

Audi Sport quattro

With the new Sport quattro, Audi is now establishing a further landmark in the development of technically ultra-sophisticated and very high powered cars with uniquely superior handling abilities.

A power output of 225 kW/306 bhp, a top speed of 250 kph and fantastic acceleration times: these are the impressive highlights in the specifications and performance of this full-blooded sports coupé.

By shortening the wheelbase of the production quattro by 320 mm, the Sport quattro is lighter, much more responsive, and even on the tightest rally stages completely problem-free and extremely manoeuvrable. With permanent four-wheel drive, the handling characteristics of the compact Audi Sport quattro are outstanding – particularly directional stability and traction under difficult road conditions.

The Audi Sport quattro is the basis for all works rally entries. In addition, it offers all private drivers with motorsport ambitions, and particularly tuning firms, the opportunity of successful motorsport participation.

But at the same time the Audi Sport quattro is also intended for a special group of customers who, without being active competition drivers, find fascination

in the relaxed distinction of driving a thoroughgoing luxury sports coupé of the very highest standard. The Audi Sport quattro is manifestly unique in every respect, enabling the responsible driver to luxuriate in a wholly different kind of driving far removed from everyday motoring, confident of the real prestige that comes from technical appreciation and exclusiveness.

Four valves per cylinder and turbocharger

The most obvious difference compared with previous Audi turbocharged engines is the use of a cylinder head with four valves per cylinder. But everything possible has also been done to the engine ancillaries to give the Audi Sport quattro an engine which, in terms of power, weight, economy and size, is far ahead of any previous high performance engines. Under these ideal conditions a capacity of 2.13 litres is sufficient for the 5-cylinder in-line engine to develop an output of 225 kW (306 bhp). In view of the purpose of the Audi Sport quattro, the overall engine concept is arranged so that a further power increase is easily possible for competition use.

Engine block

An aluminium engine block is used to compensate for the extra weight of the four-valve cylinder head, the generously dimensioned intercooler and the rather larger turbocharger.

Already fully tested in rallying, the engine block is 23 kg lighter than the familiar cast iron 5-cylinder unit. It employs a new technology for aluminium engine blocks, with an aluminium alloy being cast directly around thin-walled cast iron cylinder liners.

Out of various techniques available for manufacturing aluminium engine blocks, this method was chosen as being the most advantageous. The cylinder head is also aluminium, so this is now the first all-aluminium engine that Audi is introducing to the public.

Cylinder head

The cylinder head is also completely new. Four valves per cylinder have many advantages, whether for road-going or racing engines. The main benefits are:

- better cylinder charging
- more power output and torque
- combustion efficiency with centrally located plugs and compact combustion chamber shape
- higher compression ratio
- reduced consumption
- better emissions characteristics.

The small valve angle of 25° gives extremely good results. In racing engine development there is an increasing trend towards smaller valve angles.

Preference in the past was given to large valves necessitating large valve angles, but now designers opt for the compact combustion chamber shape which is possible with smaller valve angles.

The four valve arrangement has allowed Audi to design a cross-flow cylinder head for the in-line 5-cylinder engine for the first time. The two camshafts are closely spaced, so the intake cam can be driven directly from the exhaust cam by a pair of helical gears running inside the head. Since the overall width is very small for a four-valve engine, the cylinder head is comparatively light. For the first time in a cylinder head with four valves per cylinder, the valves are located asymmetrically.

Apart from the smaller valve angle, this has the advantage of allowing the combustion chamber volume to be concentrated below the exhaust valves. The exhaust valves are parallel to the cylinder block centre line, whereas the intake valves are angled outwards by 25° . The spark plugs are positioned exactly in the middle of the four valves. With a naturally aspirated engine, the four-valve arrangement has distinct advantages, but when combined with turbocharging the results are even better. Audi's long experience with turbocharged engines is also evident

in the ancillary systems of this engine, as well as in the cylinder head design.

