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November 2007

Audi Cross Cabriolet quattro

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Los Angeles / Ingolstadt, 14 November 2007

Open for any adventure

Audi Cross Cabriolet quattro

Audi is introducing a new vehicle segment with its presentation of the Audi Cross Cabriolet quattro concept car at the Los Angeles Auto Show (14 – 24 November 2007). The two-door, four-seater car measures 4.62 metres in length and combines the genes of a typical dynamic soft-top convertible from Audi with the all-round qualities of a fully fledged SUV. The muscular, powerful, but also elegant lines make no secret of this vehicle's potential. The 240 bhp three-litre TDI engine with ultra-low emission technology delivers sporty driving dynamics with exhaust emissions on the level of the EU 6 limits. The quattro permanent four-wheel-drive system and high-tech chassis with electric ride height adjustment are a recipe for driving pleasure on all terrain and in any curve radius.

The Audi Cross Cabriolet quattro offers a new dimension in open-top driving among the SUV field: its fabric hood lowers itself to disappear completely behind the rear seats in a spectacularly brief 17 seconds; no B-pillar and no roll-over bar obscure the view of the heavens. And for convertible fans, it offers a new dimension in spaciousness: as an SUV, the Cross Cabriolet quattro provides its occupants with copious headroom, legroom and shoulder width in addition to an off-roader's typical height and comfortable sitting position. So when cruising along the beachfront, for instance, all four occupants can enjoy the open-air experience to the full.

The longitudinally mounted six-cylinder TDI in the Audi Cross Cabriolet quattro is the brand's latest diesel engine. With a power output of 240 bhp and 500 Nm of torque, at this stage in its evolution the 3.0 TDI is now more efficient than ever – its average fuel consumption is a mere 7.3 litres of diesel per 100 km. The engine is also equipped with what is currently the most elaborate emissions reduction system developed for a production engine: the ultra-low emission system.

This does more than just ensure that the vehicle complies with all current exhaust emissions standards worldwide. It already meets the expected limits of the EU 6 standard, which is only due to be introduced in 2014 – and does so with quattro permanent four-wheel drive and tiptronic transmission.

Design and body

Spectacular – a term which sums up the visual impact of the Audi Cross Cabriolet quattro painted in "Copper Sunset", whether the top is up or down. After all, without the hint of a compromise, the concept car combines classic Audi convertible hallmarks, such as the elegant fabric hood and aluminium A-pillar surface, with the undisguised dynamism of a sports car and the masculine presence of a genuine SUV.

4.62 m long, 1.91 m wide and with a wheelbase of 2.81 m: the Audi Cross Cabriolet quattro has the dimensions of a B-segment vehicle. The longitudinally mounted engine and the basic chassis and drivetrain architectures are taken from the inventory of modules used in the current Audi A4 and Audi A5 model lines. The SUV-style height of 1.63 m with the hood closed marks the most significant difference to these relatives of the Cross Cabriolet quattro.

High passive safety

Body stiffness and passive safety measure up to the typical standards of an Audi convertible. This is achieved with reinforcements to the A-pillar, the rear seat cross member and the sill area, in addition to a simple trick that exploits the extra body height of an SUV. The Cross Cabriolet quattro has a double underbody that turns the open profile of a convertible body into a closed structure, producing a major increase in stiffness. This design feature is efficient and economical in equal measure, since it replaces conventional modifications that involve numerous body components and require significantly more material, thus adding more weight.

The A-pillar and the top edge of the relatively shallow windscreen have been heavily reinforced to aid roll-over protection. Two roll-over bars, normally lowered out of view, are located behind the rear seats and are preloaded by powerful springs. If the vehicle is in danger of rolling over, the sensor system releases the spring retaining mechanism, causing the bars to shoot up within milliseconds to provide effective protection together with the A-pillars for the occupants in the interior.

The dominant element of the face-on view is the single-frame radiator grille with polished aluminium longitudinal struts, emphasising its vertical orientation – a clear signal of the concept car's sporty character. Behind its clear-glass headlight covers, the latest lighting technology can be seen: the Cross Cabriolet quattro is the latest Audi to be equipped with full LED headlights, which also feature the characteristic strip of daytime running lights and the electronically controlled swivelling cornering light. The turn signals, brake lights and tail lights also use fast-reacting LED light units. In addition to the front and rear light units, the exterior mirrors also have integrated turn signals.

