

VOLVO XC90

MARKET POSITIONING

With its modern design, powerful petrol and diesel engines, Roll Over Protection System (ROPS) and the flexibility of up to seven forward facing seats, the Volvo XC90 is not only stylish and desirable – but a next generation Sports Utility Vehicle (SUV) that takes a step ahead of other key premium brand rivals such as the BMW X5 and Mercedes M-class.

The XC90 is Volvo's first SUV, and it has already made a big impact on the press and public alike with its innovative interior, comprehensive standard specification, competitive pricing, and advanced safety features. The public placed 2,200 orders before it even arrived in showrooms.

What Car? magazine has voted the XC90 'Best 4x4' in its 'Car of the Year Awards 2003', and it was also 'SUV of the Year 2002' in The Sun; The XC90 has also won many prestigious SUV awards over in USA, the homeland of the SUV.

- Flexible and innovative interior design with up to seven seats
- New safety: Roll Over Protection System and Roll Stability Control
- Most competitive, best equipped premium SUV
- Headphone sockets for rear passengers to listen to different music sources
- P2 platform for car-like driveability
- Electronic Haldex AWD
- Turbo engines: 272bhp T6 petrol, or 163bhp D5 diesel

With its modern design, powerful diesel and petrol engines, Roll Over Protection System (ROPS) and seven-seat capability, the Volvo XC90 is not only stylish and desirable – but a next generation Sport Utility Vehicle (SUV)

that takes a step ahead of other key premium brand rivals such as the BMW X5 and Mercedes M-class.

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Inside and out, the XC90 showcases great design:

"Masculine, but not macho; muscular, but not aggressive," is how Peter Horbury, former Vice President and Chief Designer at Volvo Cars describes the XC90. "Nobody should be in any doubt that this is a modern Volvo."

Typical of the XC90's ingenuity and flexibility is the removable armrest between the front seats to offer more legroom for the passenger in the centre seat in the second row of seats. But there's more: That centre seat also has an integrated booster cushion and slides forward to bring a child closer to the passengers in the front seats.

In fact, all seven seats are individual with head restraints and seatbelt pretensioners, while, unlike some rivals, the XC90's sixth and seventh seats don't take up valuable loadspace or have to be clumsily removed; instead they simply and cleverly fold away individually under the boot floor when not required.

Yet, despite all these features and ingenuity, the Volvo XC90 is just 87mm longer than a Volvo V70 estate.

The interior design is characterised by airiness, space and quality with a dashboard set low for a car-like driving experience and using typically simple Scandinavian style.

Optional rear headphone sockets allow the passengers in the second and third rows of seats to listen to either a CD, radio or mini disc simultaneously. A roof mounted DVD player will also be available.

In order to optimise the XC90's safety and, in particular, reduce the risk of a roll-over, Volvo has developed a Roll Over Protection System with new Roll Stability Control (RSC) technology. This uses a gyro-sensor to register the car's roll speed and roll angle to instantly calculate the terminal angle and risk of a roll-over, and automatically activate the DSTC (Dynamic Stability and Traction Control) anti-skid system, if required, to help the driver maintain control.

For added protection, Volvo has also reinforced the XC90's roof structure with extremely tough Boron steel, which is four to five times stronger than normal steel. In addition, the side Inflatable Curtain (IC) protects all three rows of seats and has been designed to stay inflated longer in case of multiple roll-overs, and to help keep occupants inside the vehicle.

Volvo has also considered the XC90's crash compatibility with other, smaller cars, and designed a lower cross-member - concealed behind the front spoiler - at the height of a bumper in a conventional car to impact with and activate its crumple zones as intended.

The XC90 is designed for all types of road surfaces and has intelligent Haldex, electronically controlled all-wheel drive with 218 mm of ground clearance, and has a choice of powerful petrol or diesel turbo engines:

- **T6:** in-line 6-cylinder, 2.9-litre petrol engine with twin turbochargers. 272bhp and 380 Nm of torque from just 1800rpm

- **D5:** in-line 5-cylinder, 2.4-litre common rail turbodiesel engine. 163bhp and 340 Nm from 1750rpm

Naturally, Volvo has not forgotten the XC90's environmental credentials, either, and ensured its fuel economy and low emissions are class leading.

In addition, its interior is free from hazardous or allergenic substances as all its textiles and leather are certified to the European Öko-Tex standard, while it features Volvo's 'Premair'® that reduces ground level ozone by converting 75 per cent of it into oxygen as it passes through a special coating on the radiator.

EXTERIOR DESIGN

"Masculine, but not macho; muscular, but not aggressive." is how **Peter Horbury**, former Vice President and Chief Designer at Volvo Car Corporation, described the XC90's exterior design.

"Nobody should be in any doubt that this is a modern Volvo." says Horbury.

The exterior design incorporates both the latest and traditional Volvo design features:

- **Dark, egg-crate grille**
- **V-shaped bonnet**
- **Broad, pronounced rounded shoulders**
- **Characteristic tail lamps**

The muscularity of the XC90 is matched by angled corners front and rear, a gently sloping (split) tailgate and shorter roof section to promote a smoother, non-aggressive impression and helping the vehicle to look more compact and desirable.

