link – comprised of two trailing arms, upper and lower links, a track rod and an anti-roll bar, control the movement of the wheels. As with the front suspension, the coil springs and dampers form a single unit. This system permits a small degree of passive rear wheel steer when cornering, to aid stability. In recognition of its role as a load carrying estate, the Volvo XC70 features load compensating suspension as standard.

The revised suspension geometry and the introduction of chunky 215/65 R16 Pirelli Scorpion STR tyres have resulted in a change in the track widths when compared with the Volvo V70. The Volvo XC70 has a front track of 1611mm, compared with 1560mm for the Volvo V70, which promotes extra stability in rough conditions.

These changes also incorporate an increase in ride height, to help the Volvo XC70 cope with rough terrain. It has a total ground clearance of 209mm, which is 69mm more than a Volvo V70 and compares well with rivals such as the Audi Allroad and even some SUVs.

AWD (with electronic Haldex coupling)

The Volvo XC70's all-wheel drive system has the latest electronic system developed in conjunction with the Swedish specialist, Haldex. It operates independently of driver input, distributing torque automatically between the front and rear wheels for the best possible grip in all conditions.

The intelligent AWD system uses a variety of sensors to monitor the road surface and the steering wheel, brake and accelerator pedal positions. In normal driving conditions on dry roads, almost all the power is distributed to the front wheels. However, for off-road work, or if the sensors detect slippage, torque is proportionately diverted to the rear wheels to maximise traction. The system responds in just one-seventh of a wheel turn, making an outstanding contribution to the Volvo XC70's versatility, responsiveness and active safety.

The XC70 further benefits from Volvo's TRACS anti-spin system and DSTC (Dynamic Stability and Traction Control).

TRACS prevents wheel spin by transferring power across the axle if it detects a wheel is losing grip on one side.

In addition, the DSTC system increases driving safety on twisty roads and in slippery conditions by using sensors to detect if one of the driven wheels shows any sign of losing traction and cutting the power to it at lightning speed so it can quickly regain grip. And if the car shows any tendency to skid, the system steps in to automatically brake the relevant wheels to help maintain smooth control.

All XC70 models benefit from ABS brakes with EBD (Electronic Brake Distribution) and EBA (Electronic Brake Assist) which senses an emergency stop and automatically brings the car to a halt in as short a distance as possible.

Second Generation 'Four-C' Chassis

The advanced electronics of Volvo's second generation 'Four-C' (Continuously Controlled Chassis Concept) technology allow all of the car's dynamic systems to communicate and work in unison and has now been specifically optimised for the variety of UK road conditions.

The car's speed, wheel movement and steering are continuously monitored via Multiplexed control systems that update the suspension settings 500 times per second.

The advanced electronics work in conjunction with the XC70's sophisticated all-wheel drive system and allow the driver to choose between two different suspension settings – Sport and Comfort - at the touch of a button on the dashboard for maximum driver choice, control and enjoyment.

With both settings the Four-C system is programmed to compensate the suspension to account for heavy loads or if the XC70 is towing.

STEERING, BRAKES AND TRANSMISSIONS

The Volvo XC70's steering and braking systems have been tuned to maximise driver enjoyment and safety, both on and off-road. The rack and pinion steering provides a linear response and plenty of feedback, while the anti-lock brakes are boosted by Electronic Brakeforce Distribution (EBD), plus Dynamic Stability and Traction Control (DSTC) with Electronic Brake Assist (EBA).

There is also an optional speed dependent system available that provides additional assistance at low speeds and more steering feel as speed increases.

A five-speed manual gearbox is standard on the petrol powered XC70, and a six-speed manual for the diesel. For those who prefer to let a computer take the strain, Volvo also offers a Geartronic automatic transmission. This system adapts its shift points to individual driving styles and also benefits from a sequential, manual shift facility for added control.

- Power-assisted, ZF rack and pinion steering optimised for feedback/response
- Anti-lock brakes with Electronic Brakeforce Distribution (EBD)
- Dynamic Stability and Traction Control with Electronic Brake Assistance (EBA)
- Speed dependent steering available (optional)
- Five-speed manual transmission for 2.5T petrol engine
- Six-speed manual transmission for D5 turbodiesel

- Optional Geartronic automatic transmission that adapts its shift patterns to suit individual driving styles and includes a sequential, manual shift facility for added control

The Volvo XC70 uses a power-assisted rack and pinion steering system that has been developed to optimise driver feedback and response, both on and off road. The steering feel has been improved through careful tuning of the torque build-up during cornering, which helps the driver to place the car accurately on the road.

Large disc brakes, which are ventilated at the front, deliver a firm and consistent response, whatever the payload. As you'd expect from Volvo, an anti-lock braking system is fitted as standard assisted by Electronic Brake Force Distribution (EBD). EBD constantly distributes braking power between the front and rear wheels to ensure maximum retardation regardless of the road conditions.

In addition, Dynamic Stability and Traction Control (DSTC) is standard on all XC70 models with EBA (Emergency Brake Assist). This senses when an emergency stop is required and automatically applies maximum braking performance.

The 2.5T engine model is supplied with the 'M56' five-speed manual gearbox. This compact unit uses a three shaft (one input/two layshaft) system in place of the more traditional two shaft design, which contributes to the smooth, positive shift quality.

The other engine in the XC70 range, the D5 turbodiesel, is fitted with a six-speed manual gearbox, but for drivers who prefer to let a computer take the strain, Volvo offers the Geartronic automatic transmission is available with either engine. This five-speed unit automatically adjusts its shift points to reflect the driver's style and also offers a manual, sequential-shift facility. The driver is able to choose gears individually by tipping the lever forwards to change up and backwards to change down.