In the side view, a distinct aspect of current Audi design can be seen in the shoulder line and dynamic line, which divide the vehicle body volume into a clearly defined sporty architecture. An equally characteristic feature is the proportion between the large body surface and shallow window area beneath the soft top's sweeping roof line – the hallmark of a sports car.

Within the pronounced styling of the wheel arches, the large 21-inch wheels with tyres of size 265/35 R21 send out a clear visual message and make an additional contribution to both driving pleasure and safety.

The fabric hood, which lowers itself fully automatically in a Z-fold behind the rear seats at the push of a button, is a trademark of all open-top Audi models. It is a stylistic feature that makes the car recognisable as a convertible, even with the hood up, and requires considerably less space in the rear and adds less weight than a complex folding steel roof.

In terms of noise and heat insulation, the Audi A4 Cabriolet's multi-layer fabric hood has long been found to compare very favourably with a solid roof in everyday use.

The underbody guard and metal running boards are classic off-roader features. They have been given a modern interpretation on the Audi Cross Cabriolet quattro. The running boards are integrated into the sills with a seamless transition to the door opening. The underbody guard covers the whole width of the vehicle. The LED front fog lights are integrated into the front section and the rear section accommodates the two exhaust tailpipes on the left and right.

Two generously sized doors provide access to the interior in typical convertible style. Thanks to the lack of a B-pillar and the easy entry front seats, rear passengers have no trouble getting in and out.

The rear loading solution is a perfect synthesis of convertible design and SUV functionality. When closed, the short stepped boot lid forms a continuation of the fabric hood's coupé line. When it opens, however, with the assistance of its gas springs, it lifts up high to provide a surprisingly large opening. At the same time, the glass rear window, which is hinged to the fabric hood, automatically lifts up too. The result is an opening to the luggage compartment that matches that of a conventional SUV equipped with an off-roader's traditional large tailgate. The loading width is 1.16 m and the load-area width is 1.05 m.

The Audi Cross Cabriolet quattro thus gives its driver the best of both worlds – the freedom and elegance of a convertible blended with the spaciousness and versatility of an SUV.

Interior

The interior of the Audi Cross Cabriolet quattro offers sophistication and ergonomically perfect solutions in all areas and with all its materials. The smooth and soft surfaces together with a gentle, natural blend of colours help to provide an atmosphere of absolute ease for the occupants. For additional convenience, each passenger has a heatable and coolable cup holder, located in the centre console at the front and in the side walls at the rear.

The driver and passengers enjoy the comfort of four spacious individual seats. The seating is entirely upholstered in "White Stone" leather. All occupants benefit from lateral support and excellent long-distance comfort. Air vents on the head restraints serve to compensate for the air turbulence around the occupant's neck.

The space available in the second row is unique for the convertible world: the legroom, shoulder space and headroom are unbeatable, even with the roof closed.

The centre console continues far into the rear of the interior and provides the rear passengers with a stowage box with lifting lid.

A regular Audi characteristic of the cockpit area in the Cross Cabriolet quattro concept car is the way it is markedly angled towards the driver. The controls can be found here, while the front-passenger area is emphatically neat and architecturally clear-cut. In turn, the dashboard and doors are connected by flowing lines, while the cockpit itself is smoothly and organically integrated.

In addition to the instrument dials under the dome-shaped cowl behind the steering wheel and a central LCD colour display integrated between them, the MMI also supplies information via its swivelling flat screen, well positioned within the driver's field of vision in the upper section of the centre console.

The MMI terminal on the centre console is also extremely neat. The central operating button and the six hard keys are the simplest way imaginable to operate the vehicle and infotainment functions.

In addition to the MMI terminal, the Cross Cabriolet quattro also has a touch-sensitive sensor field (touch pad) in front of the MMI control element. Like on a laptop, this can be used, for example, to move image sections of the map display. The system is also capable of recognising and processing commands entered by tracing letters with your finger on the touch pad.