A 'cockpit forward design' allows the windscreen to be positioned further forward and be more steeply raked than other SUVs, yet also maximises interior space for Volvo to make the XC90 a seven-seater SUV - in a body just 87mm longer than a V70.

- Stylish exterior design – Masculine, but not macho
- "Cockpit forward design" – compact seven-seat capability
- Exterior Styling Kit

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"Cockpit forward design"

The XC90's "cockpit forward design" enables the passenger compartment to be as far forward as possible with a more steeply raked windscreen than in most other SUVs.

This has allowed Volvo to make a seven-seater SUV yet still within modest overall body dimensions: The Volvo XC90 is 4.80 metres long, just 87 mm longer than a Volvo V70.

The XC90's tailgate is gently sloping rather than vertical to clearly state this is not regular Volvo estate car. This also means the shorter roofline helps the vehicle appear smaller and gives it a modern, sporty stance.

For added convenience, the tailgate is split so the lower section can be used as a seat or table, and strong enough to be stood on if loading items onto the roof, while the upper section is not too large, heavy or high when opened.

Extra Exterior Style

For customers who want some added style for their XC90, there are some options which may interest, such as:

- dark tinted rear windows
- Bi-Xenon headlights
- ribbed side décors (to help protect the lower sides of the car)

There is also a Cross Country pack available, which consists of:

- Aluminium Running Boards. Fitted along the sides under the doors to protect the sills and act as footsteps when climbing in or out of the car
- Rear Skid plate. Fitted to the rear bumper to enhances the rugged image of the Volvo XC90 and highlight its ground clearance
- Load Carrier
- Roof protection ribs. Seven rubber ribs mounted lengthwise on the roof.
- Mudflaps. Shaped to fit the wheel-arches to protect the sills and sides from gravel thrown up by the wheels

DRIVING DYNAMICS

ENGINE

The XC90 is available with a choice of two powerful, aluminium turbo engines:

- **D5:** in line five cylinder, 2.4-litre common rail turbodiesel; 163bhp; 340Nm of torque from 1,750 rpm; 0-62mph in 9.3 seconds
- **T6:** in line six cylinder, 2.9-litre petrol; 272bhp; 380Nm of torque from 1800 rpm; 0-62mph in 12.3 seconds

Both refined engines produce plenty of power and, especially, torque from low engine speeds and through the mid-range, for maximum flexibility and driving pleasure.

Volvo has also ensured the XC90 offers class leading emissions and fuel economy. The T6 engine achieves up to 29.4mpg on the extra urban cycle with emissions of 309 g/km, while the D5 diesel registers 37.7mpg on the same cycle, with emissions of 242 g/km.

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Both engines come from Volvo's car range, but they have been re-profiled to suit XC90. In particular, the petrol engine produces more torque from lower down the rev range.

The 6-cylinder engine is the same unit that powers Volvo's executive saloon, the S80 T6. It has a parallel turbo system – two small and highly efficient turbochargers installed alongside each other, driven by and feed three cylinders each. It is equipped with Continuously Variable Valve Timing (CVVT) on both the inlet and exhaust sides.

CVVT adjusts valve timing to suit the engine's current revs and load, and it thus exploits the engine more effectively, reducing fuel consumption and emissions. One of the most important results is that maximum torque is available from just 1800 rpm, compared with the 2000 revs/minute of the version in the S80.

Volvo's 'D5', 163 bhp turbodiesel engine features second-generation common rail technology with fuel injected into the cylinders under extremely high pressure, up to 1600 bar to ensure an exceptionally finely distributed supply of fuel throughout the injection sequence. The result is remarkably efficient combustion, boosting the engine's efficiency and reducing emissions.

The turbocharger is of the Variable Nozzle Turbine (VNT) type. This means the turbine features movable vanes on the inlet side which promotes a high turbine efficiency rating throughout the rev range and allows a high boost pressure from low revs, resulting in a flat torque curve and higher power output.

CHASSIS

The XC90 uses Volvo's P2 platform (S60, V70, S80) for a car-like driving experience, with a wide track and long wheelbase for maximum stability.

The Volvo XC90 is a vehicle designed for all types of roads, irrespective of the surface beneath the tyres or the weather conditions.

Even though the XC90 was never intended to be a serious off-roader, it has the versatile combination of electronically controlled Haldex all-wheel drive and a generous 218 mm of ground clearance for when the going gets tough.

A high seating position gives the XC90 driver a feeling of safety and greater awareness of the road ahead, with the knowledge that he or she can control the car with the help of instant, well-weighted response from the chassis, engine and brakes.

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The chassis in the Volvo XC90 is designed to give the vehicle the same ride and roadholding characteristics as a passenger car, and based on the chassis of the Volvo S80, S60 and V70.

In the XC90, however, the suspension is more substantial to handle heavier loads, the higher ground clearance and all-terrain possibilities.

The rear multi-link suspension is well isolated, with the dampers and springs attached directly to the subframe. This results in a quieter ride as road and transmission noise is largely filtered out before it reaches the bodywork.

