

Top cat

THE XFR IS NOT ONLY THE FASTEST PRODUCTION CAR IN JAGUAR'S HISTORY, IT ALSO FEATURES SOME CUTTING-EDGE DYNAMICS TECHNOLOGY.

BY GRAHAM HEEPS



At a time when other auto makers are shifting their focus from performance to the environment, Jaguar is doing what some would argue it does best: launching a hot new performance sedan with good looks and plenty of power.

The XFR is powered by an all-new, supercharged 510bhp V8 with 625Nm, which propels it from zero to 62mph (100km/h) in 4.9 seconds. In mildly modified form, and with the speed limiter removed, the car topped out at 225.675mph (363.188km/h) in a test run on Utah's Bonneville Salt Flats (see panel, overleaf).



SPECIFICATIONS

Jaguar XFR

Dimensions: 4,961mm (L) x 1,877mm (W) x 1,460mm (H)

Wheelbase: 2,909mm

Track: 1,559mm (F), 1,605mm (R)

Weight: 1,891kg

Brakes: Continental calipers; 380mm internally ventilated Fritz Winter front discs

ABS/ESC: Bosch

Tires: Dunlop Maxx or Pirelli PZero 255/35 R20 (F), 285/30 R20 (R)

Springs: Supplied by Krupp-Hoesch. Rates 80N/mm (F), 100N/mm (R). For comparison: 2010MY 5-liter V8 NA = 47/70; 2008MY SV8 = 63/75

Anti-roll bars: 32mm (F)/18mm (R). For comparison: 2010MY 5-liter V8 NA = 31/13.6; 2008MY SV8 = 31/16

Steering: 50mm/rev on-center and 55mm/rev at full lock. SV8 & non-R 2010MY are 45.8/55 - hence XFR is 9% quicker. Turning circle: 11.48m

Geometry: Total toe = 12' toe-in (F); 10' toe-in (R). Camber = 20-50' with 20' offset for pull-drift (F); 45-60' (R). Castor = 6.5°. All subject to tolerances

Bush rates: Unchanged from 2008MY XF



STOP WHINING

XFR's supercharger is the latest technology from Eaton's Twin Vortices Series (TVS), a sixth-generation Roots-type blower with four lobes per rotor and high helix angles, making it about 20% more efficient than the outgoing unit. "It brings significant refinement improvements, virtually eliminating supercharger whine," reports chief engine engineer Malcolm Sandford. "Some people would say that was part of the engine's character, but for me it was a clear error state that we needed to engineer out."



LEATHER SPORTS SEATS HAVE ELECTRICALLY ADJUSTABLE SQUAB BOLSTERS FOR IMPROVED SUPPORT AT HIGHER CORNERING SPEEDS

Worth its salt

In a secret speed trial at the Bonneville Salt Flats in Utah, an XFR prototype recorded a top speed of 225.675mph (363.188km/h), making it the fastest Jaguar ever. The car beat Jaguar's previous speed record of 217.1mph (349.4km/h) set in the XJ220 in 1992. Rocketsports Racing's owner, Paul Gentilozzi, who ran Jaguar XKRs to five Trans Am series victories between 2001 and 2006, drove the car on the record-breaking run.

Running with minor aerodynamic and safety modifications to meet the requirements for a Bonneville run, the 225mph top speed was achieved with additional horsepower liberated by a remapped ECU, a modified air intake and exhaust system, and revised supercharger settings. No internal engine components were changed and the six-speed automatic transmission was standard, including the gear ratios.

Jaguar has a long history of high-speed runs. 2010 will mark the 60th anniversary of the XK120's record-breaking 132.6mph run set on May 30, 1949, on a deserted stretch of motorway near Jabbeke in Belgium.



But this car is not just about going fast in a straight line. Jaguar has taken the sound basis of the XF – much of whose basic suspension hardware was derived from the impressive XK – and enhanced it to create something worthy of a range-topping supersedan.

"The XFR is an amalgam of the learning from the existing XF SV8 and last year's XK-RS," explains Mike Cross, Jaguar's chief engineer of vehicle integrity. "We've sought to increase the sporting depth of the car – the pace you can drive it at on challenging roads – but to minimize the penalty to the driver at low speeds in terms of comfort and isolation."