Infotainment

Google Earth, the interactive, three-dimensional atlas of the world, has gained a firm role on all personal computers. Now this software is making life easier on the road too. Audi has, for the first time ever, brought together the merits of the internet-based system Google Earth and its own built-in navigation system to create countless information facilities with user-friendly graphics.

The high-resolution display and photorealistic 3D maps provide a new dimension in intuitively understandable bird's eye visualisations that are rich in detail. The image angle and section can of course be adjusted to suit the driver's wishes at any time. By connecting to the internet, it will also be possible in future for traffic and weather information or even data on air quality to be included and taken into account in planning your route.

Using Google Earth's search function, the driver can also find addresses or service providers at the chosen destination and navigate directly to them – for instance restaurants, car parks or an Audi dealer.

To enter a navigation destination, there is no longer any need to enter the address by hand. The driver can click on an image in the Google Earth user interface and be directed to the identified destination.

Bang & Olufsen sound system and internet radio

Leading the way in technical and acoustical quality is the sound system from Bang & Olufsen. Derived from the unit used in the A8 luxury saloon, it is no less of a delight to the ear in the Audi Cross Cabriolet quattro. With its sparkling, brilliant reproduction, detailed resolution, precise spatial imaging and broad, well-defined frequency spectrum, this product from the Danish sound specialists satisfies every wish with its high precision and quality.

The key element in the Bang & Olufsen sound system is an amplifier with a supreme output rating of 505 watts. It processes signals digitally according to the manufacturer's own surround algorithm, which enables the occupant of every seat to enjoy the full splendour of the system's audio quality. The numerous user settings include four sound focuses. The system analyses the noise level inside the vehicle by means of a microphone and makes selective adjustments to its output signals in specific frequency ranges.

The advantages of a digital sound system really come into play in the Audi Cross Cabriolet quattro's innovative internet radio system. This provides access to the countless radio stations broadcasting over the World Wide Web.

At the same time, it turns radio into a highly personalised medium. Simply by pressing a button, the user can give a positive or negative verdict on a music track. The system will thereafter only offer the user tracks and music styles that match his/her preferences. This enables the internet radio to create a highly customised virtual station for each individual listener.

In addition, the internet delivers a large range of supplementary data besides the music being played – from a graphic display of the CD cover to information about the track and the artists.

An intercom system is fitted to assist the occupants in communicating with each other. This removes the need to raise your voice – especially welcome when driving with the top down. Four microphones pick up the speakers' voices and relay them at a subtly amplified volume via the vehicle's audio system. The sound processor filters out background noise to give an extremely natural voice reproduction.

Drivetrain

Power is supplied by the latest stage of evolution of the three-litre diesel with common rail direct injection. It develops 176 kW (240 bhp) and has an impressive maximum torque of 500 Nm. It is this ultra-powerful TDI with a displacement of 2,967 cc that truly makes the Cross Cabriolet quattro a sports car. It accelerates from 0 to 100 km/h in just 7.2 seconds and has a top speed of 240 km/h – yet the average fuel consumption is a mere 7.3 l/100 km. The 500 Nm provide a mighty surge of acceleration starting from just above idling speed.

The 3.0 TDI is coupled to the quattro permanent four-wheel drive and an eight-speed automatic transmission. If the driver wishes to change gear manually, the shift paddles at the steering wheel can be used. The especially designed selector lever with integrated control wheel for gear selection is a newly developed variation of the shift-by-wire system.

The latest 3.0 TDI is notable not only for its low fuel consumption, but also for its especially clean exhaust. A diesel particulate filter is used to reduce soot emissions: it cuts the already low level of untreated emissions further, by more than 90 percent.

The cleanest diesel in the world

The new 3.0 TDI with ultra-low emission system is a further step forward that demonstrates the potential of the Audi TDI. Drivers are thrilled not only by the dynamism of 176 kW (240 bhp) and the outstanding torque of 500 Nm, but also by its modest fuel consumption and extremely low emissions.