A wide track (1634 mm front, 1624 mm rear) and a long wheelbase (2857 mm between the front and rear axles) makes for exceptional stability, with the XC90 behaving consistently and dependably even on curving, twisting and uneven roads.

STEERING, BRAKES AND TRANSMISSION

- **Speed Sensitive Servotronic System (standard T6)**
- **Emergency Brake Assistance**
- **Intelligent Haldex Electronic All-Wheel Drive**
- **DSTC and TRACS**
- **Geartronic transmission (standard T6)**

The XC90 is as easy, responsive and rewarding to drive as a regular Volvo saloon or estate model. Its torsionally rigid body, transverse engines and all-wheel drive combine to give an almost even weight distribution (53 per cent front, 47 per cent rear).

The front MacPherson suspension, together with the new ZF steering gear, promotes increased precision and sharp response. Speed Sensitive Servotronic Steering is standard on T6 petrol models and optional for the D5 diesel.

The XC90's braking system is designed and tested to help stop the vehicle safely, even when it is fully loaded with seven people and luggage.

Geartronic transmission is standard on T6 models. A six-speed manual will be available for D5 models in late 2003.

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The XC90's braking system is designed and tested to help stop the vehicle safely, even when it is fully loaded with seven people and luggage. This is achieved with an optimised brake system and EBA (Emergency Brake Assistance) which monitors how quickly the brake pedal is pressed, and determines if the driver is panic-braking. When this occurs, the brake pressure is boosted to maximum in the shortest possible time, to reduce the stopping distance.

Electronically controlled AWD

The XC90's electronically controlled all-wheel drive system is completely automatic, and one of the most technically advanced systems available.

Compared with previous Volvo all-wheel drive systems based on a viscous coupling differential, the new Haldex AWD system has a much quicker

response. One of the front wheels only needs to start to slip through a seventh of a single revolution for the system to divert more power to the rear wheels – without the driver noticing.

Normally, up to 95 per cent of the power is transmitted to the front wheels, but anything between 5 and 65 percent of the power can be delivered to the rear wheels, if required.

Volvo's new Haldex AWD system works like this: 100 times per second, the electronic control system makes an 'intelligent' assessment of information from a number of different sources:

- Wheel rotation speed (as measured by the ABS sensors)
- Throttle status
- Engine torque
- Engine speed
- Braking system

In addition, the power is distributed between right and left wheels by 'TRACS' - Volvo's traction control system. TRACS intervenes, when necessary, by braking a wheel if it starts to spin and to increase the power to the wheel with the best traction. This means power is automatically and smoothly distributed to any wheels with the best traction at any given time.

TRACS is deactivated during braking so the brake and ABS systems can function effectively, for high stability and shorter braking distances.

Similarly, the AWD system is deactivated by the Dynamic Stability and Traction Control system (DSTC) if this performs any braking intervention to counteract skidding.

Best of two worlds: Geartronic transmission

With Volvo's Geartronic transmission, the driver gets the best of both worlds: on the one hand, the transmission can be left to take care of gearchanging

entirely automatically, or the driver can over-ride the system to change gears when required.

The automatic transmission is adaptive, which means that it monitors the driver's driving style and adjusts the gearchanging pattern accordingly. It also features a "W" setting for winter driving on slippery surfaces when it will start in a higher gear to avoid wheelspin and loss of control.

The Volvo XC90 T6 has 4-speed Geartronic automatic transmission as standard. Initial XC90 D5 production started with the Geartronic transmission with a six-speed manual is scheduled to arrive in late 2003.

INTERIOR DESIGN CONCEPT

- **Innovative and flexible interior**
- **Seven individual, forward facing seats**
- **Elegant car-like dashboard with typically simple Swedish design**

The interior of the Volvo XC90 is characterised by airiness, space and quality – but particularly by its innovative and flexible design.

The XC90's interior offers the greatest flexibility in the premium SUV class with generous interior space and seven individual, forward facing seats – all with head restraints and seat belt pretensioners.

The centre seat in the second row has an integrated child booster cushion and also slides forward so it can be directly between the two front seats, to improve contact between a child and the front seat occupants.

What's more, the armrest between the front seats is removable to create more leg room for the passenger in this centre seat.

The third row features two separate seats, offering full comfort for children or for adults of modest build. Unlike on some rival cars, these do not take up valuable space or have to be clumsily removed, but instead, they simply fold away individually out of sight into the boot floor, so are always on hand.

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The middle seat in the centre row has an integrated child booster cushion and also slides forwards independently so it can be positioned directly between the two front seats, thus improving contact between a child and the front seat occupants.

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The third row features two separate seats, offering full comfort for children or for adults of modest build. Unlike some rivals, these do not take up valuable space or have to be clumsily removed, but instead they neatly and simply fold away individually out of sight into the boot floor when not in use, so are always on hand.

"Everyone rides in Business Class in the Volvo XC90, nobody travels economy class." says Peter Horbury.

