

Jaguar XK8

Full Length Review

Jaguar has a long tradition of introducing its new engine designs first in its sports cars, and so it is with the XK8. The new car is powered by the first V8 engine ever designed by Jaguar.



Called the AJ-V8, it is manufactured in a new, dedicated facility in the United Kingdom. Engineered to provide refined power, the advanced 4.0-liter, 32-valve engine features a robust aluminum cylinder block with structural bedplate for durability and smoothness, Nikasil bore surfaces for better weight and friction than iron linings would provide, variable cam phasing for responsiveness across a wide range of speeds and an electronic, "drive-by-wire" throttle for smooth and accurate power delivery.

Jaguar claims that at the time of the XK8 launch, this engine assumes class leadership in weight, stiffness, friction, specific power output (horsepower for displacement) and package efficiency (power output for its external dimensions). The AJ-V8 requires no maintenance other than oil and filter changes for 100,000 miles.

The engine's patented cooling system brings the engine to operating temperature very quickly, assuring a comfortable cabin temperature, as well as contributing to low emissions and contributing to fuel-economy numbers that allow the XK8 to be sold without a gas-guzzler tax.

The XK8 returns Jaguar to its sports-car roots with a sophisticated five-speed automatic transmission, new designs for both front and rear suspension systems, and world-class variable-assist/variable-ratio power steering. Development efforts centered on providing taut response and precise handling without any sacrifice of ride comfort or refinement.

Extensive safety considerations are engineered into the XK8. Airbags are provided for the driver and front passenger, along with pyrotechnic seat belt pretensioners to take up seat-beltslack during impact.

Strategic use of special high-strength steel members throughout the car assures a rigid body, while crumple zones at the front and rear absorb forces in a crash. Convertibles are equipped with cross-bracing under the engine bay, added stiffening members in the door sills and a reinforced windshield frame.

Helping the driver to avoid collisions are considerable active safety provisions, including powerful four-wheel disc brakes with an advanced anti-lock system, standard automatic stability control (and optional traction control) to add control on

slippery surfaces, an independent suspension and precision rack and pinion steering.

Even as it sets a new course in Jaguar styling, the dramatic shape of the 1997 XK8 draws inspiration from Jaguar's heritage. Likewise, the mechanical details of the XK8 provide drivers with every advantage of leading-edge automotive technology, yet are built on the solid foundation of Jaguar's engineering heritage. From its basic structure through its sophisticated electronic control systems and safety provisions, Jaguar engineers designed the XK8 to deliver intelligent innovations.

The XK8 body is entirely new. Aside from retaining the advantageous long wheelbase of the predecessor XJS and adapting some portions of the XJS floor stamping, the XK8's monocoque structure is an entirely re-engineered unit.

The body-in-white is both stiffer and lighter than the XJS. Torsional stiffness is improved 25 percent compared to the XJS, and the body structure comprises some 30 percent fewer panels. Special high-strength steels form the panels subject to the highest loads (approximately 15 percent of the body), including the front longitudinals, seat-belt anchors, mounting points for the suspension, bumper mounts and the side-impact beam within each door.

In the convertible, reinforcement of the sill areas and additional cross braces under the engine bay help compensate for the lack of a roof structure. The body is manufactured in a new facility at Jaguar's Castle Bromwich facility in England.

The XK8's rigid structure is a key element in safety, providing a robust cage to help protect occupants in the event of a collision. It also contributes to the car's world-class fit and finish and enables the XK8 to achieve an extraordinary combination of responsive handling and exceptionally smooth ride.

Buyers of the XK8 convertible will certainly experience all the pleasures of top-down motoring -- with the convenience of one-button operation and automatic latching -- yet they will also be treated to cabin refinement on par with many coupes. The quiet, draft-free interior is the result of several factors: a world-class sealing system; the thick, fully lined and padded top; a glass rear window that is 5 mm thick (and heated as well); and painstaking attention to detail on the part of Karmann of Germany, which shared development work with Jaguar.

The XK8 convertible top continues the tradition of classic British roadster design in that it is covered by a soft boot when retracted. The decision to use a soft cover for the folded top -- rather than a hard panel -- is a deliberate styling choice, created by the desire to deliver a car with a sleek, low profile yet with the large gas-tank and trunk that Jaguar customers expect. The soft top is attached to an aluminum framework engineered for a low "stack" height.