The ultra-low emission system raises the principle of the direct-injection turbocharged diesel to a new level. To develop it, Audi's engineers combined a whole package of innovative measures. A new common rail system with piezo injectors operating at a pressure of 2,000 bar, high-efficiency exhaust gas recirculation and further optimised turbocharging join forces to achieve a significant reduction in untreated emissions.

A further technical breakthrough is the actual exhaust aftertreatment system, which cuts emissions of oxides of nitrogen (NO_x) by as much as 90 percent. This system operates with the additive AdBlue, an aqueous solution of carbamide, small amounts of which are injected ahead of the DeNO_x catalytic converter. In the hot exhaust gas, the solution breaks down into ammonia, which splits the oxides of nitrogen into nitrogen and water.

The AdBlue solution, which is biodegradable, is topped up as a routine operation each time the car is serviced, without the customer having to take any action. Since consumption of the solution is very low, Audi can guarantee that the amount carried on the car will be sufficient from one service to the next. The system will remain effective for the entire service life of the vehicle.

Thanks to their extremely low emissions, from 2008 Audi is able to sell its clean direct-injection diesels all over the world, even in the US states of California, Massachusetts, Maine, New York and Vermont where extremely stringent emission limits apply.

From 2010 on, Audi will be offering this new technology in further car and power output classes. The brand is pursuing a systematic strategy aimed at lowering fuel consumption and pollutant emissions still further. By 2012, Audi will have reduced its models' CO₂ emissions by some 20 percent – yet their sporty character will be enhanced at the same time.

quattro drive

The Audi Cross Cabriolet always transmits its power to the road through the quattro permanent four-wheel drive. Here again it delivers the supreme capabilities that have become an Audi hallmark in the years since this driveline was launched in 1980 – enhanced driving dynamics, safety and directional stability, together making up Audi's proverbial 'Vorsprung durch Technik'. Added to this, there is the legendary traction of the quattro driveline even under the toughest conditions, making it ideally suited to off-road driving.

The key element in the quattro driveline is its centre differential. It is a purely mechanical unit and therefore responds without the slightest delay. Its locking action is only active when the throttle is open; differences in rotational speed are tolerated when the brakes are applied and when cornering.

In normal driving conditions, 40 percent of engine power reaches the front wheels and 60 percent the rear wheels, permitting sporty handling with a rear-driven emphasis. When needed – i.e. when the wheels on either axle start to spin – the differential redirects most of the torque to the axle revolving more slowly and therefore having better traction.

The centre differential can direct up to 65 percent of the power to the front wheels and up to 85 percent to the rear wheels; as a result, the concept car can normally tackle situations close to its handling limits without braking intervention by ESP.

Dynamic chassis

The dynamic chassis on the Audi Cross Cabriolet quattro combines precision and dynamism with a high level of stability. The suspension mountings, steering, wheels and brakes have been developed for top performance and numerous aluminium components are used to keep unsprung masses to a minimum.

As in the Audi A5 and A4 models, the five-link front suspension makes a considerable contribution to the car's dynamic character.

By moving the differential to the front and the clutch to the rear, the front axle is repositioned 154 millimetres further forward. Together with the relocation of the car's battery to the boot, this optimises the load distribution between the front and rear axles.

The front axle comprises five suspension links per wheel – one supporting link and one guide link form the lower level and two guide links the upper level. The fifth link – the track rod – joins the steering box to the wheel bearing housing. All suspension links are forged aluminium parts, which guarantee low unsprung masses and extremely precise wheel location.

If sporty handling is to be combined with a high standard of ride comfort, the unsprung masses must be kept as low as possible. Audi has pursued this approach for all the rear-axle components. The upper transverse links and the track rods are aluminium forgings. Their high rigidity ensures that toe and camber angles change very little when dynamic forces act on the wheels.

The springs act directly on the wheel carriers. The design engineers adopted this layout because it enabled them to increase the ride comfort to luxury-car level and at the same time achieve the road dynamics of a sports saloon.

Stepless – the shock absorbers

The CDC (continuous damping control) shock absorbers, similar to those that Audi already uses on the luxury Q7 SUV with air suspension, are twin-tube gas-filled hydraulic units with an additional external valve and connecting pipe. Their operation can be continuously varied.