Both the second and third rows of seats can be folded down to create an entirely flat luggage compartment floor no less than 1.89 metres long, 1.13 metres wide and with a volume of 1837 litres (64.9 cu ft). In addition, the front passenger seat also folds forward to accommodate extra long loads.

Even with all seven seats in use there is still a useful amount of loadspace for the family – or, to be precise, 249 litres (8.8 cu ft).

The driver will appreciate one of the clearest and most ergonomically designed instrument panels in a typically simple Scandinavian simplicity of line and functionality: plenty of information from a small number of meticulously designed instruments.

Compared with those found in a normal saloon, the instruments and controls are angled slightly up towards the driver's eyes. Together with the high seating position, this enhances the feeling of control – the single quality that SUV buyers generally prize most highly.

QUALITY AND EQUIPMENT

- **Luxury standard specification**
- **S and SE models available**
- **Extensive range of options and accessories available**
- **Dolby Pro Logic II – the first in the car world**
- **Mini Disc available**
- **New generation RTI system covers all of Europe**
- **Rear Seat headphone sockets**

In the Volvo XC90, considerable importance has been attached to providing a comprehensive standard specification in a quality, well designed and desirable environment.

Standard specifications include 17in alloy wheels, CD player, premium audio system with eight speakers and 160w output, rear park assist and DSTC (Dynamic Stability and Traction Control) with EBA (Emergency Brake Assistance) – not forgetting the Haldex AWD, of course.

Upgrading to the SE model adds larger 18in alloy wheels, leather upholstery, an integrated six CD changer and powered driver's seat (with memory).

An extensive range of desirable options and accessories include Bi-Xenon headlights, dark tinted rear windows, ribbed side décor for added protection from stone chips, plus a Cross Country pack with side running boards, load carrier, roof protection ribs, rear skid plate and mudflaps.

Rear-seat passengers have access to their own control unit for the audio system, located conveniently in the C-post. There they can plug in their headphones and simultaneously listen to one of three separate audio sources (CD, radio or mini disc), so they are not just limited to what's coming through the loudspeakers. This means that parents and children can each enjoy their different taste in music at the same time – making long trips in a Volvo XC90 much more enjoyable.

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- Bi-Xenon headlights
- Dark tinted rear windows
- Ribbed side décor for added protection from stone chips
- 'Cross Country' pack with side running boards, load carrier, roof protection ribs, rear skid plate and mudflaps

In addition, Volvo is the first car manufacturer in the world to offer Dolby Prologic II in a car audio system. Dolby Pro Logic II creates the conditions for optimum audio perception even for passengers in the rear seats, and the sound profile is both broader and more natural. This is offered with digital surround sound, 4x70W and a 25W amplifier with 12 speakers, and is optional on all models.

A mini disc player is also optional, and can be combined with the Dolby Prologic system, rear headphone sockets, RTI Navigation system and integrated GSM telephone as part of the optional 'Communications Pack'.

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headphones and simultaneously listen to one of three separate audio sources (CD, radio or mini disc), so they are not just limited to what's coming through the loudspeakers. This means that parents and children can each enjoy their different taste in music at the same time – making long trips in a Volvo XC90 much more enjoyable.

A DVD player with a 7-inch wide screen can be fitted in the roof, where it can be seen by all passengers in both rear rows of seats will be available from late 2003. The design is compact and the screen is lowered on powered hinges. It can be remote-controlled and used with wireless headphones to avoid disturbing other passengers. The DVD player plays ordinary CDs as well.

The optional, latest generation RTI (Road and Traffic Information) navigation system is another important part of the infotainment available in the Volvo XC90. The crystal-clear 6.5-inch wide screen display is recessed into the upper face of the instrument panel when not in use, and gently glides into view at the touch of a button in the steering wheel or remote control unit.

The RTI system is DVD-based, covers all of Europe and features new ways of logging in the destination, for example via the postal code. A new function that calculates the estimated time of arrival is now included, along with a map that is accurate down to 50 metres.

Comparing the XC90's specification and price against its other premium rivals proves how competitive Volvo's SUV is:

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Make	Volvo XC90	BMW X5	Mercedes M-Class	Jeep Grand Cherokee
Model	D5 S Manual	3.0D	ML270	2.7 CRD
£ (on the road)	£28,400	£33,145	£29,395	£29,295
Specification highlights:				
7 forward facing seats	✓	X	X	x
Inflatable Curtain (side)	✓ (3 rows)	Front seats only	✓ (2 rows)	x
WHIPS*	✓	X	X	x
Reversing sensors	✓	✓	X	x
Audio system	CD, 8 speakers	Cassette, 6 speakers	Cassette, 6 speakers	CD, 8 speakers
ECC with AQS**	✓	✓	A/C	ECC
Self levelling suspension	✓	✓	✓	x
Trip computer	✓	✓	X	✓
Rain sensor	✓	✓	X	✓

All data correct as at Feb 2003 – Source manufacturer web sites

* Whiplash protection system

** Electronic Climate Control with Air Quality System

Additional peace of mind is provided by a comprehensive warranty package that includes a full three year/60,000 miles mechanical warranty.