Top operation takes less than 20 seconds and requires no more than pressing a button on the center console. Latching and unlatching are automatic. For the ultimate convenience, the top will rise and close while the XK8 is traveling up to 10 miles per hour.

Of all the innovative technologies introduced by Jaguar in the XK8, there is one significant advance bound to remain unseen by owners: multiplex electronics.

Though it provides a multitude of benefits, this system operates entirely out of sight. The multiplex system enables a level of sophistication for the controls and features, plus advanced diagnostic capabilities, that would not be attainable with a conventional electrical layout.

Though relatively new to automobiles, multiplex technology is thoroughly proven in the aerospace industry, where it simplified wiring harnesses, reduced weight and improved reliability.

In contrast to conventional systems, in which all features must be linked by hard-wired electrical connections, the multiplex system controls the various vehicle functions using a network of electronic modules that operate by low-current switching. The control commands are encoded at the output device, such as a switch or a sensor, to be utilized at a specific destination. This coding technique (in computer terms, a communications protocol) enables many messages to travel over a pair of intertwined wires rather than requiring scores of wires.

Shared usage of the communication pathway is very much like the system of roads cars use every day: Rather than providing each person in a town with his or her own personal road from home to workplace, home to school and home to the supermarket, all drivers share main thoroughfares, connecting to the road system through their driveways and local streets. Roadways can be shared by many users at the same time, even though they enter and exit at different points, so long as they adhere to certain rules governing lane usage and right of way -- a protocol system.

The shared pathway, or data bus, brings with it an enormous boost in efficiency. With operational information made available across the entire multiplex system, refinement advances greatly.

As an example, communication between the car's various electronic control modules enables the transmission shift program to be altered when the traction control system is activated, helping the driver maintain control under slippery conditions.

Another scenario: When the driver switches on the rear window defogger, that message is noted not only by the appropriate relays and heating coil circuits, but also by the engine management system. In this way, the increased electrical demand can be anticipated, and engine idle adjusted to compensate for increased load on the alternator.

The sophistication of Jaguar's suspension design has long been among the most highly ranked of the marque's traits. The XK8 advances that tradition with its balance of handling prowess, cornering precision and ride compliance.

The basic design relies on long-proven components -- independent, double-

wishbones up front and an independent, control-arm layout at the rear. These have been rigorously developed to provide accurate wheel control and outstanding isolation of road harshness. Both front and rear suspension systems bolt to carrier assemblies which, in turn, attach to the body through insulating mountings. This construction method isolates road noise and vibration from the passenger compartment yet provides the robust structure needed to maintain proper wheel geometry under hard cornering.

Front suspension: The XK8's front wheels are positioned by a short-and-long arm suspension system, a design which helps to maintain optimum wheel angles even at the extremes of hard cornering, resulting in better control and feel for the driver. A front anti-roll bar reduces body lean, a natural condition arising from the forces of cornering. The upper ends of the coil springs, which surround the damper units, mount directly to the body, reducing the load on the lower control arm bushings to improve durability. Front wheel bearings are a cartridge-type design, greased for life and never require adjustment or repacking.

To prevent road surface noise and vibration from reaching the passenger cabin, the front suspension arms are not attached directly to the XK8 body unit. Instead, Jaguar engineers mounted the inboard ends of the upper and lower wishbones to the front cross beam, a structural member which spans the car from side to side.

This intricate aluminum alloy casting is light -- a dozen pounds lighter than a steel beam would have been -- and extremely strong. Jaguar further enhanced durability by heat treating the finished component and applying a protective coating, Dacromet, to deter electrolysis where the aluminum contacts steel.

The suspension arms mount to the beam with bushings specially tuned to provide the proper degree of compliance, or give, when subjected to cornering loads.

Besides the suspension arms, the forward portion of the engine's weight is carried by the cross beam. The engine mounting system uses hydraulic mounts to avoid transferring engine vibration to the body structure.

Rear suspension: The XK8 rear suspension design is closely related to that of Jaguar's XJR sport sedan. It includes antisquat geometry, which reduces the natural tendency of the car to lower in the back under acceleration.

Like the front end, the XK8 rear suspension utilizes a control-arm design, with the coil spring and damper combined in a single unit.