"We've increased the spring rates and thus the ride frequencies (see spec panel). But to offset the effect of that we now have continuously variable Bilstein dampers. The current XF SV8 has two-stage dampers – soft and firm settings, what we call CATS – but the new ones can be continuously variable between defined upper and lower limits. Because of that greater range of available damping, the ride penalty conferred by the stiffer springs has been all but eliminated."

Jaguar calls the new system



ACCORDING TO SANDFORD, THE NEW POWERTRAIN HELPS THE XFR'S DYNAMICS. "THE LOW-SPEED TORQUE, REDUCED TRANSPORT DELAYS FROM THE DIRECT INJECTION, AND THE VCT'S HIGH ACTUATION RATES MEAN WE'VE SUBSTANTIALLY IMPROVED ON THE 4.8-LITER BMW, THE BENCHMARK FOR TRANSIENT RESPONSE"

Adaptive Dynamics. It controls vertical movement, roll and pitch by analyzing induced body motions 100 times a second, and setting each damper to an appropriate level in order to maintain a constant and level body attitude. Also 100 times a second, it predicts the roll rate due to steering inputs, and selectively increases damping forces to reduce that roll rate as well as analyzing fore and aft pitch rate, again varying damping forces to improve comfort and control.

Adaptive Dynamics also monitors the wheel positions 500 times a second and automatically increases the damping rate as the suspension approaches the limits of its travel. Similarly, it controls wheel 'hop' by varying the damping to move any wheel out of a natural bouncing frequency.

Another major addition is an electronic limited slip differential, Jaguar's first LSD since the XJ-S's mechanical one. The same GKN hardware that is an option on the

Range Rover and Range Rover Sport has had its control system revamped to cope with the very different demands of a performance sedan compared to an off-roader. Cross says, "The advantages of LSDs are well known in terms of traction, but they can negatively influence steering feel because the car is more reluctant to yaw. But with this diff we can vary the locking from completely open to completely locked, which has allowed us to tune the calibration of the diff to give us the traction benefits but without some of the drawbacks to handling and steering feel."

The task of tuning the diff (inside a Dana rear drive unit) lies within the Jaguar chassis group that also handles ABS, ESC, and traction control. The result is tight integration across the systems and the ability to provide what Jaguar terms 'more driver-focused dynamic characteristics'. This includes a scenario where selection of the correct electronic modes will permit controllable power-on oversteer. In addition, the combination of diff, stability control and adaptive damping can be used to improve stability in situations such as an emergency lane-change maneuver at high speed, or reduce the ESC

brake interventions that enthusiastic drivers might see as intrusive.

The XFR's new differential has necessitated a new, steel rear subframe. "Mounting the differential to the car is compromising in terms of response and isolation," says Cross. "If the mounts are very stiff, the guys can put in a very responsive calibration; if the mounts are soft we get good isolation from axle noise, but not as much response as we'd like. So we've got a new, wide-based four-point mounting, which gives us both good response and good isolation. That required a new rear subframe in steel, although the essential hardware for the rear suspension is unchanged."

Carried over from the existing supercharged car into the XFR is a brace that joins the rear spring/damper mounts to stiffen up the rear end. Says Cross, "It helps with the on-center steering response, although there's a slight lump in the trunk carpet to accommodate it."

Other hardware changes include new, quicker-ratio steering gear (a ZF Lenksysteme Servotronic unit, as before), which also goes into the revised XKR. There are larger disc brakes and new calipers to match the engine's increased performance,

and subtle aerodynamic tweaks in terms of a trunk-lid spoiler and a deeper front valance. The latter items further improve the front-to-rear aerodynamic balance to the benefit of high-speed stability, although Jaguar says that the XF's lift balance was already best in class.

Some high-speed stability testing was done on the Autobahn in Germany, but most of the XFR's chassis tuning was done in the UK, initially at Jaguar's site in Gaydon, Warwickshire, but also on public roads in Wales, with extreme handling tests then done on the Nordschleife. In Cross's view, "Experience has shown that if a car works in Warwickshire, Wales, at the Nürburgring, and on the Autobahn, it'll work anywhere." 

VDI SAYS

We're not fans of the BMW M5's electronics-saturated driving experience. The E-Class AMG is currently out of production, and the Audi RS6 is strangely unexciting. So if the XFR is as good on the road as it is on paper, the field could be clear for Jaguar to set a new class benchmark. If its recent products are anything to go by, it should also ride better than most other 20in-wheelers seem to manage.