SAFETY

- **RSC (Roll Stability Control)**
- **Special Boron steel reinforced roof structure**
- **IC (Inflatable Curtain) – for all three rows of seats**
- **Lower cross-member for increased car-to-car crash compatibility**

Everyone expects Volvos to be safe – irrespective of vehicle type. With the launch of its first-ever SUV, Volvo Car Corporation enters an entirely new segment, and the goal is perfectly clear: to lead the way in terms of safety.

This has meant an increased focus on several new areas. One of them is the important issue of the increased potential of roll-over accidents - because of an SUV's higher centre of gravity – and crash compatibility with smaller vehicles.

A Roll Over Protection System (ROPS) includes a new feature - Roll Stability Control (RSC) - which uses a gyro sensor to monitor the car's roll angle and speed. If the roll angle becomes critical it automatically applies the brakes and DSTC system to help the driver maintain control.

Volvo has also added extra strong Boron steel to the roof structure for maximum protection for occupants in the event of a roll-over, and designed the Inflatable Curtain (IC) to stay inflated for longer than normal across all three rows of seats in case of a multiple roll-over.

Finally, the XC90's subframe has a lower cross member neatly concealed behind the front bumper so it impacts at the same height as the bumper of a conventional car's protective structure and crumple zones.

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This holistic approach is – and always has been – one of the corner stones of Volvo's safety philosophy.

With the entry of Volvo Cars into the SUV market, there is increased focus on several new areas. One of them is the important issue of the increased potential of roll-over accidents because of an SUV's higher centre of gravity.

Roll-Over Protection System

Volvo's new Roll-Over Protection System, 'ROPS', tackles the problem from two directions:

- a stability-enhancing system, Roll Stability Control (RSC), minimises the risk of the XC90 rolling over in the first place
- increased protection for the occupants if the vehicle does roll-over

Owing to its higher centre of gravity, an SUV may have a higher risk of rolling over in certain critical situations compared with a conventional car. That is why the centre of gravity in the Volvo XC90 has been kept as low as possible compared to most SUVs. In fact, it is just 89 mm higher than that of the Volvo XC70.

However, this does not mean that Volvo has compromised on one of the properties that SUV buyers value so highly: a commanding seating position. The front seats are no less than 165 mm higher than in the Volvo XC70.

Roll Stability Control

In order to help reduce the risk of a roll-over situation, Volvo has developed an active stability-enhancing system known as Roll Stability Control or 'RSC'. The system uses a gyro-sensor to register the car's roll speed and roll angle to instantly calculate the terminal angle and roll-over risk.

If there is an obvious risk of rolling over, the DSTC (Dynamic Stability and Traction Control) anti-skid system is activated and responds by reducing the engine's power and braking one or more wheels as necessary until the car understeers and stability is regained.

This significantly helps reduce the risk of a roll-over accident initiated by extreme manoeuvres and is the only active stability-enhancement system to measure the car's roll angle.

Special Boron steel in a reinforced roof structure

If the Volvo XC90 experiences a roll-over the passive safety systems kick in.

The goal is to reduce the risk of occupants' heads from coming into contact with the car's interior roof panel or sides. So, Volvo has reinforced parts of the roof structure in the Volvo XC90 with extremely tough Boron steel, which is four or five times stronger than normal steel.

All seven seats are equipped with seat belt pretensioners to hold the occupants securely in place. In an accident, the pretensioner pulls the seat belt firmly across the occupant's body in order to help provide maximum protection.

To help prevent the head from striking the car's sides, the Volvo XC90 is equipped with Volvo's Inflatable Curtain (IC). IC also helps prevent the occupants or any limbs from being thrown from the car in an accident. In the Volvo XC90, the IC protects all three rows of seats.

The Volvo XC90's IC is specially adapted to stay fully inflated for longer to offer maximum protection in a roll-over scenario. If the occupant's head is resting against the window at the moment of inflation, the curtain will slip between the glass and the occupant's head.

Selfless compatibility

The problem of compatibility – when an SUV collides with a car that sits closer to the road surface – was another important focus throughout the development of the XC90.

A typical SUV has a high ground clearance and thus often comes with high-positioned bumpers. This may create a greater risk of damage to the

oncoming car and more serious injuries to its passengers as the lower car's protective beams and crumple zones simply slip below the front of the SUV without being activated.

In order to reduce the risk of this type of injury, the XC90's front suspension subframe is supplemented with a lower cross-member neatly concealed behind the front spoiler and positioned at the height of the beam in a conventional car.

The lower cross-member strikes the oncoming car's protective structure, activating its crumple zone as intended so the occupants can be given the maximum level of protection.

Considerable attention has also been given to the safety of pedestrians, cyclists and other relatively unprotected road-users. The entire front of the car features clean, gentle and smooth lines, and there are no protruding parts which may cause injuries.

The engine in the Volvo XC90 is installed low in the vehicle. As a result, the bonnet has no less than 80 mm of deformation space before there is any contact with the engine below it. It thus serves as a soft impact-absorbing "bumper", reducing the risk of serious injury if a pedestrian is thrown onto the bonnet.