Induction system

The engine employs a double-flow induction system, ensuring that the same quantities of air and fuel are delivered to each cylinder. The induction manifold is cast in one piece and also incorporates the water connections to the cylinder head. The forward position of the throttle valve assures the shortest possible distance to the intercooler.

Intercooler

The exceptionally large intercooler has the same dimensions as the unit used in the rally quattro. Apart from minimising pressure loss, priority was given to optimum cooling. Thus the intercooler system is capable of cooling air heated to 140°C at maximum boost back down to 60°C.

Exhaust manifold

The exhaust manifold has a great influence on the efficiency of a turbocharged engine. The engine in the Audi Sport quattro employs a cast exhaust manifold, in which the five exhaust branches only merge immediately before entering the turbine housing. The waste gate is also located at this point, an arrangement which makes best use of the energy possessed by the

exhaust gases. The turbocharger and waste gate are thus positioned to encourage the most efficient gas flow. Overall arrangement of components is chosen to facilitate the further development of this engine as a rally power unit.

Injection and ignition

Audi has always regarded the quattro activities as a means of testing out new technologies. As one example, the Audi quattro employed the first installation with all-electronic data programmed ignition, so this highly sophisticated system is of course used here as well. The injection system is completely new: an all-electronic system used here for the first time with a turbocharged engine. The air mass is registered by means of a heated wire, and with corrections for boost pressure, water and air temperature, the system assures the most efficient mixture at all operating points programmed in the data map.

Together with the generously sized air cleaner, the ducting leading to the compressor intake is designed to minimise pressure drop.

All these measures together result in power levels which until recently would have been considered impossible for road-going engines. The specific output of very nearly 110 kW (150 bhp) per litre has previously only been achieved by racing engines. The overall engine set-up is so good that compression

can still be kept at 8.0:1 in spite of the high power output. This, in turn, results in very good economy. Other features contributing to low consumption figures are the overrun cutoff integrated in the injection system and idle volume control.

quattro chassis/suspension

The Audi Sport quattro has high performance running gear with independent suspension and wide-section high speed tyres size 235/45 VR 15 on 9 J x 15 light alloy rims. The suspension components and brakes originated from rally development. Four-piston fixed calipers are used, as on the rally car with 28 mm thick ventilated discs. The handbrake operates via small additional pivoting calipers acting on the rear wheels.

The permanent four-wheel system on the Audi Sport quattro, like the other quattro versions, employs three differentials: the centre differential and rear differential can be locked when the car is moving. The centre differential is integrated in the five-speed manual gearbox.

The primary shaft, as an extension of the crankshaft, drives the secondary or output shaft, which is made hollow, and drives the differential cage. The gears in this differential drive the pinions on the inner part of the secondary shaft going to the front differential, and on the propeller shaft going to the rear

wheels. With the car running in a straight line the internal shaft to the front final drive revolves at the same speed as the hollow shaft, and when negotiating a corner the internal shaft can turn rather faster to prevent any possible wind-up.

The Audi Sport quattro is equipped with an anti-lock brake system. The electronic control unit was specially developed for the requirements of four-wheel drive and is based on the experience of second-generation ABS. The logic circuitry enables braking control upwards of 2.75 kph up to maximum speed. However, if required, the ABS can be rendered inoperative by means of a switch. This allows rally drivers to "set up" the car for a corner on slippery surfaces by deliberately locking the wheels briefly. If the differential locks are engaged the ABS system is rendered inoperative. This is indicated by the ABS warning light.

The Audi Sport quattro also has power assisted steering as standard. This allows a precise and direct steering set-up which, on the one hand, transmits sufficient road feel, and at the same time also provides the necessary light control and instant reaction to steering inputs.

Like the other Audi quattro types, the handling of the Audi Sport quattro is slightly understeering; it is set up for a forgiving response, i.e. to accommodate the driver's natural reactions.