An electromagnetically energised proportional-action valve regulates the flow of hydraulic fluid between the inner and outer damper tubes. A smaller flow cross-section makes the damping characteristic firmer, a larger one makes it softer.

The control unit applies adaptive operating characteristics within the mode the driver has chosen via Audi drive select. It adapts to match the driver's driving style and the road conditions. Even from the comfort mode, the shock absorbers can be switched in an instant to a firm setting if desired, though not to the absolute limit. They are fitted in conjunction with sports suspension springs, which still provide a good standard of ride comfort, even off road.

The control unit selects the optimum damping force for the current driving situation, for instance firmer damping to prevent body roll and pitch when cornering fast or braking, lower damping force in off-road terrain where the surface under the wheels is hard and uneven.

Electric ride height adjustment

As a true SUV, the Audi Cross Cabriolet quattro displays impressive off-road talents. These include its innovative electric ride height adjustment, which varies ground clearance by a total of 40 millimetres at the touch of a button. It works by means of electric motors under each wheel's spring plate that raise or lower the vehicle body. In addition to its low weight, one of this system's winning features is its operating speed: the preselected ride height level is reached in a maximum of four seconds.

This brings obvious advantages for the driver, not only when venturing into rough off-road terrain. The height of the vehicle body can be adjusted to make getting in and out that bit easier and also – as already seen in the Q7 – the rear can be lowered separately for easier loading into the luggage compartment.

For reasons of safety, handling dynamics and economy, the body moves automatically to the low setting at speeds above 80 km/h, thus both lowering the centre of gravity and reducing air resistance.

The system is operated either via the MMI, a button in the luggage compartment or even from outside the vehicle using the key.

Controlled power – the ceramic brakes

The Audi Cross Cabriolet quattro is equipped with ceramic brakes on all four wheels for effective deceleration even under the most demanding conditions. Compared with conventional steel discs, ceramic brakes not only last four times longer, up to 300,000 kilometres, but also offer high resistance to fading. The significant reduction in weight also leads to advantages in terms of comfort and handling, thanks to reduced unsprung masses.

On the front axle, 380-millimetre ceramic discs are fitted in combination with 21-inch wheels. The rear discs have a diameter of 356 millimetres. The elaborate cooling duct geometry of the ventilated brake discs ensures optimum brake disc cooling. Firm grip on the brake disc is guaranteed at the front by 6-piston monobloc aluminium brake callipers, and at the rear by floating-calliper brakes.

Audi drive select

The Audi Cross Cabriolet quattro is equipped with Audi drive select, as optionally available in the current generation of the bestselling Audi A4. This allows you to preselect three highly individual configurations for the engine and gear-change characteristics, and the adaptive shock absorbers. The result is a car that can be enjoyed in completely different ways and that offers a huge potential in the field of efficiency.

The default setting is the "dynamic" mode, which is automatically activated every time the engine is started and is designed purely to produce the dynamic yet comfortable driving feel typical of the brand, which Audi drivers have come to expect of their cars.

The "sport" mode gives the Cross Cabriolet quattro an emphatically sporty driving feel. The shock absorbers are set firm, the engine responds more spontaneously to the throttle and the tiptronic transmission's shift points move higher up the engine speed range: the ideal basis for active driving pleasure on winding roads.

When the driver switches to the "efficiency" mode using the MMI, the engine and S tronic respond gently to commands from the accelerator and shift paddles. This setting is ideal for a relaxed driving style, as well as offering tremendous potential for effectively lowering fuel consumption, and therefore emissions too.

In efficiency mode, the air conditioning system is automatically switched off and is only reactivated if the driver so wishes. A completely new interpretation of the cruise control system also moves the vehicle with minimum fuel consumption, allowing it to drop below the set speed within a certain lower limit in favour of lower fuel consumption, for example on gentle uphill stretches of motorway.

The efficiency mode also makes use of route data from the navigation system and the adaptive cruise control to reduce speed early and make driving as economical as possible by avoiding the need for heavy braking when approaching a tight bend or a vehicle driving ahead.

In this way, under normal operating conditions and combined with a forward-looking driving style, Audi drive select can achieve fuel savings of well over 20 percent compared to dynamic mode.