High safety level in the third row of seats

The Volvo XC90's third row of seats provides a high level of passenger safety. There is generous space behind it, so collision force in a rear-end impact can be effectively absorbed and dissipated.

The occupants of the rearmost seats sit just above the rear axle, which is the optimum position in terms of side-impact safety. These seats also feature belt pretensioners, head restraints and protection from the Inflatable Curtain.

WHIPS, Volvo's award-winning Whiplash Protection System, is fitted in the two front seats of the Volvo XC90. WHIPS is activated in the event of a rear-end collision from speeds as low as 9 mph, helping to reduce trauma on the spine and neck and thus reducing the risk of injury.

ENVIRONMENT

- **Among the cleanest SUVs on the market: ULEV and ULEV II**
- **Interior Air Quality System**
- **Emissions free interior - Öko-Tex standard 100**
- **'PremAir'® – the ozone-eater**

Environmental care is one of Volvo's core values, so designing the XC90 represented an extra challenge - a Volvo SUV had to have class leading emissions and fuel economy.

But Volvo has also taken its usual holistic approach to the environment. The XC90 protects its occupants with a superior Air Quality System and particle trap and has a sensor that automatically activates the air recirculation function if it detects high levels of poor quality air entering the car.

Allergy sufferers will appreciate the XC90's emissions free interior. All the textiles and leather used in the Volvo XC90 are certified according to Öko-Tex standard 100 - a European standard used throughout the world, which ensures that the textiles are free from hazardous and allergenic substances.

The XC90's radiator also converts ground level ozone into oxygen thanks to Volvo's Premair®.

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"We know that some people are uncomfortable about the fact that SUV's produce higher emissions and consume more fuel than most passenger cars," says Hans Wikman, the XC90 Project Director.

As a result, the XC90 will take the lead in the SUV segment for both fuel economy and emissions. The 6-cylinder, T6 petrol engine meets the American ULEV (Ultra Low Emission Vehicle) requirements.

Volvo's new 5-cylinder, D5 diesel engine is one of the cleanest on the market today, offering top-class fuel economy and low emissions achieved through a number of interacting factors. Here are a few examples:

- Both diesel and petrol engines are made of aluminium. This material is lightweight, which helps cut fuel consumption and thus emissions
- The engines are of Volvo's latest low-friction generation. All the moving parts are designed to offer the least possible resistance
- The cylinders' combustion chambers are designed to rotate the fuel/air mixture effectively and achieve high compression for more efficient combustion
- Three-way catalytic converter
- CVVT (Continuously Variable Valve Timing). This system adjusts valve timing to suit current engine revs and load more efficiently to reduce fuel consumption and emissions

Interior Air Quality System

The Volvo XC90 also takes care of the environment inside the passenger compartment and reduces the risk of allergy-related problems with its

Electronic Climate Control (ECC) with automatic Interior Air Quality System (IAQS).

IAQS consists of a filter featuring a particle trap and an active carbon filter, removing particles such as pollen and unpleasant odours from the incoming air, and has a sensor that automatically activates the air recirculation function if the concentrations of substances such as nitrogen oxide, carbon monoxide and hydrocarbons in the air entering the cabin are too high.

Ökotex and PremAir®

All the textiles and leather used in the Volvo XC90 are certified according to Öko-Tex standard 100 - a European standard used throughout the world, which safeguards that the textiles are free from hazardous and allergenic substances.

Furthermore, the leather is tanned using natural plant substances and the interior door handles have a surface treatment that does not allow nickel contact with the skin.

PremAir®, Volvo's "ozone-eater" is a unique Volvo environmental innovation that combats the problem of ground-level ozone, and another important part of the overall environmental compatibility of the Volvo XC90.

Ground-level ozone is formed through the combination of air pollutants and strong sunlight. It can cause respiratory problems and also inhibits plant growth.

Volvo was the first carmaker in the world to tackle this with the introduction of PremAir® in 1999: The car's radiator is coated with a special catalytic film that converts up to 75 percent of the ground-level ozone into oxygen as it passes through the radiator.

		Emissions	Fuel Consumption			Performance	
		CO2 g/km	UDC MPG	EUDC	Comb.	Top speed MPH	0-62 MPH Sec's
PETROL	XC90 T6 (Geartronic)	309.0	15.3	29.4	21.9	130	9.3
	X5 3.0i (auto)	310	16.1	27.4	21.9	128	8.8
	X5 4.4i (auto)	335	15.0	25.4	20.3	128 (143)	7.5
	ML350 (auto)	338	14.6	25.7	20.0	128	8.7
DIESEL	XC90 D5 (Geartronic)	242.0	23.7	37.7	31.0	115	12.3
	X5 3.0 d (auto)	259	23.0	34.4	29.1	124	10.5
	ML270 CDi (auto)	250	22.8	35.3	29.7	114	11.4

SECURITY

- Electronic immobiliser fitted as standard
- Alarm and deadlock system operated from remote control key fob
- Approach and Home Safe Lighting system
- Laminated side windows optional
- Dark tinted side and rear windows available

Volvo is committed to protecting the car, its occupants, and their possessions. The Volvo XC90 is fitted as standard with a sophisticated alarm and immobiliser system that can be switched on and off using the remote controller on the key fob. The combination of deadlocks and the option of laminated side windows can make the Volvo XC90 a difficult car to break in to. Dark tinted rear windows are also available to help conceal the contents of the interior of the XC90.