The Audi Sport quattro's high performance running gear with permanent four-wheel drive allows higher cornering speeds independent of the prevailing conditions, and gives extra safety in critical situations. The car will accelerate to 100 kph from a standstill in 4.9 seconds: this is the equivalent of racing car performance, but it is only possible since the power from the 20-valve turbocharged engine is distributed to all four wheels. The precise gear change of the five-speed manual gearbox also contributes to the responsive performance, with the intervals between the gears carefully matched to the engine characteristics.

Body and equipment

A special feature of the Audi Sport quattro is the extremely lightweight yet strong body construction: the fenders, lower aprons and roof panel, for instance, are made of high-grade fibre-reinforced plastic, stiffened with lightweight aluminium bracing where necessary.

External panels such as the fenders, roof and aprons are thus manufactured in laminated glass/Kevlar fibre for minimum weight and maximum stiffness. The rear lid is made of glass fibre reinforced polyester resin. Air intake pipes are carbon/glass fibre reinforced plastic and, for optimum durability, the radiator cowlings employ a woven Kevlar/carbon fibre hybrid material.

The interior is ergonomically designed in keeping with the car's sporting character. Comfort and safety are not neglected.

The modern dashboard design features a flexible polyurethane surface, the safety steering wheel has a foam-backed impact pad, and the steering column is mounted on a detachable coupling. The occupants are further protected by lap-and-diagonal inertia reel seatbelts, or alternatively by full-harness belts as used in rallying.

The instrument cluster, including speedometer, tachometer, boost pressure gauge, voltmeter, fuel gauge and digital LCD clock is complemented by three gauges carefully placed in the field of vision on the centre console for water temperature, oil temperature and oil pressure.

All the instruments have special translucent lighting. The characters are white in daylight, and appear in a pleasant dark red colour at night. This idea is taken from experience with aircraft pilots - it is easy on the eyes at night, and improves outward vision.

Recaro sports seats with electrical heating and genuine leather upholstery with fabric inserts, tinted windows, central locking, a washer/wiper on the rear window, and a stereo radio/cassette with four loudspeakers complete the selection of high quality appointments.



The Audi Sport quattro represents a unique and exclusive concept: a product of the most sophisticated engineering, and one more example of the outstanding developments introduced by the Audi marque.

Unternehmensarchiv AUDI AG



AUDI SPORT QUATTRO (225 kW/306 bhp)

			AUDI SPORT QUATTRO (225 kW/306 bhp)	
			AUDI SPORT QUATTRO (225 kW/306 bhp)	
Engine			Dimensions, Weights, Performance, Consumption	
			Five-cylinder, in-line, four valves per cylinder	
			Bore x stroke, mm	79.3 x 86.4
			Capacity, cc	2133
			Compression ratio	8.0:1
			Fuel system	LH Jetronic
			Fuel grade	premium, min. 98 RON
			Power output (kW/DIN bhp)	225 (306)
			at rpm	6700
			Max. torque (Nm)	350
			at rpm	3700
Electrics			Length, mm	4164
			Width, mm	1790
			Height, mm	1345
			Wheelbase, mm	2224
Transmission			Track, mm front	1516
			rear	1492
			Turning circle, m	10.3
			Luggage capacity, litres	
			sphere method	356
			VDA block method	307
			Ground clearance, mm	98
			Kerb weight, kg	1300
			Gross vehicle weight, kg	1650
			Max. roof load, kg	75
Brakes			Ignition system	All electronic data programmed
			Battery A (Ah)	300 (63)
			Alternator, max amps	90
			Capacities, litres	
			fuel tank	90
			engine oil with filter	5.0
			cooling system + heater	9.8
			Top speed, km/h	250
			Acceleration, sec.	
			0 - 80 km/h	3.6
Steering			0 - 100 km/h	4.9
			Fuel consumption	
			DIN 70 030 (l./100 km)	
			at a constant 90 km/h	7.9
Wheels			at a constant 120 km/h	10.4
			urban cycle	14.8
Wheels			Type	rack and pinion
			power assisted	
Wheels			Wheels	9 J x 15
			Tyres	235/45 VR-15