The spring is seated directly on the cast-iron transverse lower wishbone, not the damper, which reduces friction for better ride comfort and noise isolation. The driveshaft for each wheel serves as the upper suspension link.

The entire rear suspension is mounted to a steel carrier cross beam, which is then bolted to the body through bushings carefully selected for their ability to damp road harshness. In addition, the lower control arm pivots allow some deflection toward the rear when the wheel is subjected to the sharp impact of a pothole or bump. This

design allows the XK8 to absorb road surface irregularities and helps prevent unwanted steering effects from the rear suspension in hard cornering. A rear anti-roll bar helps control body roll in cornering. A sturdy, one-piece differential strut, similar in design to the XJR sedan strut, is fitted to the rear of the differential housing to avert the possibility of axle tramp under hard acceleration.

Rack and pinion steering: Continuing a long-standing Jaguar tradition, the XK8 steering system is a rack and pinion design and provides a suitable level of driver feedback and road feel without compromising its luxury-class smoothness and feel.

Based on ZF Servotronic components, Jaguar's advanced steering system incorporates speed-sensitive variable power assist and variable steering ratio.

Speed-sensitive power assist: The hydraulic system that provides the steering's power assist delivers full boost at low speeds for easy parking. As vehicle speed rises, the assist lessens to give a well-weighted, confident feel to the steering at highway speeds.

The Servotronic valve uses an electronically controlled variable opening to regulate the flow of power steering fluid to a reaction piston assembly.

While some less sophisticated systems provide variable assist by cutting the flow of fluid to the steering rack itself, their effectiveness is limited by the need to maintain sufficient flow for emergency evasive maneuvers at high-speeds. Using the hydraulic reaction principle to vary steering effort enables the XK8 to offer both world-class steering feel and power assist that is always available.

To further refine the steering feel during straight-ahead highway driving, the steering gear valve incorporates a Positive Center Feel torsion bar. As the name implies, the torsion bar twists a slight amount in operation, effectively programming an on-center position into the action of the steering valve at small steering angles, improving stability in conditions such as crosswinds.

When the steering wheel angle exceeds a predetermined amount, the torsion bar reaches the end of its travel and the control of assist levels is assumed by the Servotronic system.

Variable-ratio steering: The steering rack is a design in which the rate of road wheel movement quickens as the extremes of wheel travel left and right are approached. This makes parking less tedious yet provides an appropriate ratio -- not overly sensitive to small steering wheel movements -- for excellent stability at highway speeds.

To reduce lateral friction forces on the front tires, the steering layout of the XK8 provides near-100 percent Ackerman geometry. The desirability of this design arises from the fact that, in a turn, the left and right front wheels describe circles of different diameters (the tire on the inside of the turn makes a smaller circle). As a result, the tires need to point at slightly different angles, though they still must return to parallel alignment when the car is traveling straight ahead.

If the steering geometry does not achieve the correct differential in angles -- a condition known as 100-percent Ackerman -- the result will be coarse turning at low speeds and higher tire wear.

Standard equipment on the XK8 is automatic stability control (ASC), which reduces drive torque to the wheels by controlling the throttle position, ignition timing and fuel supply to the cylinders. The optional traction control (TRAC) adds brake intervention, using the anti-lock brake components to slow a spinning wheel.

In both systems, wheelspin is detected by the anti-lock brake sensors after comparing information supplied by all four wheel-speed sensors. Both systems may be manually canceled by pressing a switch on the center console to power out of deep snow or when using tire chains.

Automatic stability control is operational at all speeds to enhance car control in slippery conditions. When wheelspin is detected, the anti-lock electronic control module calculates the engine torque level that can be utilized without causing the tires to slip, based on information from the vehicle's controller area network (CAN).

First, the throttle angle is reduced, but because the effect of this action is not instantaneous, two further measures are taken. Ignition timing is retarded (the spark plug fires later than normal) and fuel to the cylinders cuts off until the proper throttle position is reached.

The TRAC system includes all of the provisions of the ASC system plus the ability to actively slow a spinning wheel by pulsing the brakes through the anti-lock brake system. It is most effective at lower speed and especially when starting off on surfaces with differing traction conditions under each rear wheel.

Source: The Auto Channel