The remote control also operates the Approach lighting system, which illuminates the car and the surrounding area as the driver approaches. Likewise, a tweak of the headlight stalk activates the Home Safe system, switching on the headlamps for 30 seconds after the occupants have left the vehicle.

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Volvo's passion for safety also extends to issues of personal security. The Volvo XC90 is fitted as standard with a wide range of features designed to protect occupants from burglary, theft and assault.

An electronic immobiliser makes it impossible to start the car without the right key, while the outer lock cylinder rotates, making it difficult to break in to. If the thief does manage to get in, via a window, for example, the deadlock system makes it impossible to open a door from the inside. The availability of laminated side windows can also make it harder for thieves to gain access to an XC90.

The deadlock system is activated by the remote control key fob, allowing the driver to open the car as they approach. This system can also be used to access the tailgate independently of the doors, which is a useful deterrent to opportunist thieves.

The same remote control system also switches on the alarm system, which is fitted as standard to the Volvo XC90. The alarm is triggered if anyone attempts to open the doors, the bonnet or the tailgate. It also reacts to movement inside the car or if a window is broken. As an option, this system can be upgraded to include a level sensor that activates the alarm if the car is jacked up in any way.

An important contribution to personal security is provided by the Approach and Home Safe lighting system. By pressing a button on the remote controller as they approach the car, the driver is able to turn on the inside lights, the side marker lights and the lights in the rear-view mirrors. On leaving the car, a tweak of the headlight stalk activates the dipped beam headlamps for 30

seconds, lighting a path to the door. It's a simple system that offers considerable peace of mind.

XC90 owners may also choose tougher laminated side windows to protect against break-in, while the option of dark tinted side and rear windows are a popular way of making it harder to see any personal contents inside the car – but also gives added personal security as it makes it much less obvious whether the driver is alone or not.

VITAL STATISTICS

Engine	D5	T6
Configuration	Transverse – 20 valve	Transverse – 20 valve
Cylinders	5	6
Capacity (cc)	2401	2922
Bore and Stroke (mm)	81 x 93	83 x 90
Max output ECE (bhp/kw/rpm)	163/120/4000	272/200/5100
Max torque ECE (Nm/rpm)	340/1750-3000	380/1800-5000
Octane rating	diesel	95-98 RON, unleaded
Fuel system	Multipoint direct fuel injection	Multipoint fuel injection
Compression ratio	18.0:1	8.5:1
Top speed (mph)	115	130
0-62mph (sec)	12.3	9.3
Transmission	5-speed Geartronic (6-speed manual available late 2003)	4-speed Geartronic
Fuel consumption:	(Manual/Geartronic)	(Geartronic only)
Urban - mpg (l/100km)	n/a /23.7 (11.9)	15.3 (18.5)
Extra Urban	n/a /37.7 (7.5)	29.4 (9.6)
Combined	n/a /31.0 (9.1)	21.9 (12.9)
CO ² (g/km)	n/a /242	309
VED Band	E	E
Fuel tank: litres (gallons)	72 (15.8)	72 (15.8)
Insurance group	15	16

Turning circle m/ft	12.5/41.0	12.5/41.0
Minimum Kerbweight	2114 kg	2139 kg
Max towing weight	2250 kg	2250 kg
Max total weight	2735 kg	2760 kg
Noseweight	90 kg	90 kg
Luggage compartment: 2 nd /3 rd row up (litres/cu ft)	249/8.8	249/8.8
2 nd row up, 3 rd row folded	615/21.7	615/21.7
2 nd /3 rd row folded	1837/64.9	1837/64.9
Dimensions (mm):		
Overall length	4798	4798
Overall width	1898	1898
Unladen height	1784	1784
Ground clearance	218	218

Prices (on the road)	D5 (Manual)	D5 (Geartronic)	T6
S	£28,400	£29,650	£31,865
SE	£30,400	£31,650	£33,865

More information, including full specification, options and images, are available from the Volvo media website: www.media.volvocars.co.uk

DID YOU KNOW?

1. Nearly 70 per cent of the first 2,200 UK orders taken (as at January 2003) were for the D5 engine with the higher SE specification. This is expected to stabilise at 60 per cent diesel orders.
2. The large, premium SUV market grew by 19 per cent in 2002
3. Volvo expects to sell 3,500-4,000 XC90s in 2003, and approximately 5,500 in 2004

4. The five best selling SUVs in 2002 were Land Rover Discovery (10,597), Mercedes M-Class (7,000), BMW X5 (6,665), Land Rover Range Rover (6,085), and Jeep Grand Cherokee (4,447)

5. Volvo expects 33 per cent of XC90 customers not to have owned an SUV before, 25 per cent to be 'SUV switchers', 10 per cent to be 'SUV upgraders' , and eight per cent to be 'MPV switchers'. Up to 18 per cent currently drive a Volvo estate, and six per cent a Volvo saloon or coupe.

6. Volvo expects 80 per cent of XC90 buyers to be male and aged between 25 to 45 years with a household income of £90,000. 40 per cent of these will have two children, while another 40 per cent will not have children or be empty nesters. 60 per cent will have been to university and 40 per cent will have their own business. Preferred spare time activities are outdoor sports (35 per cent), travelling (20 per cent), fitness (15 per cent), motorsport (10 per cent), and gardening (10 per cent)

7. The XC90 has already won the following awards:
 - 'Best 4x4' - What Car? Car of the Year Awards 2003
 - 'SUV of the Year' - The Sun
 - 'Best 4x4' - BBC Top Gear magazine

30 'NEED-TO-KNOW' HIGHLIGHTS

1. Volvo's first SUV – a next generation SUV
2. Stylish exterior design – only 87mm longer than a V70
3. Clever, versatile and innovative interior, with uncluttered Swedish design
4. Intelligent 7 seat system: All models have seven individual, forward facing seats available as standard (6th and 7th seats fold away into floor)
5. Clever: The middle seat in second row of seats features an integrated booster seat and also slides forward to be closer to front seats – with centre armrest between front seats removable for additional legroom

6. Smart: Rear headphone sockets available to allow rear passengers to simultaneously listen to CD, radio or Mini Disc
7. It is the most competitive, best equipped, premium sector SUV
8. Key rivals include BMW X5 and Mercedes M-class
9. Available with a choice of two powerful turbo engines:
 - five cylinder, 163bhp aluminium D5 diesel
 - six cylinder, 272bhp T6 petrol
10. The electronic Haldex AWD system automatically distributes power between the front and rear wheels within a fraction of a second
11. Prices range from £28,400 (D5 S) to £33,865 (T6 SE)
12. Crash compatibility: the XC90 has a low cross member behind the front bumper to impact at same height as bumpers/crumble zones of smaller cars
13. Class leading safety: Inflatable curtain for all three rows of seats, Side Impact Protection System (SIPS), SIPS airbags, Whiplash Protection System (WHIPS) Plus:
14. New safety features: Roll Over Protection System (ROPS) features Boron steel reinforced roof for maximum passenger protection and Roll Stability Control (RSC) - an electronic gyro sensor that registers the car's speed and roll-over risk and, in conjunction with the DSTC, automatically activates one or more brakes to reduce body roll to help maintain control
15. Standard S specification includes: Haldex AWD, 17" alloy wheels, premium audio system with CD and 160w amplifier, rear park assist, cruise control, Electronic Climate Control with Air Quality System, ABS and DSTC (Dynamic Stability and Traction Control) with EBD, and load compensating suspension
16. SE specification upgrades include: leather upholstery, 18" alloy wheels, in-dash 6 CD changer, electric driver's seat with memory, wood-effect or aluminium inlays
17. Optional Winter Pack, Communications Pack, XC design pack.
18. Stylish range of options & accessories include:
 - DVD player with pull-down, roof mounted screen for rear seat entertainment (available late 2003)

- Bi-Xenon headlights
 - dark tinted rear windows
 - laminated side windows
 - separate air conditioning for 3rd row of seats
 - Communications pack: inc Europe DVD satellite navigation; integrated GSM telephone; rear seat head sockets, sub woofer, upgraded audio with Mini Disc player, Dolby Pro Logic II digital surround sound, 4x70w and 1x25w amplifiers with 11 speakers
19. Production of D5 models started week 48 (25 November) 2002. T6 models started production on schedule in February 2003
 20. Over 2200 orders received in UK and 15,000 worldwide before XC90 officially launched in showrooms!
 21. Production target already increased to 60,000 units a year to meet unprecedented worldwide demand. 65 per cent of this is expected to be sold in the USA, with up to 4,000 in the UK in 2003
 22. In showrooms from January 2003, with first deliveries of D5 models to UK customers late January 2003
 23. The XC90 made its world debut at the Detroit Auto Show in January 2002, and was previewed at the show the previous year as the Adventure Concept Car (ACC)
 24. All six passenger seats fold flat for maximum loadspace and versatility
 25. Load space ranges from 249litres/8.8 cu ft with all seven seats up, to 1837 litres/64.9 cu ft with 2nd and 3rd row of seats down
 26. Complements XC70 in Volvo's AWD XC range
 27. Raised driving position with car-like handling & low centre of gravity (based on S80 platform)
 28. Environment: Class leading fuel consumption; Unique 'PremAir' - coating on radiator converts harmful ground-level ozone passing through it into fresh oxygen; plus Okö-tex interior – all interior fabrics and materials are allergy tested and emissions free
 29. Vast range of Volvo accessories available for all lifestyles (eg, towbars, bike/ski/snowboard carriers, etc)

30. The XC90 has already won the following awards in UK

SUV of the Year 2002, The Sun

Car of the Year 2002, Aberdeen Press & Journal

'Best 4x4' What Car? Car of the Year Awards 2003

'Best 4x4' Top Gear Car of the Year Awards 2003